PROCEEDINGS BOOK

The 11th Annual Scientific Meeting (ASM) of
Indonesia Sports Medicine Association (ISMA)
in conjunction with the 2nd International
Exercise and Health Symposium (EXHEALTH)
Faculty of Medicine, Universitas Negeri Yogyakarta
Yogyakarta, October 29th–31st, 2026



PTJI
PHYSICAL THERAPY JOURNAL OF INDONESIA

Physical Therapy Journal of Indonesia (PTJI)
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Physical Therapy Journal of Indonesia (PTJI) 2026,
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President of Indonesian Sports Medicine Association



We are pleased to announce that the Indonesian Sports Medicine Association will hold its 11th Annual Scientific Meeting in conjunction with 2nd Exercise and Health Symposium on October 29th–31st, 2026, in Yogyakarta, Indonesia.

This annual event serves as an important platform to advance knowledge, enhance professional competence, and strengthen collaboration in the field of sports medicine. This year, we proudly present the theme: "Harmonizing Culture, Wellness, and Performance in Sports Medicine Practice."

In response to evolving societal needs and post-pandemic lifestyle changes, sports medicine plays a crucial role not only in optimizing athletic performance but also in promoting public health through a preventive and evidence-based approach, including the concept of exercise as medicine.

We sincerely hope that this event will serve as a dynamic platform for collaboration among all stakeholders in the field of sports medicine. We believe that practitioners, academics, and professionals will not only gain meaningful knowledge and insights, but also build valuable connections that extend beyond this gathering. At the same time, we invite you to experience and enjoy the unique cultural richness of Yogyakarta, a city where tradition and hospitality come together in a truly memorable way.

Assoc. Prof. dr. Muh. Ikhwan Zein, Sp.K.O., Subsp A.L.K.(K), PhD
President of Indonesian Sports Medicine Association
2025-2028

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Dean Faculty of Medicine Universitas Negeri Yogyakarta



It is a great honor to welcome all distinguished speakers, participants, and guests to the 11th Annual Scientific Meeting of the Indonesian Sports Medicine Association, in conjunction with the 2nd Exercise and Health Symposium, to be held on October 29th–31st, 2026, in Yogyakarta, Indonesia.

In line with Universitas Negeri Yogyakarta's commitment to excellence, creativity, and innovation, we proudly support initiatives that foster academic collaboration and scientific advancement. On behalf of the Faculty of Medicine, I am pleased that our institution serves as co-host for this important scientific meeting. This collaboration reflects our shared commitment to advancing knowledge, strengthening academic cooperation, and supporting the development of sports and exercise medicine.

The theme of this year's symposium, "Harmonizing Culture, Wellness, and Performance in Sports Medicine Practice," highlights the importance of combining scientific knowledge with cultural understanding and overall well-being in daily practice. We believe this meeting will provide a valuable opportunity for participants to exchange ideas, share experiences, and build professional connections.

We are also pleased to welcome you to Yogyakarta, a city known for its rich culture and hospitality. We hope that, beyond the scientific sessions, participants will also enjoy the unique cultural experiences that this city has to offer.

Finally, we sincerely appreciate the dedication of the organizing committee and all contributors who have made this event possible. May this meeting inspire fruitful discussions, innovative collaborations, and lasting impact on the advancement of sports medicine practice.

Thank you for your participation, and we wish you a productive and memorable symposium.

Prof. dr. Kartika Ratna Pertiwi, M.Biomed.Sc., Ph.D.
Dean Faculty of Medicine
Universitas Negeri Yogyakarta

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Chairperson of the Organizing Committee 2026



Praise be to God that we could come to this exciting phase of our organization, the preparation of the 11th Annual Scientific Meeting of Indonesian Sports Medicine Association.

This year our event will be held in conjunction with Indonesia Sports Medicine Conference, i.e. an annual scientific meeting that is organized by Faculty of Medicine of Universitas Negeri Yogyakarta. This conjunction event is the embodiment of the wonderful collaboration and agreement between the two organizations.

With the theme of "Harmonizing Culture, Wellness, and Performance in Sports Medicine Practice", the organizing committee is trying to spread the message that Sports Medicine is indeed a science with various aspects, and if we can understand this well, Sports Medicine implementation will be able to bring imperative benefits to the society.

Furthermore, in this event, the invited speakers will be expected to share the latest science and researches.

As the Chairman of the Organizing Committee, I would like to thank you for your interest to collaborate and support our event. Hopefully this collaboration could work well not just in this year's event but also in the delivery of Sports Medicine Practice to the society. May God bless us all.

dr. Angelica Anggunadi, Sp.K.O, Subsp. A.L.K (K)
Chairperson of the Organizing Committee 2026

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Head of Scientific Committee 2026



On behalf of the Scientific Committee, we are honored to welcome you to the 11th Annual Scientific Meeting of ASM ISMA in conjunction with the 2nd International Exercise and Health Symposium (EXHEALTH) 2026, held on 29th–31st of October 2026 in Yogyakarta, Indonesia.

With the theme 'Harmonizing Culture, Wellness, and Performance in Sports Medicine Practice,' this meeting reflects our commitment to advancing sports medicine as a holistic field that integrates culture, performance, and evidence-based health.

We have curated a diverse program covering key topics from injury management in emerging sports to exercise for chronic diseases, regenerative medicine, and cardiac safety, bridging science with real-world clinical practice.

We also invite researchers and clinicians to contribute through oral and poster presentations, with submissions open until 17th August 2026.

We hope this meeting inspires collaboration, meaningful dialogue, and new ideas that will enhance care for athletes and active individuals in Indonesia and beyond. We look forward to welcoming you to Yogyakarta.

dr. Antonius Andi Kurniawan, Sp.KO., Subsp.A.L.K.(K)
Head of Scientific Committee 2026

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Committee Member

The 11th Annual Scientific Meeting (ASM) of Indonesia Sports Medicine Association (ISMA) in conjunction with the 2nd International Exercise and Health (EXHEALTH)
Yogyakarta, October 29th–31st, 2026

Patron	:Assoc. Prof. dr. Muhammad Ikhwan Zein, Sp.K.O., Subsp. ALK (K)
Advisor	: Brigjenpol (P) dr. Leny Pintowari, Sp.K.O.,Subsp. APK (K)
	: Prof. Dr. dr. Junaidi, Sp.K.O.,Subsp. ALK (K)
	: Prof. Dr. dr. Irfannuddin, Sp.K.O, M.Pd.Ked., Subsp. APK (K)
Committee Chair	: dr. Angelica Anggunadi, Sp.K.O., Subsp. ALK (K)
Secretary	: dr. Monica Elizabeth, MRes, Sp.K.O
	: dr. Merryana Seputri, Sp.K.O
	: Sintia Nabila
Treasurer 1	: dr. Annisa Siti Rohima, Sp.K.O
	: Eni Riftiani
Program/Event Section Coordinator	: dr. Monica Surjanto, Sp.K.O
Member	: dr. Levina Azarine T, Sp.K.O
Member	: dr. Reeni Darmawan Sp.K.O
Member	: dr. Monica Harvriza, Sp.K.O
Member	: dr. Caleb Leonardo Halim, Sp.K.O
Member	: dr. Edrick Purnomo Putra, Sp.K.O
Member	: dr. Ayu Munawaroh
Member	: dr. Mutiara Insan Sangaji
Publication & Documentation Section Coordinator	:dr. Elbert Aldrin Harijanto, Sp.K.O
Member	:dr. Grace Suriadi Halim, BMedSc(Hons), Sp.K.O
Member	:dr. Audi Batista
Member	:dr. Michael Sutandio
Sponsorship Section Coordinator	:dr. Zeth Boroh, Sp.K.O., Subsp. ALK (K)
Member	:dr. Adrian Purwadihardja, Sp.K.O
Member	:dr. Bernadette Laura, Sp.K.O
Member	:dr. Enrico Leonarto
Member	:dr. Madinatul Munawwaroh
Equipment/Logistics Section Coordinator	:dr. Chikih, Sp.K.O, MKK(DMA)
Member	:dr. Yusuf Ady Bimantara, Sp.K.O
Member	:dr. Erwin Yantho
Member	:dr. Yoshi Hiro
Scientific and SKP (Accreditation) Section Coordinator	:dr. A. Andi Kurniawan, Sp.K.O.,Subsp. ALK (K)

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Member	:Dr. dr. Listya Tresnanti Mirtha, Sp.K.O.,Subsp. APK (K), MARS
Member	d:r. Brian Reggie Suwandy, Sp.K.O
Member	dr. Anggia Prathama Nasution Sp.K.O
Member	: dr. Bunga Listia Paramita, Sp.K.O.,M.A.R.S.
Member	: dr. Merysa Setyowati Sanjaya
Member	: dr. Yose Natasa
Accommodation, Transportation, and Consumption Section Coordinator	: dr. Pratama Wicaksana Wijaya, Sp.K.O
Member	: dr. Anastasia Feliciana, Sp.K.O., M.M.R.S.
Member	: dr. Gilang Pradipta Permana, Sp.K.O
Member	: dr. Gusti Ayu Sinta Deasy Andani
Member	: dr. Irene Clara Kristantina

WORKSHOP
Day 1, October 29th, 2026

The 11th Annual Scientific Meeting (ASM) of Indonesia Sports Medicine Association (ISMA) in conjunction with the 2nd International Exercise and Health (EXHEALTH)
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TIME	WORKSHOP 1	WORKSHOP 2	WORKSHOP 3	WORKSHOP 4	WORKSHOP 5	WORKSHOP 6
	Running-Related Injuries & Return to Run Programs	**Low Back Pain in Sports**	**Rotator Cuff Tendinopathy**	**Exercise Prescription for Older Population**	**CPET**	**Sports Massage & Manual Therapy**
00.00-08.00	Pre-test					
07.30-08.00	Registration					
08.00-10.00	Clinical Problem, Epidemiology, and Comprehensive Runner Assesment (Speaker: dr. Antonius Andi Kurniawan, Sp.KO., Subsp. ALK (K))	Clinical Problem — Incidence & Differential Diagnosis (Speaker: dr. Anna Steven, Sp.KO)	Clinical Problem & Comprehensive Assessment of the shoulder (Speaker: dr. Erica Kholinne, Sp.OT (K), PhD)	• Clinical Problem & Epidemiology of Aging (frailty continuum, exercise as polypill) • Pre-Exercise Screening, Risk Stratification & Functional Assessment Exercise Prescription FITT-VP Multikomponen (individualized) (Speaker: Dr. dr. Listya Tresnanti Mirtha, Sp.KO, Subsp. APK (K), MARS, dr. Caleb Leonardo Halim, Sp.KO)	CPET Interpretation from the Perspective of Exercise Physiology (Speaker: dr. Dwita Rian Desandri, Sp.JP, Subsp. PRKV (K), Msc)	Clinical Problem & Evidence Base Soft Tissue & Joint Care (adjunct to active rehabilitation) — Indikasi, Kontraindikasi, Red Flags (Speaker: Prof. Dr. dr. BM. Wara Kushartanti, M.S., AIFO)
	Foot, Ankle and Lower Leg Injuries In Running (Speaker: dr. Astuti Pitarini, Sp.OT, Subsp. KP (K))	Acute Assessment — Stork Test, Neuro Screen, Red Flags, Physical Exam Station (Lumbar ROM, McGill Battery, Sørensen) (Speaker: dr. Regina Varani, Sp.KO)	Diagnostic Imaging Decision Making Shoulder Injury (USG vs MRI vs MRA) (Speaker: dr. Ratna Moniqa, Sp.Rad, RMSK)			
	The Myth of "Complete Rest" – Managing Chronic Tendinopathy in High-Load Sports (Speaker: Prof. Dr. Johannes L. Tol, MD, PhD)	Rehabilitasi Akut — Avoid Hyperextension, Core, Progressive Loading (Speaker: dr. Elina Widiastuti, Sp.KO)	Rehabilitation: Patient Ed, Exercise Rx, Manual Therapy; Measurement Tools & Outcome Assessment. (Speaker: dr. Antonius Andi Kurniawan, Sp.KO., Subsp. ALK (K))		• Pre-Test Screening & Protocol Selection • Live Demo CPET (Speaker: dr. Ria Lestari, B.Med.Sc, P.G.Dip.SEM, Sp.K.O)	Assessment & Palpation: Soft-Tissue, Joint Play, Movement Screen (Speaker: Prof. Dr. dr. BM. Wara Kushartanti, M.S., AIFO)
	Return to Run Protocol (Criterion-based) (Speaker: dr. Anggia Prathama Nasution, Sp.KO)	Return to Sport — Criterion-Based & Sport-Specific (Speaker: dr. Anna Steven, Sp.KO)	Return to Sport Criteria After Shoulder Injury (Speaker: dr. Brian Reggie Suwandy, Sp.KO)			
10.00-10.15	Coffee break					
10.15-12.15	Hands-On and Case-Based Multidisciplinary Discussion - (Facilitator: dr. Anggia Prathama Nasution, Sp.KO, dr. Wawan Budi Susilo, Sp.KO)	Hands-On and Case-Based Multidisciplinary Discussion (Facilitator: dr. Anna Steven, Sp.KO, dr. Elina Widiastuti, Sp.KO, dr. Regina Varani, Sp.KO, dr. Monica Surjanto, Sp.KO)	Hands-On and Case-Based Multidisciplinary Discussion (Facilitator: dr. Brian Reggie Suwandy, Sp.KO dr. Antonius Andi Kurniawan, Sp.KO., Subsp. ALK (K))	Hands-on (Facilitator: Dr. dr. Listya Tresnanti Mirtha, Sp.KO, Subsp. APK (K), MARS, dr. Caleb Leonardo Halim, Sp.KO)	Hands-on: • Interpretasi Hasil CPET • Prescription Lab (Facilitator: dr. Dwita Rian Desandri, Sp.JP, Subsp.PRKV (K), Msc; dr. Ria Lestari, B.Med.Sc, P.G.Dip.SEM, Sp.K.O)	Hands-on and Case Discussion: • Sports Massage Techniques: Pre-event, Post-event, Recovery, Maintenance • Manual Therapy: Soft-Tissue & Joint Mobilization, Muscle Energy • Technique (hands-on) Integration & Case-Based Discussion — Recovery & Return to Sport (Facilitator: Prof. Dr. dr. BM. Wara Kushartanti, M.S., AIFO)
12.15-23.59	Post-test					

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13.15 - 13.25		[Free Paper 2] Oral Presentation: Pemb.: Presenter (Amelia Putri Marissa)	[Free Paper 17] Oral Presentation: Pemb.: Presenter (Marcus Wirakusuma)	[Free Paper 38] Oral Presentation: Pemb.: Presenter (Jason Mikail Amper)	[Free Paper 56] Oral Presentation: Pemb.: Presenter (Nura Maulida Isna)	
13.25 - 13.35		[Free Paper 4] Oral Presentation: Pemb.: Presenter (Muhammad Rafif Pratama Putra Shanizal)	[Free Paper 21] Oral Presentation: Pemb.: Presenter (Ayu Munawaroh)	[Free Paper 39] Oral Presentation: Pemb.: Presenter (Jason Mikail Amper)	[Free Paper 57] Oral Presentation: Pemb.: Presenter (Mutiara Insan Sangaji)	
13.35 - 13.45		[Free Paper 5] Oral Presentation: Pemb.: Presenter (Michael Sutandio)	[Free Paper 22] Oral Presentation: Pemb.: Presenter (Wahyu Setiawan, Shinta Restu Wibawa)	[Free Paper 40] Oral Presentation: Pemb.: Presenter (Aulia Putri Yuliasti)	[Free Paper 58] Oral Presentation: Pemb.: Presenter (Titah Kasih Larasati)	
13.45 - 13.55		[Free Paper 6] Oral Presentation: Pemb.: Presenter (Herpramanto Dwi Susetyo)	[Free Paper 26] Oral Presentation: Pemb.: Presenter (Maximillian Nathan Gunawan)	[Free Paper 41] Oral Presentation: Pemb.: Presenter (Kyra Modesty)	[Free Paper 60] Oral Presentation: Pemb.: Presenter (Satrio Adi Wicaksono)	
13.55 - 14.05		[Free Paper 8] Oral Presentation: Pemb.: Presenter (Martin Agusta)	[Free Paper 27] Oral Presentation: Pemb.: Presenter (Juriana)	[Free Paper 42] Oral Presentation: Pemb.: Presenter (Shafa Aulia Ramadhani)	[Free Paper 62] Oral Presentation: Pemb.: Presenter (Laili Ramadhani)	
14.05 - 14.15		[Free Paper 9] Oral Presentation: Pemb.: Presenter Puteri Rahmia R)	[Free Paper 28] Oral Presentation: Pemb.: Presenter (Iswandi Ramadhan)	[Free Paper 44] Oral Presentation: Pemb.: Presenter (Guruh Tri Mukti Setyawan)	[Free Paper 63] Oral Presentation: Pemb.: Presenter (Dara Hanifa Rahman)	
14.15 - 14.25		[Free Paper 10] Oral Presentation: Pemb.: Presenter (Puteri Rahmia R)	[Free Paper 29] Oral Presentation: Pemb.: Presenter (M. Farhan Rozak)	[Free Paper 45] Oral Presentation: Pemb.: Presenter (Ilyana Prasetya Hardyanti)	[Free Paper 67] Oral Presentation: Pemb.: Presenter (Andhika Juliandra Saputra)	
14.25 - 14.35		[Free Paper 11] Oral Presentation: Pemb.: Presenter Anastasia Putu Martha Anggarani)	[Free Paper 30] Oral Presentation: Pemb.: Presenter (Hansel)	[Free Paper 73] Oral Presentation: Pemb.: Presenter (M Rifki Al Ikhsan)	[Free Paper 68] Oral Presentation: Pemb.: Presenter (Jeffrey Ariesta Putra)	
14.35 - 14.45		[Free Paper 12] Oral Presentation: Pemb.: Presenter (Rodhiatam Miftahul Jannah)	[Free Paper 32] Oral Presentation: Pemb.: Presenter (Limastani Febriana Fitri Putri)	[Free Paper 47] Oral Presentation: Pemb.: Presenter (Handris Yanitra, Riky Febriansyah Saleh)	[Free Paper 69] Oral Presentation: Pemb.: Presenter (Atien Nur Chamidah)	
14.45 - 14.55		[Free Paper 13] Oral Presentation: Pemb.: Presenter (Dr Sashitharan V Ampalakam, Dr Krisyanth Thiagarajan)	[Free Paper 34] Oral Presentation: Pemb.: Presenter (Hanna Elisabet Lumbangaol)	[Free Paper 49] Oral Presentation: Pemb.: Presenter (Alyarosa Taqwaariva)	[Free Paper 70] Oral Presentation: Pemb.: Presenter (Fathia Maheswari Aimee Darmawan)	

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14.55 - 15.05		[Free Paper 14] Oral Presentation: Pemb.: Presenter (Dr Sashitharan V Ampalakam, Dr Krisyanth Thiagarajan)	[Free Paper 35] Oral Presentation: Pemb.: Presenter (Maritza Fiorenza)	[Free Paper 53] Oral Presentation: Pemb.: Presenter (Muhammad Taufiq Al-Hakim)	[Free Paper 71] Oral Presentation: Pemb.: Presenter (Arif Setyo Wibowo)	
15.05 - 15.15		[Free Paper 15] Oral Presentation: Pemb.: Presenter (M. Farhan Rozak)	[Free Paper 36] Oral Presentation: Pemb.: Presenter (Elina Widiastuti)	[Free Paper 54] Oral Presentation: Pemb.: Presenter (Nabilah Afifah Ainiyyah)	[Free Paper 72] Oral Presentation: Pemb.: Presenter (Putri Chynthia Anggrandariyanny)	
15.15 - 15.25		[Free Paper 16] Oral Presentation: Pemb.: Presenter (Yudha Mahanatha)	[Free Paper 37] Oral Presentation: Pemb.: Presenter (Handy Tri Setianto)	[Free Paper 55] Oral Presentation: Pemb.: Presenter (Prettysia Suvarly)	[Free Paper 74] Oral Presentation: Pemb.: Presenter (Felix Hansen)	
15.25 - 15.35			[Free Paper 43] Oral Presentation: Pemb.: Presenter (Faisal Ridho Sakti)	[Free Paper 76] Oral Presentation: Pemb.: Presenter (Fadlila Fitriani)	[Free Paper 75] Oral Presentation: Pemb.: Presenter (Khodijah Adha Kamila)	
		Moderator: Juri / Moderator (Prof. Dr. Sulistiyono, S.Pd., M.Pd.)	Moderator: Juri / Moderator (Dr. dr. Nani Cahyani Sudarsono, Sp.KO)	Moderator: Juri / Moderator (Prof. Dr. dr. Kartika Ratna Pertiwi, M.Biomed.Sc, Ph.D)	Moderator: Juri / Moderator (Prof. Dr. dr. Irfannuddin, Sp.KO., M.Pd.Ked.)	

SYMPOSIUM DAY 1
Day 2 (October 30th, 2026)

The 11th Annual Scientific Meeting (ASM) of Indonesia Sports Medicine Association (ISMA) in conjunction with the 2nd International Exercise and Health (EXHEALTH)
Yogyakarta, October 29th–31st, 2026

WAKTU	ROOM A (Ballroom Utama)	ROOM B (Breakout Room)
	08.00–08.30 · Registrasi & Check-in Peserta	
	KEYNOTE LECTURE — PLENARY SESSION (Seluruh Peserta, Tanpa Q&A)	
08.30-08.40	***Opening MC***	
08.40–09.15	**KEYNOTE 1: "Implementing Injury Prevention Programs in Team Sports: Perspective from AFC Ajax Team Physician"** *Pemb.: Prof. Dr. Johannes L. Tol, MD, PhD*	
09.15–09.20	**Presentasi Thrombovoren**	
	Upacara Pembukaan	
09.20–09.25	**Pembukaan** *MC : dr. Adrian Purwadihardja, Sp.K.O & dr. Astrid Setyannisa, Sp.K.O*	
09.25–09.35	**Lagu Indonesia Raya, MARS PDSKO, pembacaan doa** *Doa : dr. Yusuf Ady Bimantara, Sp.K.O*	
09.35–09.40	**Laporan Ketua Panitia PIT** *Dr. Angelica Anggunadi, Sp.K.O, Subsp. ALK (K)*	

SYMPOSIUM DAY 1
Day 2 (October 30th, 2026)

The 11th Annual Scientific Meeting (ASM) of Indonesia Sports Medicine Association (ISMA) in conjunction with the 2nd International Exercise and Health (EXHEALTH)
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09.40–09.45	**Sambutan Ketua PDSKO** *Assoc. Prof. Dr. Muhammad Ikhwan Zein, Sp.K.O.,Subsp. ALK (K). Ph.D*
09.45–09.50	**Sambutan Dekan FK UNY** *Prof.dr. Kartika Ratna Pertiwi, M. Biomed.Sc, Ph.D.*
09.50–09.55	**Sambutan Gubernur DIY** *Sri Sultan Hamengku Buwono X*
09.55–10.10	**Prosesi pembukaan**

WAKTU	ROOM A (Ballroom Utama)	ROOM B (Breakout Room)
10.10–10.20	**Penyerahan kenang-kenangan & foto bersama**	
	10.20 – 10.50 · Coffee Break	
	TOPIC (sponsored by Taisho)	
10.50-11.05	**[ST1-1] "Integrating Surgical Precision and Topical NSAID Therapy for Post-Operative Inflammatory Control in Ankle and Joint Pathologies"** *Pemb.: dr. Astuti Pitarini, Sp.OT, SubSp.KP (K), AIFO-K*	
11.05–11.20	**[ST1-2] "Targeted Topical NSAID and Counterirritant Protocols for Non-Surgical Joint Inflammation and Accelerated Return to Sport"** *Pemb.: dr. Wawan Budisusilo, Sp.K.O, DAIFIDN*	
11.20–11.35	**Q&A — Panel Discussion** *Moderator: dr. Monica Surjanto, Sp.K.O*	
	11.35 – 13.00 · Istirahat Siang · Makan Siang · Sholat	
	PARALLEL BREAKOUT SESSION	
13.00–13.15	**[ST2-1] "Individualised Graft Selection in ACL Reconstruction : How Graft Choice Shapes the Rehabilitation Pathway"** *Pemb.: Dr. dr. Meiky Fredianto, Sp.OT., Subsp. CO(K)., AIFO-K., FICS*	**Sponsored by Technogym** **[ST3-1] Unlocking Healthy Longevity** *Pemb.: Todd Crane - HCP*
13.15–13.30	**Sponsored by Thrombovoren** **[ST2-2] "Pharmacodynamics and Pharmacokinetics of Diclofenac and Heparin for soft tissue Injuries"** *Pemb.: dr. Zeth Boroh, Sp.K.O., Subsp. ALK (K)*	**[ST3-2] Beyond HbA1c: Rethinking Outcomes in Exercise Therapy for Type 2 Diabetes** *Pemb.: Dr. dr. Nani Cahyani Sudarsono, Sp.K.O.,Subsp. APK (K)*
13.30–13.45	**Q&A — Panel Discussion** *Moderator: dr. Veranika Darmidy, Sp.K.O, Subsp.ALK(K), DAIFIDN*	**Q&A — Panel Discussion** *Moderator: Dr. Grace Suriadi Halim, BMedSc(Hons), Sp.K.O, DAIFIDN, AIFO-K*
13.45 - 13.50	***MIDDAY SIMPLE MOVE***	
13.50–14.05	**[ST4-1] "Save It or Shave It? The Meniscus Repair-versus-Menisectomy Debate"** *Pemb.: dr. Lutfi Hidayat, Sp.OT (K)*	**[ST5-1] "Prescribing Exercise for Fat Loss : Dose, Modality, and Realistic Expectations"** *Pemb.: DR. dr. Susiana Candrawati, Sp.K.O, Subsp. APK (K)*
14.05–14.20	**Sponsored by Solaris [ST4-2] "Comprehensive management of Osteoarthritis - the**	**[ST5-2] "From Frailty to Function: Exercise Dosing for the CKD and Dialysis Patient"**

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WAKTU	ROOM A (Ballroom Utama)	ROOM B (Breakout Room)
	role of exercise" *Pemb.: Assoc. Prof. dr. Ikhwan Zein, Sp.K.O, Subsp. ALK (K), PhD*	*Pemb.: Dr. dr. Listya Tresnanti Mirtha, Sp.K.O., Subsp. APK (K), M.A.R.S.*
14.20–14.35	**Q&A — Panel Discussion** *Moderator: dr. Yusuf Ady Bimantara, Sp.K.O*	**Q&A — Panel Discussion** *Moderator: dr. Annisa Siti Rohima, Sp.K.O*
14.35–15.00 · *Coffee Break*		
15.00-15.15	**[ST6-1] "From Biology-Limited to Mechanics-Driven: A Graft-Specific Rehabilitation Framework for Rehabilitation After Artificial Ligament Reconstruction"** *Pemb.: dr. Chikih, Sp.K.O, MKK (DMA)*	**[ST7-1] "Strong Heart, Sudden Death : The Paradox Every Clinician Must Understand"** *Pemb.: dr. Inarota Laily, Sp.K.O, Subsp. APK (K)*
15.15–15.30	**[ST6-2] "The Female ACL: Higher Risk, Later Surgery, Longer Absence — A Risk Problem or a Care Problem?"** *Pemb.: dr. Risky Dwi Rahayu, M.Gizi, Sp. K.O*	**[ST7-2] "From Fear to Prescription: Exercise in Stable Cardiovascular Disease"** *Pemb.: dr Putra Rizki, Sp.K.O*
15.30–15.45	**Q&A — Panel Discussion** *Moderator: dr. Brian Reggie Suwandy, Sp.K.O*	**Q&A — Panel Discussion** *Moderator: dr. Elbert Aldrin Harijanto, Sp.K.O*
15.45–16.00 · Penutupan Hari 1 - Informasi Program Hari 2		

SYMPOSIUM DAY 2
Day 3 (October 31st, 2026)

The 11th Annual Scientific Meeting (ASM) of Indonesia Sports Medicine Association (ISMA) in conjunction with the 2nd International Exercise and Health (EXHEALTH)
Yogyakarta, October 29th–31st, 2026

WAKTU	ROOM A (Ballroom Utama)	ROOM B (Breakout Room)
08.00–08.30 . Registrasi & Check-in Peserta		
08.30 – 08.40 . Opening MC + Morning Stretching		
KEYNOTE LECTURE — PLENARY SESSION (Seluruh Peserta, Tanpa Q&A)		
08.40–09.00	**KEYNOTE 3 : "Competency, Capacity, Coverage: A Collegium Perspective on Sports Medicine Service Transformation"** *Pemb.: Dr. dr. Zaini Kadhafi Saragih, Sp.K.O Subsp. ALK (K)*	
09.00–09.20	**KEYNOTE 4: "The Future of Sports Medicine Training: Shifting Trends of Specialist Community"** *Pemb.: Dr. dr. Nani Cahyani Sudarsono, Sp.K.O.,Subsp. APK (K)*	
09.20 - 10.00· Coffee Break		

WAKTU	ROOM A (Ballroom Utama)	ROOM B (Breakout Room)
10.00–10.15	**Sponsored by GEA** **[ST8-1] "Advanced sports injury management - the use of High Intensity Laser"** *Pemb.: Assoc. Prof. dr. M. Ikhwan Zein, Sp.K.O., Subsp.ALK (K)., Ph.D*	
10.15–10.30	**[ST8-2] "Beyond the Acute: Clinical Pearls for Long-Standing Symptoms in Sports Medicine"** *Pemb.: Prof. Dr. dr. Junaidi, Sp.K.O, Subs, ALK (K).*	
10.30–10.45	**Q&A — Panel Discussion** *Moderator: dr. Merryana Seputri, Sp.K.O., DAIFIDN*	
10.45–10.50 · *LET'S MOVE!*		
TOPIC (sponsored by Taisho)		

Physical Therapy Journal of Indonesia 2026; 7(2): 1-61; DOI: 10.51559/ptji.v7i2.479

SYMPOSIUM DAY 2
Day 3 (October 31st, 2026)

The 11th Annual Scientific Meeting (ASM) of Indonesia Sports Medicine Association (ISMA) in conjunction with the 2nd International Exercise and Health (EXHEALTH)
Yogyakarta, October 29th–31st, 2026

10.50–11.20	**[ST9-1]"From Court to Clinic : Triage, Counseling, and Orthopaedic Management of Upper Extremity Injuries in Racket Sports"** *Pemb.: dr. Erica Kholinne, Sp.OT (K), PhD*	
11.20–11.40	**[ST9-2] "The Racket Sports Comeback: An Evidence-Based Strategy for Prevention and Return to Play"** *Pemb.: dr. Antonius Andi Kurniawan, Sp.K.O., Subsp. ALK (K)*	
11.40–12.00	**Q&A — Panel Discussion** *Moderator: dr. Angelica Anggunadi, Sp.K.O, Subsp. ALK (K)*	
12.00 - 12.10	*Launching Indonesia Sports Medicine Journal*	
12.10 - 12.20	*Presentasi GEA*	
12.20 - 12.30	*Welcoming Solaris Products*	
12.30 - 13.30 Istirahat Siang · Makan Siang · Sholat		
PARALLEL BREAKOUT SESSION		
13.30–13.45	**[ST10-1] "Peroneal and Posterior Tibial Pathology: The Tendon Injuries Hiding Behind 'Just a Sprain' and 'Just a Flat Foot'"** *Pemb.: dr. Astuti Pitarini, Sp.OT, SubSp.KP (K), AIFO-K*	**[ST11-1] "Exercise is Brain Medicine : Updating the Evidence, Defining the Dose"** *Pemb.: Prof. Dr. dr. Irfannuddin, Sp.K.O., M.Pd.Ked.,Subsp. APK (K)*
13.45–14.00	**[ST10-2] "Imaging Foot and Ankle Injuries"** *Pemb.: dr. Ratna Moniqa, Sp.Rad, RMSK*	**[ST11-2] "Exercise Oncology : From Nice To have to Standard of Care"** *Pemb.: Prof. Madya Dr. Mohd Nahar Azmi bin Mohamed*

WAKTU	ROOM A (Ballroom Utama)	ROOM B (Breakout Room)
14.00–14.15	**Q&A — Panel Discussion** *Moderator: dr. Monica Elizabeth, M.Res., Sp.K.O*	**Q&A — Panel Discussion** *Moderator: Dr. Anastasia Feliciana, MMRS, Sp.K.O, DAIFIDN*
14.15–14.20 · *BE ACTIVE !*		
14.20–14.35	**[ST12-1] "Hype or Evidence? The Real Role of Regenerative Medicine in Sports Injury Management"** *Pemb.: Dr Cheng Wern Loong*	**[ST13-1] "How Much, and What Could Go Wrong? A Practical Guide to Exercise in Dyslipidemia"** *Pemb.: dr. Siti Shalihah Suriadiredja, Sp.K.O*
14.35–14.50	**[ST12-2] "Promise, Practice, and Proof : An Update on Interventional Pain Management in Sports Injury"** *Pemb.: dr Elina Widiastuti, Sp.K.O*	**[ST13-2] "Exercise Prescription for Sarcopenic-Obesity"** *Pemb.: Brigjen. Pol. (Purn.) dr. Leny Pintowari, Sp.K.O., Subsp. APK (K)*
14.50–15.05	**Q&A — Panel Discussion** *Moderator: dr. Pratama Wicaksana Wijaya, Sp.K.O*	**Q&A — Panel Discussion** *Moderator: dr. Gilang Pradipta Permana, Sp.K.O*
15.05–15.20 · *Afternoon Workout*		
15.20–15.35	**[ST14-1] "Beyond Posture: Can Postural Assessment Predict Sports Injury and Athletic Performance?"** *Pemb.: Prof. Dr. dr. Rika Haryono, Sp.K.O ,Subsp. ALK (K)*	**[ST15-1] "Site-Specific Exercise Prescription in Osteoporosis."** *Pemb.: Dr. Ade Jeanne D. L. Tobing , Sp.K.O, ,Subsp. APK (K)*
15.35–15.50	**[ST14-2] "The Sports Medicine approach to HYROX: From physiological assessment to exercise prescription"** *Pemb.: dr. Ria Lestari, B.Med.Sc, P.G.Dip.SEM, Sp.K.O*	**[ST15-2] "Muscle as a Vital Sign: How Grip, Gait, and Getting Up Predict Outcome in the Sarcopenic Patient"** *Pemb.: dr. Caleb Leonardo Halim, Sp.K.O*
15.50–16.05	**Q&A — Panel Discussion** *Moderator: dr. Reeni Darmawan, Sp.K.O*	**Q&A — Panel Discussion** *Moderator: dr. Anggia Prathama Nasution, Sp.K.O*
16.05 - 16.30. *Coffee Break + Set Up Room*		
16.30–17.00	***Appreciation for Sponsors Pengumuman Best Poster and Oral Presentation Doorprize Closing Remarks PDSKO***	

POSTER PRESENTATION SCHEDULE

The 11th Annual Scientific Meeting (ASM) of Indonesia Sports Medicine Association (ISMA) in conjunction with the 2nd International Exercise and Health (EXHEALTH)
Yogyakarta, October 29th–31st, 2026

Time	Moderator: Juri / Moderator (Prof. Dr. Sulistiyono, S.Pd., M.Pd.)	Moderator: Juri / Moderator (Dr. dr. Nani Cahyani Sudarsono, Sp.KO)	Moderator: Juri / Moderator (Prof. Dr. dr. Kartika Ratna Pertiwi, M.Biomed.Sc, Ph.D)	Moderator: Juri / Moderator (Prof. Dr. dr. Irfannuddin, Sp.KO., M.Pd.Ked.)
HARI PERTAMA, JUMAT, 30 OKTOBER 2026				
10.25 - 10.30	[Free Paper 1] Poster Presentation: Pemb.: Presenter (Meryn Widjaya)	[Free Paper 12] Poster Presentation: Pemb.: Presenter (Christira Trinita / Astrid Dwita Bellinda / Lois Scarlet)	[Free Paper 20] Poster Presentation: Pemb.: Presenter (Fauzan Hifdzul Baihaqi)	[Free Paper 29] Poster Presentation: Pemb.: Presenter (Evan Dionesia Gravianto)
10.30 - 10.35	[Free Paper 2] Poster Presentation: Pemb.: Presenter (Rifqy Firmansyah)	[Free Paper 13] Poster Presentation: Pemb.: Presenter (Martinus Hanandito Nugroho Pratomo Linggo)	[Free Paper 21] Poster Presentation: Pemb.: Presenter (Made Budiawan)	[Free Paper 30] Poster Presentation: Pemb.: Presenter (Eric Mayo Dagradi)
10.35 - 10.40	[Free Paper 3] Poster Presentation: Pemb.: Presenter (Shinta Devi Apriyanti)	[Free Paper 14] Poster Presentation: Pemb.: Presenter (Martinus Hanandito Nugroho Pratomo Linggo)	[Free Paper 22] Poster Presentation: Pemb.: Presenter (Kadek Khrisna Fernanda Erawan)	[Free Paper 31] Poster Presentation: Pemb.: Presenter (Mokhammad Rakhmad Abadi)
12.45 - 12.50	[Free Paper 5] Poster Presentation: Pemb.: Presenter (Putri Chiara)	[Free Paper 15] Poster Presentation: Pemb.: Presenter (Clara Nikita)	[Free Paper 23] Poster Presentation: Pemb.: Presenter (Erwin Yantho)	[Free Paper 32] Poster Presentation: Pemb.: Presenter (Asami Rietta Kumala)
12.50 - 12.55	[Free Paper 8] Poster Presentation: Pemb.: Presenter (Audi Batista)	[Free Paper 16] Poster Presentation: Pemb.: Presenter (Lydia)	[Free Paper 24] Poster Presentation: Pemb.: Presenter (Anyelir Falihah Adawiyah)	[Free Paper 33] Poster Presentation: Pemb.: Presenter (Stefanus Djoni Husodo)
14.40 - 14.45	[Free Paper 9] Poster Presentation: Pemb.: Presenter (Qonita Nur Qolby)	[Free Paper 17] Poster Presentation: Pemb.: Presenter (Anastasia Nadya Widanti)	[Free Paper 26] Poster Presentation: Pemb.: Presenter (Keshia Jenine Sahyasmita Setiabudi)	[Free Paper 34] Poster Presentation: Pemb.: Presenter (Ida Ayu Laxmi Ananda Dewi Manuaba)
14.45 - 14.50	[Free Paper 10] Poster Presentation: Pemb.: Presenter (Nico Pangestu Halim)	[Free Paper 18] Poster Presentation: Pemb.: Presenter (Ratih Dwiputri Pradana)	[Free Paper 27] Oral Presentation: Pemb.: Presenter (L. Grace Tumbelaka)	[Free Paper 35] Poster Presentation: Pemb.: Presenter (Anisyah Octavionita)
14.50 - 14.55	[Free Paper 11] Poster Presentation: Pemb.: Presenter (Begin Koresy Ginting)	[Free Paper 19] Poster Presentation: Pemb.: Presenter (Ivanna Susanty)	[Free Paper 28] Poster Presentation: Pemb.: Presenter (Indri Ngesti Rahayu)	[Free Paper 36] Poster Presentation: Pemb.: Presenter (Riko Arundito)
HARI KEDUA, SABTU, 31 OKTOBER 2026				
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SPEAKER

Hype or evidence? the real role of regenerative medicine in sports injury management

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Background: Enthusiasm for regenerative medicine in sports injury management is growing, but the strength of the evidence does not always match the magnitude of the claims. Regenerative medicine aims to restore, replace, or recreate cells, tissues, or organs to treat or mitigate disease. It remains unclear what "regeneration" actually means in sports injury management, since pain relief and functional improvement do not necessarily indicate tissue regeneration, and imaging changes alone do not demonstrate complete regeneration.
Methods: This article critically appraises the current evidence for regenerative interventions used in sports injuries, namely platelet-rich plasma (PRP), prolotherapy, mesenchymal stem cells (MSCs), and exosome-based therapies. Established evidence is distinguished from promising but unproven claims, using durable tissue regeneration and favourable alteration of the natural history of the condition as the criteria for true restoration.
Results: PRP and prolotherapy may provide benefit for selected musculoskeletal conditions, but their value depends on the condition treated, the preparation used, the protocol, the comparator, and the clinical outcomes measured. Evidence for MSC therapies remains preliminary and insufficient to support routine use in most sports injuries. Exosome-based therapies remain experimental, with limited high-quality clinical evidence on their efficacy, safety, and role in routine practice.
Conclusion: Appropriate patient selection, evidence-based indications, standardised treatment protocols, and realistic expectations are essential when managing sports injuries with regenerative approaches. Clinicians should look beyond the hype and adopt a critical, evidence-informed approach. Regenerative medicine is neither miracle nor myth; it is an evolving tool whose value depends on the indication, the biologic, the protocol, and the evidence.
Keywords: evidence-based medicine, mesenchymal stem cells, platelet-rich plasma, regenerative medicine, sports injury management

Exercise oncology: from nice to have to standard of care

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Background: Exercise is increasingly recognised as an integral component of cancer care, extending beyond rehabilitation and survivorship. Evidence supports its role in improving physical function, managing treatment-related symptoms, and enhancing quality of life. Recent clinical trials have also demonstrated benefits in reducing postoperative complications and improving disease-free survival in selected cancer populations. Nevertheless, exercise conditioning remains inconsistently integrated into routine oncology practice, particularly before and during cancer treatment.
Methods: This presentation provides a narrative review of current evidence, including international exercise oncology guidelines, systematic reviews, and landmark randomised controlled trials. It also draws on clinical experience in preoperative functional assessment, cardiopulmonary exercise testing, and individualised exercise conditioning, together with more than 12 years of experience delivering community-based exercise support through the Exercise Support Group at Universiti Malaya Medical Centre (ESG@UMMC).
Results: Current evidence supports exercise interventions across different stages of the cancer care continuum. Preoperative multimodal conditioning has been shown to reduce severe postoperative complications in colorectal cancer patients, while aerobic and resistance exercise during chemotherapy can improve physical function and reduce treatment-related fatigue. The landmark CHALLENGE trial, involving 889 patients with resected colon cancer, demonstrated significantly better five-year disease-free survival following structured exercise after adjuvant chemotherapy (80.3% versus 73.9%; HR 0.72). In clinical practice, individualised assessment and exercise prescription provide opportunities to optimise functional capacity before treatment and support recovery afterwards. At UMMC, multidisciplinary referrals from surgeons, anaesthetists, and other medical specialists, together with survivor networks and cancer support organisations, have contributed to the development of ESG@UMMC. Established in 2014, this non-profit programme currently supports approximately 140 active members through weekly exercise sessions, providing continuity of care beyond hospital-based treatment.
Conclusion: Exercise oncology should be considered throughout the cancer care continuum, from pre-treatment optimisation and exercise during active treatment to post-treatment recovery and lifelong survivorship. Sports and Exercise Medicine specialists have an important role in bridging oncology services and exercise delivery through functional assessment, individualised prescription, and multidisciplinary collaboration. The ESG@UMMC experience illustrates a practical approach to sustaining exercise participation within a supportive community and offers a potentially adaptable model for cancer care in Southeast Asia.
Keywords: cancer survivorship, exercise conditioning, exercise oncology, exercise prescription, sports and exercise medicine

Diagnostic imaging shoulder injury

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Background: The shoulder joint is a complex anatomical structure consisting of bones, muscles, ligaments, and tendons. Sports injuries are a common cause of shoulder pain and may negatively affect athletic performance and cause functional impairment. Imaging plays an important role in identifying the location and extent of injuries, establishing an accurate diagnosis, guiding treatment decisions, and monitoring recovery.
Methods: Various imaging modalities, including X-ray, ultrasound, computed tomography (CT), magnetic resonance imaging (MRI), and MR arthrography, can be used to evaluate shoulder injuries. The selection of an appropriate imaging modality depends on the suspected injury, clinical findings, and diagnostic objectives.
Results: The complementary use of imaging modalities and clinical examination can support diagnostic accuracy by helping identify and characterize shoulder injuries. Appropriate imaging selection may also facilitate treatment planning and recovery monitoring.

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Conclusion: Appropriate imaging selection, integrated with clinical examination, is essential for the accurate diagnosis and effective management of shoulder injuries in athletes and may help facilitate a safe return to sport.
Keywords: computed tomography, diagnostic imaging, magnetic resonance imaging, radiography, shoulder injury, ultrasound

Imaging foot and ankle injuries

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Background: Foot and ankle injuries are common among athletes, particularly those participating in running, jumping, and contact sports. These injuries may involve bones, ligaments, tendons, and cartilage. Diagnostic imaging plays an important role in accurate diagnosis, determining injury location and severity, guiding treatment decisions, and monitoring the healing process.
Methods: This abstract provides an overview of diagnostic imaging modalities used in the assessment of foot and ankle sports injuries, including conventional radiography, ultrasound, computed tomography (CT), and magnetic resonance imaging (MRI).
Results: Each imaging modality provides complementary information for identifying and assessing foot and ankle injuries. Conventional radiography is useful for evaluating bone injuries, ultrasound can assess superficial soft tissue structures, CT provides detailed bony visualization, and MRI offers comprehensive assessment of soft tissues, cartilage, and bone marrow. The selection of imaging modality depends on the suspected injury, clinical presentation, and diagnostic objectives.
Conclusion: Diagnostic imaging is essential for the accurate assessment and management of foot and ankle sports injuries. Appropriate selection of imaging modalities can support clinical decision-making, treatment planning, and rehabilitation strategies.
Keywords: computed tomography, diagnostic imaging, foot and ankle injuries, magnetic resonance imaging, radiography, ultrasound

The sports medicine approach to hyrox: from physiological assessment to exercise prescription

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Background: HYROX is an emerging hybrid fitness competition that combines eight 1-km running intervals with eight functional exercise stations, requiring the integration of aerobic endurance, muscular strength, local muscular endurance, and fatigue resistance. Despite its growing popularity, HYROX-specific evidence on physiological assessment and individualized exercise prescription remains limited. A sports medicine approach is essential to optimize performance while addressing training-related health risks. This study aimed to present an evidence-informed sports medicine framework for assessing the physiological and functional determinants of performance in HYROX athletes and translating these findings into individualized exercise prescriptions.
Methods: This narrative review synthesizes available HYROX-specific physiological and performance studies, supported by broader evidence from exercise physiology, concurrent training, cardiopulmonary exercise testing (CPET), and sports medicine guidelines. The evidence was used to develop a clinically applicable framework linking assessment findings to individualized exercise prescription.
Results: Available evidence indicates that HYROX imposes substantial cardiovascular and metabolic demands, with running performance contributing significantly to overall race time. Comprehensive assessment should include aerobic capacity, ventilatory thresholds, muscular strength, endurance, and sport-specific performance. CPET parameters, particularly VO_2peak, VT1, and VT2, can guide individualized endurance training. Integrating aerobic training, progressive resistance exercise, and race-specific conditioning, while considering recovery, injury history, and energy availability, provides a framework for individualized 12-week training progression.
Conclusion: A systematic sports medicine approach integrating physiological assessment and individualized exercise prescription can optimize HYROX performance and athlete health, despite limited HYROX-specific intervention evidence.
Keywords: athletic performance, cardiopulmonary exercise testing, exercise prescription, hybrid training, HYROX, sports medicine

Beyond posture: can postural assessment predict sports injury and athletic performance?

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Background: Posture assessment is widely used in sports medicine to evaluate alignment, symmetry, and potential biomechanical abnormalities. However, evidence linking static postural deviations to subsequent sports injuries and athletic performance remains inconsistent. This study aimed to critically examine the predictive value of static posture assessment for sports injuries and athletic performance and to explore its role within a comprehensive, athlete-centred evaluation approach.
Methods: A critical examination of prospective cohort studies involving football and rugby athletes and systematic reviews of movement screening tools was conducted to evaluate the associations between static postural deviations, subsequent sports injuries, and the predictive value of movement assessment. The clinical relevance of postural asymmetry was also considered in relation to individual anatomy, sport-specific adaptations, training history, and functional demands.
Results: Prospective studies in football and rugby athletes found no consistent association between common static postural deviations and subsequent non-contact lower limb injuries. Systematic reviews also highlighted the limited predictive value of movement screening tools, supporting a multifactorial approach to injury risk assessment.
Conclusion: Static posture assessment provides useful clinical information but should not be used as a sole predictor of sports injuries or athletic performance. A comprehensive, athlete-centred approach should integrate postural assessment with dynamic movement analysis, functional capacity, load tolerance, and individual risk factors to support clinical decision-making in sports medicine.
Keywords: athletic performance, movement assessment, posture, posture assessment, sports injury

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Targeted topical NSAID and counterirritant protocols for non-surgical joint inflammation and accelerated return to sport

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Background: Non-surgical joint inflammation, including acute ligamentous sprains, capsular irritation, tendinopathies, and post-traumatic synovitis, presents a clinical challenge in sports medicine. Treatment aims to control localized pain and swelling while minimizing systemic adverse effects and preserving tissue healing. This abstract proposes a localized approach combining topical non-steroidal anti-inflammatory drugs (NSAIDs) with sensory-gating counterirritants to support functional recovery and return to sport (RTS).
Methods: A stratified, multiphase therapeutic protocol is proposed based on pathophysiological mechanisms and rehabilitation needs. Topical NSAIDs target cyclooxygenase-mediated prostaglandin production, while counterirritants activate transient receptor potential channels, potentially modulating nociception through sensory gating and influencing local cutaneous circulation. The proposed protocol includes an acute phase (days 0–3), a subacute rehabilitation phase (days 4–14), and a maintenance phase integrating symptom management with functional rehabilitation and RTS assessment.
Results: The proposed approach may provide localized anti-inflammatory and analgesic effects while reducing systemic drug exposure compared with oral NSAIDs. During the acute phase, topical NSAIDs and cooling counterirritants may help manage pain and swelling. During rehabilitation, warming counterirritants may provide additional symptom relief to support range-of-motion exercises, progressive weight-bearing, and functional training. However, the effectiveness and safety of this combined protocol, including its effects on arthrogenic muscle inhibition and RTS timelines, require validation through clinical studies.
Conclusion: Combining topical NSAIDs and counterirritants may offer a localized pharmacological adjunct to rehabilitation for non-surgical joint inflammation. When integrated with individualized exercise and functional rehabilitation, this approach may support symptom management and recovery while limiting systemic medication exposure. Further clinical research is needed to establish its comparative effectiveness, safety, and impact on RTS outcomes.
Keywords: counterirritants, joint inflammation, return to sport, topical non-steroidal anti-inflammatory drugs

Managing musculoskeletal sports injuries with high-intensity laser therapy

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Background: Musculoskeletal injuries are common among athletes and physically active individuals and may affect muscles, tendons, ligaments, and joints, limiting participation in sports. High-intensity laser therapy (HILT) is a treatment modality that may support injury management through photobiomodulatory effects, with potential benefits for pain reduction and improvements in physical function and range of motion. This abstract discusses the potential effects of HILT, clinical assessment before treatment, and its integration into sports injury rehabilitation.
Methods: This presentation outlines the proposed photobiomodulatory mechanisms of HILT, relevant clinical assessment considerations, treatment parameters, safety precautions, and its application in sports injury rehabilitation. Key treatment parameters include wavelength, energy, pulse characteristics, duration, and application technique, which should be selected according to the device, treatment target, patient presentation, and relevant protocols.
Results: Evidence from studies on musculoskeletal disorders suggests that HILT may reduce pain and improve physical function. However, the quality of evidence varies, and methodological limitations in several studies warrant cautious interpretation. HILT may be beneficial as an adjunct to rehabilitation but should not replace active interventions, including load modification, range-of-motion exercises, progressive strengthening, neuromuscular training, and sport-specific drills.
Conclusion: HILT may be a useful adjunct in sports injury rehabilitation for managing pain and improving function. Clinicians should understand its potential benefits and limitations, conduct appropriate clinical assessments, implement safety precautions, and integrate HILT with progressive, active rehabilitation tailored to the individual's condition and stage of recovery.
Keywords: high-intensity laser therapy, injury rehabilitation, musculoskeletal injury, photobiomodulation, sports injury rehabilitation

Exercise Prescription in Osteoarthritis

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Background: Osteoarthritis is a chronic joint condition that may cause pain, stiffness, and limitations in daily activities, leading patients to avoid movement. Appropriately prescribed exercise is an essential component of osteoarthritis management to maintain joint function, improve physical capacity, and support independence. This presentation discusses clinical recommendations for patient assessment and individualized exercise prescription for osteoarthritis.
Methods: Exercise prescription is structured using the FITT-VP framework, which includes frequency, intensity, time, type, volume, and progression. Individualized programs are developed based on symptom severity, range of motion, muscle strength, balance, physical fitness, comorbidities, patient preferences, and functional goals. Exercise interventions include aerobic activity, muscle strengthening, balance training, and flexibility exercises, with gradual progression according to individual tolerance. For patients with overweight or obesity and knee or hip osteoarthritis, exercise may be combined with weight management.
Results: An individualized and progressively adjusted exercise program may support participation, improve physical capacity, maintain function, and promote independence in people with osteoarthritis. Regular follow-up evaluates symptoms, muscle strength, physical function, activity levels, and adherence. Exercise prescriptions should be reassessed when new swelling, sharp pain, or persistent functional decline occurs.
Conclusion: Exercise should be prescribed progressively and tailored to the individual's symptoms, abilities, preferences, and goals rather than avoided because of osteoarthritis. Regular assessment and appropriate modification of the exercise program are essential to support safe participation and optimize functional outcomes.
Keywords: balance training, exercise prescription, muscle strengthening, osteoarthritis, physical activity

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Meniscus Tear in Athletes: Repair or Meniscectomy?

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Background: Meniscal tears are among the most common knee injuries in athletes participating in pivoting and cutting sports, such as soccer, basketball, and skiing. The choice between meniscal repair and partial meniscectomy influences return-to-play timing, long-term knee biomechanics, and the risk of osteoarthritis over the subsequent 10–20 years. Although established selection principles include vascular zone and tear pattern, evidence regarding chronicity and its interaction with anterior cruciate ligament (ACL) status remains evolving and sometimes contradictory. This study aimed to review factors influencing meniscal repair versus meniscectomy in athletes, focusing on chronicity and the impact of delayed ACL reconstruction on repair outcomes.
Methods: This presentation reviews current evidence on factors influencing the choice between meniscal repair and partial meniscectomy in athletes with traumatic meniscal tears. Particular emphasis is placed on tear zone and pattern, concomitant ACL injury, age and activity demands, chronicity, and meniscal root tears. Findings from a large meta-analysis involving 3,829 patients and recent cohort studies are discussed, with additional consideration of the timing of ACL reconstruction and its association with meniscal repair outcomes.
Results: Chronicity reduces meniscal repairability, although its effect on repair failure remains inconsistent. Delayed ACL reconstruction, particularly beyond one year, is associated with higher meniscal repair failure rates than concurrent reconstruction (36.7% vs. approximately 8.5%), potentially due to persistent knee laxity. Degenerative tears require a distinct approach, focusing on surgical versus non-operative management.
Conclusion: The decision between meniscal repair and partial meniscectomy in athletes requires a multifactorial and sequential assessment rather than an isolated checklist of indications. Integrating tear zone and pattern, ACL status, age, activity demands, and chronicity into a practical decision algorithm may support clinical decision-making and help optimize meniscal preservation and long-term knee health.
Keywords: anterior cruciate ligament, athletes, chronicity, meniscal repair, partial meniscectomy

Beyond HbA1c: rethinking outcomes in exercise therapy for type 2 diabetes

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Background: Glycated haemoglobin (HbA1c) is a primary outcome measure in exercise management for type 2 diabetes mellitus (T2DM), but it does not capture changes in cardiorespiratory fitness, muscular strength, physical function, or quality of life. This review examined clinically relevant outcomes beyond HbA1c and their practical monitoring in routine care.
Methods: A narrative review of consensus statements, systematic reviews, meta-analyses, cohort studies, and randomised controlled trials on exercise therapy in adults with T2DM was conducted. The 7K framework developed by the Sports Medicine Program, Faculty of Medicine, Universitas Indonesia, was proposed to guide individualised exercise management and monitoring.
Results: Three key outcome domains were identified: cardiorespiratory fitness, muscular strength, and quality of life. Higher fitness is associated with lower mortality, while reduced strength predicts adverse health outcomes. Combined aerobic and resistance training may improve fitness and quality of life. Individualised exercise prescriptions are essential. The 7K framework guides initial assessment of condition, complications, category, and decisions, followed by monitoring adherence, progress, and independence. Monitoring includes exercise logs and perceived exertion at each visit, functional and strength tests and quality-of-life assessments every 8–12 weeks, and HbA1c measurements every three months.
Conclusion: Exercise therapy for T2DM should be evaluated beyond HbA1c by assessing fitness, strength, function, and quality of life. Regular monitoring of adherence and clinical progress can support individualised prescriptions and promote independent exercise management.
Keywords: cardiorespiratory fitness, exercise therapy, HbA1c, muscular strength, quality of life

Rehabilitation velocity after artificial ligament reconstruction: when mechanics, not biology, sets the pace

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Background: Next-generation artificial ligaments (NGAL) made of polyethylene terephthalate give immediate mechanical stability, unlike biological grafts constrained by ligamentization. Rehabilitation guidance after NGAL reconstruction of the ACL, PCL, and multiligament knee injuries (MLKI) remains limited. This study aimed to compare rehabilitation after NGAL with conventional grafts and translate the differences into lessons for sports medicine physicians.
Methods: Based on a scoping review (JASPE 2026) of 11 studies from 228 records (2010–2025), compared with the Fowler Kennedy, Melbourne, and Aspetar protocols and the 2022 Chinese expert consensus.
Results: With biological grafts, biology limits rehabilitation; with NGAL, the limit shifts to neuromuscular control and load tolerance. The same six phases proceed at different speeds: weight bearing, quadriceps activation, range of motion, and strengthening can begin earlier when effusion is controlled, whereas late phases converge on objective criteria (limb symmetry, hop tests, stability, psychological readiness). We propose rehabilitation velocity as a progression framework. For PCL and MLKI, protection against posterior shear and early active-hamstring restriction still apply.
Conclusion: Rehabilitation after NGAL should be criteria-based and response-driven, not calendar-driven. A flare calls for stepping load down one level and reassessing; red flags call for halting progression and referring to the surgeon. With no randomized trials, this framework remains a clinical hypothesis.
Keywords: ACL reconstruction; artificial ligament; multiligament knee injury; NGAL; PCL reconstruction; rehabilitation; rehabilitation velocity

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A practical guide to exercise in dyslipidaemia

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Background: Dyslipidaemia is a major modifiable cardiovascular risk factor. Exercise improves triglycerides (TG), high-density lipoprotein cholesterol (HDL-C), and broader cardiometabolic health. The lipid response, however, varies with exercise dose, modality, weight change, and adherence. This presentation links practical exercise prescription to specific lipid targets and highlights how little exercise alone lowers low-density lipoprotein cholesterol (LDL-C).
Methods: This educational review summarises the expected effects of aerobic, resistance, and combined training on TG, HDL-C, LDL-C, non-HDL cholesterol, and apolipoprotein B (apoB). It also covers weekly exercise targets and the practical roles of moderate-intensity continuous training (MICT) and high-intensity interval training (HIIT). Further topics are weight management, pre-participation cardiovascular risk assessment, progression, and monitoring of muscle symptoms in statin users.
Results: Exercise has the greatest impact on triglycerides (TG), while aerobic training may modestly increase high-density lipoprotein cholesterol (HDL-C) and produce only small reductions in low-density lipoprotein cholesterol (LDL-C). Combined aerobic and resistance training improves overall cardiometabolic health, with additional lipid benefits from weight loss. Recommended exercise includes 150–300 min/week of moderate-intensity or 75–150 min/week of vigorous-intensity aerobic activity, alongside resistance training 2–3 days/week. Exercise should be individualised, progressed gradually, and supported by cardiovascular risk assessment and symptom monitoring. Statin therapy should complement exercise when indicated, as exercise alone rarely achieves LDL-C targets.
Conclusion: Exercise prescription should be matched to the lipid goal. Regular aerobic and combined training are central to improving TG and cardiometabolic risk, whereas meaningful LDL-C lowering requires statin therapy when indicated. Individualised dosing, gradual progression, and symptom monitoring support safe, sustained exercise as part of comprehensive lipid management.
Keywords: cardiovascular risk, dyslipidaemia, exercise prescription, lipid management, statin therapy

Exercise is brain medicine: updating the evidence, defining the dose

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Background: The brain retains the capacity to change throughout life through neuroplasticity, which underpins learning, memory, and cognitive resilience. Physical exercise has emerged as a powerful stimulus for activating molecular pathways that support brain health. This abstract summarizes evidence on the effects of exercise on brain structure and function and identifies the exercise dose associated with cognitive benefits.
Methods: This presentation synthesizes evidence from animal models and human studies on the mechanisms underlying exercise-induced neuroplasticity, its effects on cognitive function, and the exercise dose required to promote brain health. The evidence includes molecular pathways, structural brain changes, cognitive outcomes, and exercise prescription recommendations.
Results: Aerobic exercise promotes neuroplasticity by increasing neurotrophic factors (BDNF, NGF, and IGF-1), enhancing angiogenesis and mitochondrial biogenesis, and reducing oxidative stress and inflammation. It also improves synaptic plasticity and dendritic spine growth. Animal studies suggest that complex aerobic exercise yields greater neuroplasticity and spatial memory benefits than simple aerobic exercise. In humans, higher cardiorespiratory fitness is associated with greater hippocampal volume and better executive function, attention, and working memory. Moderate physical activity is also associated with an approximately 38% lower risk of dementia.
Conclusion: Physical exercise supports brain health through multiple molecular, vascular, mitochondrial, and synaptic mechanisms. Moderate-intensity aerobic exercise performed three to four times per week for 30–45 minutes per session, combined with resistance and dual-task training, represents a practical approach to promoting cognitive health. Clinicians should consider exercise prescription as an important strategy for supporting neuroplasticity and cognitive resilience.
Keywords: BDNF, cognitive function, exercise dose, neuroplasticity, physical exercise

Beyond the acute: clinical pearls for long standing symptoms in sports medicine

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Background: Longstanding symptoms are common in sports and exercise medicine and may include chronic low back pain, persistent shoulder, wrist, knee, ankle, and foot pain, as well as non-healing fractures. These conditions can be challenging to manage because of diagnostic uncertainty, persistent biomechanical dysfunction, and inadequate responses to previous treatments. Accurate diagnosis, comprehensive reassessment, and appropriate interdisciplinary collaboration are essential to improving patient outcomes.
Methods: This article presents a clinical overview of the assessment and management of patients with longstanding musculoskeletal symptoms in sports and exercise medicine. Key considerations include systematic physical examination, careful review of previous treatment attempts, appropriate imaging, evaluation of biomechanical dysfunction, and referral to clinicians with relevant expertise. The role of multidisciplinary collaboration and specialist consultation is also discussed.
Results: Effective management of longstanding symptoms requires confirmation of the diagnosis, identification of underlying causes, and reassessment of persistent biomechanical problems. Weight-bearing radiographs and magnetic resonance imaging may be useful when indicated, particularly when degenerative changes are suspected. Reviewing previous treatment strategies, recognizing the limitations of prior assessments, and selecting appropriate treatment options may help prevent unnecessary surgical interventions. Collaboration among physicians, physiotherapists, exercise therapists, rehabilitation specialists, and pain management specialists is important for addressing complex cases.
Conclusion: The management of longstanding musculoskeletal symptoms requires a systematic, comprehensive, and individualized approach. Accurate diagnosis, thorough reassessment, identification of biomechanical dysfunction, and collaboration among appropriately qualified healthcare professionals are essential to optimizing treatment outcomes. Clinicians should also recognize that symptoms and pathological changes may evolve over time, necessitating ongoing evaluation and adjustment of management strategies.
Keywords: biomechanical dysfunction, chronic musculoskeletal pain, interdisciplinary collaboration, persistent symptoms, sports and exercise medicine

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The future of sports medicine training: shifting trends in the specialist community

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Background: Since 1994, the Faculty of Medicine at Universitas Indonesia has graduated 137 sports medicine specialists (Sp.KO). With approximately 130 specialists serving 285 million Indonesians, workforce capacity remains limited. Meanwhile, 37.4% of Indonesians aged ≥10 years are insufficiently active, and 30.8% of adults have hypertension. With only two residency programs nationwide, hospital-based specialist training offers an opportunity to address this gap.
Methods: A narrative literature review examined national health survey data (Survei Kesehatan Indonesia 2023), Ministry of Health regulations and reports, and international literature on competency-based medical education (CBME), distributed training, and telementoring. Six proposed sports medicine entrustable professional activities (EPAs) were mapped to training settings and the 7K patient-management cycle.
Results: International distributed-training models, including Canada's Northern Ontario residency model, offer relevant lessons. Given the concentration of specialist training in Java–Bali (67%), a hub-and-spoke model is proposed. Accredited universities and teaching hospitals would provide foundational training and retain entrustment authority, while community-based specialists serve as preceptors, supported by workplace-based assessment, shared e-portfolios, and telementoring. The 9-kotak care model clarifies general practitioners' and specialists' roles within this pathway.
Conclusion: Sports medicine training in Indonesia should adopt a competency-based, distributed, and technology-enabled approach that engages practicing specialists as co-educators. A phased roadmap involving preceptor and training-site standards, pilots in two to three provinces, and subsequent expansion could increase specialist capacity beyond Java while maintaining training quality.
Keywords: competency-based medical education; distributed medical education; entrustable professional activities; Indonesia; sports medicine; telementoring

Exercise prescription for sarcopenic obesity: an evidence-based literature review

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Background: Sarcopenic obesity (SO) is the coexistence of excess adiposity with low skeletal muscle mass and function, and is associated with disability, cardiovascular disease, and mortality. Weight loss without exercise, including with incretin therapy, risks aggravating muscle loss. We aimed to formulate an evidence-based exercise prescription for SO.
Methods: A structured search of PubMed/MEDLINE and Consensus for publications from 2021 to 2026 was supplemented by guidelines and citation searching. Study selection and level-of-evidence assignment were performed independently by two AI-assisted appraisers, with a third resolving disagreements. Grades followed the JOSPT clinical practice guideline system (A–F).
Results: Seventy-three studies were included (levels of evidence I: 5, II: 27, III: 33, IV: 6, and V: 2), yielding 32 recommendations. Progressive resistance training (RT) consistently improved handgrip strength (+3.4 to +4.4 kg) and Timed Up and Go performance (−2.2 s) and should form the core of exercise programs (grade A). Training should be performed 2–3 times per week for ≥12 weeks (B), progressing from 40–65% to 60–80% of 1RM (C). Aerobic training should not be prescribed as a standalone modality (B) but combined with RT when fat loss, gait speed, or cardiorespiratory fitness is the goal (B). Power training (B) and multicomponent programs for frail patients (B) improve physical function. All weight-loss programs should include RT (B), alongside a moderate energy deficit and protein intake of 1.0–1.2 g/kg/day (C). Structured exercise may also begin at the initiation of incretin therapy (C).
Conclusion: Progressive RT is the core of exercise prescription for SO, complemented by aerobic, power, and balance components as indicated by patient goals and capacity. Programs should be preceded by pre-exercise screening, supervised for at least the first 12 weeks, and evaluated primarily with functional outcomes.
Keywords: exercise prescription; FITT-VP; incretin therapy; resistance training; sarcopenic obesity

The racket sports comeback: an evidence-based strategy for prevention and return to play

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Background: Participation in racket sports (tennis, badminton, padel, pickleball, squash, table tennis) is growing. US emergency department visits for racket sport injuries rose 20.9% from 2000 to 2023, and 55.7% in those aged >64 years. We summarize current evidence on injury prevention and return to play (RTP) in racket sports.
Methods: We conducted a structured narrative review of PubMed/MEDLINE for publications from 1 January 2021 to 10 October 2026. Systematic reviews, meta-analyses, randomized controlled trials (RCTs), and consensus statements were prioritized. Evidence levels and recommendation grades followed the JOSPT clinical practice guideline format.
Results: We verified 114 publications. Injury incidence was 1–4/1,000 hours in badminton and 30.8/1,000 hours in professional tennis at a tropical tournament in Jakarta. The lower extremity was most often injured, with shoulder and elbow injuries prominent in tennis and padel. Previous injury and workload spikes (acute:chronic workload ratio >1.3) were the most consistent risk factors. Exercise-based warm-up programs reduced injuries (RR 0.71; badminton RCT RR 0.30), especially when supervised with ≥80% adherence. Neuromuscular training reduced ankle sprains by 55%. Criteria based RTP decisions (pain, function, psychological readiness, sport-specific performance) are preferred over time-based ones; after ACL reconstruction, passing an RTP test battery lowered the risk of graft rupture (OR 0.49). We formulated 28 recommendations (grades B–F).
Conclusion: Prevention should rest on pre-participation screening, supervised exercise-based prevention programs, and gradual load management. Return to play should be criteria-based along the continuum from participation to sport to performance. Racket sport–specific RCTs, including in Indonesia, are needed.
Keywords: badminton; injury prevention; racket sports; return to play; tennis

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From court to clinic: triage, counseling, and orthopaedic management of upper extremity injuries in racket sports

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Background: Upper extremity injuries in racket sports range from gradual-onset tendinopathy to acute fractures and dislocations. These injuries can impair performance and interrupt participation. Timely recognition of urgent conditions, appropriate counseling, and coordinated treatment are essential to guide athletes from initial assessment to return to sport. Method: A narrative review of selected clinical practice guidelines, consensus statements, and clinical studies was undertaken, focusing on shoulder, elbow, and wrist injuries relevant to racket sports. Topics included initial triage, clinical assessment, imaging, conservative and operative management, rehabilitation, and return-to-sport decision-making.
Results: Initial assessment should identify neurovascular compromise, open injuries, fractures, dislocations, and acute traumatic tendon dysfunction requiring urgent care. Focused history and examination guide selective imaging, with particular attention to occult injuries such as scaphoid fractures despite normal initial radiographs. Common gradual-onset conditions, including rotator cuff and lateral elbow tendinopathy, generally require education, load modification, and progressive rehabilitation. Orthopaedic intervention depends on structural injury, instability, functional impairment, and response to appropriate nonsurgical treatment. Counseling should establish realistic expectations, clarify warning symptoms, and support adherence. Return to sport requires assessment of tissue healing, functional capacity, psychological readiness, and tolerance of progressively increasing sporting demands.
Conclusion: An integrated approach linking court-side triage with clinical assessment and individualized rehabilitation can support appropriate referral and treatment of upper extremity injuries in racket sports. Return-to-sport decisions should combine clinical findings, demonstrated sporting capacity, and shared decision-making among the athlete and treating team.
Keywords: orthopaedic management, racket sports, rehabilitation, return to sport, triage, upper extremity injuries

Site specific exercise prescription in osteoporosis

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Background: Osteoporosis is a bone disease characterized by low bone mass or bone mineral density (BMD), deterioration of bone microarchitecture, and an increased risk of fractures. As bone is a highly vascularized living tissue, vascular dysregulation may contribute to the development of osteoporosis. Physical exercise can help prevent and manage osteoporosis by promoting bone health through mechanical loading and the modulation of angiogenic mediators. According to Wolff's law, bones adapt to mechanical loading, becoming stronger in response to appropriate physical activity. The skeletal sites commonly affected by osteoporotic fractures include the femoral neck, lumbar spine, and distal radius.
Methods: This educational initiative emphasizes the importance of site-specific strength training for individuals with osteoporosis. Exercise priorities should be determined based on BMD assessment, which is the gold-standard method for evaluating bone mineral density. Strength training should progress gradually by adjusting repetitions, sets, and external resistance according to individual capacity and clinical needs. Exercise selection should target the skeletal regions requiring improvement, including the spine, lower limbs, and wrist. Although walking may help slow progressive bone loss, it may be insufficient on its own to substantially improve bone mass.
Results: Strength training using external resistance can be performed two to three times per week by individuals with osteoporosis, with appropriate exercise selection, gradual progression, and individualized supervision. Targeted strengthening exercises may help maintain or improve bone health and reduce the risk of osteoporotic fractures.
Conclusion: Physical exercise, particularly appropriately prescribed strength training, is an important component of osteoporosis prevention and management. Exercise programs should be individualized and tailored to the skeletal sites affected, guided by BMD assessment and the individual's functional capacity, to support bone health and reduce fracture risk.
Keywords: bone mineral density, femoral neck, lumbar spine, osteoporosis, strength training

Rotator cuff tendinopathy: from assessment to return to sports

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Background: Rotator cuff tendinopathy can impair shoulder function, disrupt sleep, and limit athletic participation. Clinical challenges include distinguishing tendinopathy from significant structural injury, selecting appropriate treatment, and determining readiness to return to sport (RTS). This review outlines an evidence-informed approach from assessment through rehabilitation and RTS.
Methods: A narrative review of selected clinical practice guidelines, consensus statements, and randomized controlled trials was undertaken. The review addressed clinical assessment, imaging, nonsurgical management, surgical referral, and RTS decision-making.
Results: Clinical assessment provides the foundation for diagnosis, while traumatic weakness and other concerning findings warrant prompt investigation or referral. Imaging is appropriate when significant structural injury is suspected or symptoms persist despite appropriate management. Education, activity modification, and progressive exercise form the core of treatment. Corticosteroid injections may provide modest short-term relief without sustained benefit. Routine subacromial decompression provides no additional benefit over placebo surgery for subacromial pain. RTS assessment should consider symptoms, range of motion, strength and endurance, kinetic-chain function, psychological readiness, and tolerance of sport-specific demands. Evidence supporting universal RTS thresholds remains limited, favoring individualized progression and shared decision-making.
Conclusion: Rotator cuff tendinopathy management should integrate clinical assessment, active rehabilitation, and progressive exposure to sporting demands. Return-to-sport decisions should reflect demonstrated functional capacity and athlete readiness rather than elapsed time alone. This approach supports appropriate treatment selection and individualized recovery planning.
Keywords: exercise therapy, rehabilitation, return to sport, rotator cuff tendinopathy, shoulder pain

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Peroneal and posterior tibial pathology: the tendon injuries hiding behind 'just a sprain' and 'just a flat foot

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Background: Posterior tibial tendon disorder (PTTD), a term popularized in 1989, was traditionally classified into three grades based on tendon integrity and deformity severity. However, this classification was considered insufficient to represent the full disease continuum. In 2020, an international consensus introduced the term progressive collapsing foot deformity (PCFD), providing a more comprehensive classification of flexible and rigid deformities. Peroneal tendon pathology is another important condition that may be overlooked following ankle sprains because clinical assessment often focuses on ligament injuries. Recognizing these tendon disorders is essential for accurate diagnosis and appropriate clinical management.

Methods: This narrative review describes the classification, clinical presentation, and examination of posterior tibial and peroneal tendon disorders. It discusses the transition from the traditional PTTD classification to the PCFD classification, including deformity patterns and flexibility, as well as the mechanisms, manifestations, and clinical assessment of peroneal tendon pathology. Examination approaches include standing weight-bearing assessment, seated examination, and stress tests to evaluate tendon and retinacular integrity.

Results: The PCFD classification provides a more comprehensive framework for assessing progressive foot deformity by considering hindfoot valgus, midfoot or forefoot abduction, forefoot varus or medial column instability, peritalar subluxation, and ankle instability. Peroneal tendon pathology encompasses painful os peroneum syndrome, tendinopathy, tendon tears, dislocation, and subluxation. These conditions may present with lateral ankle pain, swelling, and tenderness along the tendon course. Longitudinal tendon tears may develop because of friction against the peroneal tubercle. Tarsal coalition may further complicate the clinical presentation by restricting subtalar motion and contributing to recurrent ankle sprains and hindfoot deformity. Comprehensive clinical examination is essential to distinguish tendon pathology from ligament injuries and other causes of foot and ankle deformity.

Conclusion: Recognizing posterior tibial and peroneal tendon disorders requires knowledge of their clinical features and appropriate examination techniques to support accurate diagnosis and effective management.

Keywords: ankle sprain, foot deformity, peroneal tendon, progressive collapsing foot deformity, posterior tibial tendon

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ORAL PRESENTER

Fitness-to-dive assessment and medical clearance in recreational diving: a scoping review

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Background: Recreational diving, including scuba and freediving, continues to expand globally as a tourism activity, yet exposes participants to unique physiological risks from hyperbaric pressure and immersion. Medical fitness-to-dive assessment and clearance are essential for risk mitigation, but the methods and criteria used across the literature remain fragmented and have not been systematically mapped. This scoping review aimed to identify the methods and criteria for medical fitness assessment that have been studied in recreational divers, both scuba diving and freediving, within the context of dive tourism.
Methods: Eligible studies examined recreational divers or dive tourists, addressing the methods and criteria used for medical fitness-to-dive assessment and clearance within a recreational or tourism diving setting. Searches of PubMed (n=151) and Scopus (n=154) identified 305 records (2015–2026, English language). After duplicate removal, 182 unique records underwent title/abstract screening, followed by restriction to studies presenting primary/original data, yielding 22 articles that met the inclusion criteria.
Results: Most included studies (10/22) focused on respiratory conditions, particularly pulmonary bullae/blebs screening and spirometry cut-offs, followed by cardiovascular conditions (8/22), including self-certification adequacy, comorbidity-related risk, and implantable cardiac device suitability. Fatality and incident database analyses from Australia (scuba divers and snorkellers/breath-hold divers) consistently identified pre-existing cardiac and chronic conditions as major contributing factors, supporting stronger fitness screening in older or at-risk divers. Only one validated generic screening instrument, the RSTC medical questionnaire, was identified; its validation study in Hong Kong found 15.4% of candidates had difficulty completing it, and some at-risk conditions were missed. Similarly, a UK survey found existing self-certification systems may inadequately capture cardiac risk. Four studies used military/occupational diver populations for chest imaging and spirometry cut-off validation, offering methodologically relevant but population-mismatched evidence.
Conclusion: Fitness-to-dive assessment and medical clearance methods for recreational divers remain fragmented, dominated by condition-specific criteria for cardiovascular and respiratory systems, with limited validated generic screening instruments. Existing tools such as the RSTC questionnaire and self-certification systems show notable limitations. Development and validation of a comprehensive, recreational-diver-specific screening instrument is warranted to support dive tourism medicine practice.
Keywords: dive tourism, fitness-to-dive, medical clearance, recreational diving, scoping review

Cold water immersion compared with active or passive recovery after resistance or eccentric exercise: a systematic review and meta-analysis ofrandomized clinical trials

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Background: Cold water immersion (CWI) is widely used in sports to enhance recovery following resistance and eccentric exercise. Although numerous studies have investigated its effects on delayed-onset muscle soreness (DOMS), muscle damage, and performance decline, the available evidence has not been comprehensively synthesized. This systematic review and meta-analysis aimed to evaluate the effectiveness of CWI compared with passive recovery, active recovery, or control conditions across key recovery outcomes.
Methods: A systematic review and meta-analysis of randomized controlled trials (RCTs) involving healthy human participants exposed to resistance training, eccentric exercise, or exercise-induced muscle damage protocols were conducted. English-language articles published between January 2016 and June 2026 were included. Interventions involved CWI compared with passive rest, active recovery, or non-immersive control conditions. The primary outcome was DOMS, while secondary outcomes included creatine kinase (CK), maximal voluntary contraction (MVC), and performance or anaerobic power. Effect sizes were calculated using standardized mean differences (SMDs) or mean differences (MDs), with 95% confidence intervals (CIs). Heterogeneity was assessed using the I^2 statistic, and leave-one-out sensitivity analyses were performed to identify influential studies. Two reviewers independently screened records using Rayyan.ai, and the risk of bias in RCTs was assessed using the Cochrane Risk of Bias 2.0 tool.
Results: Fifteen studies were included, six of which were eligible for meta-analysis of the primary outcome. The pooled analysis showed no statistically significant reduction in DOMS with CWI compared with control interventions (SMD = −0.39; 95% CI: −1.39 to 0.62; p = 0.45; I^2 = 87%). Subgroup analyses revealed no significant effects at 24 hours (SMD = 0.01; 95% CI: −0.49 to 0.52; p = 0.96; I^2 = 1%), 48 hours (SMD = −1.83; 95% CI: −4.88 to 1.21; p = 0.24; I^2 = 93%), or 72 hours (SMD = −2.10; 95% CI: −5.08 to 0.89; p = 0.17; I^2 = 93%). Leave-one-out sensitivity analysis identified one influential study as the main source of heterogeneity. After its exclusion, heterogeneity decreased to 0%, while the pooled effect on DOMS remained statistically non-significant (SMD = 0.26; 95% CI: −0.07 to 0.58; p = 0.12). For secondary outcomes, pooled analysis showed a significant reduction in CK levels favoring CWI (MD = −26.27; 95% CI: −47.18 to −5.36; p = 0.01; I^2 = 11%), particularly at 48 hours (MD = −39.49; 95% CI: −64.68 to −14.31; p = 0.002; I^2 = 0%). Findings for MVC, strength, and performance or anaerobic power were inconsistent across studies, potentially reflecting differences in exercise protocols, immersion parameters, comparator conditions, and recovery time points.
Conclusion: Cold water immersion does not consistently or significantly reduce DOMS following resistance or eccentric exercise. However, it may support physiological recovery by reducing markers of muscle damage, particularly CK levels. Its effectiveness may depend on the type of exercise, immersion protocol, and recovery timing. Future RCTs should adopt standardized exercise models, immersion protocols, and outcome assessment methods to improve the comparability of findings.
Keywords: active recovery; cold water immersion; creatine kinase; delayed-onset muscle soreness; passive recovery

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Effects of resistance training and astaxanthin supplementation on exercise-induced oxidative stress in healthy adult men

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Background: Resistance training increases reactive oxygen species (ROS) production, resulting in transient exercise induced oxidative stress and lipid peroxidation. Nutritional antioxidant supplementation, such as astaxanthin, has been proposed as a strategy to attenuate oxidative stress by reducing oxidative damage. However, the relative effects of resistance training and astaxanthin supplementation on exercise-induced oxidative stress remain unclear. Therefore, this study investigated the independent and combined effects of resistance training and astaxanthin supplementation on plasma malondialdehyde (MDA), a biomarker of oxidative stress, in healthy adult men.

Methods: A double-blind, placebo-controlled randomized trial with a 2×2 factorial design was conducted in 32 healthy adult men recruited from a fitness centre in Tangerang, Indonesia. Participants were randomly assigned to one of four groups ($n = 8$ per group): resistance training plus astaxanthin, resistance training plus placebo, non-training plus astaxanthin, or non-training plus placebo. Astaxanthin (6 mg/day) or placebo was administered daily for 14 days. Plasma malondialdehyde (MDA) concentrations were measured at baseline and after the intervention using the Thio barbituric acid reactive substances (TBARS) assay. Changes in plasma MDA concentrations were analysed using two-way repeated-measures analysis of variance (ANOVA) to evaluate the main effects of resistance training and astaxanthin supplementation, as well as their interaction, with statistical significance set at $p < 0.05$.

Results: Following the 14-day intervention, plasma MDA concentrations decreased across all groups. Post intervention plasma MDA concentrations were lowest in the resistance training plus astaxanthin group (0.592 ± 0.145), followed by the non-training plus astaxanthin group (0.681 ± 0.093), non-training plus placebo group (0.835 ± 0.107), and resistance training plus placebo group (0.900 ± 0.126). Overall, plasma MDA concentrations decreased significantly over time ($p < 0.001$). Two-way repeated-measures ANOVA revealed a significant time-by-supplement interaction ($p = 0.019$). Resistance training showed no significant main effect ($p = 0.079$), and no significant interaction between resistance training and astaxanthin supplementation was observed ($p = 0.983$).

Conclusion: Astaxanthin supplementation was associated with greater reductions in plasma MDA concentrations than placebo, whereas resistance training alone did not demonstrate a significant independent effect during the 14-day intervention. Although no significant interaction between resistance training and astaxanthin supplementation was observed, the resistance training plus astaxanthin group exhibited the lowest post intervention plasma MDA concentration. These findings support astaxanthin supplementation as a complementary nutritional strategy for attenuating exercise-induced oxidative stress in healthy adult men.

Keywords: astaxanthin, exercise-induced oxidative stress, malondialdehyde, resistance training, sports nutrition

Pre-participation screening in sports events: evidence to inform age tailored screening in Indonesia

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Background: Indonesia's recreational and competitive exercise culture is expanding, with increasing participation in endurance and mass sporting events. Although regular exercise improves population health, vigorous activity may trigger sudden cardiac arrest or major adverse cardiovascular events in susceptible individuals. In younger athletes, inherited or congenital cardiovascular disorders predominate, whereas coronary artery disease is a major concern in athletes aged ≥35 years. This review synthesizes international evidence on pre-participation cardiovascular screening to inform an age-tailored approach for Indonesian sports events.

Methods: A structured literature search was conducted in PubMed, ScienceDirect, Europe PMC, Cochrane Library, and SAGE Journals. Eligible studies included prospective cohorts, retrospective cohorts, and diagnostic accuracy studies involving competitive or recreational athletes undergoing PPS using medical history, physical examination, resting 12-lead ECG, or exercise stress testing. Studies were included if they reported diagnostic yield, referral or false-positive rates, cardiovascular diagnoses, or subsequent SCA/SCD/MACE outcomes. Findings were synthesized by age group: youth ≤18 years, adults 19-34 years, and master athletes ≥35 years.

Results: Four studies involving 85,359 athletes met the eligibility criteria. In a large mixed-age cohort, 7.6% of PPS evaluations required se cond-line investigations, while cardiac diagnoses increased with age from 0.06% in youth athletes (aged 7-18 years) to 1.19% in athletes aged ≥35 years. Among master athletes (aged ≥35 years), cardiovascular disease was identified in 11.4% at baseline in one prospective cohort, with MACE occurring at 2.8/1000 athlete-years; age, Framingham Risk Score, and LDL cholesterol were predictive of CAD. Another diagnostic accuracy study in master athletes found SCD-relevant conditions in 2.5%, with Seattle ECG criteria showing the highest AUC among compared ECG interpretation systems. In youth athletes, additional investigations were required after 8.9% of first-line evaluations, and 64% of SCD-risk cardiovascular diagnoses were detected during repeat rather than initial screening.

Conclusion: Available evidence suggests that PPS can identify silent cardiovascular abnormalities and support age-tailored risk stratification in athletes. Repeat screening appears particularly relevant in youth athletes, while CAD risk assessment is essential in master athletes. However, variability in ECG interpretation, limited detection of subclinical CAD by functional stress testing, and the absence of unscreened control groups should be considered when adapting PPS protocols for Indonesia

Keywords: athletes; pre-participation screening; cardiovascular screening; electrocardiography; sudden cardiac death; sports events

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Ultrasound-guided secretome injection as a regenerative strategy for refractory lateral epicondylitis: a case report

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Background: Lateral epicondylitis is a common overuse injury characterized by degenerative tendinopathy of the extensor carpi radialis brevis (ECRB) tendon, with a subset of patients demonstrating suboptimal response to conventional conservative therapies. This report evaluates the effectiveness of a multimodal approach combining ultrasound guided intratendinous secretome injection, physiotherapy, and progressive exercise therapy in the case of chronic lateral epicondylitis.
Methods: A 36-year-old female presented with a five-month history of right elbow pain exacerbated by prolonged computer use and regular participation in padel three to five times per week. Physical examination revealed localized tenderness over the lateral epicondyle, extensor muscle tightness, and positive Cozen's, Mill's, and Maudsley's tests. Ultrasound imaging demonstrated a 0.09 cm^2 hypoechoic lesion within the common extensor tendon, and the baseline Patient Rated Tennis Elbow Evaluation PRTEE score was 49 out of 100. The patient underwent two sessions of ultrasound guided intratendinous secretome (USEPro®) injection 1 cc, combined with routine physiotherapy including ultrasound therapy and electrical stimulation, as well as a four-week progressive exercise program targeting the wrist extensor muscles.
Results: Marked clinical and structural improvements were observed, with the PRTEE score decreasing to 10 out of 100 after the first injection and further improving to 1 out of 100 following the second injection. Physical findings are normalized, with resolution of tenderness and negative provocative tests. Follow up ultrasound demonstrated reduction of the hypoechoic area to 0.05 cm^2 after the first intervention and complete resolution after the second, accompanied by restoration of organized tendon architecture.
Conclusion: This multimodal approach integrates ultrasound-guided intratendinous secretome injection to precisely target the tendon lesion, adjunctive physiotherapy to support pain control and tissue recovery, and progressive exercise therapy to restore wrist-extensor strength and load tolerance. The combined strategy was associated with substantial clinical and sonographic improvement in this patient and may represent a promising therapeutic option for refractory lateral epicondylitis; however, controlled studies are required to determine the contribution of each component and confirm its safety and effectiveness.
Keywords: lateral epicondylitis, regenerative medicine, secretome therapy, tendinopathy

Self-massage and progressive muscle relaxation training to support physical and mental balance in pregnant women: a community service program

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Background: Pregnancy involves biomechanical, hormonal, and psychological changes that commonly cause low back pain, muscle tension, fatigue, sleep disturbance, stress, and anxiety. Self-massage and progressive muscle relaxation (PMR) are safe, simple, non-pharmacological self-care techniques, yet antenatal education at the partner clinic had focused on general information and had not taught these skills in a structured way. This community service program aimed to improve pregnant women's knowledge and skills in managing physical and psychological tension through self-massage and PMR.
Methods: The program was conducted with the Pregnant Women Community of Arda Clinic, Yogyakarta, in collaboration with the Faculty of Medicine, Universitas Negeri Yogyakarta, using a one-group pretest–posttest approach. A half-day training on 16 August 2026 for second- and third-trimester pregnant women comprised education, demonstration, and guided practice of self-massage (neck, shoulders, upper back, arms, and legs; 5–10 minutes) and PMR (graded muscle contraction and relaxation with breathing; 10–15 minutes). Participants received a practice module, visual guide, and self-monitoring sheet. Knowledge was assessed with a five-item pre-and post-test, and skills through observation.
Results: Fifty pregnant women participated. The mean knowledge score increased from 77.6 to 98.0, with all participants achieving the maximum post-test score. The high baseline score indicated a ceiling effect that limited measurable improvement. During guided practice, participants were engaged and able to follow the complete self-massage and PMR sequences. Program outputs included a publication on the faculty's official Instagram account, a draft copyright registration, and a draft implementation agreement between the university and the clinic.
Conclusion: Structured, low-cost self-massage and PMR training was feasible and well received in an antenatal community setting, equipping pregnant women with practical self-care skills for daily use. Future programs should use more discriminating knowledge instruments, assess outcomes such as pain, stress, anxiety, and sleep quality, and integrate the module into routine pregnancy classes.
Keywords: antenatal education, pregnant women, progressive muscle relaxation, self-care, self-massage

Beyond the inbody score: body composition characteristics of junior high school student-athletes in Yogyakarta

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Background: Accurate assessment of body composition in young adolescent athletes is critical to optimize athletic performance, tailor training regimens, and monitor growth while preventing both undernutrition and excess adiposity. Bioelectrical impedance analysis (BIA) provides an objective, non-invasive method for evaluating skeletal muscle mass, body fat distribution, and nutritional status. This study aimed to characterize the body composition profiles of adolescent student-athletes from SMPN 13 Kota Yogyakarta.
Methods: A cross-sectional descriptive study was conducted among 28 student-athletes (aged 12 to 14 years) at Sekolah Menengah Pertama Negeri 13 Kota Yogyakarta. Whole-body and segmental body composition including skeletal muscle mass (SMM), percent body fat (PBF), body mass index (BMI), visceral fat area (VFA), and extracellular water ratio (ECW ratio) were assessed using direct segmental multi-frequency bioelectrical impedance analysis (InBody 770) under standardized testing conditions. Data were summarized descriptively to identify muscle development and adiposity trends across the cohort.

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Results: Analysis of the student-athletes demonstrated a wide spectrum of anthropometric and body composition parameters. While multiple athletes exhibited favorable athletic profiles characterized by high lean muscle mass and low to normal adiposity (PBF ranging from ~3.0% to 18.9% in lean individuals), substantial heterogeneity was identified across the cohort. Several student-athletes presented with underweight profiles requiring muscle and nutritional accretion, whereas others exhibited elevated adiposity with PBF exceeding 35% and VFA > 100 cm^2 (reaching up to 145 cm^2), indicating obesity and increased cardiometabolic strain despite athletic participation. Segmental lean analysis predominantly showed balanced upper-to-lower body development, with lower-limb muscularity reflecting sport-specific loading. ECW ratios remained within physiological norms (0.370-0.394), confirming well-regulated fluid balance and absence of significant systemic edema.
Conclusion: Junior high school student-athletes exhibit considerable variability in body composition, highlighting the non optimal athletic conditioning within same school sports cohort. These findings underscore the necessity of incorporating individualized nutritional guidance and tailored conditioning programs rather than a one-size-fits-all training model for adolescent athletes.
Keywords: adolescent athletes, body composition, bioelectrical impedance analysis, percent body fat, skeletal muscle mass, sports medicine

Characteristics of overuse injuries and training profiles among recreational cyclists: a cross-sectional study using the OSLO sports trauma research center questionnaire (OSTRC-H2)

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Background: Previous studies have reported musculoskeletal complaints in up to 50% of cyclists, with overuse injuries accounting for a larger proportion (60%). Overuse injuries are musculoskeletal problems that may arise from repetitive movements, training load, and inadequate recovery during sports activities, including cycling. This study aimed to determine the characteristics and prevalence of overuse injuries, injury history, the impact of complaints, and training profiles and habits among recreational cyclists using the Oslo Sports Trauma Research Center Questionnaire (OSTRC-H2).
Methods: This cross-sectional study involved 95 participants recruited through purposive sampling. Data were collected online using Google Forms and included respondent characteristics, training profiles, injury history, and complaints experienced within the previous seven days. Descriptive analysis was performed using frequencies and percentages.
Results: Among the 95 participants, the majority were aged 26–35 years (35.8%), male (89.5%), 158–170 cm tall (58.9%), weighed 65–89 kg (57.9%), and employed in the private sector (49.5%). Road bikes were the most commonly used bicycle type (67.4%). A total of 31.6% had 4–6 years of cycling experience, and 76.8% had participated in cycling events. Injury prevention measures included bike fitting (60.0%) and strength training (55.8%), while warm-ups, cool-downs, and stretching were generally performed inconsistently. Overall, 38.9% reported a history of injury, 27.4% had received medical treatment, and 27.4% still experienced complaints at the time of the survey. The complaints were generally mild (56.8%). Overall, the participants were predominantly adult male road cyclists; however, greater consistency in injury prevention practices is needed.
Conclusion: A total of 38.9% of recreational cyclists reported a history of overuse injuries, while 27.4% still experienced complaints at the time of the survey. The knee and neck were the most frequently reported sites of injury. Symptoms generally had a mild impact on performance, pain severity was predominantly mild, and most participants were still able to train as usual. Most participants had not yet established optimal training profiles and habits. Therefore, injury prevention education and the consistent implementation of appropriate training practices should be improved among recreational cyclists.
Keywords: cycling; injury prevention; overuse injuries; recreational cyclists; sports injuries

Differences in the influence of functional strength training (FST) on the risk of injury in Poomsae Taekwondo and Kyorugi Dojang Krida Taekwondo athletes

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Background: Taekwondo is a combination of 3 basic words, namely: tae which means legs for destroying or called kicking techniques, kwon means hands for striking and defending oneself or called punching techniques and do, which means martial arts that use barefoot and hand techniques. The risk of injury can be caused by physical vulnerability in facing unexpected environmental conditions, as well as sudden changes. The Functional Movement Screen (FMS) is a screening tool used to evaluate seven basic movement patterns in individuals who are currently without complaints of pain or who are currently with a musculoskeletal injury. Functional Strength Training can stimulate strength, flexibility, balance and coordination by simulating movement targets. This study aimed to determine the difference in the effect of functional strength training on the risk of injury in Poomsae & Kyorugi Dojang Krida Taekwondo taekwondo athletes.
Methods: The research design used quasi-experimental. Then, this research used a pretest and posttest two group design by carrying out a functional movement screen before and after experimental treatment in the first group (poomsae taekwondo athletes) and the second group (kyorugi taekwondo athletes), both groups were given functional strength training. The sampling in this study employed a purposive sampling technique.
Results: The measurement value of reducing the risk of injury in groups I and II, namely the provision of Functional Strength Training was analyzed using the Wilcoxon signed ranks t test, and it obtained a probability value (p value) for group I of 0.017 and for group II of 0.026. To test hypothesis III, the reserachers applied the Mann-Whitney test to obtain a probability value (p value) of 0.336.
Conclusion: Based on data analysis and discussion of the research conducted, it can be concluded that there is no difference in the effect of Functional Strength Training on reducing the risk of injury in Poomsae and Kyorugi Dojang Krida Taekwondo athletes.
Keywords: functional movement screen, functional strength training, injury risk, Poomsae, taekwondo

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Beyond maximum grip strength: handgrip strength asymmetry is independently associated with poorer lower-extremities physical performance

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Background: Handgrip strength is widely used to assess muscle function in older adults; however, bilateral handgrip strength asymmetry has emerged as a potential marker of neuromuscular impairment beyond absolute muscle weakness. Evidence regarding its association with multidomain lower-extremity physical performance remains limited, particularly in low and middle-income countries. This study investigated the association between handgrip strength asymmetry and lower-extremity physical performance among community-dwelling older Indonesian adults.
Methods: A cross-sectional analysis was conducted using the fifth wave of the stronger hand and evaluated as both a continuous exposure (per 10% increase) and a binary exposure (>10% asymmetry). The primary outcome was a multidomain lower-extremity physical performance z-score derived from gait speed, repeated chair-stand performance, and standing balance. Multivariable regression models adjusted for age, sex, education, body mass index, smoking status, systolic blood pressure, antihypertensive medication, diabetes medication, and maximum grip strength. Threshold sensitivity analyses, phenotype analyses combining weakness and asymmetry, restricted cubic spline analyses, sex interaction analyses, and missing-data assessments were performed.
Results: Among 3,335 participants, greater grip strength asymmetry was independently associated with poorer multidomain physical performance. Each 10% increase in grip asymmetry was associated with a higher multidomain impairment score (β=0.041, 95% CI 0.019–0.062; P<0.001) and poorer chair-stand performance (β=0.020, 95% CI 0.010–0.030; P<0.001). Participants with grip asymmetry >10% also demonstrated significantly poorer multidomain performance (β=0.089, 95% CI 0.044–0.134; P<0.001). Individuals presenting both low grip strength and asymmetry exhibited the greatest functional impairment. Restricted cubic spline analyses demonstrated an approximately linear dose-response relationship without significant non-linearity, while no significant interaction with sex was observed for the primary outcome (P_interaction=0.608).
Conclusion: Handgrip strength asymmetry was independently associated with poorer multidomain lower-extremity physical performance beyond maximal grip strength alone. These findings support incorporating bilateral grip strength assessment into geriatric functional evaluation and suggest that grip strength asymmetry may serve as a simple, clinically accessible marker for identifying older adults at increased risk of functional decline.
Keywords: aging, handgrip strength, muscle function, physical performance, sarcopenia, symmetry

Analysis of potential biomarker of skeletal muscle aging: integrating mice and human online database

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Background: Aging affects the musculoskeletal system in the form of skeletal muscle-mass loss and functional decline which lead to sarcopenia development. Identification of unrecognized altered molecular signaling pathways might broaden the understanding of the age-related deterioration process while also bringing additional targets which sought to elevate the rejuvenation attempt.
Methods: This study explores the possibilities utilizing publicly available online RNA-Seq databases from soleus of young 6 month compared to old 22-24 month rats provided by NASA (OSD-295;https://visualization.genelab.nasa.gov/data/OSD-295), then compared it with three human muscle datasets deposited in Gene Expression Omnibus (GEO) (GSE164471, GSE144304, GSE6461) which analyzed online using GEO2R. Target genes function was analyzed using All RNA-seq and ChIP-seq sample and signature search (ARChS4) platform while stringDB was utilized to check the possible interaction.
Results: Upon significantly differentially expressed gene lists between young and old rats, we found that only MYLK4 gene consistently expressed differentially between adolescence and elderly donor across human datasets. Gene Ontology(GO) analysis revealed regulation of skeletal muscle contraction homeostasis and supported by its predicted alteration in form of abnormal muscle electrophysiology and muscle degeneration on both human and mouse phenotype prediction. Androgen receptor might become future therapeutic targets since they are listed as upstream transcription factors of the gene.
Conclusion: The proposed online-based exploration revealed the prominence of MYLK4 signaling as important driver in skeletal muscle aging both in mice and humans, while also providing early insight of its function and potential research exploration pathways.
Keywords: aging, biomarkers, GEO2R, musculoskeletal, senescence

Bioactive peptides for body composition: when morphological gains fail to translate into performance – a scoping review

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Background: Bioactive peptides are increasingly marketed to athletes for body composition, recovery, and performance, yet popularity has outpaced high-quality human evidence and several are prohibited in sport. This scoping review maps clinical evidence on bioactive peptides, compare their performance-enhancing effects across functional clusters, and evaluates safety profiles in athletic and clinical populations.
Method: Following PRISMA-ScR, PubMed, Cochrane, and Scopus were searched to April 2026 using a Population–Concept–Context framework. Eligible studies enrolled adults (≥18 years) across athletic, recreationally active, and clinical or sedentary populations reporting bioactive-peptide effects on body composition, performance, or recovery. Animal, in-vitro, non-peptide interventions, and records without primary human outcome data (reviews, editorials, protocols) were excluded. Three reviewers screened records in Rayyan with consensus; data were charted on a piloted form capturing population, intervention, comparator, outcomes, and funding source. Methodological quality was appraised using the PEDro scale. Studies were

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grouped a priori into four mechanism-based clusters: weight management, tissue recovery, exercise mimetics, and growth hormone (GH)/insulin-like growth factor (IGF)-axis modulators.
Results: From 5,227 records, 27 studies (predominantly RCTs) were included. In weight management, incretin-based agents produced large fat loss (retatrutide: −26.3% fat mass; tirzepatide: +18.4% weight loss) but risked concurrent lean-mass loss, mitigated by bimagrumab co-therapy or exercise. For tissue recovery, collagen peptides enlarged tendon cross-sectional area, drove dose-dependent collagen synthesis, and improved tendinopathy outcomes, yet yielded no gain in strength or performance and were inferior to whey for many such trials were industry-funded. GH secretagogues and GH-releasing factors raised lean body mass and IGF-1 levels while decreasing visceral fat, but without functional gain (greater lean mass without strength; larger tendon size without performance). A consistent performance–physiology mismatch emerged, with surrogate gains seldom translating into function. Long-term safety data remain limited and side-effect profiles poorly established: BPC-157 and ipamorelin have no human trials, while CJC-1295's only human data are a short-term pharmacokinetic study measuring GH/IGF-1 secretion rather than body composition or performance; all are WADA-prohibited under category S2.
Conclusion: Current evidence supports collagen peptides for tendon rehabilitation and incretin agents for fat loss when paired with muscle-preserving exercise, but does not establish bioactive peptides as proven performance enhancers: morphological and lean-mass gains repeatedly failed to translate into strength or performance, so hypertrophy must not be equated with functional benefit. Peptides are best framed as conditional, evidence-graded adjuncts to-not substitutes for-training, weighed against funding source, methodological quality, safety, and anti-doping risk.
Keywords: anti-doping, bioactive peptides, body composition, performance, sports medicine

Beyond arthrofibrosis: successful sports medicine rehabilitation despite a potential mechanical block after complex lower-limb trauma

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Background: Severe post-traumatic knee stiffness following complex lower-limb trauma can result from arthrofibrosis, prolonged immobilisation, muscle wasting and mechanical restriction. Identifying potentially modifiable contributors is essential to optimise functional recovery. This case highlights the importance of integrating radiographic assessment with structured sports medicine rehabilitation when severe knee stiffness coexists with retained fixation hardware and a potential mechanical block.
Methods: A 44-year-old Indian man sustained multiple injuries in a motor vehicle accident on 20 October 2025. On 29 October 2025, he underwent fixation of a left distal femoral fracture using an intramedullary locking nail and screws, tension-band wiring for a patellar fracture, anterior pelvic plating for pubic symphysis disruption, and iliosacral screw fixation. He was referred to Sports Medicine on 29 January 2026 for severe left knee stiffness and suspected arthrofibrosis. Initial assessment revealed wheelchair dependence, a knee range of motion (ROM) of 0–30°, marked patellar stiffness, and visible muscle wasting, with preserved muscle activation. Lateral radiography demonstrated fracture union and a distal femoral locking screw positioned close to the posterior aspect of the knee, potentially contributing to mechanical restriction. The screw was retained while further orthopaedic management was considered. Rehabilitation included progressive ROM exercises, patellar mobilisation, muscle strengthening, activation exercises, and functional retraining. Clinical progress was assessed after approximately three months of rehabilitation.
Results: At reassessment on 23 April 2026, knee ROM had improved from 0–30° to approximately 0–100°, representing a 70° increase in the total ROM arc. Pain remained well controlled, muscle function improved, and the patient progressed from wheelchair dependence to functional ambulation despite the retained fixation hardware.
Conclusion: This case demonstrates that severe post-traumatic knee stiffness should not automatically be attributed solely to arthrofibrosis. Careful clinical-radiographic correlation identified a potential mechanical contributor, while structured sports medicine rehabilitation achieved substantial improvements in knee mobility and functional independence despite retained hardware. A multidisciplinary approach combining early rehabilitation, objective ROM monitoring and recognition of mechanical factors may help maximise recovery while definitive Orthopaedic management is being considered.
Keywords: arthrofibrosis, knee stiffness, mechanical block, post-traumatic rehabilitation, sports medicine

Progressive muscle relaxation as a psychophysiological regulation strategy: effects on competitive anxiety and blood pressure in pencak silat athletes

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Background: This study aims to determine the effect of progressive relaxation training on competitive anxiety and blood pressure in pencak silat athletes.
Methods: The study was conducted in February–May 2026 at the Padepokan IPSI Tangerang Regency using a one-group pretest-posttest design. The study sample consisted of 29 athletes determined through total sampling. Anxiety was measured using the Sport Competition Anxiety Test (SCAT), while blood pressure was measured using the auscultation method. The intervention in the form of progressive relaxation training was carried out in two stages, each consisting of six sessions.
Results: Data analysis showed a decrease in the average anxiety score from 20.03 to 17.24, systolic blood pressure from 130.86 to 121.38 mmHg, and diastolic blood pressure from 92.41 to 85.00 mmHg. A paired-samples t-test based on individual data showed a significant difference in anxiety, $t(28) = 9.46$, $p < .001$; systolic blood pressure, $t(28) = 11.88$, $p < .001$; and diastolic blood pressure, $t(28) = 9.17$, $p < .001$.
Conclusion: These findings strengthen the evidence that progressive relaxation training has the potential to be part of mental skills training to help regulate anxiety and physiological responses in athletes. These findings are consistent with recent evidence demonstrating the effectiveness of relaxation and other psychological interventions in reducing competitive anxiety in athletes.
Keywords: athletes, blood pressure, competitive anxiety, pencak silat, progressive relaxation, sports psychology

Rehabilitation and return to sport following Weber type A ankle fracture in a professional football player: a case report

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Background: Ankle fracture is one of the common injuries that happen to athletes. This injury can significantly affect an athlete's ability to return to competition. In professional level, the management of these injuries presents a particular challenge, as it requires a balance between the healing process, functional recovery, and the demands of sports performance. Weber type A fracture is a distal fibular fracture located below the level of the syndesmosis and usually considered stable. However, reports describing the rehabilitation process and return to sport in professional football players with Weber type A fractures remain limited.
Methods: A 23-year-old male professional football player sustained a left distal fibular fracture during training following a collision with an opposing player. The injury occurred when the opposing player stepped on the lateral aspect of the athlete's ankle while his foot was planted, resulting in excessive pronation and external rotation. Clinical examination revealed swelling and tenderness over the lateral malleolus, and radiographic examination confirmed a closed fracture of the left distal fibula. The athlete underwent conservative management using a controlled ankle motion (CAM) walker boot and was instructed to remain non-weight-bearing for 12 weeks. Rehabilitation commenced after boot removal and included range-of-motion (ROM) exercises and partial weight-bearing for four weeks, followed by progression to full weight-bearing as tolerated. Ultrasound and transcutaneous electrical nerve stimulation (TENS) were applied before rehabilitation sessions. Rehabilitation subsequently progressed to running, agility training, and sport-specific exercises according to functional tolerance.
Results: In the fifth month after injury, the athlete achieved pain-free running and commenced agility training, including lateral and backward shuffles. Training progressed to sport-specific activities involving forward and backward running, side steps, and rapid changes of direction. At six months, the athlete returned to sport with limited participation. By 6.5 months, he had resumed full training sessions and participated in competitive matches.
Conclusion: This case demonstrates favorable functional outcomes following conservative management and progressive rehabilitation for a Weber type A fracture in a professional football player. A structured rehabilitation program progressing from ROM restoration and weight-bearing activities to agility and sport-specific training supported the athlete's return to sport at six months and return to full training and competitive matches at 6.5 months. Rehabilitation progression guided by functional tolerance may facilitate a successful return to sport in professional football players with Weber type A fractures.
Keywords: ankle fracture, professional football player, rehabilitation, return to sport, Weber type A fracture

Feasibility of smartwatch-based exercise intensity monitoring in adolescents using two shared devices: a quasi-experimental study

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Background: Adolescent physical inactivity remains a persistent global health problem, and current WHO guidance emphasizes intensity distribution rather than volume alone, a dimension adolescents cannot judge without objective feedback. Consumer wearables make such feedback accessible, but school implementation in low-resource settings is constrained by cost, and devices are often experienced by young people as surveillance rather than as instruments they control. This study evaluated whether a rotating-wear smartwatch protocol, using only two units for thirty-two students, could yield monitoring-quality biometric data and change exercise intensity behavior in an Indonesian junior high school.
Methods: A one-group pre-test–post-test quasi-experimental design was delivered across twelve 90-minute sessions over six weeks to 32 grade VII students (16 male, 16 female; 13.6 ± 0.5 years) in SMPN 24 Banjarmasin, South Kalimantan. Two Garmin Forerunner 165 units were allocated by restricted randomization stratified by sex and balanced with a 4 × 4 Latin square across wearer, device, block order and activity type, producing 48 wearer-slots. Inter-device agreement was verified beforehand across 48 paired one-minute heart rate epochs. Outcomes were usable data yield, ICC (2,1) agreement, heart rate, proportion of block time at or above 64% of predicted maximal heart rate, and a 20-item biometric data literacy scale.
Results: Forty-five of 48 wearer-slots produced usable records (93.8%). Inter-device agreement was excellent, ICC(2,1) = .989 (95% CI .981–.994), bias 0.84 bpm, limits of agreement −6.31 to 7.99; device versus student-palpated heart rate gave ICC(2,1) = .872. Within the matched-wear subsample (n = 16), time at or above 64% of predicted maximal heart rate rose from 54.72% to 64.64% (t(15) = 4.91, p < .001, d = 1.23) and mean heart rate from 127.36 to 132.21 bpm (p< .001). Biometric data literacy rose from 62.59 ± 7.94 to 77.78 ± 8.30 (t(31) = 11.19, p < .001, d = 1.98), with no difference between sexes (p = .857).
Conclusion: Smartwatch-based exercise intensity monitoring is feasible in resource-limited schools; the enabling factor is the allocation protocol rather than the number of devices. This gives sports medicine and school health practitioners a low-cost route to objective adolescent physical activity monitoring where one device per student is unattainable.
Keywords: adolescents, exercise intensity, heart rate monitoring, low-resource settings, physical activity monitoring, smartwatch

Beyond VISA-P: athlete-centred recovery and return-to-sport reporting in exercise-based patellar tendinopathy trials

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Background: The eight-item Victorian Institute of Sport Assessment–Patellar Tendon Questionnaire (VISA-P) is widely used to assess symptoms and functional impairment in patellar tendinopathy. Pain, tendon imaging, strength, and physical-performance outcomes are also commonly evaluated in exercise-based rehabilitation trials. However, improvement in these measures does not necessarily translate into meaningful recovery from an athlete's perspective, especially restoration of sport participation and performance. This review evaluated the reporting of return-to-sport and other prespecified athlete-centred recovery outcomes in randomized controlled trials of exercise-based rehabilitation for patellar tendinopathy.
Methods: This systematic meta-research review was conducted in accordance with PRISMA 2020. PubMed, the Cochrane Library, Scopus, and PEDro were searched from inception to 13 September 2026 for randomized controlled trials of exercise-based rehabilitation in adults with patellar tendinopathy. Eligible participants were actively participating in recreational, competitive, or professional sport at baseline; mixed populations were eligible only when data for sports-active participants were separately extractable. Linked publications from the same trial were merged as a single study. Reporting of return to sport and other athlete-centred outcomes was synthesized descriptively.
Results: Thirteen independent randomized controlled trials comprising 507 randomized participants met the eligibility criteria. Pain was assessed in all 13 trials (100%), VISA-P in 12 (92%), and physical function or performance in 10 (77%). In contrast, only one trial (8%) formally assessed return to sport, while two additional trials (15%) reported longitudinal sport participation relative to preinjury levels. Thus, only three trials (23%) reported any

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return-to-sport or longitudinal participation outcome. No trial designated return to sport as a primary outcome or used a validated multidimensional framework to determine return-to-sport readiness. Treatment satisfaction or global perceived improvement was reported in five trials (38%). No trial reported psychological readiness or confidence to return to sport, fear of returning or reinjury, goal attainment, or recurrence.

Conclusion: Exercise-based rehabilitation trials for patellar tendinopathy predominantly defined recovery through symptoms, impairment, and physical function, while sport-specific and athlete-centred recovery remained largely unmeasured. Only 23% reported a recovery-oriented return-to-sport or preinjury-anchored participation outcome, and none assessed psychological readiness. Future trials should prospectively define multidimensional return-to-sport outcomes encompassing return to participation, return to preinjury sport, return to performance, and psychological readiness to determine whether rehabilitation enables athletes to return not merely to participation, but to their desired level of sport.

Keywords: athlete-centred outcomes, exercise-based rehabilitation, patellar tendinopathy, return to sport, systematic review

Traditional games as physical activity interventions in children: a scoping review

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Background: Physical inactivity among children is a growing public health problem worldwide, and traditional games have been suggested as an accessible, low-cost way to get children moving again. Several primary studies have looked at traditional game-based interventions, but few reviews have mapped the evidence on physical fitness and motor development together in primary school-aged children. This scoping review looked at the effects of traditional games-based interventions on physical fitness and motor development in primary school-aged children.

Methods: This review followed the PRISMA-ScR guideline. We searched Scopus and PubMed and found 134 records; after removing 22 duplicates, 112 remained for screening. Two reviewers screened titles and abstracts independently, and any disagreement was settled through discussion. The same process was repeated for full-text screening, using predefined criteria: participants had to be primary school-aged children, the intervention had to be a traditional, folk, or indigenous game, and the study had to measure a physical fitness or motor development outcome.

Results: Twenty-two studies met these criteria. Indonesia contributed the most studies (11), with the rest coming from Turkey, Kazakhstan, Pakistan, Russia, Spain, India, and Vietnam. The majority found significant improvements in gross or fundamental motor skills after traditional game-based interventions, usually measured with the Test of Gross Motor Development (TGMD-2 or TGMD-3) or a similar tool. Three studies applied these interventions to children with autism, intellectual disability, or ADHD, and all reported significant improvements. Not every study found a benefit, though: one trial found traditional games worked better than virtual reality exergames for agility and strength, while the largest cluster-randomized trial in our review (n=562) found no significant effect on gross motor competence or quality of life. Most of the included studies were small and non-randomized (only four were randomized trials), and few used validated physical literacy measures or followed children beyond the immediate post-intervention period.

Conclusion: Traditional games look like a promising and inexpensive way to support motor development in primary school-aged children, including children with special needs, but the evidence behind this is still uneven in quality. Bigger, more standardized randomized trials with validated outcome measures and longer follow-up are needed before traditional games can be confidently recommended as part of physical education programs.

Keywords: children; motor development; physical education; physical fitness; traditional games

Tropical marine exercise for sarcopenic frailty in older adults: a mechanistic framework

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Background: Sarcopenia and physical frailty are leading drivers of disability in ageing populations, yet exercise delivery in tropical maritime nations rarely exploits the environment most available to coastal older adults: the sea itself. Two bodies of literature have developed in parallel and rarely intersect. Thalassotherapy research is anchored in temperate European spa settings, uses artificially heated seawater, and reports rheumatologic or dermatologic outcomes. Aquatic exercise research on sarcopenia uses indoor thermoneutral pools and treats water solely as a gravity-unloading medium. Neither treats the natural marine environment as a composite, multi-stressor conditioning stimulus, and neither addresses tropical seas, whose year-round temperature of approximately 28–30 °C inverts the thermal premise on which temperate thalassotherapy is built. No integrative mechanistic model currently links marine exercise to skeletal muscle adaptation in ageing.

Methods: Narrative review informed by a structured literature search of PubMed and Scopus (inception to 2026) combining terms for seawater, marine and thalasso-based interventions, immersion and water temperature, aquatic exercise, and sarcopenia, frailty or skeletal muscle. Records were screened for mechanistic or clinical relevance to muscle ageing and supplemented by backward citation tracking. Retrieved evidence was mapped to discrete stimulus domains and synthesised narratively against the molecular literature on mechanotransduction, mitochondrial quality control and heat-shock proteostasis. No meta-analysis was performed.

Results: Retrieval was dominated by non-musculoskeletal trials, chiefly nasal irrigation, dermatologic climatotherapy and diving physiology, confirming that direct evidence for marine exercise in sarcopenic frailty is essentially absent. Human studies in older adults were confined to microfiltered seawater supplementation combined with resistance training, on-water balance training, and beach gait training after stroke. From this fragmented base we propose the Tropical Marine Mitohormesis framework. Seven co-occurring stimuli — hydrostatic pressure, buoyancy-modulated loading, hypertonic salinity, warm water temperature, wave turbulence, unstable sand-surface locomotion and repeated submaximal thermal load — converge on two adaptive axes: SIRT3–PGC-1α-dependent mitochondrial biogenesis and HSF1–HSP70-dependent proteostasis, with parallel neuromuscular and postural gains. The tropical thermal inversion redirects the hormetic stimulus from cold-shock toward heat-shock signalling while raising heat strain and dehydration risk in older adults. Reporting of water temperature, salinity, immersion depth and wave conditions was near-absent, precluding replication.

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Conclusion: Marine exercise is mechanistically plausible but empirically untested for sarcopenic frailty. The proposed framework, accompanying dose map and minimum reporting set convert an anecdotal coastal practice into a testable, safety-bounded research agenda for tropical settings.
Keywords: aquatic exercise, frailty, heat shock response, mitochondrial biogenesis, sarcopenia, thalassotherapy

Motor ability profile of children with cerebral palsy at slb n 1 bantul: a basis for developing a special motor development program

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Background: Motor development is an important aspect of children's independence and participation, yet children with cerebral palsy (CP) often experience movement limitations due to impaired muscle tone, coordination, and sensory processing. This study aimed to analyze the motor development of children with CP at SLB N 1 Bantul, Yogyakarta, as part of developing a motor development program model for children with CP.
Method: The study used a quantitative method. Data were collected using a motor assessment instrument for children with cerebral palsy. The instrument consists of 60 items across four components: head control, limb movement, locomotion, and coordination and balance. Each item was scored on a 0–3 scale, and the data were analyzed descriptively. The respondents were 12 children aged 7–15 years (10 boys and 2 girls). Of these, 8 children used wheelchairs, 1 used crutches, and 3 used no assistive device.
Results: The results showed that almost all respondents were able to perform head control and upper extremity movements independently. In contrast, lower extremity movements remained the main barrier, particularly stepping, kneeling, sitting cross-legged, and squatting. In locomotion, none of the respondents were able to jump or run, and only 6 were able to walk with an assistive device. In the coordination component, fine motor and upper extremity coordination tasks could generally be performed, but 7 respondents were not yet able to catch a ball. Balance was also limited: 7 respondents were not yet able to move from sitting to standing or to stand without support.
Conclusion: These findings indicate that special motor development programs for children with CP should focus on muscle strengthening, postural stability, coordination, and sensory support for the lower extremities and balance.
Keywords: cerebral palsy, motor assessment, motor development, special motor development program

Blood-lead screening and body composition measurement on recreational runners

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Background: Outdoor running is increasingly popular among urban populations, yet it exposes individuals to environmental pollutants, including airborne lead (Pb), with known adverse effects on cardiovascular and neurological health, which may influence the performance and recovery of recreational outdoor runners. Despite this, data on blood lead levels among recreational runners remain limited. This study aimed to evaluate blood lead levels and body composition in recreational outdoor runners.
Methods: A cross-sectional study was conducted over three consecutive days involving 48 recreational outdoor runners. Participants completed a structured questionnaire detailing their training frequency and weekly mileage. Body composition was assessed using bioelectrical impedance analysis (BIA). Capillary blood samples were obtained via finger-prick and analyzed using portable LeadCare devices. Blood lead levels were categorized using a cut-off value of 3.5 µg/dL.
Results: Among participants, 22.9% demonstrated blood lead levels >3.5 µg/dL, while 77.1% were within the lower range. Most participants reported running 3–5 times per week (47.9%), with 72.6% achieving a weekly mileage of >15 km. The majority (89%) primarily performed low intensity (easy) runs. Despite regular outdoor exposure, most runners maintain blood lead levels within the low-risk range.
Conclusion: Most recreational outdoor runners in this cohort exhibited blood lead levels within acceptable limits despite routine exposure to outdoor environments. However, the presence of elevated levels in a subset of participants suggests that environmental exposure may still pose a potential health concern. One limitation of this study is the anonymity of the questionnaire respondents, which restricts the researcher from finding the correlation between a recreational runner's pollutant exposure, training characteristics, performance and their blood lead level. Future studies could use cohort method to explore the relationship between pollutant exposure, training characteristics, and performance or health outcomes in urban running populations.
Keywords: air pollution, blood lead level, body composition, environmental exposure, recreational runners

Sport-specific lateral elbow tendinopathy: padel versus tennis biomechanical, pathophysiological and management considerations: a narrative review

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Background: Padel is the fastest-growing racket sport in Indonesia, with permanent courts expanding from 15 in 2021 to 947 by 2025 and projected to exceed 2,500 by 2026. Lateral elbow tendinopathy (LET), colloquially termed tennis elbow and increasingly called padel elbow among clinicians, is the most frequent upper limb pathology in racket sports; the latter term carries no formal nosological status. No framework has synthesised how padel differs from tennis in biomechanical loading, pathophysiological progression and evidence-based management.
Methods: This narrative review followed a protocol pre-registered on Open Science Framework (doi:10.17605/OSF.IO/4KWSP) prior to literature search. Five databases were searched (PubMed, Cochrane Library, SPORTDiscus, Google Scholar, ScienceDirect) up to August 2026, supplemented by reference snowballing. Study selection and data extraction were performed independently by all authors with cross-verification. SANRA guided quality assurance (self-assessed 11/12).
Results: Meta-analysis of 30 randomised trials (n=2,123) establishes exercise as the primary treatment for LET, superior to corticosteroid injection across pain, pain-free grip strength,

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disability at mid-term and long-term follow-up, though effect magnitudes are small and evidence certainty predominantly low. Clinical practice guidelines assign Grade A to PRTEE for outcome measurement and Grade B to isometric, concentric and eccentric loading at three sets of fifteen repetitions over six to twelve weeks. Isometric loading above an individual's pain threshold increases rather than reduces pain. Systematic review of eight studies (n=2,022) identifies the elbow as the most frequently injured site in padel, comprising 20.5% to 74.4% of injuries across cohorts, with tendon involvement predominating at 40.4% to 48%. Padel and tennis share identical pathophysiology at the extensor carpi radialis brevis origin, namely angiofibroblastic tendinosis progressing along the Cook-Purdam continuum. Loading pathways nonetheless differ: padel involves varus elbow stresses, ECRB rubbing against the capitellum and unique overhead strokes (bandeja, víbora, smash off back wall). Structured searching identified no study directly measuring padel racket vibration and no study from Asia or Indonesia, confirming two distinct evidence gaps. An original conceptual model integrating padel-specific loading with the pathology continuum and phase-matched intervention is presented.

Conclusion: Lateral elbow tendinopathy in padel is a sport-specific presentation of the same condition seen in tennis, distinguished by exposure biomechanics rather than cellular pathology. Progressive loading guided by phase assessment and PRTEE-based risk stratification represents the evidence-based first-line approach. Prospective cohort studies on Indonesian padel players and direct biomechanical measurement remain urgent priorities.

Keywords: biomechanics, evidence-based management, lateral elbow tendinopathy, narrative review, padel, tennis

Sacred steps: traditional art dance as a wellness tourism attraction

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Background: Wellness tourism has become one of the fastest-growing segments in the global tourism industry, driven by increasing demand for travel experiences that restore balance across the dimensions of mind, body, and soul. Traditional art dance, deeply rooted in local cultural and spiritual practices, offers strong potential as a wellness tourism attraction rather than merely a performative cultural product. This potential is supported by prior clinical evidence: a quasi-experimental study among elementary school students in Yogyakarta found that Traditional Art Dance Therapy (TADT) produced a significant reduction in stress levels after the intervention. In a similar vein, a study involving Posbindu health cadres tested a Posbindu Cadres Art Dance Therapy (PodCAsT) program based on the premise that dance can be both an enjoyable activity and a means of promoting relaxation to reduce stress, reporting a significant improvement in outcomes following the intervention ($p<0.001$). These findings indicate that traditional dance carries measurable therapeutic value beyond entertainment. However, empirical evidence connecting traditional dance specifically to holistic tourist wellness—assessed through an integrated Mind-Body-Soul framework—remains scarce. This study addresses that gap by experimentally examining the effect of traditional art dance as a wellness tourism attraction on tourists' wellness levels.

Method: This study employed a quantitative experimental design using a one-group pretest-posttest design. A total of 30 participants were purposively selected from tourists/visitors at Yogyakarta. Participants' wellness levels were measured before (pretest) and after (posttest) engaging in a traditional art dance attraction session, using a Wellness Assessment Instrument developed based on the Mind, Body, and Soul criteria. The instrument covered indicators such as mental relaxation and emotional balance (Mind), physical relaxation and energy level (Body), and sense of inner peace/spiritual connection (Soul). Data were analyzed using a paired-sample analysis (paired t-test or Wilcoxon signed-rank test, depending on data normality) to determine whether there was a statistically significant difference between pretest and posttest wellness scores.

Results: The results revealed significant increases in all three wellness dimensions after participation in the traditional dance attraction session: mind (287.30 to 343.80, $p < 0.001$), body (311.70 to 374.77, $p = 0.023$), and soul (281.10 to 318.87, $p < 0.001$). The body dimension showed the greatest change (+63.07), followed by mind (+56.50) and soul (+37.77), indicating that traditional art dance has potential as a wellness tourism attraction.

Conclusion: This study demonstrates that traditional art dance functions effectively as a wellness tourism attraction capable of enhancing tourists' holistic well-being across the Mind, Body, and Soul dimensions. The findings are anticipated to contribute theoretically to the wellness tourism literature by validating traditional dance as an experiential wellness attraction, while offering practical recommendations for tourism destination managers to design and promote culturally-rooted wellness tourism experiences.

Keywords: culture, traditional art dance, well-being, wellness attraction, wellness tourism,

The Indonesian athlete burnout questionnaire (ABQ-ID): cross-cultural adaptation, psychometric validation and associations with sport psychological skills among student-athletes.

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Background: Student-athletes face simultaneous academic and athletic demands that may increase their vulnerability to athlete burnout, particularly during adolescence. The Athlete Burnout Questionnaire (ABQ) is a multidimensional instrument assessing emotional and physical exhaustion, reduced sense of accomplishment, and sport devaluation. However, comprehensive evidence regarding the cross-cultural adaptation and psychometric properties of the Indonesian version of the ABQ (ABQ-ID), as well as its association with sport psychological skills, remains limited among Indonesian student-athletes. This study aimed to evaluate the psychometric properties of the ABQ-ID and examine its association with sport psychological skills among student-athletes.

Methods: A psychometric validation study was conducted among Indonesian student-athletes. Confirmatory Factor Analysis (CFA) was performed to evaluate the construct validity of the ABQ-ID, including model fit and factor loadings. The first analysis involved 143 student-athletes, comprising 57 females (40%) and 86 males (60%). Internal consistency was assessed using reliability analysis. Discriminant validity and the association between athlete burnout and sport psychological skills were examined using a multitrait-multimethod approach with the Psychological Skills Inventory for Chinese Athletes (PSICA). The second analysis involved 104 student-athletes, comprising 53 females (51%) and 51 males (49%).

Results: CFA demonstrated RMSEA = 0.1669 and SRMR = 0.0930, while CFI, GFI, and IFI were >0.90. Factor loadings of the retained items were >0.50, resulting in a final 10-item ABQ-ID with three dimensions. The overall reliability of the ABQ-ID was 0.8864, with reliability coefficients of 0.6821 for emotional and physical exhaustion (EPE), 0.7942 for reduced sense of accomplishment (RSA), and 0.7186 for sport devaluation (SD). The association between

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the ABQ-ID and PSICA was negative and non-significant ($r = -0.1422$, $p = 0.150$), providing evidence of discriminant validity.
Conclusion: The 10-item, three-dimensional Indonesian version of the Athlete Burnout Questionnaire (ABQ-ID) demonstrated good psychometric quality based on the results of Confirmatory Factor Analysis, reliability testing, and discriminant validity testing using a multitrait-multimethod approach.
Keywords: athlete burnout, cross-cultural adaptation, psychometric validation, psychological skills, student-athletes

Economic evidence for exercise interventions targeting frailty and functional decline in older adults

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Background: Frailty and functional decline impose substantial healthcare and long-term care costs in ageing populations, yet economic evidence for exercise-based interventions remains scattered and incompletely synthesised. This scoping review therefore mapped what is currently known about their economic value in this population.
Methods: Following PRISMA-ScR guidance, searches across five databases (PubMed, Scopus, ProQuest, PEDro, and ScienceDirect) for studies published between 2016 and 2026 yielded 841 records, of which 704 remained after deduplication. After title and abstract screening, 34 full-text reports were assessed for eligibility. Sixteen reports met the inclusion criteria for synthesis; one represented a follow-up or extension of another study, resulting in 15 unique studies.
Results: All evidence originated from high-income settings, with no studies identified from low-or middle-income countries (LMICs). Interventions ranged from Otago-based multicomponent balance-and-strength programmes, the most frequently represented framework, to resistance training, Tai Chi-based, dance-based, and lifestyle-integrated formats. Nine studies used formal cost-effectiveness or cost-utility analyses with an incremental cost-effectiveness ratio (ICER), while six used non-ICER approaches such as return-on-investment or cost-consequences analyses. Outcomes spanned healthcare utilisation, falls, quality-adjusted life-years (QALYs), and functional performance measures. Ten studies (67%) reported favourable economic outcomes, while five reported mixed or inconclusive results. This pattern was more consistent when functional measures, including physical performance, falls, and step counts, were used than when QALYs served as the primary outcome. Substantial heterogeneity in comparators, costing approaches, and analytical methods limited direct comparison across studies.
Conclusion: These findings suggest that exercise-based interventions may offer economic value for addressing frailty and functional decline. Evidence from residential aged-care settings and LMICs remains particularly limited, underscoring the need for context-specific economic evaluations to determine the cost-effectiveness and affordability of exercise programmes across diverse health systems.
Keywords: cost-effectiveness, exercise, frailty, functional decline, older adults, quality-adjusted life-year

Structured exercise and physical fitness in prostate cancer during androgen deprivation therapy: a systematic review

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Background: Androgen deprivation therapy (ADT), a cornerstone treatment for prostate cancer, may adversely affect physical fitness and functional capacity. Structured exercise may mitigate these effects, although exercise modalities and prescriptions vary considerably across studies. This systematic review aimed to evaluate the effects of structured exercise on cardiorespiratory fitness, muscular strength, and physical performance in men with prostate cancer receiving ADT and to characterize exercise prescriptions using the Frequency, Intensity, Time, Type, Volume, and Progression (FITT-VP) framework.
Methods: A systematic search was conducted across PubMed, ScienceDirect, Europe PMC, Cochrane Library, and SAGE Journals. Randomized controlled trials involving adult men with prostate cancer receiving ADT were eligible if they evaluated structured aerobic, resistance, or combined exercise against usual care, no structured exercise, or another exercise intervention and reported at least one objective measure of cardiorespiratory fitness, muscular strength, or physical performance. Exercise prescriptions were characterized using FITT-VP. Risk of bias was assessed using the Cochrane Risk of Bias 2 (RoB 2) framework.
Results: The search identified 889 records, of which six randomized studies met the eligibility criteria. Sample sizes ranged from 23 to 172 participants, and exercise components lasted 8–24 weeks. Interventions included resistance training, high-intensity interval training, and combined aerobic and resistance training delivered through supervised, home-based, or technology supported approaches. Significant between-group benefits were reported for selected outcomes, including VO_2peak (+4.9 mL/kg/min; $p<0.001$), leg-press 1-RM (+47.9 kg; $p=0.01$), 6-minute walk distance (+21.0 m; $p=0.01$), 2-minute walk distance (group-by-time $p=0.040$), and Lift-and Carry performance ($p=0.006$). However, several other measures of cardiorespiratory fitness, muscular strength, and physical performance showed no significant between-group differences, while some outcomes were not reported or unavailable for between-group comparison. Overall risk of bias was rated as some concerns in five studies (83.3%) and high in one (16.7%); no study was rated as low risk.
Conclusion: Structured exercise demonstrated benefits in selected measures of cardiorespiratory fitness, muscular strength, and physical performance in men with prostate cancer receiving ADT, although effects were not consistent across all outcomes or trials. Interpretation is limited by heterogeneous exercise prescriptions and comparators, co-interventions, incomplete outcome reporting, and methodological concerns. Further adequately powered randomized trials using standardized objective outcomes and clearly reported FITT-VP prescriptions are warranted.
Keywords: androgen deprivation therapy, exercise, muscular strength, physical performance, prostate cancer, systematic review

Pre-participation screening in sports events: evidence to inform age tailored screening in Indonesia

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Background: Indonesia's recreational and competitive exercise culture is expanding, with increasing participation in endurance and mass sporting events. Although regular exercise improves population health, vigorous activity may trigger sudden cardiac arrest or major adverse cardiovascular events in susceptible individuals. In younger athletes, inherited or congenital cardiovascular disorders predominate, whereas coronary artery disease is a major

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concern in athletes aged ≥35 years. This review synthesizes international evidence on pre-participation cardiovascular screening to inform an age-tailored approach for Indonesian sports events.

Methods: A structured literature search was conducted in PubMed, ScienceDirect, Europe PMC, Cochrane Library, and SAGE Journals. Eligible studies included prospective cohorts, retrospective cohorts, and diagnostic accuracy studies involving competitive or recreational athletes undergoing PPS using medical history, physical examination, resting 12-lead ECG, or exercise stress testing. Studies were included if they reported diagnostic yield, referral or false-positive rates, cardiovascular diagnoses, or subsequent SCA/SCD/MACE outcomes. Findings were synthesized by age group: youth ≤18 years, adults 19-34 years, and master athletes ≥35 years.

Results: Four studies involving 85,359 athletes met the eligibility criteria. In a large mixed-age cohort, 7.6% of PPS evaluations required se cond-line investigations, while cardiac diagnoses increased with age from 0.06% in youth athletes (aged 7-18 years) to 1.19% in athletes aged ≥35 years. Among master athletes (aged ≥35 years), cardiovascular disease was identified in 11.4% at baseline in one prospective cohort, with MACE occurring at 2.8/1000 athlete-years; age, Framingham Risk Score, and LDL cholesterol were predictive of CAD. Another diagnostic accuracy study in master athletes found SCD-relevant conditions in 2.5%, with Seattle ECG criteria showing the highest AUC among compared ECG interpretation systems. In youth athletes, additional investigations were required after 8.9% of first-line evaluations, and 64% of SCD-risk cardiovascular diagnoses were detected during repeat rather than initial screening

Conclusion: Available evidence suggests that PPS can identify silent cardiovascular abnormalities and support age-tailored risk stratification in athletes. Repeat screening appears particularly relevant in youth athletes, while CAD risk assessment is essential in master athletes. However, variability in ECG interpretation, limited detection of subclinical CAD by functional stress testing, and the absence of unscreened control groups should be considered when adapting PPS protocols for Indonesia

Keywords: athletes; pre-participation screening; cardiovascular screening; electrocardiography; sudden cardiac death; sports events

Periodized fitness for refinery firefighter fire combat performance

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Background: Refinery and petrochemical firefighters operate at the intersection of culture, wellness and performance. Live hydrocarbon fire response requires rapid mobilization, agility, hose handling, ladder and rescue tasks, heat tolerance, decision-making under stress and safe recovery. Weight-loss-only wellness campaigns are insufficient because fire combat performance depends on work capacity, movement quality, metabolic reserve and readiness across high-risk refinery locations and operating phases.

Methods: A systematic-review protocol and implementation framework were developed for literature/systematic review submission. The planned PRISMA 2020 review will search PubMed/MEDLINE, Scopus, Web of Science, SPORTDiscus, CINAHL, Cochrane CENTRAL and official repositories for studies and guidance on firefighter fitness, work load analysis, functional capacity assessment, exercise periodization, fire combat skills, occupational hygiene and refinery emergency response. Eligible evidence includes firefighter exercise interventions, occupational physical-ability studies, sports medicine guidelines, NFPA health-related fitness principles, API refinery fire-protection guidance, IOGP health-risk assessment, and OHTA measurement frameworks. A future refinery implementation trial will be reported using CONSORT.

Results: The proposed algorithm is LOCATE-RISK-PERIODIZE: location and phase mapping from feedstock-to-product operations; activity and similar-exposure-group definition with predicted person-on-board; RAM-based fire, heat, smoke, toxic gas, noise, ergonomic and fatigue prioritization; WLA/FCA cross-match; individualized FITT-VP prescription; and monthly reassessment of response time, agility, hose advancement, stair/load carriage, rescue drag, recovery, symptoms and adverse events. Industrial hygiene readiness integrates OHTA 501 hazardous-substance measurement, 502 thermal environment, 503 noise, ergonomics and health-effect surveillance. Medical readiness links drill scenarios, response-time clocks, ambulance pathways, first-aid capability and MCU packages for occupational disease risk screening.

Conclusion: A refinery firefighter campaign should not chase weight loss alone; it should engineer repeatable fire combat capacity through risk-based periodization, measurement-quality governance and non-punitive culture. The framework provides a reproducible bridge from sports medicine and occupational hygiene to refinery emergency reliability, requiring prospective controlled evaluation before causal claims about operational performance.

Keywords: fire combat performance, firefighter fitness, occupational health, refinery, sports medicine, work capacity

The effectiveness of neuromuscular training programs in preventing lower extremity injuries among athletes: a systematic review

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Background: Lower extremity injuries account for more than two-thirds of sports injuries among adolescent and young adult athletes, with surveillance data reporting over 40% sustaining at least one injury annually, at 2.64 injuries per 1,000 hours of exposure. Neuromuscular training (NMT) targets neuromuscular control deficits underlying these injuries. Previous evidence has demonstrated approximately 25% reduction in overall knee injury risk (RR 0.75, 95% CI 0.65–0.85), while FIFA 11+ has been associated with 30–46% reductions in sports injuries. However, previous reviews have primarily focused on individual sports or specific injury sites, leaving uncertainty regarding optimal training frequency, sport-specific adaptation, and adjunctive modalities. This systematic review synthesizes contemporary randomized evidence on NMT for preventing lower extremity injuries across sports and athletic populations.

Methods: This review followed the PRISMA 2020 statement. PubMed, PEDro, Europe PMC, and Cochrane CENTRAL databases using a combination of keywords "neuromuscular training", "injury prevention program", "FIFA 11+", "lower extremity/limb", "knee", "ankle", "ACL", and "athletes", limited to English-language randomized controlled clinical trials published between 2021–2026. RCT involving active athletes with no acute injury at the start of the study, applying NMT as a primary intervention or warm-up, and reporting incidence of lower extremity injuries or related biomechanical/functional outputs.

Results: A total of 320 records were identified, 267 remained after duplicate removal and 48 underwent full text assessment. Eight randomized controlled clinical trials comprising approximately, 4.282 athletes were included in qualitative synthesis. A consistent protective effect was observed across soccer, netball, and taekwondo, from childhood to elite adulthood. Modified or football-specific NMT programs (e.g. M11+) outperformed standard FIFA 11+ and conventional warm-ups in both injury reduction and performance. FIFA 11+ reduced the risk of

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hamstring strain injury by 63%. Adjunctive modalities (Stop-X exercises, real-time biofeedback, and anodal transcranial direct current stimulation) further improved hip strength, range of motion, balance, and feedforward muscle activation related to anterior cruciate ligament injury risk. Compliance and training frequency were the principal moderators of effectiveness: teams with high adherence (≥2 sessions/week) achieved substantially greater reductions in non-contact lower extremity injury, although once-weekly training in elite netballers still reduced injurious knee rotation moments during unplanned cutting.

Conclusion: NMT reduces lower extremity injury risk across sports and age groups, with greatest benefit when programs are sport-specific and sustained at adequate adherence. These findings support integrating sport-specific NMT into routine training and underscore the need for coaches and sports medicine personnel to prioritize compliance.

Keywords: anterior cruciate ligament, lower extremity injury, neuromuscular training, injury prevention, warm-up program

Early rehabilitation trajectory of acl reconstruction with hamstring vs superficial quadriceps autograft: a comparative case series

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Background: Graft selection in anterior cruciate ligament (ACL) reconstruction plays a pivotal role in determining postoperative recovery and early return to functional activity. While hamstring tendon (HT) autograft has been well-established, the superficial quadriceps tendon (sQT) graft has gained attention as a viable alternative with potential advantages in preserving quadriceps function. However, comparative data on early rehabilitation milestones between these graft types remain limited. This case series compares the early rehabilitation trajectory encompassing Phase I through III, of ACL reconstruction using HT versus sQT autografts.

Method: A comparative case series involving four patients who underwent primary ACL reconstruction was conducted. All patients were observed by both an orthopedic surgeon and a sports medicine physician. Two patients received hamstring tendon autograft (HT group: HT1, male, 18 years; HT2, female, 28 years) and two received superficial quadriceps tendon autograft (sQT group: sQT1, female, 26 years; sQT2, male, 19 years). Concomitant pathologies included meniscus tear (HT1, sQT1) and hyperlaxity (HT2). Injury-to-surgery intervals ranged from 1 week to 1 year. Rehabilitation parameters across Phase I through III were tracked, including interval to pain-free status, quadriceps activation, resolution of knee effusion, full active knee range of motion (ROM), and initiation of jumping exercises.

Results: The sQT group demonstrated consistently favorable milestones compared to the HT group. Pain-free status was achieved at week 1 in both sQT patients versus weeks 2 – 3 in HT. Quadriceps activation was attained by weeks 2 – 3 (sQT) versus weeks 2 – 8 (HT). Knee effusion resolved at week 3 in both sQT patients versus weeks 3 – 7 in HT. Full active ROM was achieved at weeks 5 – 8 (sQT) versus weeks 7 – 9 (HT). The sQT group showed more consistent recovery, whereas the HT group demonstrated greater variability.

Conclusion: ACL reconstruction using sQT autograft may offer a superior early rehabilitation trajectory compared to HT autograft, particularly in achieving earlier quadriceps activation and more consistent recovery milestones. Earlier quadriceps activation is clinically significant as it is essential for early exercise initiation, knee stabilization, and timely rehabilitation progression. Larger prospective studies are warranted to validate these findings.

Keywords: anterior cruciate ligament reconstruction; hamstring tendon autograft; superficial quadriceps tendon autograft.

Intestinal barrier integrity during physical activity in the heat: a scooping review of assessment markers and the tropical evidence gap

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Background: Physical activity performed under heat and/or humid conditions can compromise intestinal barrier integrity through splanchnic hypoperfusion and increased mucosal permeability, a phenomenon well documented among athletes, military personnel, and outdoor workers. This disruption may facilitate endotoxin translocation and contribute to gastrointestinal symptoms and heat-related illness. In tropical regions-where high ambient temperature and humadity persist year round, and where active tourism (including activities undertaken by travelers susceptible to traveler's diarrhea) is common-the risk of gut barrier compromise may theoretically be amplified. However, the extent to which existing evidence on intestinal barrier assessment originates from genuine tropical field conditions, as opposed to laboratory-simulated heat in temperate-climate countries, has not been systematically mapped.

Methods: This scooping review follows the JBI methodology and PRISMA-ScRguidelines. Eligible studies include experimental and observational studies involving healthy adults (18-65 years) engaged in physical activity under explicit heat exposure (laboratory or field-based), reporting biological markers of intestinal barrier integrity (e.g., I-FABP, dual-sugar permeability test, endotoxin/LPS, LPS-binding protein, sCD14, EndoCAb, zonulin, tight junction proteins, calprotectin). Studies involving diseases known to independently alter intestinal permeability (IBD, celiac disease, IBS, sepsis, malignancy), pediatric populations, and animal/in vitro models were excluded. A systematic search was conducted in PubMed and Scopus using a combination of terms related to physical activity, heat exposure, and intestinal barrier markers, without publication year restriction. Screening was performed independently based on title/abstract using Rayyan.

Results: The PubMed search yielded 83 records, while the Scopus search yielded 119 records (65 duplicates with PubMed). Following title/abstract screening, a substantial number of primary studies met the inclusion criteria and are proceeding to full-text assessment and data charting. Preliminary screening indicates that eligible studies predominantly originate from laboratory based heat simulation in temperate-climate countries (e.g., United Kingdom, Australia, United States), with markedly fewer studies conducted under genuine tropical field conditions.

Conclusion: This scooping review is expected to provide a comprehensive overview of the markers and methods available for assessing heat-and-exercise-induced intestinal barrier disruption, while revealing the extent of the evidence gap from tropical settings. These findings are relevant to sports medicine in tropical destinations such as Banyuwangi, and may inform future primary research addressing this gap.

Keywords: endotoxemia; gut permeability; heat stress; intestinal barrier; physical activity; tropical

Beyond the finish line: a meta-analysis of acute physiological stress, neurocognitive fatigue, and recovery trajectories following ultra-trail running

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Background: Ultra-trail running represents one of the most demanding forms of endurance exercise, exposing athletes to prolonged eccentric loading, metabolic stress, thermal challenges, and sleep disruption. These extreme demands may induce complex multisystem responses involving muscle damage, inflammation, cardiovascular strain, autonomic dysfunction, and altered central nervous system performance. However, current evidence remains fragmented across independent physiological and neurocognitive domains, with heterogeneous race characteristics and inconsistent recovery assessment. This limits understanding of the magnitude and duration of post-race disturbances. Therefore, this meta-analysis aimed to quantify acute physiological stress, neurocognitive fatigue, and recovery trajectories following ultra-trail running.
Methods: A systematic review and meta-analysis was performed in accordance with PRISMA 2020 recommendations. Relevant studies involving adult ultra-trail and mountain ultra-endurance runners were identified through comprehensive database searches. Studies were included when they provided pre- and post-race measurements evaluating physiological stress, neurocognitive responses, or recovery-related outcomes. Extracted variables were organized into three major domains: physiological stress responses, including muscle damage, inflammatory, cardiac, endocrine, and autonomic markers; neurocognitive fatigue, including executive function, reaction time, and attentional performance; and recovery dynamics, including autonomic restoration and return toward baseline status. Pooled effect estimates were calculated using Hedges' g under random-effects models, with heterogeneity assessed using Cochran's Q and I^2 statistics.
Results: Ultra-trail running demonstrated a substantial multisystem stress response characterized by increased muscle damage, inflammation, cardiovascular strain, autonomic disturbance, and transient neurocognitive impairment. Elevated creatine kinase, lactate dehydrogenase, C-reactive protein, and inflammatory cytokines reflected prolonged exercise-induced tissue stress. Cardiac biomarkers indicated transient myocardial strain following extreme endurance exposure, whereas reductions in heart rate variability suggested impaired parasympathetic recovery and autonomic imbalance. Neurocognitive assessments demonstrated temporary alterations in executive function, attentional regulation, and cognitive performance following prolonged trail endurance exercise. Recovery patterns differed between biological systems, with autonomic function, subjective well-being, and cognitive readiness requiring longer recovery periods compared with some biochemical markers.
Conclusion: Ultra-trail running induces a coordinated acute stress response involving muscular, inflammatory, cardiovascular, autonomic, and neurocognitive pathways. Recovery following extreme endurance competition occurs through distinct biological trajectories rather than a uniform process. Integrating biochemical biomarkers, heart rate variability monitoring, and cognitive assessment may provide a more comprehensive framework for evaluating athlete readiness and optimizing individualized recovery strategies after ultra-trail competition.
Keywords: cardiac biomarkers, executive function, heart rate variability, neurocognitive fatigue, physiological stress, recovery trajectory, ultra-trail running

Hepatocyte activity from low- to high-intensity exercise: a scoping review

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Background: Exercise is a physical activity performed by almost everyone worldwide, lasting 15–60 minutes, ranging from light to vigorous intensity. This physical activity involves the breakdown of glucose for energy, producing lactic acid as a byproduct, which is converted to glucose by hepatocytes in the liver. This study aimed to examine the activity of hepatocyte cells in converting lactic acid to glucose at light to vigorous exercise intensities.
Methods: Using the JBI Methodology, the authors mapped the literature based on the Population, Concept, and Text (PCC) Framework. 441 articles were successfully found through PubMed and Scopus, and 137 duplicates were removed, leaving 304 for screening. Three reviewers independently screened titles and abstracts, and discussions were held to resolve disagreements and confusion regarding the articles. Articles were then screened by reading the full text based on the inclusion criteria: the presence of exercise activity in living organisms, measuring hepatocyte cell activity, and measuring metabolic results in the liver.
Results: 20 studies met these criteria.The literature found is almost mostly from America. A higher increase in glucose levels was found in mice that performed controlled exercise compared to mice that did not. The study used mice aged 4 weeks to 9 months, with a training period of 4 weeks to 15 weeks, tested on a treadmill. This measurement involved sacrificing the mice to observe glucose levels in liver tissue before and after exercise. This indicates hepatocyte cell activity in gluconeogenesis.
Conclusion: This study suggests that there is higher hepatocyte cell activity during high-intensity exercise with high blood sugar levels. However, this hypothesis requires further investigation in humans and its effects under various conditions to yield more accurate results for human measurements.
Keywords: hepatocyte, exercise, metabolism, pyruvate acid, physical activity

Artificial intelligence for cardiopulmonary physiotherapy: a narrative review for supporting SDGs 3 and SDGs 9

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Background: Artificial Intelligence has become a promising technology for improving the development and implementation of pulmonary and cardiovascular rehabilitation by using personalized interventions, remote patient monitoring, and evidence-based clinical decision making. This study aims to evaluate current scientific evidence regarding AI application in cardiopulmonary rehabilitation and explore its potential in supporting Sustainable Development Goals (SDGs) 3 & 9
Methods: A narrative review was conducted using Scopus, ScienceDirect, and Sage Research databases, including studies published between 2020 and 2026. Literature was retrieved using PICO-guided search strategies and Boolean operators combining AI and cardiopulmonary terms. Data regarding AI methods, rehabilitation domains, clinical outcomes, and limitation

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were extracted and synthesized into four core themes: study characteristics, cardiac application, pulmonary applications, and future perspectives.

Results: Evidence demonstrates that AI techniques, including machine learning, Explainable AI (EAI), Clinical Decision Support Systems (CDSS), wearable sensors and digital platforms significantly enhance functional outcome predictions, patient adherence, and telerehabilitation accessibility. AI applications are evolving toward precision rehabilitation by utilizing multimodal data and continuous monitoring. However, clinical adoption remains constrained by a lack of large-scale validation, ethical and regulatory considerations, and data management challenges Conclusion: These findings suggest that AI has a lot of potential to support Sustainable

Development Goal (SDG) 3 by improving the quality, personalization, and accessibility of cardiopulmonary rehabilitation, as well as helping achieve SDG 9 through advances in digital health innovations and smart rehabilitation technologies

Keywords: artificial intelligence, cardiopulmonary rehabilitation, digital health, precision physiotherapy

Circulating inflammatory biomarkers and fatigue in women with endometriosis: a systematic review of the biomarker-symptom relationship

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Background: Endometriosis is an oestrogen-dependent, chronic inflammatory disease, fatigue is one of its most prevalent symptoms. Systemic peritoneal inflammation drives much of the disease, and inflammation is a recognised biological cause of fatigue in other chronic conditions, whether circulating inflammatory biomarkers relate to fatigue in endometriosis not been synthesised. This study aimed to systematically review whether circulating peritoneal inflammatory biomarkers are associated with fatigue in women with endometriosis, to characterise the quality and consistency of that evidence.

Methods: We searched PubMed, Embase, Cochrane CENTRAL, Scopus, Web of Science, with citation searching, for observational studies reporting a quantified inflammatory biomarker and a validated fatigue domain measure in women with endometriosis. Two reviewers independently searched, screened, and appraised the studies, assessing all included reports at full-text level. Methodological quality judged with the Newcastle-Ottawa Scale adapted to the included designs, findings were synthesised narratively following the SWiM guideline, and certainty was rated with GRADE.

Results: 850 records identified, 103 fulltext reports assessed, 7 studies (total n of approximately 829 participants) included: two case-control studies, two cohort studies, two cross-sectional studies and one single-arm cohort. Two studies tested a direct biomarker-fatigue relationship. Serum chemokines correlated selectively with the vital energy domain in the endometrioma subgroup, with an inverse association for RANTES, r equal to -0.353 (p equal to 0.006), and for MCP-2, r equal to - 0.295 (p equal to 0.022), but no association for most markers. In the other, iron status marker rather than a classical cytokine, women with iron deficiency had worse fatigue those without (adjusted FACIT-Fatigue 26.3 versus 29.8; p equal to 0.025). Remaining five studies reported inflammatory markers and fatigue in the same cohort without a direct association analysis; where an anti-inflammatory intervention lowered interleukin-6, tumour necrosis factor-alpha, C reactive protein, vitality improved in parallel, but no individual level link was demonstrated. Most analyses were unadjusted for pain, anaemia, sleep and mood. Overall risk of bias was high in five of seven studies, certainty of evidence was very low across relationships.

Conclusion: Direct evidence linking circulating inflammatory biomarkers to fatigue in endometriosis is scarce, heterogeneous and very low certainty. A biologically plausible signal exists but is confounded and under tested. These findings are hypothesis generating and indicate the need for adequately powered studies measure a defined biomarker panel and a validated fatigue instrument concurrently, with adjustment for pain, anaemia, sleep and mood.

Keywords: cytokines; C-reactive protein; endometriosis; fatigue; inflammation; quality of life.

Comparative efficacy of biologics in accelerating return-to-play for hamstring injuries: a network meta-analysis

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Background: High-grade hamstring strain injuries (HSIs) in elite athletes present a major clinical challenge due to prolonged recovery times and high recurrence rates. While biologic therapies such as Platelet Rich Plasma (PRP), Mesenchymal Stem Cells (MSCs), and MSC derived cell-free products (Secretome and Exosomes) are emerging as potent agents to accelerate tissue healing, their relative efficacy when combined with functional rehabilitation remains unestablished through direct comparative trials. This study aimed to evaluate and rank the comparative clinical efficacy of PRP, MSCs, Secretome, and Exosome therapies in accelerating time to Return-to-Play (RTP) and reducing re-injury rates in high-grade hamstring injuries among competitive athletes.

Methods: A systematic search was conducted across MEDLINE (PubMed), Embase, Cochrane Central Register of Controlled Trials (CENTRAL), and Web of Science up to 2026. Randomized controlled trials (RCTs) and high-quality comparative prospective studies evaluating autologous or allogeneic biologics (PRP, MSCs, Secretome, Exosomes) combined with functional rehabilitation versus rehabilitation alone (or placebo) for Grade II/III HSIs were included. Network Meta-Analysis (NMA) was performed using a Bayesian framework to calculate mean differences (MD) for time-to-RTP (days) and odds ratios (OR) for 12-month re-injury rates. Treatments were ranked using the Surface Under the Cumulative Ranking Curve (SUCRA).

Results: A total of 20 studies (800 patients/athletes) met the eligibility criteria. Biologic augmentation significantly reduced time-to-RTP compared to rehabilitation alone. Exosome therapy combined with accelerated rehabilitation demonstrated the highest efficacy in reducing time-to-RTP (MD: -14.2 days, 95% CrI: -18.5 to -9.8), followed by Secretome (MD: -12.1 days) and MSCs (MD: -10.4 days), outperforming PRP (MD: -6.3 days). Regarding re-injury risk at 12 months, Exosome and Secretome therapies achieved the lowest recurrence rates (OR: 0.28 and 0.32, respectively). SUCRA ranking identified Exosomes (SUCRA = 91.2%) and Secretome (SUCRA = 84.5%) as the most effective biological modalities for rapid functional recovery without compromising structural tissue integrity.

Conclusion: Advanced cell-free regenerative therapies (Exosomes and Secretome) exhibit superior efficacy over traditional cell-based approaches (MSCs and PRP) in accelerating Return-to-Play and minimizing reinjury risk in high-grade hamstring injuries. Integrating targeted cell-free biological augmentation with structured functional loading represents a paradigm shift in sports orthopedics and elite athlete rehabilitation.

Keywords: exosomes, hamstring strain injury, network meta-analysis, regenerative biologics, return-to play, secretome

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Factors associated with sleep quality among older adults: the role of perceived stress

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Background: In Indonesia, 67% older people frequently experience sleep disruptions, which can have a detrimental impact on their functional, psychological, and physical health. While physiological elements like heart rate (HR) and heart rate variability (HRV) may potentially have an impact on sleep regulation, psychological stress is thot to be a significant factor linked to poor sleep quality. To design effective preventive and rehabilitative programs for older persons, it is crucial to identify aspects related to sleep quality.
Methods: Ninety-six older people participated in this cross-sectional study. The Pittsburgh Sleep Quality Index (PSQI) was used to measure sleep quality, while the felt Stress Scale (PSS) was used to measure felt stress. As physiological variables, heart rate and heart rate variability were also evaluated. To find variables related to sleep quality, descriptive analysis, logistic regression, multiple linear regression, chi-square test, and Spearman correlation were used.
Results: Of the 96 individuals, 76.0% had poor sleep quality based on the PSQI. Perceived stress revealed a moderate positive connection with PSQI scores ($r = 0.423$; $p < 0.001$), indicating that higher stress levels were linked with poorer sleep quality. Multiple linear regression indicated that felt stress was substantially linked with PSQI scores ($B = 0.433$; $p < 0.001$), although age, sex, HR, and HRV were not significant predictors. The regression model explained 23.6% of the variance in PSQI values. Logistic analysis also demonstrated that each one-point increase in perceived stress was related with a 14.8% increase in the odds of experiencing poor sleep quality (OR = 1.148; 95% CI: 1.051–1.253; $p = 0.002$).
Conclusion: In this study, the most important factor linked to older individuals' sleep quality was perceived stress. While age, sex, HR, and HRV were not substantially correlated with PSQI scores, higher stress levels were linked to worse sleep quality. These results emphasize the significance of stress management as a possible element of community-based therapies and physical therapy targeted at enhancing older individuals' sleep quality.
Keywords: elderly, heart rate variability, perceived stress, Pittsburgh sleep quality index, sleep quality

Match density and medical burden in state-level rugby sevens: insights from a Malaysian Pre-Sukma selection tournament

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Background: Rugby sevens is a physically demanding collision sport characterised by repeated high-intensity efforts, rapid changes of direction, and frequent physical contact. During state-level selection tournaments, these demands may be intensified by congested match schedules and limited recovery opportunities. This study describes the medical burden and injury profile observed during a Malaysian Pre-SUKMA selection tournament and explores the potential implications of match density, recovery constraints, and environmental heat exposure for athlete safety.
Methods: A retrospective descriptive analysis was conducted using medical records from a two-day Malaysian Pre-SUKMA rugby tournament held in Penang on 13–14 June 2026. Demographic characteristics, injury characteristics, anatomical regions, diagnoses, management, and clinical outcomes were recorded and analysed descriptively.
Results: A total of 58 medical encounters involving athletes aged 16–26 years were documented, comprising 41 males (70.7%) and 17 females (29.3%). New injuries accounted for 55 cases (94.8%). The most frequently affected anatomical regions were the knee (17.2%), head (15.5%), shoulder (13.8%), and other upper limbs (12.1%). Six cases involved concussion or suspected concussion. Heat-associated presentations included five cases of muscle cramps and two cases of heat exhaustion with associated metabolic concerns. Across the two-day tournament, 98 matches were played, including 58 matches on Day 1 without scheduled recovery breaks. Concussion, suspected concussion, and heat-related presentations were observed more frequently during the later stages of Day 1, particularly in the afternoon. Thirteen athletes (22.4%) required immediate hospital referral, while 18 (31.0%) were discharged following on-site treatment.
Conclusion: This tournament demonstrated a substantial medical workload among state-level rugby athletes competing in a high-intensity selection environment. The concentration of concussion, suspected concussion and heat-related presentations during the later stages of competition raises concern regarding the combined effects of match density, inadequate recovery, and environmental heat exposure. Although causality cannot be established from this retrospective analysis, these findings support the need for structured recovery intervals, proactive heat-illness prevention, appropriate match-load management, and robust pitch-side medical preparedness in high-level rugby tournaments. Prospective studies incorporating match exposure, recovery time, environmental conditions, and player workload are warranted.
Keywords: athlete safety, heat stress, injury burden, match density, rugby sevens

Mapping musculoskeletal pre-participation evaluation instruments, their measurement properties, and rater professions: a scoping review

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Introduction: Musculoskeletal assessment is a core component of athlete pre participation evaluation (PPE), but available screening instruments vary substantially in constructs, measurement properties, administration, and assessor background. This study aimed to map musculoskeletal PPE instruments, their measurement properties, rater professions, and evidence relevant to the development of a standardized multidisciplinary screening instrument.
Methods: A scoping review was conducted according to Arksey and O'Malley, JBI guidance, and PRISMA-ScR. PubMed, Cochrane Library, and ScienceDirect were systematically searched. Eligible studies involved athletes undergoing pre participation, pre-season, periodic, or comparable musculoskeletal screening. Data were charted for instrument characteristics, COSMIN-aligned measurement properties, assessor professions, feasibility, and inter-professional reliability. Findings were synthesized descriptively.
Results: Of 1,702 identified records, 28 studies were included. Instruments included the Functional Movement Screen, Y-Balance/SEBT, Tuck Jump Assessment, LESS/LESS-RT, pGALS, Arm Care Screen, MIR-Q, QASLS, and several sport-specific or multidimensional screening batteries. Reliability was the most frequently evaluated property. Several tools showed

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favorable same-rater or within-profession reliability, although item-level and between-rater agreement were more variable. Standardized training and simplified scoring were consistently associated with better reproducibility.
Discussion: Existing instruments provide complementary rather than comprehensive solutions. Their strongest elements may inform selection of candidate domains and items for a new PPE instrument, particularly when feasibility and cross-professional usability are considered alongside reliability.
Conclusion: The current evidence provides a structured foundation for developing a multidisciplinary musculoskeletal PPE instrument with standardized administration and subsequent validation across sports medicine physicians, sports-focused general practitioners, and sports physiotherapists.
Keywords: athletes, inter-professional reliability, measurement properties, musculoskeletal screening, pre-participation evaluation

Lifting for two: evidence mapping of resistance training prescription during pregnancy – a scoping review

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Background: Resistance training is recommended as part of prenatal exercise for uncomplicated pregnancies to maintain muscular strength, physical function, and overall maternal health. Although current international guidelines consistently support exercise during pregnancy, practical guidance on prescribing resistance training remains limited. Existing recommendations largely address whether resistance training is safe rather than how it should be prescribed using reproducible exercise-dose principles. This lack of standardized prescription limits translation of evidence into everyday clinical practice. This scoping review aimed to map current evidence on resistance training prescription using the FITT-VP framework, identify evidence gaps that hinder reproducible exercise prescription, and inform clinical decision-making in sports medicine.
Methods: A scoping review was conducted in accordance with the Joanna Briggs Institute methodology and reported following the PRISMA Extension for Scoping Reviews (PRISMA ScR). PubMed, Scopus, Cochrane Library, and ScienceDirect were searched for studies published between 2020 and 2025. Studies evaluating structured resistance-training interventions during pregnancy were included. Two reviewers independently screened studies and extracted data using the Population–Concept–Context framework. Exercise prescription variables and safety outcomes were synthesized descriptively according to the FITT-VP framework.
Results: Fifteen studies met the inclusion criteria. Frequency, intensity, session duration, andexercise type were reported with reasonable consistency, indicating broad agreement regarding core components. In contrast, volume, progression strategies, and progression criteria were inconsistently reported, representing the principal gap limiting reproducible prescription. No serious exercise-related maternal or fetal adverse events were reported in women with low-risk pregnancies or selected women with well-controlled gestational diabetes mellitus or hypertensive disorders when individualized screening, supervision, and clinical monitoring were implemented. Emerging evidence also suggests that supervised heavy resistance training (>80% one-repetition maximum) may be feasible in highly trained pregnant women without acute maternal or fetal compromise, although evidence is limited. Collectively, these findings suggest that individualized prescription should be guided by clinical assessment, training status, and maternal response rather than gestational age alone.
Conclusion: Current evidence indicates that the key challenge in prenatal resistance training is no longer determining whether pregnant women should exercise safely, but translating existing evidence into reproducible exercise prescription. The principal evidence gap lies in the inconsistent reporting of exercise volume and progression, limiting implementation in clinical practice. Standardizing these components within the FITT-VP framework may strengthen future clinical guidelines and enable more consistent evidence-based resistance-training prescription in sports medicine and obstetric care.
Keywords: exercise prescription, fitt-vp, pregnancy, resistance training, sports medicine

Heavy squatting and knee structural changes in strength athletes: a systematic review

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Background: The loaded squat is the cornerstone of strength sport, and in elite powerlifters the peak tibiofemoral joint contact force during the squat reaches about 23 times body weight. The imaging evidence points two ways: active weightlifters have thicker knee cartilage on MRI, while former weightlifters show more osteoarthritis on radiographs. No systematic review has synthesised knee structural imaging outcomes in strength athletes. This review evaluated the association between loaded squat training and structural knee outcomes in strength-sport athletes.
Methods: PubMed, Embase and Scopus were searched from inception to 26 June 2026. Eligible studies enrolled competitive or recreational strength-sport athletes exposed to loaded squat training and reported knee structural outcomes on radiography, MRI or ultrasound; acute single-event injury studies, occupational squatting, post-surgical populations and non-primary publications were excluded. Records were screened in Rayyan following PRISMA 2020, risk of bias was assessed with the Newcastle-Ottawa Scale, and studies were synthesised narratively, with one exploratory random-effects meta-analysis of cartilage thickness. The review was not registered and received no funding.
Results: Of 445 records identified, 39 duplicates were removed, 406 records were screened and 11 full texts were assessed; six studies (five independent samples) were included, with 79 strength athletes and 218 comparison participants (Newcastle-Ottawa 2 to 6 of 9 stars). Cartilage was thicker in weightlifters in three cross-sectional studies (pooled SMD 1.28, 95% CI 0.83 to 1.73; I^2 17%); this pool is exploratory: three small studies, one imputed estimate, femoral and patellar sites combined. Radiographic knee osteoarthritis was present in 31% of former elite weightlifters versus 3% of former shooters (age-adjusted OR 12.9, 95% CI 1.47 to 113), mostly patellofemoral. On MRI at the Olympic Games, patellofemoral cartilage damage was seen in 7 of 10 weightlifters (70%) versus 45 of 112 athletes of other sports (40%; unadjusted RR 1.74, 95% CI 1.09 to 2.77). Patellar cartilage change after 30 knee bends did not differ detectably from untrained controls (-2.9% versus -4.1%). No study reported subchondral bone or meniscal outcomes.
Conclusion: Active strength athletes appear to have thicker knee cartilage, but this does not rule out patellofemoral osteoarthritis later. All studies were cross-sectional and small, and exposure was the sport rather than the squat itself, so certainty is very low: heavy squatting is neither shown to be harmful nor shown to be safe. Prospective imaging studies that measure squat load are needed.
Keywords: cartilage, knee, osteoarthritis, squat, systematic review, weightlifting

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Dose and composition of prehabilitation before anterior cruciate ligament reconstruction: a systematic review and meta-analysis

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Background: Anterior cruciate ligament reconstruction (ACLR) restores mechanical stability, but optimizing postoperative functional recovery remains challenging. Preoperative rehabilitation (prehabilitation) may improve patients' physical and functional status before surgery; however, the optimal training dose and exercise composition remain uncertain. This systematic review and meta-analysis evaluated the association between prehabilitation and long-term functional outcomes after ACLR, with particular emphasis on training frequency and exercise composition.
Methods: Following PRISMA guidelines, PubMed, Cochrane Library, ScienceDirect, Europe PMC, and Epistemonikos were systematically searched for prospective comparative studies evaluating exercise-based prehabilitation versus standard care or no structured prehabilitation in patients undergoing primary ACLR. Long-term outcomes (≥12 months) included Knee Injury and Osteoarthritis Outcome Score (KOOS) Total and International Knee Documentation Committee (IKDC) change from baseline, return-to-sport (RTS) rates, and time to RTS. Random-effects meta-analyses were performed, with prespecified subgroup analyses according to training frequency (<3 vs ≥3 sessions/week) and exercise composition (strength-focused vs strength combined with neuromuscular/balance training).
Results: All included prospective studies prescribed prehabilitation for ≥4 weeks. Prehabilitation was not significantly associated with improved long-term KOOS Total change from baseline (MD, 8.37; 95% CI, −2.46 to 19.19; p=0.13), with substantial heterogeneity observed (I^2=95.7%). In frequency-based subgroup analysis, programs delivered ≥3 sessions/week demonstrated a larger pooled effect on KOOS Total (MD, 16.97; 95% CI, 5.73 to 28.22; p=0.13), whereas programs delivered <3 sessions/week showed no significant effect (MD, 0.06; 95% CI, −5.43 to 5.54; p=0.98). Similarly, the overall effect on long-term IKDC change was not significant (MD, 11.00; 95% CI, −7.94 to 29.95; p=0.25; I^2=98.6%), while programs delivered ≥3 sessions/week demonstrated a substantial pooled improvement (MD, 19.97; 95% CI, 7.98 to 31.96; p=0.255) and programs delivered <3 sessions/week showed a significant negative pooled effect (MD, −7.00; 95% CI, −10.76 to −3.24; p=0.0003). Strength-focused prehabilitation was associated with improved IKDC scores (MD, 26.14; 95% CI, 22.09 to 30.18), while multimodal programs incorporating strength and neuromuscular/balance training demonstrated a pooled effect of MD, 3.46 (95% CI, −17.02 to 23.94). Prehabilitation increased the likelihood of RTS (OR, 1.52; 95% CI, 1.08–2.14; p=0.016; I^2=0%). Time to RTS was reduced by approximately 8.3 weeks in the study reporting this outcome.
Conclusion: Preoperative exercise-based rehabilitation was associated with a higher likelihood of return to sport and demonstrated greater pooled improvements in long-term knee function among programs delivered at least three sessions per week. These findings suggest that training frequency may be an important effect modifier of prehabilitation efficacy. However, substantial between-study heterogeneity and variation in exercise composition limit definitive Conclusion regarding the optimal prehabilitation dose and composition. Further adequately powered trials directly comparing prehabilitation frequencies and exercise components are warranted.
Keywords: anterior cruciate ligament reconstruction, exercise composition, knee function, prehabilitation, return to sports, training frequencyEffectiveness of a multifactorial return-to-sport decision-making framework (functional, load, and psychological factors) in athletes following musculoskeletal injuries: a systematic review

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Introduction: Return-to-sport (RTS) decision-making following musculoskeletal injury has traditionally relied on isolated criteria such as time-based protocols or single-domain functional testing. However, growing evidence suggests that unidimensional approaches fail to capture the complexity of athlete readiness, contributing to high re-injury rates. Multifactorial RTS frameworks integrating functional performance, load tolerance, and psychological readiness have emerged as a more holistic alternative. This systematic review aimed to evaluate the effectiveness of multifactorial RTS decision-making frameworks in reducing re-injury and improving successful return to competitive sport among athletes following musculoskeletal injury.
Methods: A systematic search was conducted across PubMed, Scopus, Web of Science, and SPORTDiscus for studies published between 2015 and 2026, following PRISMA 2020 guidelines. Eligible studies included those evaluating RTS frameworks incorporating at least two of the three domains (functional, load-based, psychological) in athletes recovering from musculoskeletal injury. Outcomes assessed included re-injury rate, RTS success rate, and time to return. Methodological quality was appraised using the PEDro scale and ROBINS-I tool.
Discussion: Preliminary synthesis indicates that multifactorial frameworks are associated with lower re-injury rates compared to single-criterion approaches, particularly when psychological readiness measures—such as fear of re-injury and self-confidence are incorporated alongside functional and biomechanical testing. However, heterogeneity in outcome measures and framework composition limits direct comparability across studies.
Conclusion: Integrating psychological readiness with functional and load-based criteria appears to enhance the effectiveness and safety of RTS decisions. Standardized, validated multifactorial protocols are needed to improve clinical applicability and reduce inconsistency in RTS practice.
Keywords: return to sport; musculoskeletal injury; psychological readiness; functional performance; load management; decision-making framework; systematic review

Can saliva predict the next injury?: a systematic review of biomarkers for fatigue and injury risk

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Background: Monitoring physiological stress, fatigue, recovery, and injury risk remains a central challenge in sports medicine. Saliva offers a practical, non-invasive matrix for repeated biological sampling without venipuncture, enabling assessment of endocrine, immune, enzymatic, and emerging molecular signatures. While salivary biomarkers have been increasingly investigated as indicators of exercise-related physiological responses, substantial uncertainty persists about whether these markers can extend beyond detecting fatigue to genuinely predict subsequent sports injury.

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Methods: This systematic review followed the PRISMA 2020 guidelines. PubMed, Web of Science, and Scopus were searched without publication-year restrictions. Studies involving recreational, amateur, collegiate, or elite athletes that quantitatively evaluated salivary biomarkers in relation to fatigue, overreaching, overtraining, or subsequent sports injury were eligible. Due to substantial heterogeneity in study designs, biomarkers, and outcomes, findings were synthesized narratively. Risk of bias was assessed using the QUADAS-2 (Quality Assessment of Diagnostic Accuracy Studies-2) tool.

Results: Salivary cortisol, testosterone, testosterone-to-cortisol ratio, immunoglobulin A, and alpha-amylase demonstrated associations with training-related physiological stress and fatigue states. High-frequency multi-omics profiling enabled detection of individualized biological deviations associated with stress, hydration, and recovery; however, substantial methodological heterogeneity limited the establishment of universal reference thresholds. Critically, evidence directly linking salivary biomarkers to subsequent sports injury was limited, and no study provided sufficient prospective validation to establish saliva as a stand-alone injury predictor.

Conclusion: Salivary biomarkers show promise as non-invasive tools for longitudinal monitoring of physiological state and fatigue in athletes. However, current evidence remains insufficient to support their independent use for predicting subsequent sports injury. The key gap lies in translating biologically informative signals into validated prognostic models. Future research should prioritize prospective cohorts with standardized sampling protocols and individualized multimodal integration of salivary trajectories with training load, performance metrics, and wearable-derived data.

Keywords: athlete monitoring, injury risk prediction, microRNA, salivary biomarkers, sports injury.

Can step-based programmes reduce waist circumference in overweight and obesity? a systematic review and meta-analysis

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Background: Central adiposity is an important cardiometabolic risk factor not fully reflected by BMI or body weight, which cannot distinguish fat from lean tissue. Step-based programmes use objectively measured daily steps as behavioural targets, offering a scalable approach to increasing physical activity. Their effects on waist circumference remain uncertain, as available trials are heterogeneous, multicomponent, and inconsistently report step changes achieved. We evaluated their effects in adults with overweight or obesity.

Method: PubMed, Scopus, Cochrane CENTRAL, and ScienceDirect were searched from August 2016 to August 2026 for studies evaluating programmes that increased objectively measured daily steps versus usual-care or minimal-intervention comparators, reporting central-adiposity outcomes. The primary outcome was end-of-intervention waist circumference. Four parallel-group randomized controlled trials were pooled using generic inverse-variance random-effects models. Sensitivity analyses excluded the mixed-T2DM study, used Chiang et al.'s walking-only arm, added a crossover trial, and applied a fixed-effect model. Risk of bias was assessed using RoB 2 and ROBINS-I. The review was not prospectively registered and received no external funding.

Results: Eleven studies met eligibility criteria; one full text could not be retrieved. Four parallel-group trials (835 participants) contributed waist-circumference data to the primary meta-analysis. Step-based programmes reduced waist circumference versus comparators (MD −1.80 cm, 95% CI −3.26 to −0.34; P=0.02; I^2=49%). The effect remained significant when excluding the mixed-T2DM study (MD −2.66 cm, 95% CI −4.18 to −1.13; I^2=0%), using Chiang's walking-only arm (MD −1.57 cm, 95% CI −2.82 to −0.33; I^2=35%), adding a crossover trial (MD −1.38 cm, 95% CI −2.24 to −0.52; I^2=32%), and applying a fixed-effect model (MD −1.10 cm, 95% CI −1.74 to −0.45). Across 11 studies, none had low risk of bias; three had moderate/some concerns and eight high/critical risk. Among the four primary trials, three had some concerns and one had high risk, mainly owing to missing outcome data, unclear randomization, and retrospective registration.

Conclusion: Step-based multicomponent programmes produced a modest, consistent reduction in waist circumference across sensitivity analyses. However, the small number of trials, risk of bias, intervention heterogeneity, and accompanying lifestyle components limit confidence in precluding attributing this effect solely to increased steps.

Keywords: central adiposity, meta-analysis, obesity, physical activity, step-based intervention, systematic review

Achilles tendon rupture (ATR) in elderly recreational badminton player: case report

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Background: Badminton is a high-intensity sport involving repetitive jumping, lunging, and rapid changes in direction, which may increase the risk of lower-limb injuries, including Achilles tendon rupture (ATR). The optimal management of acute ATR remains controversial, with both surgical repair and non-operative functional treatment being viable options. Treatment decisions should consider the patient's functional demands, medical status, and goals for returning to sport.

Methods: A 72-year-old male recreational badminton player presented to the emergency department with acute left ankle pain sustained during a badminton match. He reflexively stepped backward in response to an opponent's deceptive shot, fell, and became unable to stand. The Thompson test revealed no plantar flexion of the affected foot. Ankle radiography and magnetic resonance imaging confirmed a complete left Achilles tendon rupture near its calcaneal insertion. The patient had played badminton recreationally for approximately 40 years, with a frequency of three times per week. His medical history included hypertension managed with a single antihypertensive medication for 10 years. Given his active lifestyle and desire to return to badminton, surgical repair using implant-anchor fixation with a bridging technique was performed to reattach the tendon to the calcaneus.

Results: Postoperative assessment demonstrated an intact Achilles tendon on the Thompson test, indicating restoration of tendon continuity. The surgical approach was selected based on the patient's functional demands, long-standing participation in badminton, and preference for returning to sport. Although operative treatment has been associated with lower rerupture rates in some systematic reviews, non-operative functional treatment remains a reasonable alternative, particularly for older patients. Evidence supporting implant-anchor fixation with

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a bridging technique in elderly recreational athletes remains limited. Further postoperative monitoring and rehabilitation are necessary to evaluate functional recovery and return to sport. Conclusion: Implant-anchor fixation with a bridging technique may be a viable surgical option for acute Achilles tendon rupture in physically active older adults with high functional demands. However, the immediate postoperative finding of an intact tendon does not establish long-term functional success. Individualized rehabilitation, continued follow-up, and gradual return to sport are essential to assess recovery and treatment outcomes.
Keywords: achilles tendon rupture, badminton, case report, implant-anchor fixation, recreational athlete.

When a slip isn't 'just a sprain': clinically diagnosed achilles tendon rupture from a simple slip in an elderly rice farmer

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Background: Achilles tendon rupture is commonly associated with young, athletic adults following high-energy activity. However, ruptures in older, non-athletic manual laborers following low-energy trauma are less frequently recognized and may be misdiagnosed as ankle sprains, potentially affecting clinical outcomes. This case highlights the importance of recognizing atypical presentations of Achilles tendon rupture.
Methods: A 58-year-old male rice farmer presented with pain and swelling in the left posterior ankle two days after slipping in a rice field while his foot remained planted on the ground. No sporting activity was involved. Clinical examination revealed a palpable gap over the Achilles tendon, weak plantar flexion, and a positive Thompson test. Due to limited resources, the diagnosis was established through clinical examination without ultrasonography or magnetic resonance imaging. The patient underwent open end-to-end Achilles tendon repair.
Results: Clinical findings supported the diagnosis of acute Achilles tendon rupture. Despite the absence of diagnostic imaging, a diagnosis was established through focused clinical examination. The patient underwent surgical repair and demonstrated postoperative improvement.
Conclusion: Achilles tendon rupture should be considered in older, non-athletic individuals presenting with posterior ankle pain following low-energy trauma, particularly those engaged in manual labor. Age-related tendon degeneration and chronic occupational loading may contribute to rupture susceptibility. Careful history-taking and focused clinical examination, including the Thompson test, can facilitate diagnosis in resource-limited settings where imaging is unavailable.
Keywords: achilles tendon rupture, agricultural worker, clinical diagnosis, low-energy trauma, resource-limited setting

Inter-limb eccentric hamstring strength asymmetry in young handball players with a history of knee injury

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Background: Inter-limb strength asymmetry is commonly assessed in athletes to identify lower-limb function differences that may affect performance and injury management. Following knee injury, differences in eccentric hamstring strength between limbs may remain even after athletes return to sport. However, evidence regarding eccentric hamstring strength asymmetry in young handball players with a history of knee injury is still limited. This study aimed to compare inter-limb eccentric hamstring force asymmetry between young handball players with and without a history of knee injury and to examine differences in eccentric hamstring peak force between the previously injured limbs and contralateral limbs.
Methods: This cross-sectional study involved 45 young handball players with previously knee injured (PI; 22 males, age 18.82 ± 2.28 years) and uninjured players (UN; 23 males, age 18.35 ± 2.23 years). Bilateral eccentric hamstring peak force was assessed using the Nordic hamstring test with a NordBord device (Vald Performance, Australia). Inter-limb asymmetry was calculated from the eccentric hamstring strength values of both limbs.
Results: Players with a previous knee injury (PI) exhibited significantly higher inter-limb asymmetry compared with uninjured players (UN) (PI: 13.65 ± 8.17% vs. UN: 4.93 ± 3.31%, $p < 0.001$). Within the previous knee injury group, eccentric hamstring peak force was significantly lower in the injured limbs (255.90 ± 66.42 N) compared to the contralateral limbs (271.49 ± 60.69 N, $p < 0.05$). Furthermore, a significant positive correlation was observed between a history of knee injury and inter-limb asymmetry ($rs = 0.491$; $p < 0.001$).
Conclusion: The difference between previously knee injured and contralateral limbs further suggests that strength discrepancies may persist beyond the initial injury period. Assessing bilateral eccentric hamstring strength variabel may therefore provide useful information for identifying residual strength deficits in young handball players with a history of knee injury.
Keywords: eccentric hamstring strength, handball players, inter-limb asymmetry, knee injury

Better together? a systematic review and meta-analysis of singular and combined exercise interventions for sarcopenic obesity in older adults

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Background: Sarcopenic obesity (SO), defined by low muscle mass and/or strength with excess adiposity, raises the risk of falls, functional disability, cardiometabolic disease, and mortality. While exercise is recommended, it remains unclear whether singular or combined modalities are more effective. This systematic review and meta-analysis compared their effects on physical performance and body composition in older adults with SO.
Methods: This systematic review and meta-analysis adhered to PRISMA 2020 guidelines. Comprehensive searches were conducted across PubMed, Scopus, Web of Science, and Cochrane CENTRAL through August 11, 2026. Randomized controlled trials (RCTs) evaluating exercise only interventions, including singular modalities and combined/multicomponent exercise programs, while excluding dietary trials, in adults aged >50 years diagnosed with sarcopenic obesity via AWGS, EWGSOP/EWGSOP2, ESPEN/EASO, or Baumgartner criteria were included. Evaluated outcomes comprised physical performance and body composition. Random-effects models using inverse-variance weighting calculated MDs or SMDs with 95% CIs. Subgroup analyses were conducted comparing singular versus combined/multicomponent exercise modalities. Methodological quality was appraised using the Cochrane Risk of Bias 2 (RoB 2) tool.
Results: Of 766 records screened, 9 RCTs met eligibility criteria, encompassing singular exercise programs (elastic band, progressive resistance, circuit, and high-velocity power training)

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and combined/multicomponent programs (elastic band + aerobic, Posture, Strengthening, Motricity (PSM), Total Mobility Plus, and walking + resistance + balance training). Compared with controls, exercise improved gait speed (MD 0.19, 95% CI 0.13–0.26; 7 studies), handgrip strength (SMD 2.78, 95% CI 1.14–4.41; 5 studies), lower-extremity strength/chair-stand performance (SMD 3.98, 95% CI 1.87–6.09; 5 studies), static balance (SMD 5.03, 95% CI 3.21–6.86; 4 studies), aerobic capacity (SMD 2.21, 95% CI 0.04–4.38; 3 studies), and muscle quality/power (SMD 4.98, 95% CI 2.36–7.61; 5 studies). Exercise was also associated with greater lean mass (SMD 2.42, 95% CI 1.23–3.61; 7 studies) and reductions in total body adiposity (SMD −3.95, 95% CI −5.28 to −2.63; 8 studies) and BMI (MD −0.93, 95% CI −1.49 to −0.37; 5 studies). Combined/multicomponent regimens generally showed larger effects than singular modalities across most outcomes, though heterogeneity across analyses was substantial ($I^2 = 90–96\%$).

Conclusion: Exercise effectively improves physical performance and body composition in older adults with SO, with multicomponent or combined training showing greater outcomes compared to single-modality exercises. Subsequent RCTs should use standardized diagnostic criteria and outcomes, report intervention dosages transparently, and recruit adequately powered samples to establish precise exercise prescriptions.

Keywords: exercise intervention, obesity, physical performance, sarcopenic, sarcopenic obesity

Heart rate variability biofeedback (HRV-BFB) for performance anxiety in athletes: a scoping review

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Background: Performance anxiety can negatively affect athletes psychological state, physiological responses, and sports performance. Heart rate variability biofeedback (HRV-BFB) is a non-pharmacological self-regulation intervention using physiological feedback and controlled breathing to improve autonomic regulation and adaptation to stress. However, HRV-BFB protocols and their effects on performance anxiety and psychophysiological responses in athletes have not been comprehensively mapped. This scoping review aimed to characterize HRV-BFB interventions and examine their potential effects on performance anxiety, psychophysiological responses to stress and sports performance in athletes.

Methods: This scoping review was reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR), using the Population–Concept–Context framework. PubMed, Scopus, and Cochrane were searched in June 2026 without publication-year restrictions and supplemented by hand searching. Original human studies involving athletes, HRV-BFB as the primary intervention, and outcomes related to performance anxiety, psychological stress, psychophysiological stress responses, autonomic function, or sports performance were included. Findings were mapped and synthesized descriptively according to intervention characteristics and psychological, psychophysiological, and performance outcomes. Formal risk-of-bias assessment was not performed.

Results: Seven studies published between 2012 and 2026, comprising 215 athletes aged 15–28 years from individual and team sports, were included. HRV-BFB protocols primarily involved slow or resonance-frequency breathing, with intervention periods ranging from 1–6 weeks and individual session lasting of 5–30 minutes. Of the seven included studies, six reported improvements in anxiety or perceived stress, three in HRV or autonomic regulation, three in cognitive or sensorimotor function, and four in sports-performance outcomes. Psychophysiological improvements were more consistently observed than reductions in anxiety, suggesting that physiological adaptation may precede subjective psychological changes. Three of the seven studies also demonstrated the feasibility of digital HRV-BFB delivery, using smartphone-guided breathing, smartphone applications combined with heart-rate monitoring, or portable HRV-BFB devices. Interpretation is limited by the small number of studies, heterogeneous protocols and outcome measures, and inconsistent effects on performance anxiety. Conclusion: HRV-BFB may represent a brief, non-invasive self-regulation strategy to improve psychophysiological regulation, support the management of performance anxiety and stress, and enhance sports performance. Its brief and portable nature may facilitate integration into athletes mental training and recovery programs. However, current evidence regarding performance anxiety and sports performance remains limited and heterogeneous. Further studies using standardized protocols and stronger study designs are needed to determine optimal intervention duration and frequency and clarify the relationship among HRV changes, performance anxiety, and sports performance.

Keywords: anxiety, athletes, heart rate variability biofeedback, performance anxiety, psychophysiological stress, sports performance

Blood flow restriction during injury immobilization: muscle savior or false hope? an updated meta-analysis

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Background: Immobilization after musculoskeletal injury causes rapid muscle atrophy and strength loss, which can delay rehabilitation and return to sport, while conventional exercise is limited during this period. Blood flow restriction (BFR) has been proposed as a passive, low-load countermeasure, yet the trials are small, a recent sham-controlled trial reported no benefit, and no previous review has pooled them. This meta-analysis aimed to quantify the effect of BFR applied during lower-limb immobilization on thigh size, muscle strength, and vascular safety, and to appraise the certainty of the evidence.

Methods: PubMed, Scopus, Web of Science, Semantic Scholar, and Google Scholar were systematically searched for randomized and quasi-randomized controlled trials comparing BFR, including passive occlusion controls in individuals undergoing immobilization after musculoskeletal injury. Risk of bias was assessed using the Cochrane Risk of Bias 2.0 tool. Random-effects meta-analyses were performed using standardized mean differences (SMDs) with 95% confidence intervals (CIs) in Review Manager (RevMan) v5.4. Prespecified subgroup analyses explored differences according to muscle movement, contraction mode, and thigh circumference to investigate sources of heterogeneity.

Results: Five trials (79 healthy young adults; 14-day lower-limb immobilization) were included. BFR attenuated the loss of thigh circumference (MD 0.49 cm; 95% CI 0.28 to 0.70; I^2=74%; after sensitivity analysis 0.33 cm; 0.23 to 0.42; I^2=0%). BFR was associated with a smaller loss of muscle strength (MD 22.55; 95% CI 17.10 to 28.00; I^2=93%). After sensitivity analysis, pooled effects were 11.12 (7.68 to 14.56; I^2=61%) by muscle group and 13.51 (9.70 to 17.31; I^2=77%) by contraction mode. The effect was larger for flexor (MD 13.65; 10.59 to 16.70) than extensor strength (MD 5.91; 0.91 to 10.90; subgroup difference P=0.010) and favored BFR in all contraction modes (MD 7.42 to 27.68). Vascular safety was assessed in one trial, which found no difference in flow-mediated dilation (P=0.21).

Conclusion: BFR applied during lower-limb immobilization was associated with smaller losses of thigh circumference and muscle strength, and this direction persisted after sensitivity analysis, although the magnitude is uncertain. However, all trials were at high risk of bias and

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enrolled healthy volunteers, so the certainty of the evidence is low. BFR should be regarded as a promising but unproven adjunct. Standardized protocols are needed.
Keywords: blood flow restriction, immobilization, muscle atrophy, muscle strength

Resistance training and astaxanthin supplementation for exercise-induced oxidative stress: a narrative review

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Background: Resistance training increases the production of reactive oxygen species (ROS), leading to exercise induced oxidative stress and lipid peroxidation. Although regular exercise promotes physiological adaptation, excessive oxidative stress may impair muscle recovery and performance. Astaxanthin, a potent carotenoid antioxidant, has been proposed as a nutritional strategy to attenuate oxidative stress through modulation of endogenous antioxidant defense pathways. However, current evidence regarding the combined role of resistance training and astaxanthin supplementation in reducing exercise-induced oxidative stress remains inconsistent. Therefore, this narrative review aimed to summarize the current evidence on the effects of resistance training and astaxanthin supplementation on oxidative stress, with a particular focus on plasma malondialdehyde (MDA) as a biomarker of lipid peroxidation
Methods: A narrative review was conducted by searching PubMed, Scopus, and Web of Science for peer-reviewed articles published between 2019 and 2024. The search strategy included the keywords "oxidative stress," "resistance training," "astaxanthin," "malondialdehyde," "aging," and "adults." Twenty-five relevant articles, including original studies, systematic reviews, and meta-analyses, were selected and synthesized narratively to summarize current evidence on the effects of resistance training and astaxanthin supplementation on oxidative stress, with a particular focus on plasma malondialdehyde (MDA).
Results: The reviewed studies suggest that resistance training and astaxanthin supplementation modulate exercise induced oxidative stress through complementary mechanisms. Resistance training was associated with enhanced endogenous antioxidant defense as a physiological adaptation to exercise, whereas astaxanthin supplementation was associated with reduced lipid peroxidation, reflected by lower plasma malondialdehyde (MDA) concentrations. Several studies also reported that astaxanthin activates the nuclear factor erythroid 2-related factor 2 (Nrf2) pathway, leading to increased expression of endogenous antioxidant enzymes, including superoxide dismutase, catalase, and glutathione peroxidase. In addition, activation of the peroxisome proliferator-activated receptor gamma coactivator-1 alpha (PGC-1α) pathway was associated with improved mitochondrial biogenesis and cellular energy metabolism, supporting the potential role of astaxanthin in exercise recovery and physiological adaptation.
Conclusion: Current evidence suggests that resistance training and astaxanthin supplementation play complementary roles in modulating exercise-induced oxidative stress. While resistance training enhances endogenous antioxidant defense through physiological adaptation, astaxanthin supplementation may further attenuate lipid peroxidation and support exercise recovery by strengthening antioxidant capacity. These findings indicate that astaxanthin may serve as an adjunct nutritional strategy to complement resistance training. However, further well-designed randomized controlled trials are needed to establish the optimal dosage, supplementation duration, and long-term effects in physically active individuals.
Keywords: astaxanthin, exercise-induced oxidative stress, malondialdehyde, resistance training, sports nutrition

Association of exercise participation with early body composition changes during weight management program

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Background: Obesity management programs often focus primarily on total body weight reduction, while favorable changes in body composition are critical for long-term metabolic health. This study aims to analyze the association between exercise participation and early-phase body composition changes among adults undergoing a weight management program in Indonesia.
Methods: This prospective observational cohort study involved 66 adults followed for one month prior to and during a weight management program. Participants were advised on a caloric-deficit diet and physical activity based on American College of Sports Medicine guidelines, with exercise participation independently chosen by each participant. Physical activity was monitored weekly via online questionnaires. Based on their participation during the observation period, participants were classified into an exercise group (n=36) and a non-exercise group (n=30). Baseline and 1-month follow-up data were obtained using segmental multi-frequency bioelectrical impedance analysis. The primary outcome was achieving ≥5% weight loss. Secondary outcomes included absolute weight loss, percentage body weight reduction, body fat percentage change, and skeletal muscle mass change.
Results: Baseline characteristics showed no significant differences between groups. After one month of observation, 31 of 36 participants (86.1%) in the exercise group achieved ≥5% weight loss compared to 16 of 30 (53.3%) in the non-exercise group (RR 1.61; 95% CI 1.13–2.31; $p = 0.006$). The exercise group experienced greater percentage weight loss (7.58% vs. 4.68%; difference: 2.91 percentage points) and higher absolute weight loss (6.16 kg vs. 3.57 kg; difference: 2.59 kg). These findings were supported by a significantly greater reduction in body fat percentage in the exercise group (2.88% vs. 2.07%; difference: 0.81 percentage points; $p = 0.031$). However, the exercise group also exhibited a greater reduction in skeletal muscle mass (-1.47 kg vs. -0.69 kg; $p = 0.025$).
Conclusion: Exercise participation is associated with a greater early weight loss response, larger reduction in body fat percentage, and a higher proportion of achieving ≥5% weight loss in adults undergoing a weight management program. The finding of greater muscle mass reduction in the exercise group highlights the necessity of paying close attention to protein intake management during the early phase of weight loss programs. Because exercise participation was self-selected and the study was observational, causality cannot be inferred. Studies with larger sample sizes, more precise exercise tracking, and longer follow-up periods are warranted to confirm these findings.
Keywords: body composition, exercise, physical activity, sports medicine, weight loss, weight management

Manual acupuncture for lower-extremity delayed onset muscle soreness in a recreational runner

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Background: Delayed onset muscle soreness (DOMS) is characterized by muscle pain and stiffness that develop 24–72 hours after unaccustomed exercise or an increased training load, potentially impairing athletic performance and delaying return to training. Although manual acupuncture has been proposed as a non-pharmacological recovery strategy, evidence regarding serial changes in pain intensity and pressure pain threshold (PPT) in recreational runners with DOMS remains limited. This case report describes the outcomes of manual acupuncture in a recreational marathon runner with lower-extremity DOMS.

Methods: A 30-year-old woman presented with bilateral lower-extremity pain and stiffness approximately 24 hours after completing a 10-km training run at a pace of 6 min/km, following an increase in training load during marathon preparation. Symptoms involved the bilateral quadriceps, hamstrings, and gastrocnemius muscles and were aggravated by stair climbing, rising from a seated position, initiating running, and muscle stretching. Physical examination revealed tenderness and increased muscle tone in the affected muscle groups, pain-limited active range of motion, and preserved muscle strength (5/5). Baseline PPT values ranged from 3.1 to 5.0 kg/cm^2. The patient received five consecutive daily sessions of manual acupuncture using sterile 0.25 × 25 mm needles at bilateral GB34, SP10, ST34, ST36, LR3, LI4, and BL57. Twirling manipulation was performed every 5 minutes, with a needle retention time of 20 minutes per session. No concurrent pharmacological or rehabilitation therapy was administered. Pain intensity was assessed using the visual analogue scale (VAS), and PPT was measured across the three muscle groups. Written informed consent was obtained for publication of this case.

Results: VAS scores before and after each session were 6/3, 3/1, 1/0, 0/0, and 0/0, respectively. PPT increased progressively across all examined muscle groups, reaching 6.4–7.2 kg/cm^2 after the fifth session. The patient resumed training and completed the scheduled marathon without reported adverse events.

Conclusion: In this single case, manual acupuncture was associated with pain reduction and increased pressure pain threshold in a recreational runner with lower-extremity delayed onset muscle soreness. Clinical improvement was accompanied by resumption of training without reported adverse events. Given the limitations inherent to a single case report, these findings should be interpreted with caution, and further studies with larger sample sizes and controlled designs are needed to confirm the efficacy of manual acupuncture for lower-extremity DOMS in a recreational runner.

Keywords: delayed onset muscle soreness, manual acupuncture, pressure pain threshold, recreational marathon runner, return-to-sport

Role of acupuncture in the management of delayed onset muscle soreness

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Background: Delayed onset muscle soreness (DOMS) is a common exercise-induced musculoskeletal condition characterized by pain, stiffness, and transient neuromuscular dysfunction that typically develops 24–72 hours after unaccustomed or high-intensity exercise, particularly eccentric contractions. Although DOMS is self-limiting, it may impair athletic performance, delay return to training, and reduce exercise capacity. Acupuncture has been increasingly investigated as a non-pharmacological intervention for DOMS; however, the underlying mechanisms and current clinical evidence remain to be comprehensively summarized. This review aims to describe the pathophysiology of DOMS and evaluate the role of acupuncture in post-exercise recovery.

Methods: A narrative literature review was conducted using PubMed, ProQuest, ScienceDirect, and the Cochrane Central Register of Controlled Trials (CENTRAL), complemented by manual searching. Literature published between January 2020 and December 2025 was searched using combinations of the keywords muscle soreness, myalgia, muscle pain, muscle tenderness, acupuncture, electroacupuncture, laser acupuncture, and dry needling with Boolean operators (AND/OR). Relevant meta-analyses, systematic reviews, and randomized controlled trials published in English were narratively reviewed. Seven eligible studies were included for qualitative synthesis.

Results: Current evidence indicates that acupuncture may reduce pain intensity, increase pressure pain threshold, improve range of motion, and facilitate functional recovery following exercise-induced muscle injury. Meta-analytic evidence demonstrated significant reductions in delayed-onset muscle soreness compared with control, particularly at 24 hours (SMD −0.49, 95% CI −0.94 to −0.04; p=0.03) and 72 hours (SMD −0.63, 95% CI −0.97 to −0.29; p<0.001), accompanied by lower serum creatine kinase levels (overall SMD −0.91, p<0.001). Individual randomized controlled trials also reported significant improvements in pain intensity, with reductions of approximately 54–80%, increased pressure pain threshold of up to 32%, and improved joint range of motion following acupuncture treatment. These findings are supported by proposed mechanisms involving activation of descending inhibitory pathways, endogenous opioid release, modulation of inflammatory cytokines, enhancement of local microcirculation, regulation of neuromuscular activity, and improved connective tissue mobility. However, variations in acupuncture techniques, treatment protocols, and outcome measures limit direct comparison across studies.

Conclusion: Acupuncture appears to be a promising adjunctive therapy for DOMS by reducing exercise-induced muscle soreness and facilitating post-exercise recovery. Current evidence supports beneficial effects on pain intensity, pressure pain threshold, and functional recovery; however, heterogeneity in acupuncture protocols and outcome measures precludes firm Conclusion. Larger randomized controlled trials with standardized protocols are needed to confirm its effectiveness.

Keywords: acupuncture, delayed onset muscle soreness, exercise recovery, inflammation, neuromuscular recovery, pressure pain threshold

External validation and generalisability of wearable sensor-based machine learning models for injury prediction in athletes: a systematic review

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Introduction: Wearable sensors and machine learning are increasingly being used to predict sports injuries. However, high model performance in development datasets does not necessarily indicate reliable performance in new athlete populations or settings. This study aimed to systematically evaluate the external validation and generalisability of wearable sensor-based machine learning models for sports injury prediction in athletes.

Methods: PubMed, the Cochrane Library, and ScienceDirect were systematically searched. Studies evaluating machine learning models that used wearable-derived data to predict subsequent sports injuries were included. Model characteristics, validation strategies, predictive performance, calibration, and generalisability were qualitatively synthesized.

Results: Of the 370 records identified, six studies were included. The sports investigated included soccer, Australian football, short-track speed skating, and tennis. Validation

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predominantly involved internal or temporal approaches. No study conducted true independent external validation using a separate team, institution, or athlete population. Reported predictive performance ranged from near-chance discrimination to an area under the curve (AUC) of 0.956, although study designs, populations, algorithms, and prediction horizons were highly heterogeneous. Formal calibration measures were not reported.
Conclusion: Wearable sensor-based machine learning shows promise for injury forecasting, but evidence of external generalisability remains limited. Independent validation and calibration should become priorities before widespread implementation.
Keywords: external validation, generalisability, machine learning, sports injury, wearable sensors

Prevalence, severity, and determinants of coronary artery calcification in masters endurance athletes: a systematic review

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Background: Despite reducing mortality, high-volume endurance exercise presents an unexpected paradox. Data from the Master@Heart study indicate that lifelong male masters athletes have higher odds of coronary artery calcification (OR = 1.86, p = 0.008) and vulnerable non-calcified plaques (OR = 1.96, p = 0.011) than active controls. Because high cardiorespiratory fitness may mask subclinical vascular disease, defining the prevalence, severity, and determinants of coronary artery calcification is essential for optimizing cardiovascular screening in veteran athletes.
Methods: Following the PRISMA 2020 guidelines, MEDLINE, Embase, and Scopus were searched for primary quantitative cohort studies assessing coronary artery calcium (CAC) or plaque morphology using tomographic imaging in masters endurance athletes. Eight primary cohort studies, comprising 1,732 directly evaluated athletes and an aggregate dataset of 2,749 participants, met the eligibility criteria and underwent quantitative data extraction and quality appraisal using the Newcastle–Ottawa Scale (NOS).
Results: The overall prevalence of CAC was 20.6% (565/2,749) for CAC >0 Agatston units (AU), 6.5% (179/2,749) for CAC >100 AU, and 1.6% (43/2,749) for CAC >400 AU. Compared with healthy controls, lifelong male athletes demonstrated higher odds of CAC >0 AU (57.1% vs. 47.7%; OR = 1.86, p = 0.008), CAC >100 AU (OR = 1.96, p = 0.043), non-calcified plaques (OR = 1.96, p = 0.011), and mixed plaques (OR = 1.78, p = 0.038). Longitudinal plaque progression was independently associated with exercise intensity (≥9 METs, p = 0.010; training duration at >85% of maximum heart rate [HRmax], p = 0.018), but not with total training volume (p = 0.310 and p = 0.810, respectively). Additional predictors of CAC included exercise-induced peak systolic blood pressure ≥210 mmHg (OR = 2.84, p = 0.024), age (p < 0.001), LDL cholesterol (p = 0.004), and male sex (p < 0.001). Post-exercise troponin elevations did not significantly differentiate CAD status (p = 0.420). Methodological quality was rated as good for seven cohorts (NOS 7–9/9) and fair for one cohort (NOS 5/9).
Conclusion: Subclinical coronary atherosclerosis, including coronary artery calcification, is prevalent among masters endurance athletes. Plaque progression was associated with exercise intensity rather than total training volume, while exercise-induced hypertension emerged as an additional predictor of CAC. Conventional cardiovascular risk scores may underestimate subclinical coronary artery disease (CAD) in veteran athletes, highlighting the potential role of selective cardiac imaging and targeted blood pressure monitoring.
Keywords: cardiac computed tomography, coronary artery calcium, coronary atherosclerosis, endurance exercise, exercise intensity, masters athletes

Needle tip tops injury: acupuncture to prevent sport injury related to pre competition anxiety

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Background: Pre-competition anxiety is closely associated with an increased risk of sport injury, through mechanisms involving peripheral attentional narrowing and heightened muscle tension. Acupuncture has been shown to be effective as a non-pharmacological intervention across various situational anxiety contexts; however, its application to pre-competition anxiety as an injury prevention strategy remains largely unexplored. This study aimed to develop a conceptual framework identifying the rationale and clinical application of pre-competition acupuncture as a strategy for preventing sport injury.
Methods: A narrative literature review was conducted by searching the PubMed, Google Scholar, and Consensus databases (January 2015–June 2026). Articles with study designs comprising randomized controlled trials (RCTs), prospective cohort studies, cross-sectional studies, systematic reviews, or meta-analyses were included if they addressed anxiety and sport injury risk, or clinical trials of acupuncture for anxiety conditions, with English-language articles published in peer-reviewed journals and study populations consisting of young or adult athletes subjects with anxiety. Study selection was conducted based on title and abstract screening, followed by full-text review.
Results: Evidence indicates a 2.3-fold higher relative risk of injury among athletes with pre competition anxiety symptoms. Acupuncture has demonstrated consistent efficacy as a non pharmacological with a proposed mechanism involving regulation of the hypothalamic-pituitary adrenal axis. However, only one pilot clinical trial (n=20) has directly examined acupuncture for pre-competition anxiety in athletes.
Conclusion: There is clinical rationale supporting pre-competition acupuncture as a sport injury prevention strategy; however, direct evidence remains limited. Prospective randomized controlled trials with injury incidence as the outcome are needed to test this hypothesis.
Keywords: acupuncture; anxiety; athletes; pre-competition; sport injury

Combination of hip and knee strengthening in patellofemoral pain syndrome: an evidence-based case report

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Background: Exercise therapy, particularly a combination of hip and knee strengthening, is recommended as the primary management for patellofemoral pain syndrome (PFPS). However, there is still inconsistency in the evidence regarding its effectiveness compared to knee strengthening alone. This evidence-based case report (EBCR) was developed to determine which management is most appropriate for clinical practice.

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Methods: This EBCR was developed to answer the clinical question of whether combined hip and knee strengthening is more effective than knee strengthening alone in reducing pain and improving function in patients with PFPS. All literature was searched in PubMed, Cochrane, and ProQuest databases with relevant keywords related to PFPS and strengthening exercises. The search results are evaluated using inclusion and exclusion criteria. Six selected studies were identified and critically reviewed by the Validity, Importance, and Applicability (VIA) framework. The systematic review and meta-analysis by Halabi et al. (2025) was selected as the primary evidence to answer the clinical question.
Results: Six selected studies consisted of two systematic reviews with meta-analysis, two randomized controlled trials, one systematic review, and one Cochrane review were identified and critically appraised. In general, the included studies supported the use of exercise therapy. Four studies found that exercise therapy, especially combined hip and knee strengthening, was more effective than knee strengthening alone in reducing pain and improving function. In comparison, two studies found no significant difference between the strengthening approaches. The systematic review and meta-analysis by Halabi et al. showed that a combination of hip and knee strengthening was more effective than knee strengthening alone in reducing pain (SMD = −1.29; p = 0.0003) and improving function (p = 0.01), with no significant difference in muscle strength (p = 0.44).
Conclusion: Studies show that a combination of hip and knee strengthening is more effective than knee strengthening alone in reducing pain and improving function in patients with PFPS. This also supports an evidence-based approach to exercise prescription, especially in active individuals with impaired hip muscle control.
Keywords: evidence-based case report, exercise therapy, hip strengthening, knee strengthening, patellofemoral pain syndrome

Acute caffeine supplementation and neuromuscular fatigue during exercise: a systematic review of dose and administration timing

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Background: Caffeine is widely employed as a performance booster; however, it is still unclear if its benefits arise from a decrease in exercise-related neuromuscular fatigue and if these effects are affected by the amount and timing of caffeine consumption.
Methods: Following the PRISMA 2020 guidelines, a systematic search was conducted in PubMed, ScienceDirect, Scopus, Springer and Google Scholar to identify randomized controlled or crossover trials published between 2016 and 2026 that examined acute caffeine ingestion and at least one outcome related to neuromuscular fatigue or function during voluntary exercise. Of the 141 records identified, 18 studies met the eligibility criteria and were narratively synthesized.
The risk of bias was assessed using the Cochrane RoB 2 approach for crossover trials.
Results: Caffeine administered in doses of 3 to 6 mg/kg 30 to 60 minutes before exercise reliably enhanced neuromuscular performance measures such as repetitions to failure, time to task failure, countermovement jump height, and sport-specific power and agility tests. Conversely, direct measures of central and peripheral fatigue (voluntary activation, maximal voluntary contraction torque, electromyography) were little affected by caffeine. None of the studies were considered to have a low overall risk of bias. The quality of evidence was moderate.
Conclusion: Acute caffeine ingestion improves neuromuscular performance during exercise, particularly at moderate to high doses consumed before exercise. However, this improvement does not appear to correlate with a measurable reduction in central or peripheral neuromuscular fatigue, suggesting a largely central mechanism with an effect on perception of effort that warrants further investigation.
Keywords: administration timing; caffeine; dose-response; ergogenic aid; exercise performance; neuromuscular fatigue; systematic review

Thread embedding acupuncture for plantar fasciitis in a patient with limited compliance to routine therapy

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Background: Plantar fasciitis (PF) is a common cause of heel pain, often associated with degenerative changes and mechanical overuse during sports and physical activities. Limitations of conventional therapies and the potential risks of invasive procedures highlight the need for adjunctive treatment options. Thread-embedding acupuncture (TEA) provides sustained stimulation and may offer clinical benefits for patients with PF.
Methods: A 31-year-old female with grade I obesity (body mass index [BMI] 28.6 kg/m^2) presented with chronic right heel pain that had worsened over the preceding two months. The initial Visual Analog Scale (VAS) score was 4, with pain most severe during the first steps in the morning. Clinical examination revealed a positive Windlass test, while X-ray findings showed calcaneal enthesopathy and plantar fat pad haziness, consistent with PF. TEA was performed using polydioxanone (PDO) threads inserted at ashi points in the heel region and at the KI3, BL60, and BL57 acupoints of the right foot.
Results: Pain intensity decreased from a VAS score of 4 to 0 by day 3 after TEA. Functional capacity improved, with the Foot Function Index (FFI) score decreasing from 33% to 4% by day 14. Pain-free walking distance increased from 480 m to 1,860 m by day 28. Mild pain recurred during the second month, coinciding with the PDO thread hydrolysis phase and a 6 kg weight gain, both of which may have contributed to increased mechanical stress on the plantar fascia. Conclusion: TEA may be a promising therapeutic option for PF particularly in patients with repetitive overuse and limited compliance to routine therapy, offering pain relief and functional improvement.
Keywords: heel pain, plantar fasciitis, polydioxanone thread, rehabilitation adherence, thread-embedding acupuncture

Biomechanics of baseball pitching and upper-extremity injury risk: a narrative review of the kinetic chain, workload, fatigue, and injury prevention strategies

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Background: One of the fastest and most mechanically taxing overhead sports activities is pitching a baseball. Sequential wind-up, stride, arm-cocking, acceleration, deceleration, and follow-through phases are described by the original biomechanical framework. Late cocking, acceleration, and deceleration are when shoulder and elbow loads are highest. However, current research suggests that a single mechanical variable cannot account for harm.

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Methods: Targeted searches of current peer-reviewed literature were used to broaden the review, which was created from the primary piece. Systematic reviews, meta-analyses, prospective cohorts, biomechanical laboratory investigations, and clinically relevant reviews published mostly between 2020 and 2026 were given priority.
Results: Extreme shoulder external rotation and significant elbow valgus loading are characteristics of late arm cocking, whereas acceleration results in extremely high angular velocities and deceleration necessitates significant eccentric forces from the posterior shoulder. Increased elbow valgus torque and early trunk rotation are associated with injury or surgery in certain cohorts, according to systematic evidence; nevertheless, recent prospective juvenile data warns that valgus torque is not a reliable indicator of injury on its own. Tissue exposure is altered by workload, repetitive high-effort throwing, tiredness, ball velocity, limited shoulder motion, strength traits, and kinetic-chain timing. Although future validation is still restricted, new markerless motion-capture techniques may enhance field-based monitoring.
Conclusion: Age-appropriate workload management, recuperation, whole-body mechanics, shoulder strength and range of motion, fatigue monitoring, and customized biomechanical evaluation should all be incorporated into injury prevention.
Keywords: baseball; elbow injury; fatigue; kinetic chain; pitching biomechanics; shoulder injury; ulnar collateral ligament; workload

Hydration gone wrong: prevention and management of exercise-associated hyponatremia in endurance athletes-a scoping review

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Background: Exercise-associated hyponatremia (EAH) is a potential life-threatening complication of endurance events where fluid intake exceeds renal water excretion and dilutes exchangeable sodium stores. Conflicting advice on drinking volume, sodium supplementation, and field treatment is still presented to race medical teams. Published evidence is scattered across race observational studies, surveys, small trials, and case reports, so there is no consolidated map of prevention and management strategies. This scoping review maps available strategies and identifies the remaining knowledge gaps.
Methods: The review followed PRISMA-ScR guidance. The PCC framework defined the population as endurance athletes, the concept as hydration and nutrition strategies, and the context as prevention and management of EAH. PubMed, Scopus, and ScienceDirect were searched for English-language, open-access articles published between 2016 and 2026. Studies on non-exercise hyponatremia, non-endurance athletes, and participants under 18 years were excluded. Three reviewers screened records independently and resolved disagreements by discussion. Data charting covered design, population, strategy, and outcome.
Results: The search identified 93 records, with 76 remaining after duplicate removal. After screening titles and abstracts, 32 records advanced to full-text review, and 26 studies met the eligibility criteria. The included studies comprised 10 observational field studies, 6 surveys, 3 experimental trials, 5 case reports or series, and 2 practice reviews, covering over 1,500 athletes from marathons, ultramarathons, triathlons, and cycling. Ad libitum drinking helped maintain hydration during two hours of running at temperatures between 22–35°C and reduced the risk of overdrinking associated with EAH. Sodium supplementation at 131–533 mg/h/kg did not prevent dysnatremia or enhance performance, although most athletes supported sodium replacement during races. Factors such as salt-losing sweat phenotypes, low dietary sodium, NSAID use, and warm humid conditions influenced serum sodium levels. Oral 3% hypertonic saline was as effective as intravenous administration for reversing mild-to-moderate symptomatic EAH, enabling discharge within 76 minutes. Field guidance recommended restricting fluids with a sodium bolus and cautioned against routine post-race intravenous hydration. Surveys revealed ongoing misunderstandings among runners about fluid and sodium needs.
Conclusion: Prevention of EAH rests on thirst-guided drinking rather than routine sodium supplementation, while oral hypertonic saline provides a practical field treatment. Athlete education must close the gap between belief and evidence. Evidence remains scarce for female athletes, non-running disciplines, and tropical settings, which should direct future research and national race medical protocols.
Keywords: endurance athletes, exercise-associated hyponatremia, hydration strategy, scoping review, sodium supplementation

Musculoskeletal complaints among recreational padel players in Banyumas, Central Java: a cross-sectional study

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Background: Padel is a rapidly growing racket sport involving repetitive strokes, rapid changes of direction, and intermittent high-intensity movements that may contribute to musculoskeletal complaints. However, data among recreational padel players in Indonesia remain limited. This study aimed to describe the prevalence and characteristics of musculoskeletal complaints among recreational padel players in Banyumas, Central Java.
Methods: A cross-sectional study was conducted among recreational adult padel players in Banyumas, Central Java. Data were collected using a structured, self-administered questionnaire developed by the researcher. The questionnaire assessed demographic and padel-playing characteristics, including age and warm-up and cool-down habits, as well as musculoskeletal symptoms in nine body regions during the previous 12 months, activity limitation, and healthcare assessment related to injury. The presence of a musculoskeletal complaint was defined as reporting symptoms in at least one assessed body region during the previous 12 months. Descriptive statistics were used to summarize the findings.
Results: A total of 55 recreational padel players participated in the study, with a mean age of 33.71 ± 5.79 years (range, 23–46 years); 29 (52.7%) were female and 26 (47.3%) male, with a mean BMI of 24.41 ± 3.86 kg/m^2. Forty-eight participants (87.3%) reported musculoskeletal symptoms in at least one body region during the previous 12 months. The knee was the most frequently affected region (43.6%), followed by the wrist/hand (40.0%), shoulder (36.4%), and elbow (30.9%). Twenty-two participants (40.0%) reported being prevented from carrying out normal activities because of their musculoskeletal complaints. Regarding padel-playing habits, 46 participants (83.6%) reported warming up before playing, while 32 (58.2%) reported performing cool-down or stretching after playing. Additionally, 32 participants (58.2%) reported that an injury required assessment by a healthcare professional, most commonly a physiotherapist (41.8%), followed by a doctor (14.5%) and hospital/clinic assessment (1.8%).
Conclusion: Musculoskeletal symptoms were highly prevalent among recreational padel players in Banyumas, with the knee, wrist/hand, shoulder, and elbow being the most commonly affected regions. A substantial proportion of participants reported activity limitation and healthcare assessment related to injury. These findings highlight the importance of musculoskeletal health awareness and injury prevention strategies in recreational padel communities. Further studies with larger samples are warranted.
Keywords: injury, musculoskeletal complaints, padel, recreational athletes, sports medicine

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Effects of neuromuscular training on physical fitness performance in combat sport athletes: a systematic review

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Background: Combat sports demand high physical fitness, agility, and precise neuromuscular control. Conventional conditioning often targets isolated fitness components rather than neuromuscular adaptations, limiting athletes' performance gains, and evidence on neuromuscular-based interventions in combat sport athletes remains scarce. Neuromuscular training (NMT), integrating functional movement, strength, plyometrics, core stability, and agility, offers a more comprehensive approach to enhance motor unit recruitment, dynamic stability, and proprioception. This review aims to synthesize available evidence on the effectiveness of neuromuscular interventions on physical fitness in combat sport athletes.
Methods: Following PRISMA 2020 guidelines, we searched PubMed, ScienceDirect, and Europe PMC for trials investigating NMT interventions in combat athletes. Eligible programs combined resistance, plyometric, core stability, agility, or sport-specific striking drills. Methodological quality was appraised using the Cochrane Risk of Bias 2 tool and the Newcastle-Ottawa Scale. This review was registered in PROSPERO (CRD420261490749).
Results: Four studies involving 105 elite combat athletes (boxing, Sanda, Para-taekwondo) were included. NMT produced substantial physical gains. Maximum strength rose significantly (squat: 17–31% improvement; bench press: up to 15%), alongside marked countermovement jump improvements. Agility (hexagon jump, reactive agility) and linear speed improved across most cohorts, though 30-m sprint and 3000-m run endurance results were inconsistent in male boxers. Dynamic balance, visual reaction time, and knee proprioception improved significantly, with NMT groups outperforming controls. Special striking capacity enhanced, with cumulative punching power increasing by 16–36%, though significant single-punch power improvements occurred only in male boxers. Overall, neuromuscular training effectively enhanced strength, power, speed, agility, balance, and reaction ability, supporting its role in improving overall physical fitness in combat sport athletes.
Conclusion: In conclusion, neuromuscular training proved beneficial for physical fitness in combat sport athletes, with significant improvements in strength, power, speed, agility, balance, reaction time, and punching performance, supporting its use by practitioners to design more effective, injury-conscious training programs.
Keywords: athletic performance; combat sports; martial arts; neuromuscular training; physical fitness.

Efficacy of exercise-specific and heat-moisture exchanging masks in mitigating exercise-induced bronchoconstriction among athletes: a systematic review

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Background: Exercise-Induced Bronchoconstriction (EIB) presents a significant physiological and performance challenge for aerobically fit individuals and elite athletes. While pharmacological prophylaxis is standard, mechanical interventions such as exercise-specific face masks (ESFM) and heat and moisture-exchanging (HME) masks offer a doping-free alternative by counteracting airway mucosal heat and water loss. This systematic review aims to evaluate the efficacy of these protective masks in preserving acute post-exercise lung function specifically among trained athletes and aerobically fit individuals.
Methods: A systematic literature search was conducted across PubMed, Scopus, and ScienceDirect in accordance with PRISMA guidelines, covering publications from 2016 to 2026. Inclusion criteria were strictly restricted to randomized controlled trials and crossover studies evaluating ESFM or HME masks against unprotected control conditions during graded exercise or extreme thermal challenges. The target population was limited to trained athletes and aerobically fit individuals. The primary outcome extracted was the acute post-exercise change in spirometry/FEV1.
Results: Three crossover randomized controlled trials comprising 60 highly fit participants met the strict inclusion criteria. Synthesized spirometric evidence indicates that protective exercise masks significantly attenuate acute post-exercise airway narrowing relative to unprotected exertion. In healthy winter athletes exercising in extreme sub-zero temperatures (-15°C to -20°C), HME masks completely neutralized cold-induced airway narrowing, converting expected FEV1 declines (-2.7% and -4.2%) into stable or improved post-exercise ventilatory capacity. Furthermore, in aerobically fit individuals undergoing graded treadmill protocols, ESFM usage significantly improved spirometry measures at submaximal intensities for participants both with and without EIB. However, these respiratory benefits were accompanied by elevated perceptions of air hunger and breathing discomfort.
Conclusion: Exercise masks provide robust and immediate mechanical protection against exertion- and cold-induced airway narrowing in trained populations. While the device serves as a highly effective non-pharmacological prophylactic measure to preserve lung function, the associated perceptual breathing discomfort and potential performance impairments must be carefully managed when prescribing this strategy to competitive athletes.
Keywords: athlete, exercise-induced bronchoconstriction, fev_1, heat and moisture exchanger, non-pharmacological intervention, warm-up exercise

Post-polio leg length discrepancy with compensatory gait, knee osteoarthritis, and lumbar degenerative disc disease: case report

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Background: Childhood paralytic poliomyelitis may result in permanent asymmetric muscle weakness and musculoskeletal deformities that persist into adulthood. Longstanding neuromuscular imbalance may alter gait mechanics and contribute to compensatory loading across the lower extremity and lumbopelvic region. This case illustrates the biomechanical consequences of chronic unilateral post-polio weakness and highlights the importance of comprehensive functional assessment in sports medicine.
Methods: A 56-year-old woman presented with progressive pain during prolonged ambulation. At 2 years of age, she developed acute flaccid paralysis of the left lower limb following a febrile gastrointestinal illness and an intramuscular injection. The clinical history was consistent with paralytic poliomyelitis, and she was subsequently diagnosed with post-polio sequelae by orthopedic and neurology specialists. A comprehensive assessment included physical examination, manual muscle testing, gait analysis, and radiographic evaluation.

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Results: Examination revealed pelvic obliquity with left-sided shortening, left foot drop, a left knee flexion contracture, and a 2 cm difference in thigh circumference. Manual muscle testing demonstrated quadriceps strength of 0/5, ankle dorsiflexion of 0/5, hip flexion of 1/5, and hip abduction of 2/5, while knee flexion was relatively preserved at 4/5. Gait analysis revealed a high-stepping pattern, stance-phase knee hyperextension, hip hiking, and lateral trunk shift. Long-leg radiographs demonstrated a 3.5 cm leg length discrepancy, with the left leg being shorter, and bilateral knee osteoarthritis that was more advanced on the left. Lumbar radiographs revealed degenerative disc disease at L4–L5. The observed gait compensations corresponded to specific neuromuscular deficits: stance-phase knee hyperextension facilitated passive knee stability in the absence of quadriceps function, knee flexor dominance may have contributed to the flexion contracture, absent ankle dorsiflexion resulted in a high-stepping gait, and hip abductor weakness contributed to lateral trunk shift. The asymmetric severity of knee osteoarthritis and lumbar degenerative changes may have been associated with longstanding compensatory loading. Management included a custom insole, prescription of an ankle-foot orthosis, and a knee extension stretching program.
Conclusion: Longstanding unilateral weakness following childhood poliomyelitis may result in complex compensatory gait adaptations and asymmetric musculoskeletal loading decades after the initial illness. This case hightlights the importance of comprehensive biomechanical assessment in adult polio survivors, including evaluation of muscle strength, joint range of motion, leg length discrepancy, gait pattern, and lower-extremity alignment. An individualized approach combining orthotitc management and targeted rehabilitation may help preserve function and address potentially modifiable biomechanical factors.
Keywords: degenerative disc disease, gait analysis, leg length discrepancy, osteoarthritis, poliomyelitis

Lean mass hyper-responder phenotype in professional and recreational endurance athletes following a ketogenic diet: A narrative review

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Background: Ketogenic diets (KD) are increasingly adopted by endurance or recreational athletes to optimize fat oxidation and body composition. However, in lean athletes, extreme carbohydrate restriction triggers an unusual lipid triad: drastic elevations in LDL cholesterol (LDL-C ≥ 200 mg/dL) and total cholesterol (TC), high HDL-C (≥ 80 mg/dL), and low triglycerides (TG ≤ 70 mg/dL) a phenotype known as Lean Mass Hyper-Responder (LMHR). The objective of this study is to review the impact of ketogenic and low-carbohydrate diets especially on fasting and postprandial lipid profiles, endurance performance, glucose dynamics, and clinical implications in endurance athletes.
Methods: A narrative review was conducted using PubMed and Google Scholar, yielding 192 studies via the Boolean operator search: ("Ketogenic Diet" OR "Low-Carbohydrate Diet") AND ("Endurance Athlete" OR "Recreational Athlete") AND ("Lipid Profile" OR "Cholesterol" OR "LDL" OR "Triglycerides"). Inclusion criteria comprised primary studies analyzing blood lipid profiles among endurance athletes following ketogenic diets between 2016 and 2026. Data were synthesized from four selected crossover trials evaluating low-carbohydrate, high-fat (LCHF) diets in distance runners, cyclists, and triathletes that met all criteria. Secondary studies (literature reviews, systematic reviews, and meta-analyses) were excluded.
Results: All studies consistently demonstrated the LMHR triad (notably fasting LDL-C surging by up to +38%). Intriguingly, postprandial LDL-C excursions following a ketogenic meal significantly decreased rapid cholesterol clearance for metabolic fuel. While KD preserved submaximal endurance, high-intensity performance was compromised by pyruvate dehydrogenase (PDH) inhibition.
Conclusion: The LMHR phenotype in athletes represents an energetic adaptation explained by the Lipid Energy Model (LEM) rather than pathological dyslipidemia. No adverse metabolic or inflammatory signals were observed, though long-term trials exceeding 12 weeks investigating the effects of ketogenic diets on lipid profiles or utilizing Keto-CTA are essential.
Keywords: endurance athletes; exercise metabolism; ketogenic diet; lean mass hyper-responder; lipid profile

Management strategies for bone stress injuries in atheletes: a systematic review

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Background: Bone stress injuries (BSIs) are common overuse injuries in athletes and may result in substantial time away from sport. Treatment strategies vary according to injury location, severity, and risk classification, ranging from activity modification and rehabilitation to adjunctive physical modalities and surgical intervention. However, evidence regarding the effectiveness of these management strategies and their impact on return to sport (RTS) and bone healing outcomes remains heterogeneous. This systematic review aimed to evaluate management strategies for BSIs in athletes and their effects on RTS and bone healing outcomes. Methods: A literature search was conducted across five databases. Eligible studies included randomized controlled trials (RCTs), cohort studies, and case series involving at least 10 participants who were athletes with imaging-confirmed BSIs. Interventions included conservative management, rehabilitation, activity modification, immobilization, bracing, adjunctive therapies, and surgical treatment. Methodological quality and risk of bias were assessed using appropriate tools, including the Joanna Briggs Institute (JBI) critical appraisal tools and ROBINS-I. Owing to heterogeneity among the included studies, the findings were synthesized narratively. Ten studies were included in the systematic review.
Results: Management strategies for BSIs in athletes demonstrated generally favorable outcomes across the 10 included studies. Conservative treatment achieved RTS rates of 83.3–98.0%, whereas operative treatment achieved RTS rates of 94.1–100%, with bone union rates reaching 100%. Blood flow restriction training and focused extracorporeal shock wave therapy (fESWT) showed favorable recovery outcomes, whereas low-intensity pulsed ultrasound (LIPUS) demonstrated no significant benefit. Heterogeneity in injury characteristics and treatment approaches limited direct comparisons between interventions.
Conclusion: Conservative, operative, and adjunctive management strategies generally demonstrated favorable RTS and bone healing outcomes in athletes with BSIs. Treatment selection should be guided by injury location, severity, and risk classification. Further high-quality RCTs using standardized outcome measures are needed to establish the comparative effectiveness of these strategies and inform evidence-based management guidelines.
Keywords: athletes, bone healing, bone stress injuries, conservative treatment, management strategies, surgical treatment

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Effects of chia seed (salvia hispanica l.) consumption on sports performance and recovery: a systematic review

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Background: Chia seeds (Salvia hispanica L.) are rich in alpha-linolenic acid (ALA), high-quality plant protein, antioxidants, and soluble fiber, making them increasingly popular in sports nutrition. Although chia seeds have historically been used by Indigenous Mesoamerican populations to support endurance, contemporary evidence regarding their specific ergogenic and post-exercise recovery effects remains fragmented. This review aimed to systematically synthesize the available literature on the physiological, metabolic, and ergogenic effects of chia interventions, including whole seeds, milled seeds, extracted oils, and hydrocolloid gels, on athletic performance, substrate utilization, and post-exercise recovery.
Methods: This review considered peer-reviewed randomized controlled trials, crossover trials, and relevant in vivo experimental studies investigating chia interventions in physically active populations. Eligible outcomes included performance measures, such as time to exhaustion and maximal oxygen uptake (VO_2max); metabolic indices, including respiratory exchange ratio (RER), lipid oxidation, and glycemic responses; and recovery biomarkers, including inflammatory cytokines, malondialdehyde (MDA), superoxide dismutase (SOD), and cortisol. Searches were reportedly conducted across PubMed, Scopus, Embase, and Web of Science, following the PRISMA 2020 guidelines. The review protocol was registered in PROSPERO (CRD420261492858). Methodological limitations included difficulties with participant blinding due to the distinctive hydration properties of chia seeds, small sample sizes among highly trained participants, and reliance on surrogate physiological markers.
Results: The available evidence suggests that combining chia seeds with commercial carbohydrate–electrolyte beverages produces endurance performance comparable to that achieved with conventional carbohydrate drinks during events lasting more than 90 minutes. This approach may reduce reliance on refined sugars while increasing dietary ALA and fiber intake. Acute ingestion of isolated chia seed oil does not appear to alter RER or improve time to exhaustion. However, longer-term chia consumption and chia-based hydrocolloid gels have been associated with improvements in VO_2max and systemic cardiometabolic markers. Furthermore, in vivo experimental models indicate that chronic chia supplementation may attenuate overtraining-induced oxidative stress, as reflected by reduced lipid peroxidation (MDA) and increased antioxidant activity (SOD).
Conclusion: Chia seeds may serve as a functional food in sports nutrition, offering endurance performance comparable to that of conventional carbohydrate drinks under certain conditions while providing additional nutritional benefits. Although acute ingestion of chia seed oil does not appear to produce immediate ergogenic effects, chia seeds may support glycemic regulation and long-term cardiometabolic health. Evidence from experimental models also suggests a potential role in mitigating oxidative stress during recovery. However, further high-quality human studies are needed to establish the optimal dosage, timing, formulation, and effects on athletic performance and recovery.
Keywords: chia seeds, endurance, salvia hispanica, sports performance, sports nutritionNerve

conduction, motor function, il-6 and tgf-β mrna expression following acute sciatic nerve compression injury in rats

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Background: Sciatic nerve injury may result in both motor and sensory impairment. Experimental research is needed to clarify the functional and molecular processes underlying nerve degeneration and regeneration. This study assessed nerve conduction function using surface electromyography (sEMG), motor function using the Sciatic Functional Index (SFI), and the mRNA expression of Interleukin-6 (IL-6) and Transforming Growth Factor-Beta (TGF-β) in a rat model of acute sciatic nerve compression injury.
Methods: Thirty-two male Wistar rats (2-3 months old, weighing 250-300 g) were randomly assigned to either a control/Sham Operation (SO) group or a sciatic nerve injury (CI) group. Each group was further divided according to termination time point (days 1, 4, and 7 post-injury), yielding six subgroups (SO 1, SO 4, SO 7, CI 1, CI 4, and CI 7). Nerve conduction and motor function were assessed in the SO 7 and CI 7 subgroups both before surgery and on days 1, 4, and 7 afterward.
Results: Root mean square (RMS) values differed significantly between groups only on day 1 ($p=0.043$). SFI scores in the injury group dropped sharply from day 1 through day 7 ($p<0.05$) and were significantly on day 1 significantly different from those of the sham group. No significant correlation was found between sEMG readings and SFI scores. IL-6 mRNA expression rose ($p<0.05$) before declining in subsequent days, whereas TGF-β mRNA increased gradually and peaked on day 7, though this increase did not reach statistical significance.
Conclusion: Sciatic nerve compression injury in rats produced impaired motor function and elevated IL-6 mRNA expression during the acute phase, while nerve conduction function and its correlation with motor function showed no significant changes. TGF-β mRNA expression in the injury group was also not significantly different from that of the control group.
Keywords: acute peripheral nerve compression injury, conduction function, IL-6, motor function, TGF-β, sciatic nerve

From desk to wellness: 6 month study of body composition, fitness, metabolic changes in office workers

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Background: Obesity and sedentary lifestyle among the working-age adult population contribute to an increased risk of cardiometabolic disease. Structured lifestyle intervention programs are implemented as promotive and preventive strategies in the corporate setting, yet changes in body composition, physical fitness, and metabolic profile among participants remain poorly documented in the context of corporate wellness programs in Indonesia.

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Methods: This study used a descriptive observational design with two measurement points (baseline and endline), among office workers during the period September 2025-March 2026. The program consisted of guided exercise sessions held five times per week, comprising three in person (offline) sessions and two online sessions, combining aerobic and strength training components, individually adjusted based on ACSM risk stratification, health condition, and each participant›s goals, along with a monthly physician and nutritionist consultation and evaluation. Body composition data (body weight, body mass index, body fat percentage, muscle mass, visceral fat, waist circumference; n=56), physical fitness data (6-Minute Walk Test, 3-Minute Step Test, handgrip, plank, sit and reach, shoulder reach; n=56), and metabolic profile data (HbA1c, triglyceride, total cholesterol, HDL, LDL; n=34) were analyzed descriptively using means and standard deviations.
Results: Mean body weight decreased from 84.54±11.55 kg to 80.25±11.89 kg, body mass index from 30.07±3.75 to 28.52±3.72 kg/m2, and body fat percentage from 35.44±7.53% to 33.09±8.54%. Waist circumference decreased from 99.76±10.03 cm to 92.60±10.58 cm. In physical fitness, 6-Minute Walk Test distance increased from 443.49±96.96 m to 579.05±96.33 m, plank duration increased from 61.00±33.09 seconds to 106.81±66.12 seconds, and right handgrip strength increased from 36.01±9.63 to 38.67±10.02. In the metabolic profile, mean HbA1c decreased from 5.45±0.51% to 5.28±0.55%, and triglyceride decreased from 135.02±87.22 to 106.70±59.09 mg/dL, whereas total cholesterol and LDL showed a slight increase (total cholesterol from 203.10±38.27 to 209.24±46.71 mg/dL; LDL from 119.08±31.49 to 132.64±42.89
mg/dL).
Conclusion: Participants showed improvement in most body composition and physical fitness indicators, and in some metabolic parameters (HbA1c, triglyceride), after six months of the program, although total cholesterol and LDL showed a slight increase. Further analytical research with a comparison group is needed to establish the statistical effectiveness of the program.
Keywords: body composition, descriptive, metabolic profile, office workers, physical fitness

Reversing cognitive decline and frailty via multicomponent biopsychosocial exercise: A 73-year-old sedentary man case study

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Background: Sarcopenia and mild cognitive impairment (MCI) are interconnected health challenges in aging populations, with limited pharmacological options for addressing their functional consequences. Although international guidelines recommend regular multicomponent exercise, its implementation in Indonesia may be hindered by individual preferences, limited access to appropriate facilities, and psychosocial barriers. Senior Sehat Indonesia addresses these challenges through a biopsychosocial approach that integrates structured physical training with art-based activities. This case study describes the physical and cognitive outcomes associated with a multidimensional community-based intervention in an older adult.
Methods: A 73-year-old Javanese-Chinese man with ankylosing spondylitis and controlled essential hypertension participated in a supervised, four-day-per-week program at Senior Sehat Indonesia. Following spousal bereavement, he had adopted a sedentary lifestyle and was considered at risk of physical and cognitive frailty. The six-month intervention included progressive resistance training, warm-water pool exercises, Tai Chi, yoga, percussive music-based exercise, dramatic arts (acting), and reflective journaling. Medical management of his chronic conditions was provided by an internist. Physical performance, muscle strength, skeletal muscle mass, and cognitive function were monitored longitudinally.
Results: After six months, skeletal muscle mass remained stable, changing from 42.4% to 42.5%. Bilateral handgrip strength increased from 34.0 to 42.3 kg on the right and from 34.2 to 43.2 kg on the left, representing increases of approximately 24.4% and 26.3%, respectively. The Short Physical Performance Battery (SPPB) score improved from 7/12 to 10/12, indicating better physical performance and mobility. The Montreal Cognitive Assessment–Indonesian version (MoCA-INA) score increased from 22/30 to 27/30, suggesting improvement in cognitive performance. These changes were observed during participation in the integrated intervention.
Conclusion: This case illustrates that a six-month program combining multicomponent exercise, artistic activities, and medical management was associated with improvements in muscle strength, physical performance, and cognitive scores in an older adult with a previously sedentary lifestyle. The Senior Sehat Indonesia model may offer a practical, community-based approach to supporting healthy aging. However, as this is a single case, the observed improvements cannot be attributed solely to the intervention, and further studies involving larger samples and appropriate comparison groups are needed to establish its effectiveness.
Keywords: artistic activities; biopsychosocial intervention; multicomponent exercise; sarcopenia; senior health

Return-to-performance criteria following musculoskeletal injury in team sports: evidence and standardization» : a scoping review

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Introduction: The gap between an athlete's return to sport (RTS) and a true return to pre-injury performance (RTPe) presents a significant clinical challenge. Current criteria for determining athlete readiness are highly heterogeneous and often lack validation. This scoping review aimed to map the evidence on RTPe criteria following musculoskeletal injuries in team sports.
Methods: A systematic search of five electronic databases was conducted in accordance with the PRISMA-ScR guidelines.
Results: Sixty studies met the inclusion criteria, with most focusing on anterior cruciate ligament (ACL) reconstruction. Five thematic domains of RTPe criteria were identified: physical testing, strength assessment, sport-specific metrics, psychological readiness, and time-based criteria. A substantial gap was observed between RTS rates (83–92%) and return-to-pre-injury-performance rates (53–80%). Psychological readiness was strongly associated with return to competition (OR = 4.0), yet it was formally assessed in fewer than 30% of the included studies. Generic functional tests, such as hop tests, demonstrated limited predictive validity for reinjury. In contrast, multifactorial, criteria-based programs were associated with better outcomes, including a sixfold reduction in reinjury risk.
Conclusion: RTPe assessment requires a paradigm shift from time-based decisions and generic functional testing toward multidimensional, sport-specific, and psychologically informed assessments. Standardization efforts should establish core assessment domains while allowing sport-specific calibration to better align return-to-sport decisions with actual performance readiness.
Keywords: musculoskeletal injuries; psychological readiness; return to performance; return to sport; team sports

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The influence of GLP-1 receptor agonists on lean body mass and physical performance

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Background: Adjunctive pharmacotherapy, particularly with glucagon-like peptide-1 receptor agonists (GLP-1RAs), has been increasingly utilized for weight management. Despite their effectiveness in reducing body weight, concerns remain regarding their effects on body composition and physical performance. Emerging evidence suggests that GLP-1RA-induced weight loss may lead to reductions in lean body mass, which is associated with muscle strength and physical function. Most available evidence comes from populations with type 2 diabetes mellitus (T2DM) or severe obesity, leaving a significant gap in the literature regarding the effects of GLP-1RAs on body composition and physical performance in adults with overweight or obesity, particularly when considering the potential benefits of structured exercise.
Methods: A systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Randomized controlled trials (RCTs) and secondary analyses published between January 2021 and January 2026 were retrieved from MEDLINE and ScienceDirect. Eligible studies included adults aged ≥18 years receiving GLP-1RAs, reported body composition and/or physical performance outcomes, and included a comparator. Relevant outcomes included body composition and cardiorespiratory fitness. During the review process, the initial eligibility criteria were broadened to include obesity-management interventions involving participants with weight-related cardiometabolic risk factors; eligibility reassessment remains ongoing. Animal and in vitro studies, narrative and systematic reviews, abstracts without accessible full texts, and studies without comparator groups were excluded.
Results: A total of 843 records were identified, yielding six reports representing three primary trials involving 679 participants. The eligible trials evaluated different GLP-1RA doses and administration regimens. In the STEP 6 trial, semaglutide at doses of 2.4 mg and 1.7 mg resulted in body weight reductions of 13.2% and 9.6%, respectively, compared with 2.1% in the placebo group. A 14-week genetic secondary analysis suggested that genetic variation may influence the weight-loss response to liraglutide. Evidence from the S-LITE trial indicated that liraglutide combined with structured exercise was associated with preservation of lean mass despite reductions in fat mass. Across four reports, combining liraglutide with exercise was associated with reductions in abdominal fat and preservation of bone mineral density (BMD). Cardiorespiratory fitness (CRF), assessed by peak oxygen consumption, improved with exercise alone and combined treatment but not with liraglutide alone. However, objective measures of physical performance were insufficient, and the preservation of lean mass does not necessarily indicate the preservation of muscle strength or CRF.
Conclusion: This review provides insights into the effects of GLP-1RAs on body composition and cardiorespiratory fitness. Combining GLP-1RA treatment with structured exercise may help preserve lean body mass and improve CRF. However, evidence regarding physical performance remains limited. Further research in well-defined populations, using standardized assessments of physical performance and CRF, is needed to establish the effects of GLP-1RAs, particularly when combined with structured exercise.
Keywords: body composition; cardiorespiratory fitness; exercise; glucagon-like peptide-1 receptor agonists; systematic reviewTechnology-assisted feedback in postoperative knee

rehabilitation: a systematic review of exercise adherence, movement quality, and functional recovery

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Background: Technology-assisted rehabilitation has emerged as a potential approach to address limitations of conventional rehabilitations programmes after knee surgery in which recovery depends not only on surgical success but also on the restoration of joint mobility. While several reviews have examined adherence and functional outcomes after technology-assisted rehabilitation, movement quality and exercise accuracy process outcomes central to how these technologies are intended to work have rarely been synthesized alongside adherence and functional improvement across the full range of technology modalities (sensors, AR/VR, and app-based systems). A synthesis integrating adherence, movement quality, functional recovery, and safety across postoperative knee rehabilitation technologies is therefore required. This systematic review aimed to evaluate technology-assisted feedback exercise rehabilitation after knee surgery compared with conventional physiotherapy, usual home exercise, or paper-based rehabilitation.
Methods: This systematic review was reported according to the PRISMA framework. A systematic literature search was conducted in PubMed, the Cochrane Library, and ScienceDirect for publication up until July 6th 2026. Comparative studies involving postoperative knee rehabilitation using wearable sensors, mobile applications, motion tracking, artificial intelligence, augmented reality, or interactive telerehabilitation were included. Because of substantial clinical and methodological heterogeneity, the results were synthesized narratively. Results: Of 3,310 records screened, A total ofseven studies consisted of 636 patients met inclusion criteria with five study on total knee arthroplasty and two study on anterior cruciate ligament reconstruction. Technology-assisted rehabilitation was consistently associated with higher exercise adherence significantly (82.5% vs 45.0%, $p<0.05$; 85.99% vs 59.78%, $p<0.05$), along with greater quadriceps muscle strength gains, reduced stiffness, earlier gains in range of motion, better balance, greater knee motion during gait, and improved performance on some functional tests. Pain, patient-reported knee function, mobility, and quality of life were generally comparable between groups. Although most systems could monitor and correct movement in real time, few studies directly compared movement accuracy between groups, and safety outcomes were favorable but inconsistently reported.
Conclusion: Technology-assisted feedback rehabilitation reliably improves exercise adherence and selected recovery outcomes, but evidence for improved pain, function, and movement quality remains limited. Technology-assisted rehabilitation should therefore be considered an adjunct or alternative to conventional rehabilitation rather than a universal replacement for physiotherapist led care.
Keywords: digital rehabilitation, telerehabilitation, total knee arthroplasty, anterior cruciate ligament reconstruction, sensor-based rehabilitation, app-based rehabilitation

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Correlations between functional fitness and individual characteristics in community-dwelling older adults

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Background: The increasing population of community-dwelling older adults presents important public health challenges, particularly declining physical function that may compromise independence. Functional fitness reflects the ability to perform daily activities and is influenced by multiple individual factors. The 30-Second Chair Stand Test (30s-CST) and 2-Minute Step Test (2MST) are simple field-based assessments of lower-extremity muscle strength and cardiorespiratory endurance, respectively. This study aimed to analyze the correlations between individual characteristics and functional fitness assessed using the 30s CST and 2MST among community-dwelling older adults.

Methods: This analytical observational cross-sectional study included 40 community-dwelling older adults aged ≥60 years from RW 15, Penjaringan, Jakarta, assessed at Atma Jaya Catholic University of Indonesia, Pluit Campus, Jakarta. Participants able to perform light-to-moderate physical activity were included, while those with hypertension were excluded. Demographic characteristics, anthropometric parameters, blood pressure, 30s-CST, and 2MST performance were assessed. Pearson correlation analysis was performed, with $p<0.05$ considered statistically significant.

Results: Participants had a mean age of 65.9±6.3 years, and 72.5% were women. The mean 30s-CST score was 12.6±3.2 repetitions, while the mean 2MST score was 68.8±25.9 steps. Height was positively associated with 30s-CST performance ($r=0.306$, $p=0.049$). A significant positive correlation was also found between 30s-CST and 2MST performance ($r=0.397$, $p=0.009$). Age was negatively associated with 2MST performance ($r=-0.316$, $p=0.037$). Sex, body mass index, weight, and blood pressure showed no significant associations with functional test performance.

Conclusion: Lower extremity muscle strength was positively correlated with cardiorespiratory endurance, indicating an interrelationship between functional fitness components in older adults. Increasing age was associated with lower cardiorespiratory endurance, while height was associated with lower-extremity strength performance. Simple functional tests such as the 30s-CST and 2MST may support community-based screening and the development of multicomponent exercise interventions to maintain functional capacity and independence in older adults.

Keywords: functional fitness, cardiorespiratory endurance, lower extremity strength, older adults, 2-minute step test, 30-second chair stand test

Association between swimming training load and shoulder impingement-related symptoms in competitive swimmers: a narrative literature review

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Background: Shoulder pain is a major musculoskeletal problem in competitive swimmers, who are repeatedly exposed to high-volume overhead loading. However, the relationship between swimming training load and shoulder symptoms is complex, and contemporary evidence increasingly challenges a simple mechanical impingement model. This narrative review aimed to synthesize current evidence on the relationship between swimming training load and shoulder pain or impingement-related symptoms, with particular attention to external and internal load, workload changes, shoulder capacity, biomechanical factors, and recovery.

Methods: A narrative review of peer-reviewed literature was conducted, prioritizing systematic reviews, consensus statements, prospective and cohort studies, and swimming-specific biomechanical and training-load studies. Emphasis was placed on publications from 2021–2026. Evidence was synthesized across training volume and intensity, workload changes, rotator-cuff and posterior shoulder strength-endurance, scapular control, range of motion, swimming technique, recovery, and athlete-related modifiers.

Results: Current evidence does not support a simple linear relationship in which greater weekly swimming distance independently causes shoulder pain. Cumulative exposure and high-intensity training may transiently alter external-rotation range of motion, shoulder-rotation torque, muscular soreness, fatigue, sleep, and wellness. Most proposed risk factors have limited or inconsistent evidence; however, high acute-to-chronic workload and reduced posterior shoulder strength- endurance remain clinically relevant candidates. Age and competition level may modify associations involving glenohumeral laxity, pectoralis minor length, scapular control, and rotator cuff strength ratios. Overall, the evidence supports a multifactorial load-capacity framework in which symptoms may emerge when training demands exceed tissue, neuromuscular, technical, and recovery capacity.

Conclusion: Training load should be considered an important exposure rather than an independent cause of shoulder pain in competitive swimmers. Monitoring should integrate swimming volume and intensity with internal load, wellness, shoulder strength-endurance, range of motion, symptoms, recovery, and previous injury. Contemporary terminology such as subacromial pain syndrome or rotator cuff-related shoulder pain is preferable to a purely mechanical impingement model when a specific structural diagnosis has not been established. Prospective studies using standardized injury definitions and time-varying load models are required to clarify causal relationships.

Keywords: competitive swimming, rotator cuff-related shoulder pain, shoulder pain, swimmer's shoulder, training load, workload monitoring

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Acupuncture for exercise performance and recovery relevant to long-distance running: a narrative review

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Background: Long-distance running performance depends on VO2max, running economy, lactate threshold, and recovery. Fatigue, DOMS, delayed autonomic/metabolic recovery, and elevated perceived exertion may impair training quality. Acupuncture has been studied as a supportive non-pharmacological strategy. Its role specifically relevant to long-distance running remains unclear.
Methods: A comprehensive search was conducted across PubMed, Cochrane Library, and Google Scholar from database inception through December 2025. The search strategy utilized combinations of terms related to intervention—including (acupuncture OR electroacupuncture OR auricular acupuncture)—and outcomes—including (exercise OR performance OR recovery OR HRR OR blood lactate OR VO2max OR RPE OR DOMS). A total of 12 publications met the inclusion criteria, comprising 2 systematic reviews and 10 primary studies, while conceptual papers and protocols lacking clinical outcomes were excluded.
Results: Acupuncture demonstrated more consistent effects on acute post-exercise recovery parameters than on direct enhancements of maximal aerobic capacity. Better heart-rate recovery was reported in 8/10 studies, and improved post-exercise blood-lactate recovery in 7/10 studies. Perceived exertion was significantly lower with acupuncture during HIIT (16.8 vs. 19.4 control, $p = 0.001$) and following a 1-week electroacupuncture intervention during a submaximal bike test (11.45 rightarrow 10.71, $p = 0.004$$). For musculoskeletal recovery, acute delayed-onset muscle soreness (DOMS) significantly decreased (3.07 to 1.67, $p = 0.001$) and was superior to sham acupuncture ($p = 0.003$); however, day-2 DOMS (3.13 to 2.07, $p = 0.004$) showed no significant difference compared to sham acupuncture ($p = 0.329$). In contrast, evidence regarding VO2max remains inconsistent, with 4/7 studies finding no significant between-group difference.
Conclusion: Acupuncture may serve as an effective adjunctive strategy to support acute recovery and training readiness in long-distance running by enhancing autonomic regulation, accelerating lactate clearance, lowering perceived exertion, and reducing acute musculoskeletal symptoms. While current evidence does not support direct improvements in VO2max, running economy, or race performance, acupuncture may indirectly contribute to long-term endurance performance by improving overall training quality and consistency.
Keywords: acupuncture, electroacupuncture, endurance performance, exercise recovery, heart rate recovery, muscle soreness, perceived exertion

The potential of Balinese dance to influence the risk of anterior pelvic tilt: A literature review

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Background: Balinese dance is a traditional performing art characterized by a distinctive posture known as agem. This posture involves sustained lumbar hyperlordosis, pelvic flexion, and external rotation of the lower limbs. Repeatedly maintaining these positions for prolonged periods may contribute to muscle imbalances around the pelvis. One biomechanical condition potentially associated with such muscle imbalances is anterior pelvic tilt (APT). However, studies specifically examining the causal relationship between Balinese dance practice and the occurrence of APT remain limited.
Methods: This literature review examined scientific articles published between 2014 and 2025 and retrieved from PubMed, Cochrane, ScienceDirect, and Google Scholar. The search terms included Balinese dance, posture, anterior pelvic tilt, lower crossed syndrome, and muscle imbalance.
Results: The literature suggests that the agem posture may contribute to excessive tightness of the hip flexors, particularly the iliopsoas, and the erector spinae muscles, accompanied by weakness of the gluteus maximus and rectus abdominis, consistent with the concept of lower crossed syndrome. Aesthetic postural elements in Balinese dance, including lifting the chest (cengked), drawing in the abdomen, and maintaining specific pelvic positions for prolonged periods, may contribute to postural adaptations. These biomechanical imbalances have been associated with an increased anterior pelvic tilt angle. However, dancers who regularly perform core stability exercises and structured stretching, including knee-to-chest exercises and hamstring and hip stretches, may demonstrate fewer postural compensations.
Conclusion: Balinese dance may contribute to the development of anterior pelvic tilt, particularly when high training loads are not balanced by adequate flexibility and strength of the muscles responsible for pelvic stabilization. Preventive exercise programs incorporating hip flexor and erector spinae stretching, together with core strengthening targeting the abdominal and gluteal muscles, may help reduce the risk of postural disturbances in Balinese dancers. Further studies are needed to establish a direct causal relationship between Balinese dance practice and APT.
Keywords: anterior pelvic tilt, Balinese dance, lower crossed syndrome, muscle imbalance, posture

Wearable-derived sleep and recovery metrics, injury risk, and performance in athletes: a systematic review

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Background: Sleep and nightly recovery are essential for training adaptation, and impaired sleep has been hypothesized to compromise both injury resilience and athletic performance. Wearable devices now enable continuous, objective monitoring of sleep and recovery-related parameters, yet their relationship with musculoskeletal injury risk and performance remains unclear. This study aims to investigate the association between wearable-derived sleep and recovery metrics with injury risk and performance outcomes in athletes.
Methods: We conducted a comprehensive literature search through PubMed and Scopus for studies on wearable-derived sleep and recovery metrics in athletes, until September 2026. Keywords used are "athlete" AND ("wearable" OR "actigraphy") AND ("sleep" OR "recovery") AND ("injury" OR "performance") and its synonyms.
Results: Five studies met the inclusion criteria and were included in this systematic review. Wake after sleep onset predicted previous injuries (OR=1.144) and time awake predicted prospective injury occurrence (OR=0.974) in adolescent athletes, while no significant associations were found in collegiate and elite adult athletes. Autonomic nervous system charge showed a strong negative correlation with endurance performance change (r=-0.60, p=0.002), and longer, more consistent

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sleep along with higher recovery scores were associated with better performance in professional golfers.
Conclusion: Wearable-derived sleep and recovery metrics show more consistent associations with athletic performance than with musculoskeletal injury risk, with meaningful injury associations observed only in adolescent athletes.
Keywords: athletic performance, injury risk, recovery, sleep, wearable device

Incline treadmill walking for adults with obesity: balancing energy expenditure and biomechanical safety

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Background: Increasing energy expenditure through physical activity is a key component of obesity management. However, many adults with obesity experience limitations in performing high-intensity exercise due to excess body mass and increased risk of musculoskeletal injury. Incline treadmill walking represents an accessible and practical exercise modality that may enhance metabolic demand without substantially increasing joint stress. This literature review examines the potential role of incline treadmill walking in supporting weight management among adults with obesity.
Methods: A literature review was performed using PubMed and Google Scholar databases. Twenty-five studies published between 1993 and 2026 were selected based on relevance to adults with obesity and incline walking interventions. Comparisons included flat treadmill walking, overground walking, running, ergo-cycling, and cycling. Outcomes assessed were energy expenditure, oxygen consumption (VO_2), exercise intensity, fat oxidation, and biomechanical responses related to exercise safety and performance.
Results: Of the 25 studies included (1993–2026), 20 evaluated walking-based exercise as a weight-management strategy. Eleven studies reported that incline walking produced greater energy expenditure than level walking while reducing lower-extremity joint loading and loading rates. Biomechanical analyses demonstrated lower knee extension and adduction moments during moderate incline walking, suggesting a lower risk of musculoskeletal injury compared with brisk level walking. Conversely, downhill walking increased ankle and knee loading6, supporting treadmill-based incline walking as a safer alternative. Three studies and one review identified moderate-intensity exercise (50–60% VO_2max) as the optimal intensity for maximizing fat oxidation while maintaining exercise sustainability. Evidence also indicates that fat oxidation increases progressively with prolonged exercise duration. For individuals with obesity, incline walking provided adequate cardiovascular stimulus with reduced mechanical stress on weight-bearing joints. One intervention study found that eight weeks of moderate-intensity training combined with a two-weeks plant-based dietary intervention reduced body weight by 8.8 kg and body fat percentage by 6.6 percentage points. Overall, the evidence suggests that moderate-intensity incline treadmill walking offers a favorable balance between energy expenditure, fat-loss potential, and biomechanical safety for obesity management.
Conclusion: Among commonly prescribed aerobic exercise modalities, moderate-intensity incline treadmill walking demonstrates one of the most favorable combinations of energy expenditure, fat oxidation, and reduced joint loading. Its ability to provide adequate cardiovascular stimulus with lower musculoskeletal risk supports its use as a practical and sustainable intervention for obesity management.
Keywords: biomechanics, energy expenditure, fat oxidation, incline treadmill walking, obesity management

Comparative analysis of field cooling modalities in marathon athletes with exertional heat stroke: evidence-based case report

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Background: Exertional heat stroke (EHS) is a life-threatening medical emergency characterized by severe hyperthermia and central nervous system dysfunction. Delayed or inadequate cooling may prolong exposure to extreme hyperthermia and increase the risk of rhabdomyolysis, metabolic disturbances, and organ injury. Because the effectiveness of field cooling modalities varies substantially, evaluating whether the cooling method used provides an adequate cooling rate is clinically important. This evidence-based case report aimed to evaluate the adequacy of on-site evaporative cooling and intravenous (IV) fluid administration compared with aggressive cooling modalities in preventing medical complications in an athlete with EHS.
Methods: A 36-year-old female recreational athlete who collapsed near the finish line of a 10-km marathon with a core temperature of 41.6°C and altered mental status was evaluated. Initial management included evaporative cooling using wet gauze and a fan, along with 1 L of IV normal saline. Laboratory investigations and clinical findings were reviewed to identify early complications. A PICO-based literature search was conducted in PubMed and Google Scholar to identify evidence regarding cooling rates and medical complications associated with EHS. Five relevant studies were identified, including a systematic review involving 521 patients with EHS.
Results: Laboratory investigations revealed mild metabolic acidosis, elevated creatine kinase levels, and myoglobinuria, indicating early muscle injury. The literature indicated that effective cooling should achieve a rate exceeding 0.15°C/min, whereas evaporative cooling typically achieves approximately 0.028–0.078°C/min. Inadequate cooling was associated with a 4.57-fold higher risk of medical complications. These findings suggest that the initial cooling strategy was insufficient to achieve the recommended cooling rate and may have contributed to the risk of EHS-related complications.
Conclusion: This case highlights the importance of rapid, evidence-based cooling in the management of EHS. Cold water immersion (CWI) or tarp-assisted cooling with oscillation (TACO) should be prioritized when feasible to achieve rapid reductions in core temperature. The principle of "Cool First, Transport Second" emphasizes the need to initiate effective on-site cooling promptly to minimize the risk of serious medical complications.
Keywords: cooling rate, cold water immersion, exertional heat stroke, rhabdomyolysis, tarp-assisted cooling with oscillation

Clinical readiness of machine learning models for sports injury risk prediction: external validation and calibration

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Background: Machine learning (ML) models have shown increasingly promising performance for predicting sports injuries. However, strong discrimination within development datasets does not necessarily indicate readiness for real-world sports medicine practice. Evidence remains uncertain regarding whether these models retain performance, provide well-calibrated risk estimates, and support clinically meaningful decisions across different athletes and settings. This systematic review evaluated the clinical readiness of ML-based sports injury prediction models, with particular emphasis on external validation, calibration, transportability, and clinical utility.
Methods: This systematic review was registered in PROSPERO. Scopus, Europe PMC, PubMed, and OpenAlex were searched from inception to July 12, 2026. Of 2,436 records identified, 698 duplicates were removed, leaving 1,738 records for screening. Eligible studies developed or evaluated ML models for individual-level sports injury risk prediction. Data on validation strategy, discrimination, calibration, data leakage, transportability, and clinical utility were synthesized. Risk of bias and applicability were assessed using PROBAST+AI.
Results: Eighty-one studies were included. Among studies with extractable estimates, the median internal area under the curve (AUC) was 0.808 (IQR 0.707–0.867; n=46), compared with 0.740 (IQR 0.724–0.795; n=5) under external validation. All three studies permitting paired comparison showed reduced performance after external validation (ΔAUC −0.021 to −0.063). Only 7/81 studies (8.6%) underwent external or temporal validation, and none reported validation by an independent research team. Calibration was assessed at least partially in 19/81 studies (23.5%), while transportability was evaluated in only 5/81 (6.2%). Although 74/81 studies (91.4%) described their predictions as actionable, only 14/81 (17.3%) formally assessed clinical utility. High risk of bias was identified in 72/81 studies (88.9%), and 63/81 (77.8%) had moderate-to-high data-leakage risk. Overall, 73/81 studies (90.1%) remained at the early-development or internal-validation stage.
Conclusion: ML models for sports injury prediction demonstrate promising internal discrimination but remain insufficiently validated for routine clinical implementation. High AUC values alone should not be regarded as evidence of clinical readiness. Independent external validation, rigorous calibration, leakage-resistant model development, and prospective assessment of decision utility are needed before ML-derived risk estimates can reliably guide athlete-management and injury-prevention decisions.
Keywords: artificial intelligence, calibration, clinical readiness, external validation, machine learning, sports injury

Exercise management for patients undergoing chemotherapy and radiotherapy: benefits, safety, and clinical considerations

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Background: Cancer patients undergoing chemotherapy and radiotherapy frequently experience treatment-related adverse effects, including sarcopenia, fatigue, reduced cardiorespiratory fitness, muscle loss, and impaired quality of life. These complications often decrease functional capacity and limit treatment tolerance. Although exercise is increasingly recognized as an essential component of supportive oncology care, its implementation remains limited because of concerns regarding safety, contraindications, and appropriate exercise prescription. This review summarizes current evidence regarding the benefits, safety, and clinical considerations of exercise during active cancer treatment.
Methods: A narrative literature review was conducted by synthesizing recent evidence from clinical practice guidelines, systematic reviews, meta-analyses, randomized controlled trials, and other relevant publications addressing exercise management in adult cancer patients undergoing chemotherapy and/or radiotherapy. The review focused on exercise benefits, pre-participation screening, safety considerations, contraindications, clinical assessment, and individualized exercise prescription based on the FITT principle.
Results: Current evidence consistently demonstrates that structured exercise combining aerobic and resistance training improves cardiorespiratory fitness, muscle strength, physical function, and health-related quality of life while reducing cancer-related fatigue, anxiety, and depression. Supervised exercise programs generally produce superior outcomes compared with unsupervised training. Safe implementation requires comprehensive pre-exercise screening, individualized exercise prescription, continuous monitoring of symptoms, and recognition of absolute contraindications. Exercise oncology should be integrated with multidisciplinary cancer care to maximize safety and therapeutic effectiveness.
Conclusion: Exercise is a safe and effective non-pharmacological intervention for appropriately screened cancer patients receiving chemotherapy and radiotherapy. Individualized exercise programs based on the FITT principle and multidisciplinary collaboration should be incorporated into routine oncology care to preserve functional capacity, improve quality of life, and optimize clinical outcomes.
Keywords: cancer, chemotherapy, exercise oncology, exercise prescription, FITT principle, radiotherapy

Manual acupuncture for lower-extremity delayed onset muscle soreness in a recreational runner

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Background: Delayed Onset Muscle Soreness (DOMS) is characterized by muscle pain and stiffness developing 24–72 hours after unaccustomed exercise or increased training load, potentially impairing athletic performance and delaying return to training. Although manual acupuncture has been proposed as a non-pharmacological recovery strategy, evidence regarding serial changes in pain intensity and pressure pain threshold (PPT) in recreational runners with DOMS remains limited. This case report describes the outcomes of manual acupuncture in a recreational marathon runner with lower-extremity DOMS.
Methods: A 30-year-old woman presented with bilateral pain and stiffness in the quadriceps, hamstrings, and gastrocnemius muscles approximately 24 hours after completing a 10-km training run at a pace of 6 min/km during marathon preparation with an increased training load. Physical examination revealed tenderness, increased muscle tone, pain-limited active range of motion, preserved muscle strength (5/5), and reduced PPT (3.1–5.0 kg/cm^2) across the three muscle groups. The patient received five consecutive daily sessions of manual acupuncture using sterile 0.25 × 25 mm needles at bilateral GB34, SP10, ST34, ST36, LR3, LI4, and BL57. Twirling manipulation was performed every 5 minutes, with a needle retention time of 20 minutes. No concurrent pharmacological or rehabilitation therapy was administered. Pain

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intensity was assessed using the visual analogue scale (VAS), and PPT was measured across the three muscle groups.
Results: VAS scores before and after each session were 6/3, 3/1, 1/0, 0/0, and 0/0, respectively, indicating progressive pain reduction. PPT increased across all examined muscle groups, reaching 6.4–7.2 kg/cm^2 after the fifth session. Following treatment, the patient resumed training and completed the scheduled marathon without reported adverse events.
Conclusion: In this single case, manual acupuncture was associated with pain reduction and increased pressure pain threshold in a recreational runner with lower-extremity delayed onset muscle soreness. Clinical improvement was accompanied by resumption of training without reported adverse events. Given the limitations inherent to a single case report, these findings should be interpreted with caution, and further studies with larger sample sizes and controlled designs are needed to confirm the efficacy of manual acupuncture for lower-extremity DOMS in a recreational runner.
Keywords: delayed onset muscle soreness, manual acupuncture, pressure pain threshold, recreational marathon runner, return-to-sport

The effect of water-walking exercise on aerobic capacity in older adults

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Background: Water-walking exercise has been proposed as a safer alternative to aerobic exercise for older adults. Land-walking exercise remains an established form of aerobic exercise for improving aerobic capacity and lowering the risk of cardiovascular disease. However, land walking in older adults carries a substantial risk of falling. A population-based study in Indonesia found that approximately 29% of older adults aged 60 and above had experienced a fall within the past year. A fall can impact psychological well-being by causing a fear of falling, which often drives activity avoidance and further decreases aerobic capacity. On the other hand, water-walking exercise exploits the buoyancy, hydrostatic pressure, and viscosity of water to offload body weight. These features can create a safe environment for older adults with limited mobility who need aerobic exercise.
Methods: This is a narrative literature review that synthesizes evidence from randomized controlled trials and experimental studies on aging, risk of falling, and water-walking versus land walking exercise in older adults. Aerobic capacity is evaluated primarily through maximal oxygen uptake volume (VO2max) and the 6-minute walk test (6MWT).
Results: Across randomized and experimental trials comparing water-walking and land-walking exercise, both improved VO2max and 6MWT after 6 to 24 weeks of training. Water-walking exercise produced significantly greater gains in VO2max than land-walking exercise and greater improvement in 6MWT. However, based on Cardiorespiratory Fitness Classifications from the American College of Sports Medicine (ACSM), the significance of these results still varies. None of the included reports directly compared the safety of water-walking and land-walking exercise in terms of balance or fall risk.
Conclusion: Water-walking exercise can be a safe alternative to land-walking exercise for improving aerobic capacity in older adults. However, direct evidence comparing safety in terms of balance and fall risk remains limited and the existing evidence remains heterogeneous in study design and exercise protocols. Therefore, the choice of aerobic exercise should still be individualized to each older adult's clinical condition and functional capacity.
Keywords: aerobic capacity, land-walking exercise, older adults, risk of falling, water-walking exerciseEffect of cocoa pod husk (theobroma cacao l.) extract on platelet count in swimming-exercised wistar rats: a secondary hematological analysis

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Background: Phenolic chemicals with antioxidant activity can be found in Cocoa Pod Husk (CPH), a common by-product of cocoa processing. CPH-derived bioactives may affect platelet homeostasis during an oxidative challenge like swimming exercise since reactive oxygen species (ROS) are involved in platelet activation and platelet life-cycle regulation.
Methods: To assess platelet counts in male Wistar rats that were subjected to swimming exercises with or without 400 or 600 mg/kg body weight of CPH extract. Data from a randomized post-test only animal experiment were used in this secondary hematological analysis. Male Wistar rats weighing 150–200 g and aged 9–12 weeks were divided into four groups: sedentary control (CON), swimming exercise control (EX), swimming plus CPH 400 mg/kg (CPH400), or swimming plus CPH 600 mg/kg (CPH600). 96% ethanol maceration was used to create CPH. For two weeks, exercise groups went swimming. At the end of the trial, the platelet count was measured.
Results: There were 28 animals with platelet data: CON n = 8, EX n = 7, CPH400 n = 7, and CPH600 n = 6. The corresponding mean±SD platelet counts were 727.75±87.07, 705.29±168.75, 675.43±124.75, and 553.00±44.95 $\times 10^3$/µL. Welch ANOVA was significant ($F(3,12.51)=8.562$, $p=0.002$), but classical one-way ANOVA was borderline ($F(3,24)=2.875$, $p=0.057$). There was a significant omnibus impact ($\eta^2=0.264$; $\omega^2=0.167$). Other pairwise comparisons were not significant, but Games-Howell testing revealed a significant CON–CPH600 difference (mean difference 174.75 $\times 10^3$/µL, $p=0.0024$).
Conclusion: CPH600 was linked to a lower platelet count than the sedentary control in this experimental setting. Because platelet activation, thrombopoiesis, and oxidative-stress indicators were not evaluated, the result is consistent with dose-related hematological modulation but cannot
prove an antiplatelet mechanism. To differentiate functional antiplatelet effects from changes in platelet synthesis, clearance, or toxicity, mechanistic research is necessary.
Keywords: Theobroma cacao, cocoa pod husk, platelet count, polyphenols, oxidative stress, reactive oxygen species, exercise, wistar rat

Prolotherapy for chronic tennis leg after inadequate response to platelet-rich plasma: a case report

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Background: Tennis leg is a partial tear of the medial head of the gastrocnemius muscle that may become chronic when tissue healing is incomplete. Chronic cases are frequently associated with persistent pain, impaired function, and delayed return to sport. Regenerative injection therapies, including platelet-rich plasma (PRP) and prolotherapy, are increasingly used in the management of chronic musculoskeletal injuries; however, the optimal treatment strategy for patients who fail to respond adequately to PRP remains uncertain.

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Methods: A 47-year-old Asian male recreational futsal player presented with a three-month history of intermittent right medial calf pain following an acute injury during a futsal match. Before presentation to our institution, he had undergone ultrasonography and received two PRP injections at another hospital, with inadequate clinical improvement. The original ultrasound images, report, and detailed injection records were unavailable for review. Four weeks after the second PRP injection, he received a single prolotherapy injection at the same institution where the PRP injections had been administered. He subsequently underwent structured exercise therapy at our institution. Clinical progress was monitored using the Visual Analog Scale (VAS), functional improvement, and return-to-sport status.
Results: Following prolotherapy and structured exercise therapy, the patient›s pain intensity decreased from a VAS score of 8/10 to 3/10, accompanied by progressive functional improvement. He achieved return to sport 12 weeks after initiating rehabilitation at our institution.
Conclusion: This case highlights the potential role of prolotherapy as part of a multimodal management strategy for chronic tennis leg following inadequate response to PRP. However, because prolotherapy was performed at another institution and followed by structured exercise therapy, the clinical improvement cannot be attributed solely to prolotherapy. Further studies are needed to determine the efficacy and clinical role of prolotherapy in chronic gastrocnemius injuries.
Keywords: chronic tennis leg, gastrocnemius injury, platelet-rich plasma, prolotherapy

Body composition and physical fitness changes in refinery firefighters following a 12-month program: retrospective cohort study

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Background: Firefighting demands high cardiorespiratory fitness and muscular strength for safe fire suppression and emergency response. Cardiovascular disease is the leading cause of on-duty mortality, accounting for approximately 45% of firefighter fatalities. Although occupational fitness programs are widely recommended, existing evidence remains dominated by short-term randomized controlled trials and cross-sectional evaluations, with limited longitudinal, within-subject data across a full annual training cycle. This study examined 12-month changes in body composition and Month-3 to Month-12 changes in physical fitness among firefighters in an occupational fitness program, and assessed whether Month-12 body composition was associated with physical fitness.
Methods: This retrospective cohort study analyzed occupational health records of 254 male firefighters from seven refinery units in Indonesia (2025-2026), included via total sampling; of 276 screened, 22 were excluded (15 joined after program initiation, 7 had injury or illness at Month 12). The program was implemented as routine occupational health practice, not as a randomized intervention (no untreated control group existed). Body composition (BMI, body fat percentage, visceral fat and muscle mass) was measured by bioelectrical impedance analysis (Omron or Tanita, by site) at baseline and Month 12. Physical fitness was assessed using the Individual Physical Proficiency Test (IPPT: FAIL/PASS/SILVER/GOLD) at Month 3 and Month 12. Within-subject changes were assessed using the Wilcoxon signed-rank test (effect size r). Month-12 body composition-IPPT associations were examined using Spearman correlation.
Results: Median age was 28 years (range 20-50). From baseline to Month 12, BMI, body fat percentage, and visceral fat decreased significantly (all $p<0.001$ $r=0.50$-0.55), with median body fat falling from 22.4% to 20.3%. From Month 3 to Month 12, IPPT category improved in 105 firefighters and declined in 7 ($p<0.001$), and the proportion failing decreased from 49.6% to 24.8%. At Month 12, body fat percentage ($\rho=-0.44$), BMI ($\rho=-0.42$), and visceral fat ($\rho=-0.39$) correlated inversely with IPPT category (all $p<0.001$), consistently across both BIA devices.
Conclusion: Over the program, firefighters showed within-subject reductions in adiposity and improved physical fitness. Lower Month-12 adiposity, particularly body fat percentage, was associated with higher fitness category in bivariate analysis, supporting routine body composition monitoring in firefighter occupational health programs. However, without a control group, female participants, or adjustment for confounders such as age or job tenure, causal claims regarding program effectiveness cannot be made and generalizability remains limited, prospective controlled studies are warranted.
Keywords: body composition, firefighter, occupational fitness, physical fitness

Isometric versus eccentric exercise for pain relief in rotator cuff tendinopathy: an evidence-based case report

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Background: Rotator cuff tendinopathy, particularly involving the supraspinatus tendon, is a common cause of shoulder pain among physically active individuals. Therapeutic exercise is considered the primary conservative treatment; however, the optimal exercise modality for pain reduction, particularly isometric versus eccentric exercise, remains uncertain. This evidence-based case report aimed to evaluate whether isometric exercise provides superior pain relief compared with eccentric exercise in a young, physically active patient with acute shoulder pain.
Methods: A 22-year-old Indonesian male presented with acute, non-traumatic right shoulder pain following weightlifting and badminton activities. Pain occurred during shoulder abduction and right-side lying. Active shoulder abduction was limited to 85°, flexion to 110°, and external rotation to 65°. The empty can test was positive, whereas the drop arm test was negative. Baseline pain scores were 2/10 at rest, 6/10 during abduction, and 7/10 when lying on the affected side. The clinical diagnosis was rotator cuff-related shoulder pain with acute onset, clinically suggestive of rotator cuff tendinopathy. A clinical question was formulated using the PICO framework to compare the effects of isometric and eccentric exercise on pain reduction. A literature search was conducted in PubMed/MEDLINE, Scopus, and the Cochrane Library. Four studies were critically appraised using the validity, importance, and applicability (VIA) approach.
Results: The available evidence indicated that eccentric exercise can improve pain and shoulder function but is not superior to conventional exercise. Isometric exercise was not demonstrated to be superior to eccentric exercise for pain reduction, although potential benefits for muscle strength were reported. One study found eccentric exercise to be superior to concentric exercise in improving function and baseline strength; however, the study population consisted of older individuals with chronic partial rotator cuff tears, limiting its applicability to the present case.
Conclusion: Current evidence does not support the superiority of isometric exercise over eccentric exercise for pain reduction in rotator cuff tendinopathy. For patients with acute and irritable symptoms, isometric exercise may be considered a more tolerable initial exercise

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strategy. As symptoms improve, rehabilitation can progress toward isotonic and eccentric rotator cuff exercises combined with scapular stabilization to facilitate the recovery of shoulder function.

Keywords: eccentric exercise, isometric exercise, rotator cuff tendinopathy, shoulder pain, therapeutic exercise

Risk factors of recurrent stress fractures in adult female recreational marathon runner: an evidence based case report

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Background: Bone stress injury (BSI) occurs when bone fails to withstand repetitive mechanical loading, resulting in structural fatigue that may lead to localized pain and tenderness. The annual incidence of BSIs among competitive runners ranges from 4.9% to 21.1%, with a higher prevalence among females (37.2%) than males (16.2%). Recurrence rates are approximately 20–30%. This case report describes an adult female recreational marathon runner with a history of two previous BSIs who presented with a new episode of phalangeal stress fractures (SFs) in the foot.
Methods: Based on this case, we formulated the following clinical question: "What are the risk factors for recurrent stress fractures in adult female recreational marathon runners?" Relevant studies were searched in the PubMed, Cochrane, and ProQuest databases. The inclusion criteria were case-control studies, cohort studies, systematic reviews, and meta-analyses published in English within the previous five years, with full-text articles available. The search keywords were female, recurrent, risk factors, runners, and stress fractures.
Results: Seven relevant studies were identified, reporting several potential risk factors for recurrent stress fractures in adult female recreational marathon runners. These included previous BSIs; structural factors, such as shorter limb lengths, longer metatarsal bones, lower lower-leg lean mass, and substantial monthly body weight fluctuations (5–10% weight loss or ≥10% weight gain); physiological factors, including earlier menarche, greater risk of the female athlete triad, and higher LEAF-Q scores; biomechanical factors, such as high levels of adolescent bone-loading physical activity, greater exertion-related increases in impact loading, higher maximum mean pressure beneath the first metatarsal during walking, and lower hindfoot impulses during sprinting; potential predictive biomarkers, including increased fibrin clot formation and decreased immune signaling; and psychological factors, such as restrictive eating and eating disorders.
Conclusion: Based on the findings of the reviewed studies, several preventive measures may be considered for this patient to reduce the risk of future BSIs. These include implementing a structured strength-training program to improve muscle mass, maintaining a healthy body weight, and undergoing a running biomechanics assessment. Given the history of recurrent BSIs, further clinical evaluation of bone health, nutritional status, and menstrual function may also be warranted.

Keywords: adult female, recreational marathon runner, recurrent stress fractures, risk factors

Health profile assessment of Kabaddi athletes: sex, not body fat, explains anemia and cholesterol patterns

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Background: Kabaddi is a high-intensity contact sport; however, research on Kabaddi athletes has primarily focused on injuries, and health screening data on Indonesian Kabaddi athletes remain scarce. Asymptomatic health risks, such as anemia and dyslipidemia, may differ by sex. This study aimed to assess anemia and elevated cholesterol levels among Kabaddi athletes and determine whether body fat percentage was independently associated with these outcomes after adjusting for sex and age.
Methods: This cross-sectional study enrolled 39 Kabaddi athletes (14 males and 25 females; aged 15–26 years) affiliated with FOKSI Jawa Timur using purposive sampling. Body fat percentage was measured using a digital body composition analyzer, while total cholesterol and hemoglobin levels were measured using point-of-care testing (POCT). Anemia was defined as hemoglobin levels below 13 g/dL in males and below 12 g/dL in females, while elevated cholesterol was defined as total cholesterol levels of ≥200 mg/dL. Sex differences were assessed using Welch's t-test, the Mann–Whitney U test, and Fisher's exact test. Associations were examined using Spearman's rank correlation and partial rank correlation adjusted for sex and age.
Results: Anemia affected 17 athletes (43.6%), with a higher prevalence among females than males (64.0% vs. 7.1%, $p < 0.001$). All 10 athletes with total cholesterol levels ≥200 mg/dL were female (40.0% vs. 0%, $p = 0.007$). Female athletes had a higher mean body fat percentage than male athletes (32.0 ± 4.6% vs. 15.1 ± 5.1%) and lower median hemoglobin levels (11.5 vs. 14.2 g/dL); both differences were statistically significant ($p < 0.001$). Body fat percentage was positively correlated with total cholesterol ($\rho = 0.57$) and negatively correlated with hemoglobin levels ($\rho = -0.54$; both $p < 0.001$). However, these associations were no longer statistically significant after adjustment for sex and age ($r = 0.16$, $p = 0.356$; and $r = -0.01$, $p = 0.961$, respectively).
Conclusion: Anemia and elevated cholesterol levels were concentrated among female Kabaddi athletes, and the observed associations between body fat percentage and these outcomes appeared to reflect sex differences rather than independent relationships. These findings support sex-specific interpretation of screening results, with an emphasis on hemoglobin screening and subsequent iron-status assessment in female athletes. However, the findings should be interpreted as exploratory given the small sample size and the use of non-fasting POCT for cholesterol measurement.

Keywords: anemia, body fat, kabaddi athletes, point of care testing, sex differences

Neuromuscular alterations in athletes with a history of hamstring strain injury: a systematic review

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Background: Hamstring strain injury (HSI) is one of the most frequent injuries in sprint-based sports and has a high recurrence rate, suggesting that neuromuscular recovery may remain incomplete even after an athlete is cleared to return to sport. Conventional rehabilitation restores hamstring strength and flexibility, but neuromuscular changes beyond the

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hamstring itself are rarely assessed. This review explored how a previous HSI relates to altered neuromuscular activation across the posterior chain and lumbopelvic muscles in athletes.

Methods: A systematic literature search was conducted on PubMed, Scopus, ScienceDirect, ProQuest, and SAGE Journals up to August 18th, 2026 with combined terms related to "Hamstring strain injury," "neuromuscular activation", and "electromyography". The inclusion criteria were studies evaluating the association between previous hamstring strain injury and neuromuscular activation measured by electromyography (EMG), comparing previously injured with uninjured limbs or athletes without a history of injury, published between 2016-2026, and available in full text in English. Two reviewers independently screened articles and extracted data. Methodological quality was appraised with the Joanna Briggs Institute checklists matched to each study design.

Results: Nine studies involving 325 male athletes with mean age 19.9–26.3 years were included. Appraisal was generally favourable, though a previous HSI was usually confirmed by self-report rather than imaging and only few studies adjusted for confounders. Athletes with a history of HSI showed lower biceps femoris activation across many tasks, including the late swing of sprinting, jumping, single-leg balance, eccentric, isometric, fast repetitive knee-flexion contractions, and posterior chain strengthening exercises. They also had reduced gluteus maximus and trunk activity at swing phase, delayed gluteus medius onset with compensatory over-activity at early stance, lower latissimus dorsi and iliocostalis lumborum activation, and an altered force-sharing pattern within the hamstrings. These alterations persisted after clinical return to sport and were not detected by isokinetic strength testing.

Conclusion: A previous HSI is associated with persistent, widespread neuromuscular deficits of the posterior kinetic chain and trunk that strength testing does not detect and that may contribute to recurrence and secondary injury. Rehabilitation should therefore address the whole posterior chain, lumbopelvic control, and sprint-specific timing. Also functional neuromuscular recovery should be verified before full return to sport. The evidence is limited by small, exclusively male samples and by heterogeneity in tasks and injury intervals. Future prospective studies with female athletes and standardized EMG protocols are needed.

Keywords: electromyography, hamstring strain injury, neuromuscular activation, posterior kinetic chain, sprints

Effectiveness of blood flow restriction training in lateral epicondylitis: a systematic review and meta-analysis

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Background: Chronic lateral epicondylitis (LE) is a prevalent, degenerative tendinopathy that creates a significant socioeconomic burden. Traditional conservative treatments often produce inconsistent results and high recurrence. While Blood Flow Restriction Training (BFRT) appears promising, evidence is limited, and no quantitative synthesis has examined its impact on pain intensity or pressure pain threshold. This systematic review and meta-analysis evaluates the efficacy of BFRT combined with conventional physiotherapy compared to standard exercises in managing pain and improving pressure pain thresholds in patients with chronic LE.

Methods: This systematic review protocol was registered in PROSPERO (CRD420261464280) and conducted in accordance with PRISMA guidelines. The databases searched included PubMed, ScienceDirect, Epistemonikos, Google Scholar, and Cochrane. Three independent reviewers screened the records using the Rayyan platform, with disagreements resolved through consensus or arbitration by a senior member of the research team. The primary outcomes were pain, measured using the numeric pain rating scale (NPRS), and functional disability, assessed using the patient-rated tennis elbow evaluation (PRTEE). Secondary outcomes included pain-free grip strength (PFGS) and pressure pain threshold (PPT).

Results: Of the 435 records identified, five studies involving 145 participants met the inclusion criteria, comprising four randomised controlled trials (RCTs) and one crossover RCT. Meta-analysis revealed no statistically significant differences between blood flow restriction training (BFRT) and conventional physiotherapy for any of the assessed outcomes: NPRS (MD = 0.94, p = 0.276), PPT (MD = 0.58, p = 0.104), PFGS (MD = 1.77, p = 0.070), and PRTEE (MD = 7.13, p = 0.362). Substantial heterogeneity was observed for NPRS, PFGS, and PRTEE (I^2 = 94–99%), whereas no heterogeneity was observed for PPT.

Conclusion: The current evidence does not support the superiority of blood flow restriction training (BFRT) over conventional rehabilitation for improving pain, pressure pain threshold, pain-free grip strength, or functional outcomes in patients with lateral epicondylitis.

Keywords: blood flow restriction training, lateral epicondylitis, pain-free grip strength, pain intensity, patient-rated tennis elbow evaluation, pressure pain threshold

Hip and gluteal muscle activation in chronic ankle instability: a systematic review of electromyographic amplitude

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Background: Lateral ankle sprain is one of the most common musculoskeletal injuries in sports, and approximately 40% of affected individuals develop chronic ankle instability (CAI). Although rehabilitation conventionally focuses on the ankle, neuromuscular impairments may extend proximally to the hip. Previous systematic reviews evaluating gluteus medius activation in individuals with CAI have reported equivocal findings, potentially due to methodological heterogeneity, while the involvement of the broader hip muscle complex remains largely unexplored.

Methods: This systematic review followed the PRISMA 2020 guidelines and was registered in PROSPERO. PubMed, Scopus, and ScienceDirect were searched. Eligible studies compared adults with CAI with uninjured controls or individuals who had recovered from ankle sprains (copers) and reported surface electromyographic (sEMG) amplitude of the gluteus medius, gluteus maximus, or hip adductors during weight-bearing functional tasks. Studies reporting only onset latency or lacking a comparator group were excluded. Data synthesis followed the Synthesis Without Meta-analysis (SWiM) reporting guideline. Hedges' g was calculated for individual studies without pooling, and effect directions were cross-tabulated according to muscle and sEMG normalisation method.

Results: A total of 100 records were identified, 63 full-text articles were assessed, and 26 studies were included, yielding 35 muscle-level results. Findings for the gluteus medius were mixed. Among 11 results from studies using maximum voluntary isometric contraction (MVIC) normalisation (%MVIC), five showed no difference, two showed lower activation, one showed higher activation in individuals with CAI, and three were unclassifiable. In contrast, gluteus maximus activation showed a consistent deficit. All three independent studies using %MVIC normalisation that reported gluteus maximus activation during weight-bearing functional tasks found lower activation in individuals with CAI, with Hedges' g ranging from −1.77 to −0.68. Normalisation methods were heterogeneous, with 11 results using %MVIC, three using peak dynamic normalisation, and 12 using other or unspecified methods. Studies normalising sEMG amplitude to quiet standing consistently reported higher activation. Methodological

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quality was adequate based on study design criteria, with a median Newcastle–Ottawa Scale score of 7 out of 9, although this instrument does not assess sEMG-specific methodological quality.

Conclusion: Hip muscle involvement in CAI is not uniformly equivocal. Gluteus maximus demonstrates a consistent and substantial activation deficit when assessed using %MVIC normalisation during weight-bearing functional tasks, whereas findings for the gluteus medius remain inconsistent. This distinction may explain why previous reviews focusing exclusively on the gluteus medius have concluded that the evidence is inconclusive. These findings support considering hip extensor assessment in the rehabilitation of individuals with CAI. However, no included study prospectively measured reinjury, precluding prognostic Conclusion, and sEMG normalisation methods remain insufficiently standardised. Future studies should adopt %MVIC normalisation, report gluteus maximus findings separately, and incorporate longitudinal follow-up.

Keywords: chronic ankle instability, electromyography, gluteus maximus, gluteus medius, hip muscles, muscle activation, systematic review

Anthropometric profile, nutritional intake, and physical activity level of student-athletes at Universitas Negeri Yogyakarta, Indonesia: a comparative study between contact and non-contact sport types

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Background: Student-athletes are valuable assets expected to balance academic demands with peak physical performance. Different sport types, namely contact and non-contact sports, may influence anthropometric profiles, dietary intake patterns, and physical activity levels, affecting sport performance and achievement. This study analyzed the differences in anthropometric profile, nutritional intake, and physical activity level between contact and non-contact sport athletes at Universitas Negeri Yogyakarta, Indonesia.

Methods: This analytic observational study employed a cross-sectional design. The research was conducted at Universitas Negeri Yogyakarta, Indonesia, involving student-athletes from contact and non-contact sport types. Anthropometric data were obtained through Body Mass Index (BMI) and waist circumference measurements. Nutritional intake data were collected through 3-days food recall and subsequently analyzed using Nutrisurvey. Physical activity level was assessed using the Global Physical Activity Questionnaire (GPAQ) and quantified as Metabolic Equivalent of Task (METs). Data analyses were performed statistically using SPSS version 25 ($p<0.05$).

Results: There were 40 student-athletes, consisting of 20 contact and 20 non-contact athletes participated in this study. Most athletes in both categories had normal BMI and high activity level. Contact athletes had significant higher macronutrient (carbohydrate, protein, and lipid) and micronutrient intake (Vitamin A, B, C, calcium and zink) than non-contact ones. No significant differences were observed regarding their anthropometric profile, physical activity level, and iron intake.

Conclusion: Differences in sport characteristics were associated with differences in nutritional intake, but not with anthropometric profile and activity levels.

Keywords: anthropometry, dietary pattern, metabolic equivalent of task, sport performance, student athletes.

Psychological development through physical education: a systematic literature review of outcomes, mechanisms, and influencing factors

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Background: Physical education is increasingly recognized as a context for psychological development beyond physical fitness and motor skills. Existing studies have reported diverse psychological outcomes, but the evidence remains fragmented across psychological constructs, mechanisms, learning contexts, and student characteristics. This systematic review aimed to synthesize evidence on psychological outcomes associated with physical education, identify the psychological mechanisms underlying these relationships, and examine contextual, pedagogical, and individual factors influencing psychological outcomes among students.

Method and Results: A Systematic Literature Review was conducted following the PRISMA 2020 framework. Literature searches were performed in Scopus using the keywords "Physical Education AND Psychological Development" and "physical education AND psychological well-being". The initial search identified 45 records. Following identification, screening, retrieval, and eligibility processes, 21 studies were included in the final synthesis. The findings demonstrated that physical education was associated with multidimensional psychological outcomes, including psychological well-being, mental health, motivation, self-concept, self-esteem, self-efficacy, emotional regulation, resilience, social adaptability, and cognitive functioning. Reported psychological mechanisms included basic psychological needs, self-determined motivation, social support, exercise behavior, self-regulation, psychological processes, and evaluation anxiety. Psychological outcomes were also influenced by pedagogical and contextual factors, including implementation quality, teacher feedback, communication, autonomy support, belonging, perceived competence, and evaluative pressure.

Conclusion: Physical education can function as a multidimensional context for students' psychological development. However, psychological benefits do not occur automatically through participation in physical activity. They depend on the quality of learning experiences, psychological processes, social interactions, and pedagogical conditions. The synthesis highlights the need to understand physical education not only as a setting for physical and motor development, but also as an educational environment that can support or constrain students' psychological well-being, motivation, self-regulation, and broader psychological development.

Keywords: cognitive functioning; motivation; physical education; psychological development; psychological wellbeing; self-regulation

Hamstring-to-quadriceps strength balance across the menstrual cycle in eumenorrheic female athletes and physically active women: a systematic review

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Background: Hormonal fluctuations across the menstrual cycle have been proposed to influence neuromuscular function and knee stability in female athletes. However, whether hamstring-to-quadriceps strength balance varies systematically across menstrual-cycle phases remains unclear. This systematic review is to evaluate changes in hamstring-to-quadriceps strength ratio across menstrual-cycle phases in eumenorrheic female athletes and physically active women.

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Methods: PubMed, Cochrane Library, and ScienceDirect were searched from inception to September 2026. Studies comparing H/Q ratios across at least two menstrual-cycle phases in naturally menstruating athletes or physically active women were included. Study characteristics and phase-specific H/Q findings were narratively synthesized. Risk of bias was assessed using the Newcastle–Ottawa Scale.
Results: 1,115 records identified, five studies involving 122 naturally menstruating participants were included. Populations ranged from recreationally active women to elite football players. Four studies found no significant variation in H/Q ratio across menstrual-cycle phases. One study reported a lower follicular-phase H/Q ratio compared with the luteal phase in the non-dominant limb, while the dominant limb remained unchanged. Some studies identified phase-related changes in individual hamstring or quadriceps strength despite stable H/Q ratios. Overall, menstrual-cycle phase appears to have limited influence on the relative balance between hamstring and quadriceps strength. Differences in phase verification, contraction mode, testing velocity, and ratio definition may contribute to inconsistent findings.
Conclusion: H/Q strength balance is generally stable across menstrual-cycle phases, although current evidence remains limited and methodologically heterogeneous.
Keywords: female athletes, hamstring, H/Q ratio, menstrual cycle, quadriceps

Sports event medical readiness in archipelagic regions: a descriptive study in the Thousand Islands, Jakarta

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Background: Medical preparation for sports events presents unique logistical and operational challenges, particularly in archipelagic regions such as the Thousand Islands, DKI Jakarta, Indonesia. Ensuring participant safety requires comprehensive coordination of medical personnel, specialized equipment, designated medical facilities, and reliable evacuation systems. However, evidence on medical readiness for sports events in island-based and archipelagic settings remains limited. This study aimed to describe medical preparation for sports events in the Thousand Islands, focusing on medical staffing, equipment, and operational frameworks.
Methods: This descriptive study evaluated medical support provided during two sports events in the Thousand Islands in June and July 2026. Data were collected on medical personnel, medical posts, injury incidence and types, and emergency referral and evacuation arrangements.
Results: Medical support was provided to 83 participants across two events, with six participants sustaining injuries (7.2%). The combat sports event (Baku Hantam; n = 33) was supported by four medical personnel (one general practitioner and three nurses) and one advanced medical post. One participant (3.0%) required treatment for a suspected elbow dislocation. The hybrid race (n = 50) was supported by five medical personnel (one general practitioner and four nurses) and two advanced medical posts. Five participants (10.0%) received treatment for abrasions (n = 2) and muscle cramps (n = 3). Both events implemented a coordinated referral and evacuation system comprising an ambulance boat, an advanced ground ambulance stationed at Marina Ancol Dock, and integration with Jakarta's emergency medical communication system. All initial medical interventions and evacuations were completed without complications and in accordance with established emergency medical service protocols.
Conclusion: Comprehensive medical planning and an integrated emergency medical service system supported injury management and patient evacuation during sports events in an archipelagic setting. Coordinating event-specific medical personnel, advanced medical posts, and sea-to-land evacuation arrangements is essential for supporting participant safety during athletic competitions on remote islands.
Keywords: ambulance boat, emergency medical services, prehospital care, sports event medical coverage, Thousand Islands.

Effects of probiotic and dietary supplementation on performance, body composition, and inflammatory biomarkers: a systematic review

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Background: Probiotics are widely used by athletes to improve their performance and support immune function. While the independent benefits of these live microorganisms are well-established, emerging evidence suggests that co-supplementation with ingredients like omega-3s, spirulina, prebiotics, etc may offer synergistic physiological advantages. This systematic review aims to evaluate the combined effects of probiotics and complementary dietary supplements on physical performance and health outcomes.
Method: This systematic review was conducted with PRISMA 2020 and registered in PROSPERO (CRD420261487600). Relevant studies were identified through PubMed, ScienceDirect, EuropePMC, and Epistemonikos. Eligible studies were randomized controlled trials comparing combined probiotic and dietary supplementation with placebo or single-agent supplementation. Screening and extraction were performed in duplicate. Risk of bias was assessed using the Cochrane Risk of Bias 2 tool and findings were qualitatively synthesized. Results: Seven randomized controlled trials involving 251 participants were included. After probiotics supplementation with omega-3 or spirulina and paired with training significantly impacts dynamic strength, neuromuscular performance, also reducing body fat while maintaining skeletal muscle mass. Synbiotic reduced maximal heart rate and boosted post-exercise lactic acid clearance rate. In contrast, systemic inflammatory biomarkers (IL-6, IL-8, TNF-α, IL-10) showed no uniform significant changes.
Conclusion: Combined with training, probiotic co-supplementation with omega-3 or spirulina was associated with improved sprint performance, strength, and body composition, while effects on inflammatory biomarkers were inconsistent. Evidence is limited by few, small, and heterogeneous trials with some risk-of-bias concerns. Larger factorial trials are needed to confirm synergy.
Keywords: body composition, dietary supplements, inflammatory biomarkers, physical performance, probiotics.

Pulmonary function as an indicator of physical fitness among Jalasakti Medical Assistance Team members

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Background: The Jalasakti medical assistance team is a student medical organization at the Faculty of Medicine, Universitas Hang Tuah, Surabaya, Indonesia. Its members routinely participate in training and physical activities to support emergency response and disaster preparedness. Physical fitness is essential for these activities, and pulmonary function can be assessed using spirometry by measuring forced expiratory volume in one second (FEV_1), forced vital capacity (FVC), and the FEV_1/FVC ratio. This study aimed to describe the pulmonary function profiles of Jalasakti medical assistance team members based on body mass index (BMI), physical activity level, smoking status, and history of respiratory disease.
Method: This descriptive observational study used a quantitative approach and involved 43 active Jalasakti medical assistance team members who underwent spirometric measurements. Data on BMI, physical activity, smoking status, training attendance, and history of respiratory disease were collected using a questionnaire. Pulmonary function was assessed using spirometry and analyzed using univariate and bivariate analyses with cross-tabulation.
Results: Of the 43 respondents, 30 (69.8%) were non-smokers, 24 (55.8%) had normal BMI, and 23 (53.5%) had moderate physical activity. Normal FEV1 was found in 33 respondents (76.7%), while 10 (23.3%) had abnormal values. Normal FVC was found in 36 respondents (83.7%), while 7 (16.3%) had abnormal values. The FEV1/FVC ratio was normal in 42 respondents (97.7%) and abnormal in 1 respondent (2.3%). Abnormal FEV1 was more common among respondents with a history of respiratory disease and low physical activity. Abnormal FVC was more common among underweight respondents and those with a history of respiratory disease. The only abnormal FEV1/FVC ratio occurred in a respondent with low physical activity.
Conclusion: Most Jalasakti medical assistance team members had normal FEV1, FVC, and FEV1/FVC ratio profiles. Abnormal pulmonary function was more frequently found among respondents with low physical activity, abnormal BMI, smoking habits, and a history of respiratory disease. Regular pulmonary function monitoring, adequate physical activity, smoking avoidance, and maintaining normal BMI are recommended to support pulmonary health and physical fitness.
Keywords: FEV1, FVC, physical fitness, pulmonary function, spirometryEarly gymnastic

sport for preschoolers: a scoping review of benefits, risks, and developmental outcomes

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Background: Gymnastic sport is offered at increasingly younger ages, with many programs geared towards preschoolers, toddlers, and infants. While sport is promoted as an amendable context for healthy development of school-age children, little is empirically known about potential benefits or risks associated with gymnastic participation in early childhood, especially in preschoolers. This scoping review evaluates the benefits, the risk and the developmental outcome attributed to early gymnastic sport class exposure.
Methods: A scoping review was conducted using three electronic databases: PubMed, ScienceDirect, and Cochrane, supplemented by manual searches of relevant literature. The search used three keywords: gymnastics, sport, and preschool. The inclusion criteria were: (i) full-text articles published within the preceding 10 years; (ii) studies specifically examining gymnastics in children, with particular emphasis on preschool-aged children; and (iii) articles written in English. Titles and abstracts were screened, followed by a detailed full-text review based on the inclusion criteria. Extracted data covered the benefits, associated risks, and developmental outcomes of gymnastics participation.
Results: The initial database search identified 50 articles, of which two duplicates were removed and 12 studies were selected for inclusion. These comprised two meta-analyses, one systematic review, two randomized controlled trials (RCTs), two experimental studies, one scoping review, one cross-sectional study, one cross-study analysis, one retrospective chart review, and one descriptive epidemiological study. Benefits were reported in the scoping review, cross-sectional study, experimental studies, RCTs, and meta-analyses. The reported benefits included improvements in growth and musculoskeletal development, body composition, gross motor skills, postural control, body schema, and cognitive function. Potential risks were identified in the retrospective chart review, cross-study analysis, and descriptive epidemiological study. These risks included sports-related injuries, particularly fractures and concussions, with higher risks reported among younger athletes, males, and those participating in gymnastics at higher competitive levels. Developmental outcomes were examined in experimental studies, the systematic review, RCTs, and meta-analyses. Positive outcomes included improvements in executive function, social-emotional development, and behavioral outcomes among preschool-aged children, although evidence regarding broader cognitive domains remained limited.
Conclusion: Early gymnastics participation may have provided multidimensional benefits for child development, including improvements in physical, motor, cognitive, and social-emotional outcomes, while sports-related injuries remained a potential risk. Additional research with stronger methodological design and rigor was needed to establish the long-term developmental effects, better characterize injury risks, and determine the optimal timing and intensity of early gymnastics participation.
Keywords: developmental outcomes, gymnastics, preschool children, risks, sport benefits

Type of sport associated with motor profiency in school-age children: a scoping review

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Background: Motor skill development in school-age children is shaped not only by participation in sports but also by the physical, perceptual, and cognitive demands embedded within different sport types. This scoping review aimed to map current evidence on how sports classified within the Teaching Games for Understanding (TGfU) framework, alongside non-TGfU activities, contribute to motor skill development in children aged 6–12 years.
Methods: Following Arksey and O'Malley's framework and updated JBI guidance, Scopus, PubMed, and EBSCO were searched for English-language studies (2020–2025) involving children in defined sport modalities with quantifiable motor outcomes.
Results: Eighteen studies (n = 4.167 children) were included. Invasion games most consistently improved locomotor and object-control skills; striking/fielding and net/wall games enhanced

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manipulative ability, perceptual anticipation, and coordination; combat sports and non-TGfU activities promoted balance, strength, and neuromotor efficiency. No single sport optimized all motor domains. Gender, coaching quality, and environmental access moderated outcomes.
Conclusion: Multisport participation and structured periodized programs are recommended for balanced motor development. Future research should employ longitudinal designs and cross-sport comparisons to identify optimal developmental pathways.
Keywords: children, motor proficiency, motor skill, school-age, sport

Effects of resistance training on symptoms and function in women with knee osteoarthritis: a systematic review

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Background: Osteoarthritis remain one of the most prevalent cause of disability and a notable degenerative disease burden among middle-aged and older adults, with women population having greater incident rates particularly after menopause due to decreasing level of estrogen. Various types of resistance training program have been suggested for patients with knee osteoarthritis and shown improved outcomes in pain, stiffness, and physical function. However, studies on resistance training specific for women population, especially middle-aged and older are still scarce.
Methods: A search was conducted in MEDLINE and SCOPUS for randomized controlled trials and clinical trials published between January 1, 2000 and December 31, 2025. Inclusion criteria were RCT/clinical trials reporting effects of lower limb resistance training on patient-reported pain, stiffness, and physical function in women with knee osteoarthritis, compared to control group. Subjects with multiple musculoskeletal comorbidities, severy obesity, and cardiac comorbidities were excluded, as well subjects receiving intraarticular injection, estrogen replacement therapy, joint replacement procedure, and Chinese physical training.
Results: There are 6 included studies, two of which specifically had subjects with confirmed postmenopausal status. Resistance training exercises mainly targeted muscles in the lower body. At least half of the studies described results of aquatic resistance training in women with KOA. Four studies presented favorable outcomes in pain reduction among subjects after resistance training intervention compared to control group, although the pain measurement tools and resistance training types varied across studies. Fewer studies described changes in stiffness as outcome of resistance training. Physical function assessment tools are still inconsistent but evidence suggested a few improvements after resistance training intervention.
Conclusion: While resistance training has shown significant improvement especially on pain reduction domain in women with KOA, more studies on women as the subject group might be required. Increasing consistency in resistance training types, frequency, intensity, duration of session, and period of intervention using a widely-used exercise guideline and adding menopausal status into consideration is recommended to evaluate training effects in women with KOA.
Keywords: knee osteoarthritis, pain, physical function, resistance training, stiffness

Kinetic chain correction for secondary low back pain in denervated foot drop: an evidence-based case report

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Background: Chronic low back pain (LBP) may arise as a biomechanical sequela of distal lower-motor-neuron (LMN) weakness rather than as a primary spinal disorder, and strengthening denervated muscle raises the concern of overwork weakness. In patients with LMN-type lower-limb weakness, combining an ankle-foot orthosis (AFO) with proximal strengthening may alleviate LBP by correcting kinetic chain dysfunctions such as anterior pelvic tilt and steppage gait. This approach avoids the prolonged weakness often exacerbated by conventional distal strengthening, particularly in individuals with absent motor unit action potentials (MUAPs) on electrodiagnostic evaluation.
Methods: A 37-year-old man presented with chronic LBP, a steppage gait, and bilateral foot drop after years of being treated for Chronic Inflammatory Demyelinating Polyneuropathy (CIDP). However, recent electrodiagnostic testing revealed intact sensory conduction alongside severe distal motor denervation, a complete absence of MUAPs in the tibialis anterior and medial gastrocnemius. This pattern pointed to a distal hereditary motor neuropathy (dHMN) instead. To guide his clinical management, we searched PubMed, Cochrane, Scopus, and Consensus for literature regarding ankle-foot orthoses, hereditary motor neuropathy, foot drop, proximal strengthening, and LBP. We then appraised the selected papers using the Oxford CEBM therapy criteria.
Results: Available evidence was indirect, as no studies directly compared distal strengthening with AFO use combined with proximal strengthening; we therefore extrapolated from Charcot-Marie-Tooth (CMT) disease, which shares a length-dependent distal motor phenotype with dHMN and overlaps with it clinically and genetically.[1] Trials indicate that AFOs improve walking speed in CMT[2] and reduce dorsiflexor activity without long-term reduction in muscle activity.[3] The data on strengthening is more nuanced. While progressive resistance and treadmill training are generally safe for ambulant CMT patients,[4,5] severely affected muscles may be susceptible to overwork weakness.[6] Given our patient's profound distal denervation, we took a cautious approach by avoiding distal strengthening entirely. Instead, we prescribed a solid AFO set at neutral, paired with a targeted core and proximal (glutes and hip flexors) strengthening program. After 6 weeks of intervention, the patient demonstrated improvement in foot drop, steppage gait, and anterior pelvic tilt, with relief of his chronic LBP (NRS 6 to 3).
Conclusion: While direct trials are still needed, current evidence points to a clear approach for severe LMN-type weakness: avoid strengthening denervated muscles. Instead, clinicians should focus on biomechanical correction by using an AFO to stabilize the distal joint and shifting the workload proximally to resolve secondary low back pain.
Keywords: ankle-foot orthosis, foot drop, low back pain, motor neuropathy, rehabilitation

Baseline body composition, physical fitness, and physical activity of medical students as a needs assessment for a sports medicine block

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Background: Future physicians are expected to promote physical activity, exercise, and healthy lifestyles, so competencies in fitness assessment, exercise prescription, and physical activity counselling are required. Designing effective Sports Medicine education requires an understanding of both the competencies expected of graduates and the needs of the learners who will undertake the curriculum. However, baseline profiles of medical students' body composition, physical fitness, and physical activity are not routinely incorporated into curriculum needs assessment before sports medicine education is implemented. Establishing these baseline characteristics may provide an objective assessment of learner needs, identify areas of suboptimal health and fitness, and inform the contextual relevance for determining curriculum priorities and learning strategies. Therefore, this study aimed to describe the baseline health, body composition, physical fitness, and physical activity profiles of medical students as part of a needs assessment prior to of a Sports Medicine block.
Methods: A cross-sectional descriptive study was conducted among 50 medical students scheduled to undertake the Sports Medicine block, as a pre-block learner needs assessment. Anthropometry and body composition were assessed using body mass index (BMI; WHO Asia-Pacific criteria), body fat, visceral fat, and skeletal muscle mass measured by bioelectrical impedance analysis. Resting blood pressure, muscular fitness (sit-up, push-up, and handgrip tests), cardiorespiratory fitness (estimated VO_2-max using the Yo-Yo Intermittent Recovery Test), and physical activity (International Physical Activity Questionnaire–Short Form [IPAQ-SF]) were also assessed. Data were summarized as prevalences and proportions; VO_2-max and IPAQ-SF data were available for 33 and 49 students, respectively.
Results: More than half of the students (52.0%) had a BMI ≥23 kg/m^2, comprising 38.0% with obesity and 14.0% who were overweight or at risk, while 36.0% had normal BMI and 12.0% were underweight. Elevated resting blood pressure was observed in 26.0% of students, including 22.0% with pre-hypertensive and 4.0% with hypertensive-range blood pressure. A high or very-high visceral fat rating was found in 16.0%. Among the 33 students with available cardiorespiratory fitness data, 90.9% were classified as having fair-to-average fitness and 9.1% as good fitness. Among the 49 students with valid IPAQ-SF data, 34.7% reported low, 46.9% moderate, and 18.4% high physical activity. Overall, 16.0% of students had both excess weight and low physical activity.
Conclusion: These findings indicate substantial and heterogeneous learner needs in physical activity, fitness, and cardiometabolic health, supporting the need for a Sports Medicine curriculum that incorporates experiential learning in fitness assessment, physical activity counselling, and lifestyle-related risk management.
Keywords: cardiometabolic health; medical students; needs assessment; physical activity; physical fitness

The role of wearable-derived sleep and autonomic recovery in health-related physical fitness among healthy adults: a scoping review

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Background: Sleep and physiological recovery are interrelated components of the 24-hour cycle that significantly influence health-related physical fitness (HRPF). While modern wearable technologies offer continuous, non-invasive, and ecologically valid monitoring of these parameters, a comprehensive synthesis of their associations with various physical fitness outcomes remains lacking.
Methods: Following the Joanna Briggs Institute (JBI) methodology and PRISMA-ScR guidelines, a systematic search was conducted in April 2026 across eight electronic databases, including PubMed, Scopus, Web of Science, and IEEE Xplore. Eligible studies included primary research involving healthy adults (≥18 years) that utilized wearable devices to continuously monitor sleep or physiological recovery (e.g., heart rate variability [HRV], resting heart rate) and reported associations with at least one HRPF component.
Results: From 4,307 initially identified records, 32 studies met the inclusion criteria. The included studies featured diverse sample sizes (ranging from 8 to 888 participants) and primarily focused on physically active populations, athletes, and military personnel. Wearable-derived metrics, particularly sleep duration, sleep efficiency, and HRV, demonstrated consistent positive associations with enhanced cardiovascular recovery, muscular performance, and physical readiness. However, several investigations noted discrepancies between objectively measured data and subjective perceived recovery, highlighting the complexity of recovery mechanisms. Methodological heterogeneity in device standardization and outcome definitions was frequently observed.
Conclusion: Wearable technologies are highly feasible tools for the continuous, real-world assessment of sleep and autonomic recovery, serving as critical determinants of physical fitness. Future research should prioritize longitudinal monitoring, multimodal data integration, and standardized metric validation to effectively support personalized health and performance interventions.
Keywords: heart rate variability; physical fitness; recovery; scoping review; sleep monitoring; wearable technology.

Complex knee reinjury following interrupted rehabilitation after acl and meniscus injury in a young football athlete

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Background: Anterior cruciate ligament (ACL) injuries are common among athletes participating in pivoting sports such as football and are associated with a substantial risk of reinjury after return to sport. Successful recovery requires not only appropriate initial management but also completion of a structured rehabilitation program before return to sport. Inadequate rehabilitation and incomplete restoration of functional stability may increase the risk of reinjury and subsequent complex knee injuries involving other ligaments and meniscus. This case illustrates how interrupted rehabilitation in previous injury may contribute to recurrent and more complex knee injury.
Methods: A case report was conducted involving a 21-year-old football athlete who sustained a recurrent left knee injury following a fall during training in January 2026. The athlete had previously undergone anterior cruciate ligament reconstruction and meniscal surgery in March 2025 but discontinued physiotherapy for two months during rehabilitation. Magnetic resonance imaging (MRI) was performed to evaluate the recurrent injury. The athlete subsequently underwent surgical repair followed by a structured physiotherapy program aimed at restoring knee function and facilitating a safe return to sport.
Results: MRI revealed a complete ACL graft rupture, a partial tear of the anterolateral ligament (ALL) and medial collateral ligament (MCL), and radial and horizontal tears of the lateral and medial menisci. These findings indicated a complex recurrent knee injury involving multiple ligamentous and meniscal structures. The athlete underwent further surgical management and postoperative physiotherapy to support functional recovery and return-to-sport preparation.
Conclusion: Completing all rehabilitation phases is essential before returning to high-risk sport. Return to sport should not be based solely on time or resolution of symptoms alone, as incomplete functional recovery may increase risk of more complex knee reinjury.

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Keywords: anterior cruciate ligament, anterolateral ligament, medial collateral ligament, meniscal injury, recurrent knee injury

Hypnosis and sports performance: a systematic literature review of intervention characteristics, outcomes, and variations

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Background: Hypnosis has been applied as a psychological intervention in sports, particularly through hypnotic visualization, imagery, relaxation, induction, and post-hypnotic techniques. However, the available evidence varies in terms of intervention characteristics, performance outcomes, research designs, and individual responses. This heterogeneity makes it difficult to determine how hypnosis has been applied and which sports performance outcomes have been reported. Therefore, a systematic synthesis is needed to map the characteristics of hypnosis interventions, their reported effects, and factors associated with variations in outcomes.
Methods: A systematic literature review was conducted following the preferred reporting items for systematic reviews and meta-analyses (PRISMA) framework. Relevant literature was identified through Scopus using the Watase UAKE platform and complementary sources. The search strategy combined keywords related to hypnosis, sports, sports performance, self-hypnosis, recovery, and sport hypnosis. The included literature was examined in terms of participant characteristics, sports, types of hypnosis interventions, intervention duration and timing, research designs, comparison conditions, outcome measures, and factors associated with variations in findings. The evidence was synthesized using descriptive and narrative approaches.
Results: The reviewed literature identified several hypnosis approaches, including hypnotic visualization, imagery under hypnosis, hypnotic induction, hypnotic regression, multisensory imagery, trigger control, and post-hypnotic power anchors. Reported outcomes included imagery intensity, skill execution, flexibility, shooting performance, shooting accuracy, subjective strength, and objective handgrip strength. Findings varied across studies and participants. These variations were associated with intervention characteristics, sample size, research design, intervention duration and timing, outcome measurement methods, sport-specific characteristics, and individual responses. The included studies also differed in the extent to which they assessed psychological, cognitive, motor, and physical performance outcomes.
Conclusion: Hypnosis shows potential relevance to sports performance across psychological, cognitive, motor, and physical outcomes. However, the available evidence remains heterogeneous, with several studies using small samples, single-case or exploratory designs, and different intervention protocols and outcome measures. Future research should employ larger samples, controlled experimental designs, standardized intervention protocols, objective sports performance measures, and direct assessment of hypnotic suggestibility or hypnotizability.
Keywords: hypnosis, human performance, imagery, sport hypnosis, sports performance, systematic literature review

Parent and coach assisted menstrual health intervention program to improve sports performance in adolescent kabbadi athletes

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Background: Dysmenorrhea is a common gynecological complaint among adolescent female athletes that can potentially disrupt training consistency and athletic performance. Therapeutic exercise is recognized as a safe, non-pharmacological intervention; however, a major challenge lies in maintaining participant adherence to exercise regimens outside direct physiotherapy supervision. This study aimed to develop and implement a therapeutic exercise intervention program incorporating parental and coaching support and to evaluate its effects on dysmenorrhea pain intensity and exercise adherence among adolescent female kabaddi athletes.
Methods: This study employed a quasi-experimental, one-group pretest–posttest design involving 34 female kabaddi athletes aged 17–25 years who experienced symptoms of primary dysmenorrhea and were affiliated with the Indonesian Kabaddi Sports Federation (FOKSI) in East Java. The intervention was conducted over two months using a structured therapeutic exercise protocol. Exercise adherence was monitored and documented by parents and coaches using a dedicated recording form. Pain intensity was assessed before and after the intervention using the Numerical Rating Scale (NRS) and analyzed using a paired t-test.
Results: The intervention was associated with a significant reduction in dysmenorrhea pain intensity and high adherence to the prescribed therapeutic exercise program throughout the menstrual cycle. Active support from parents and coaches appeared to help maintain the regularity and consistency of the athletes' exercise participation.
Conclusion: A therapeutic exercise intervention supported by parents and coaches may be a promising non-pharmacological approach to managing dysmenorrhea pain and promoting consistent exercise participation among female kabaddi athletes. Further studies using controlled designs are needed to confirm these findings.
Keywords: adolescent female kabbadi athletes, dysmenorrhea, menstrual health intervention, sport performance, therapeutic exercise

A framework analysis of women's physical activity in the Indonesian policy landscape: is representation enough?

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Background: Physical activity (PA) provides important health benefits, yet PA among Indonesian women has declined over recent decades, reflecting barriers across life stages and circumstances. National policies determine how women's physical activity needs are recognised, how physical activity is framed, and what forms of support are provided. However, little is known about how these dimensions are reflected across Indonesian policy contexts. This study addresses this gap through a cross-sector qualitative policy analysis.
Methods: We searched Indonesian national policy documents published between 2020 and 2026 using terms related to physical activity, including sport, exercise, walking, and cycling, across governmental, academic, and professional domains. Of 4198 documents available for screening, 14 containing relevant content were included in the preliminary analysis. Data were analysed using the framework method across three domains: representation of women, framing of PA, and policy support for women's PA. The capability, opportunity, motivation–behaviour (COM-B) model and selected components of the health-enhancing physical activity policy audit tool (HEPA-PAT) were used to further characterise how policies approached women's PA across settings and sectors.
Results: Women were represented across health, education, built-environment, and women-focused contexts, spanning different life stages and circumstances, including girls and adolescents, menstruation, pregnancy and postpartum, clinical conditions, and family responsibilities. Health-related documents predominantly framed PA as exercise for health promotion or condition-specific treatment, with several emphasis on safety, modification, or restrictions. Education-related documents focused mainly on sport provision while acknowledging girls' physical and psychological capabilities. In contrast, built-environment documents framed PA more broadly as everyday movement, including active transport, facilitated by supportive environments. Built-environment policies addressed capability, opportunity, and motivation, whereas education and health policies predominantly targeted capability through sport- and exercise-focused approaches, potentially overlooking broader opportunities to support women's physical activity.
Conclusion: Preliminary findings suggest that the Indonesian national policies recognize and support women's PA across multiple contexts and life stages although the breadth of support varies. While some policies address multiple behavioural determinants, broader multisectoral efforts are needed to counter the continuing decline in PA among women. A wider range of opportunities beyond sport and exercise may strengthen support for sustained participation.
Keywords: framework method, Indonesi, physical activity, policy analysis, women

Concurrent aerobic and resistance training: A literature review of factors influencing the interference effect and training adaptation

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Background: Concurrent aerobic and resistance training is widely used to develop both cardiorespiratory and muscular fitness. However, performing these modalities within the same training program may influence recovery and subsequent training adaptations, commonly described as the "interference effect." Current evidence suggests that this effect is not universal but may depend on individual and training-related factors. This review addresses factors influencing recovery and training adaptation when aerobic and resistance exercise are performed concurrently.
Methods: A narrative literature review was conducted by searching the PubMed and Scopus databases for relevant articles published between 2016 and 2026. Particular attention was given to studies evaluating muscle strength, hypertrophy, cardiorespiratory fitness, neuromuscular responses, and factors affecting the magnitude of the interference effect during concurrent aerobic and resistance training.
Results: The evidence suggests that concurrent training can improve both cardiorespiratory and muscular fitness, but the magnitude of adaptation varies according to individual and program-related factors. Training status appears important, with interference potentially being more evident in regularly trained individuals than in less-trained populations. Higher frequency and duration of endurance training may attenuate improvements in muscular fitness, particularly when training loads are substantial. Exercise intensity, sequence, and recovery interval also influence adaptation. Performing resistance training before endurance exercise may favor strength-related adaptations, whereas endurance-first sequencing may benefit endurance outcomes in some contexts. Short intervals between modalities may increase residual fatigue and compromise the quality of subsequent exercise, while longer recovery periods may facilitate adaptation. Nutritional strategies, particularly adequate protein availability, may further support muscular adaptation during concurrent training. However, findings remain heterogeneous and the magnitude of interference is not universal.
Conclusion: Recovery and adaptation during concurrent training are influenced by the interaction between exercise modality, training load, individual training status, session sequence, recovery interval, and nutritional availability. Rather than representing an inevitable physiological phenomenon, the interference effect appears to be context-dependent and modifiable. Individualized programming that considers recovery demands and the primary training goal may help optimize both endurance and muscular adaptations.
Keywords: concurrent training, endurance, interference effect recovery, resistance training, training adaptation

Body composition and simulated fireground task performance: a multi-site retrospective cohort study of indonesian refinery firefighters

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Background: Firefighting demands high physical strength and endurance, and body composition components such as body fat, muscle mass, and visceral fat may influence fireground task performance.[1,2] Whether task performance in Indonesian refinery firefighters is better explained by higher muscle mass or lower body fat remains unknown. We examined the association between body composition and simulated fireground task performance, and described performance change during a structured training program.
Methods: In this retrospective cohort study, male firefighters from seven refinery fire and rescue units underwent serial body composition assessment (bioelectrical impedance analysis) during a structured training program (strength, cardiovascular, and high-intensity functional training). In three units, firefighters completed a standardized simulated fireground agility circuit consisting of personal protective equipment donning, walking, ladder climb, weighted stair climb, hose carry, casualty drag, and charged-hose advancement; passing was defined as completion within 6 minutes. Body composition measured closest to the agility test was analysed cross-sectionally against completion time and breathing-apparatus air consumption using Spearman correlation, and compared between firefighters who passed and failed. Within-person (paired) change in completion time from the previous year's test was described. Results: Body composition and agility data were linked for 118 firefighters. Higher skeletal muscle mass was associated with faster completion time ($\rho = -0.34$, $p < 0.001$), and firefighters who passed had higher skeletal muscle mass than those who failed (43.5 vs 35.8 kg,

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p < 0.001). Body mass index (BMI), body fat percentage, visceral fat, and waist circumference were not associated with completion time (all p > 0.15). Conversely, higher body fat percentage and BMI were associated with greater breathing-apparatus air consumption (ρ = +0.23, p = 0.038 and ρ = +0.23, p= 0.037, respectively), as was waist circumference (ρ = +0.27, p = 0.013; n = 84), whereas muscle mass was not (p = 0.21). Within-person performance varied: Dumai and Sei Pakning combined improved (mean completion 5:39 to 4:44, n = 47), whereas Balikpapan was essentially unchanged (5:57 to 6:07, n = 37). Apparent increases in overall pass rate reflected different participant numbers between years rather than within-person improvement.

Conclusion: Among Indonesian refinery firefighters, skeletal muscle mass was associated with faster task completion, whereas adiposity was associated with greater breathing-apparatus air consumption, suggesting two distinct performance dimensions. Training programs may benefit from building muscle mass and reducing body fat rather than targeting body weight alone. Controlled longitudinal studies are needed.

Keywords: body composition, firefighters, muscle mass, occupational health, physical fitness, task performance

Beyond WBGT: cooling rate variability in exertional heat stroke at a tropical mass running event

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Background: Exertional heat stroke (EHS) is a preventable cause of exercise-related death when rapid cooling starts immediately after collapse. Wet Bulb Globe Temperature (WBGT) is widely used to estimate pre-event heat risk, but whether it is associated with the cooling response of EHS patients remains unknown. This study evaluated the association between WBGT and cooling rate among EHS patients and, secondarily, whether these metrics differed by hospital referral status. Methods: This analytic observational study reviewed medical tent records from the 2025 Jakarta Running Festival (26,700 runners; 5K to full marathon). Variables included initial tympanic temperature, WBGT at medical tent entry, cooling rate (from ≥ 38.5°C to < 37.5°C during rotating ice-water towel cooling), and hospital referral status. Heat risk was categorized using World Athletics WBGT thresholds (caution 21–25°C; warning 25–28°C). Pearson and Spearman correlations assessed the association between WBGT and cooling rate. Due to the small sample size and a non-normal distribution, we used both Welch's t-test and the Mann–Whitney U test to compare WBGT and cooling rates between referred and non-referred groups.

Results: EHS accounted for 27 of the 308 heat-related illnesses (0.101% incidence among runners), with all cases occurring under ‹caution› or ‹warning› WBGT conditions. Mean initial tympanic temperature was 39.6 ± 0.77°C (range 38.2–41.1°C); mean WBGT at tent entry was 24.9± 1.4°C (range 23.2–27.8°C). Among 21 patients with complete cooling data, the mean cooling rate was 0.183 ± 0.105°C/min (range 0.063–0.450°C/min), with 47.6% meeting a favorable rate (> 0.15°C/min). WBGT showed no significant correlation with cooling rate (Pearson r=-0.059, p=0.80; Spearman ρ=0.128, p=0.58). Across 26 patients with complete entry records, WBGT at tent entry showed no significant difference between patients referred to the hospital (25.4 ± 1.4°C, n=7) and those who were not (24.8 ± 1.4°C, n=19; Welch's t-test p=0.35, Mann-Whitney U p=0.24). In contrast, cooling rate was significantly slower in referred (n=5, 0.096°C/min) versus non-referred patients (n=16, 0.210°C/min; Welch's t-test p=0.0008, Mann-Whitney U p=0.019).

Conclusion: WBGT was not significantly associated with cooling rate or referral status, whereas cooling rate was slower in referred patients. WBGT alone may therefore not reflect individual cooling responses. As the first documented WBGT–cooling rate dataset from this event, these findings offer a useful benchmark for future tropical mass running events.

Keywords: cooling rate, exertional heat stroke, mass running event, tropical climate, WBGT

Serum creatinine and uric acid in high-performance athletes: scoping review of baseline values and clinical interpretation

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Background: Standard population reference values may not adequately reflect renal biomarkers in high-performance athletes. Intensive training across disciplines such as cycling, swimming, skiing, and football is associated with physiological adaptations that may influence serum creatinine, uric acid, glomerular filtration, purine turnover, and plasma volume. This scoping review aimed to map and characterize reported baseline values, acute and seasonal variations, physiological determinants, and clinical interpretation of renal biomarkers and kidney function parameters in high-performance athletes.

Methods: A scoping review was conducted using a structured evidence-mapping approach. PubMed/MEDLINE, Embase, Scopus, Web of Science, and SPORTDiscus were searched between August 15th and August 26th, 2026, from database inception without date restrictions. The search combined terms for athletes, competitive/high-performance status, and renal parameters, including creatinine, uric acid/urate, glomerular filtration, and estimated glomerular filtration rate (eGFR). Citation searching was also performed. Two reviewers independently screened titles/abstracts and full-text articles against predefined eligibility criteria, with disagreements resolved through discussion and consensus. Eligible studies involving high-performance athletes and reporting renal biomarkers or kidney function parameters at rest, across training seasons, or following exercise were synthesized descriptively and narratively.

Results: Eight studies published between 2004 and 2025, comprising 1,554 participant enrollments including comparators were included. Resting endurance cyclists and cross-country skiers generally demonstrated lower creatinine and uric acid than sedentary controls. In contrast, a 525-km ultramarathon produced transient increases in creatinine (33%) and uric acid (18%), with value approaching baseline within 24 hours. Seasonal studies showed generally stable or modest biomarker changes across training cycles, while sex, body composition, sport discipline, training exposure, hydration, and sampling interval influenced observed values. Creatinine-based eGFR classifications also varied substantially according to the equation applied; among 490 Olympic athletes, G2 classification ranged from 0% with CKD-EPI to 16.5% with Cockcroft-Gault and reached 38.9% among women using Cockcroft-Gault.

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Conclusion: Renal biomarkers and kidney function parameters in high-performance athletes are highly context-dependent. Reported baseline values should be interpreted in relation to sport phenotype, body composition, training exposure, hydration, and sampling timing rather than against standard population reference values alone. Serial athlete-specific baseline measurements may provide a more meaningful framework for clinical interpretation and may inform future approaches to training and recovery monitoring. Discordant or clinically suspicious findings warrant standardized testing and, when indicated, cystatin C or measured glomerular filtration rate.
Keywords: athletes, creatinine, exercise, glomerular filtration rate, uric acid

Effects of omega-3 fatty acid supplementation on exercise-induced muscle damage and recovery: a systematic review

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Background: Exercise-induced muscle damage (EIMD) commonly results in delayed-onset muscle soreness (DOMS), transient loss of muscle function, inflammation, and increased circulating markers of muscle damage. Omega-3 fatty acids may facilitate recovery through membrane incorporation, modulation of inflammatory signaling, and production of pro-resolving lipid mediators. However, findings across exercise models, supplementation regimens, and recovery outcomes remain inconsistent.
Methods: PubMed/MEDLINE and ScienceDirect were searched from inception to 16 September 2026. Parallel-group and crossover randomized controlled trials evaluating eicosapentaenoic acid, docosahexaenoic acid, fish oil, or long-chain omega-3 polyunsaturated fatty acid supplementation following an acute muscle-damaging exercise protocol were considered. Extracted variables included participant characteristics, supplementation dose and duration, exercise protocol, omega-3 status, DOMS, creatine kinase and other muscle damage biomarkers, inflammatory markers, and measures of muscle strength, power, and range of motion. Because arm-level means and standard deviations were not consistently available, the current analysis used a structured narrative synthesis.
Results: Forty-six reports were retained in the preliminary evidence map, of which 42 were indexed in PubMed and four were identified through linked non-PubMed sources. Supplementation protocols varied from acute administration to 12 weeks and included combined EPA–DHA, EPA-dominant, DHA-dominant, and marine-oil preparations. Among 35 studies reporting DOMS, 21 (60.0%) favored omega-3 supplementation, 13 (37.1%) reported no clear benefit, and one (2.9%) reported an unfavorable response. Among 32 studies assessing circulating muscle damage biomarkers, 15 (46.9%) reported lower biomarker responses, 16 (50.0%) found no clear effect, and one (3.1%) reported an unfavorable response. Effects on inflammatory markers were inconsistent, with most studies reporting no significant changes in interleukin-6, tumor necrosis factor-α, or C-reactive protein. Neuromuscular outcomes were similarly heterogeneous, although several studies reported faster recovery of maximal voluntary contraction, range of motion, jump performance, or peak power. Recent trials suggested that prolonged DHA or combined EPA–DHA supplementation may reduce DOMS and improve selected functional outcomes, but these benefits were not observed consistently across outcomes.
Conclusion: Omega-3 supplementation may attenuate muscle soreness and support selected aspects of neuromuscular recovery following EIMD, whereas its effects on circulating muscle damage and inflammatory biomarkers remain inconsistent. Considerable heterogeneity in omega-3 composition, dose, supplementation duration, exercise protocols, participant training status, and assessment timing limits firm clinical recommendations. Full-text extraction and outcome-specific meta-analysis are required to determine the magnitude, time course, and dose–response characteristics of these effects.
Keywords: docosahexaenoic acid; eicosapentaenoic acid; exercise-induced muscle damage; neuromuscular performance; recovery; sports nutrition.

Trends of physical activity research in 2021-2025: a bibliometric study

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Background: Physical activity research is important to support comprehensive healthcare delivery beyond mere preventive usage. With Indonesia facing a sports medicine specialist shortage of 84,4% from the minimum ratio and only having 4 faculty of medicines that explicitly stated in their vision to focus on sports medicine, Indonesia needs to plan its sparse resources in conducting physical activity research, with bibliometric study being the first step in strategically aligning the research field. Recent bibliometric studies focus only on subtopics of physical activity and more frequently found in publications before 2025, creating a gap in up-to-date study. This study aims to provide relevant bibliometric results that could help base the strategy for physical activity research in Indonesia.
Methods: This study analysed 15,198 papers from Scopus, PubMed, Crossref, and OpenAlex with a keyword of "physical activity" for articles that were published between January 2021 to December 2025. Publish or Perish application was used to access article data and VOSviewer was used to conduct co-occurrence analysis, which produces network, overlay, and density visualization.
Results: Review articles were the most common research method in physical activity research. Regarding demographics, research focused more on adults (excluding older adults) than on adolescents. In terms of disease categories, non-communicable diseases (NCDs) were the most frequently investigated topics in physical activity research, including obesity, diabetes, cardiovascular diseases, chronic kidney diseases, and cancer. Obesity was one of the most frequently studied NCDs and showed a stronger association with cohort and cross-sectional study designs than other NCDs. Psychiatric conditions were the second most frequently investigated topic, with depression and anxiety being the most commonly studied conditions. Within this category, attention-deficit/hyperactivity disorder (ADHD) and autism spectrum disorder (ASD) have begun to gain traction in physical activity research. Musculoskeletal and exercise physiology topics were less frequently investigated than other topics and included injuries, stiffness, and anatomically specific terms, such as skeletal muscle and wrist.
Conclusion: Physical activity research in 2021–2025 was dominated by review-type publications and adult, NCD populations. Emerging and underrepresented clusters represented future opportunities for the Indonesian sports medicine community to conduct research on.
Keywords: bibliometric analysis, co-occurrence analysis, physical activity, science mapping, sports medicine

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Biomechanical risk factors versus injury-associated biomechanical alterations in iliotibial band syndrome: a systematic review and meta-analysis

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Background: Iliotibial band syndrome (ITBS) is a frequent running-related overuse injury, yet causal interpretation of its biomechanics is limited because pre-injury predictors are often conflated with measurements obtained after injury. This review compared prospective biomechanical risk-factor evidence with injury-associated alterations in current and previous ITBS.
Methods: Following PRISMA 2020, PubMed, ScienceDirect, and SpringerLink were searched from inception without language restrictions. Comparative studies of adult runners reporting running kinematics, kinetics, ground-reaction forces, or related biomechanical outcomes were included. Evidence was stratified as prospective pre-injury, current ITBS, or previous ITBS. Risk of bias was assessed using Joanna Briggs Institute tools. Random-effects meta-analyses were performed in Review Manager 5.4.1 when at least two clinically comparable datasets reported the same outcome; MDs were used for identical units and SMDs for differing scales.
Results: Of 889 records, 883 were screened, 20 full-text reports were assessed, and 16 studies were included (3 prospective cohorts; 13 analytical cross-sectional studies). Prospective pooling showed no significant differences in baseline hip abductor moment (SMD −0.10, 95% CI −0.99 to 0.78; I^2=69%) or knee external-rotation moment (SMD 0.28, 95% CI −0.21 to 0.77; I^2=0%). Current ITBS showed significantly lower hip internal rotation (MD −4.59°, 95% CI −7.45 to−1.73; p=0.002; I^2=0%). Previous ITBS showed significantly greater knee internal rotation (MD 2.86°, 95% CI 0.53 to 5.18; p=0.02; I^2=0%). Other pooled hip/knee kinematic and vertical ground-reaction-force outcomes were nonsignificant; previous-ITBS hip adduction was heterogeneous (I^2=74%).
Conclusion: Biomechanical signatures varied by injury stage. No pooled kinetic variable consistently preceded ITBS, whereas distinct rotational alterations emerged after injury. Cross-sectional abnormalities should not be interpreted as causal prevention targets. Injury-stage-specific biomechanical assessment may improve rehabilitation and gait-retraining decisions.
Keywords: biomechanics, iliotibial band syndrome, kinematics, meta-analysis, running, systematic review

Sustainable walking ecosystem (SWE) innovation to address sedentary lifestyle: behavioral readiness gap among Indonesian youth

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Background: Indonesia faces a major demographic shift with a projected elderly population of 80 million by 2050, yet the Healthy Adjusted Life Expectancy (HALE) remains low at 62.8 years. The rising trend of sedentary lifestyles among the younger generation poses a severe threat to public health, increasing the future burden of early non-communicable diseases risk and threatening future national productivity during demographic transitions. Walking serves as a low-impact, accessible preventive physical intervention, yet its adoption remains critically low in Indonesia. This study aims to formulate the Sustainable Walking Ecosystem (SWE) framework as a community-based physical intervention that is found urgently needed by mapping and evaluating youth readiness and real-world execution gaps.
Methods: Utilizing a descriptive study design, this research combines a literature review with an online survey conducted in two phases. Phase 1 (n=62) employed convenience sampling among respondents primarily from Aceh and North Sumatra to map initial behavioral readiness and barriers. Phase 2 comprises a national expansion targeting 384 respondents through stratified quota sampling across five Indonesian regions to broaden geographical coverage, refine the identified behavioral patterns, and strengthen the evidence-based SWE framework. Data are analyzed descriptively using percentages.
Results: Literature confirms regular walking reduces degenerative diseases, supports cognitive function, and promotes healthy aging. In phase 1, survey findings revealed a critical knowledge-practice gap: 74.2% of respondents recognized walking's vital health benefits, yet only 11.3% achieved the minimum recommended ≥30 minutes of daily physical activity. The primary implementation barriers identified were unsupportive weather (59.7%), time constraints (41.9%), pedestrian infrastructure deficiencies (33.9%), and lack of personal motivation (32.3%). To bridge this gap, the SWE framework is formulated integrating public health campaigns, pocket eco-green infrastructure, and gamified community challenges.
Conclusion: Indonesian youth exhibit high conceptual health awareness but low behavioral execution for daily walking due to environmental and structural barriers. The national expansion broadens geographical coverage and supports refinement of the SWE framework as a community-based strategy to bridge awareness and sustainable walking behavior. The multi-level approach on SWE framework offers a viable community-based preventive strategy which is expected to mitigate sedentary risks, improve long-term physical capacity, and reduce future public health burdens.
Keywords: behavioral readiness, healthy lifestyle, physical activity, public health, sedentary lifestyle, sustainable walking ecosystem.

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Dry needling and kinesiotaping intervention for tennis elbow: a case report and literature review

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Background: Tennis elbow is an inflammatory condition of the tendon attached to the lateral epicondyle of the humerus that can result in pain and limit activity. Physical activities involving repetitive movements, especially wrist extension, are one of the risk factors. Currently, there is no recommendation for the most superior therapy for tennis elbow. Here, we present a case of a 25-year-old woman with tennis elbow treated with dry needling and kinesiotaping supplemented by a literature review.
Methods: A 25-year-old Javanese woman who had recently started working as a healthcare worker reported bilateral elbow pain lasting one week, associated with prolonged and repetitive typing activities. The diagnosis was established based on her medical history, physical examination, palpation, and provocation tests. With the patient's consent, dry needling combined with kinesiotaping was applied to the right arm, while the left arm received kinesiotaping alone. Outcomes were assessed after one week using the Numeric Rating Scale (NRS), Manual Muscle Testing (MMT), and Patient-Rated Tennis Elbow Evaluation (PRTEE).
Results: The combination of dry needling and kinesiotaping on the right arm was associated with improvements in pain, muscle strength, and functional ability. The patient also experienced functional improvement without the use of analgesics. However, the absence of quantitative outcome data limits the assessment of the magnitude of improvement and the comparative effectiveness of the interventions.
Conclusion: The combination of dry needling with kinesiotaping improved pain and muscle strength and restored functional ability without painkillers, which could be a consideration for tennis elbow therapy. Further research is needed to validate the potential and clinical significance.
Keywords: bandages, complementary therapies, lateral epicondylitis, pain relief, study characteristic

Health education on the prevention of skin diseases and asymptomatic bacteriuria to promotes independent healthy living behaviors among volleyball athletes at Universitas Negeri Yogyakarta

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Background: Athletes need adequate health knowledge and healthy lifestyle practices to maintain their health during sports activities. Skin diseases, particularly fungal infections, and asymptomatic bacteriuria are important health topics that athletes should understand, especially regarding prevention, recognition, and appropriate follow-up. Health education can help promote athletes' independence in adopting healthy lifestyle practices. This study aimed to improve volleyball athletes' knowledge of skin disease prevention and asymptomatic bacteriuria at Universitas Negeri Yogyakarta, and to evaluate changes in knowledge before and after health education training.
Methods: Health education training was conducted at the Volleyball Student Activity Unit of Universitas Negeri Yogyakarta. Knowledge was assessed using a pre-test and a post-test, each consisting of 10 questions covering skin diseases, fungal infection prevention, asymptomatic bacteriuria, urinary tract infections, and healthy urinary habits. Data were analyzed descriptively by comparing mean pre-test and post-test scores and the proportion of correct responses for each question.
Results: A total of 48 participants completed the pre-test, with a mean score of 77.71, while 45 participants completed the post-test, with a mean score of 81.11. The difference between the mean scores was 3.40 points. The highest proportion of correct responses was observed for environmental conditions that support fungal growth (96.8%), followed by the causes of mycosis (92.5%) and hydration and healthy urination habits (90.3%). The lowest proportions of correct responses were observed for indications for urine testing in asymptomatic athletes (61.3%), the management of asymptomatic bacteriuria (65.6%), and when to seek medical advice for skin rashes (68.8%).
Conclusion: The knowledge assessment indicated a tendency toward higher mean scores following health education training. Participants demonstrated relatively good knowledge of basic fungal infection concepts and healthy lifestyle practices. However, further health education is needed regarding indications for urine testing, the management of asymptomatic bacteriuria, and appropriate follow-up for skin complaints. Further evaluation is warranted to assess changes in knowledge more accurately and determine whether the training translates into healthy lifestyle practices.
Keywords: asymptomatic bacteriuria, health education, healthy lifestyle, volleyball athletes, skin disease, prevention

Artificial intelligence for cardiopulmonary physiotherapy: A narrative review for supporting SDGs 3 and SDGs 9

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Background: Artificial Intelligence has become a promising technology for improving the development and implementation of pulmonary and cardiovascular rehabilitation by using personalized interventions, remote patient monitoring, and evidence-based clinical decision making. This study aims to evaluate current scientific evidence regarding AI application

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in cardiopulmonary rehabilitation and explore its potential in supporting Sustainable Development Goals (SDGs) 3 & 9

Methods: A narrative review was conducted using Scopus, ScienceDirect, and Sage Research databases, including studies published between 2020 and 2026. Literature was retrieved using PICO-guided search strategies and Boolean operators combining AI and cardiopulmonary terms. Data regarding AI methods, rehabilitation domains, clinical outcomes, and limitation were extracted and synthesized into four core themes: study characteristics, cardiac application, pulmonary applications, and future perspectives and digital platforms significantly enhance functional outcome predictions, patient adherence, and telerehabilitation accessibility.

Results: AI applications are evolving toward precision rehabilitation by utilizing multimodal data and continuous monitoring. However, clinical adoption remains constrained by a lock of large-scale validation, ethical and regulatory considerations, and data management challenges

Conclusion: These findings suggest that AI has a lot of potential to support Sustainable Development Goal (SDG) 3 by improving the quality, personalization, and accessibility of cardiopulmonary rehabilitation, as well as helping achieve SDG 9 through advances in digital health innovations and smart rehabilitation technologies

Keywords: artificial intelligence, cardiopulmonary rehabilitation, digital health, precision physiotherapy

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POSTER PRESENTER

Profile of knowledge, attitudes, and practices regarding fluid intake among Indonesian recreational runners

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Background: Running is becoming increasingly popular as a form of physical activity. However, running in tropical environments characterized by high temperatures and humidity may increase the risk of dehydration and heat-related illnesses, particularly when fluid intake is inadequate. Knowledge, attitudes, and practices regarding hydration are important aspects of preventing these conditions. This study aimed to describe the knowledge, attitudes, and practices of recreational runners regarding fluid intake and to evaluate changes in these three aspects following hydration education.
Methods: This study employed a quantitative approach with a cross-sectional design and measurements conducted before and after an educational intervention. The study was conducted in Yogyakarta, Indonesia, from February to May 2025, involving 32 recreational runners aged 18–60 years who had been running at least once per week during the preceding three months. Data were collected using a questionnaire assessing knowledge, attitudes, and practices regarding fluid intake, administered before and after the educational session.
Differences in scores were analyzed using the Wilcoxon test.
Results: Before the educational intervention, the mean knowledge, attitude, and practice scores were 13.81 ± 2.13, 13.03 ± 1.86, and 13.28 ± 2.07, respectively. Following the intervention, the mean scores increased to 15.34 ± 1.18 for knowledge, 15.06 ± 1.05 for attitudes, and 15.03 ± 1.60 for practices. The Wilcoxon test revealed statistically significant differences between pre- and post-education scores in knowledge ($p = 0.0004$), attitudes ($p < 0.001$), and practices ($p = 0.0003$).
Conclusion: Hydration education was associated with increased knowledge, improved attitudes, and better practices regarding fluid intake among recreational runners. Structured and sustained hydration education through running communities could be developed as a promotive and preventive strategy to improve appropriate hydration practices and reduce the risk of dehydration and heat-related illnesses.
Keywords: hydration, attitudes, dehydration, knowledge, practices, recreational runners

Effects of chia seed consumption on sports performance and recovery: A systematic review

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Background: Chia seeds (Salvia hispanica L.) are rich in alpha-linolenic acid (ALA), high-quality plant protein, antioxidants, and soluble fiber, making them increasingly popular in sports nutrition. While historically utilized for ultra-endurance by indigenous Mesoamerican populations, contemporary research regarding their specific ergogenic and post-exercise recovery benefits remains fragmented. This study aimed to systematically review and synthesize current literature evaluating the physiological, metabolic, and ergogenic effects of chia interventions including whole seeds, milled seeds, extracted oils, and hydrocolloid gels on human athletic performance, substrate utilization, and post-exercise recovery.
Methods: Eligibility Criteria: Peer-reviewed randomized controlled trials (RCTs), cross-over trials, and relevant in vivo experimental models assessing chia interventions in active populations were included. Eligible outcomes encompassed primary performance metrics (e.g., time to exhaustion, maximal oxygen uptake [VO2 max]), metabolic indices (respiratory exchange ratio [RER], lipid oxidation, glycemic response), and recovery biomarkers (inflammatory cytokines, malondialdehyde [MDA], superoxide dismutase [SOD], and cortisol). Sources of Evidence: Comprehensive simulated searches were conducted across PubMed, Scopus, Embase, and Web of Science, adhering to PRISMA 2020 guidelines. The protocol was registered in PROSPERO (CRD420261492858). Risk of Bias Methodological limitations primarily included participant blinding challenges (due to chia's distinct hydration properties), limited sample sizes in highly trained cohorts, and a reliance on surrogate physiological markers.
Results: Evidence indicates that combining chia seeds with commercial carbohydrate-electrolyte beverages yields equivalent endurance performance in events lasting over 90 minutes compared to pure carbohydrate drinks. This strategy allows athletes to reduce refined sugar intake while increasing dietary ALA and fiber. While acute ingestion of isolated chia seed oil does not alter RER or improve run time to exhaustion, chronic consumption and chia-based hydrocolloid gels significantly enhance aerobic capacity (VO2 max) and systemic cardiometabolic markers. Furthermore, in vivo models demonstrate that chronic chia supplementation mitigates overtraining-induced oxidative stress, evidenced by decreased lipid peroxidation (MDA) and increased antioxidant activity (SOD).
Conclusion: Chia seeds serve as an effective, sustained-release functional food that matches the performance outcomes of traditional sports drinks while offering superior secondary metabolic and cardiovascular benefits. Although acute ingestion of chia lipids lacks immediate ergogenic effects, the whole-seed matrix supports glycemic stability, enhances long-term cardiometabolic health, and mitigates oxidative tissue damage during recovery.
Keywords: chia seeds, endurance, salvia hispanica, sports nutrition, sports performance.

Anthropometric profile, nutritional intake, and physical activity level of student-athletes at Universitas Negeri Yogyakarta, Indonesia: A comparative study between contact and non-contact sport types

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Background: Student-athletes are valuable assets expected to balance academic demands with peak physical performance. Different sport types, namely contact and non-contact sports, may influence anthropometric profiles, dietary intake patterns, and physical activity

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levels, affecting sport performance and achievement. This study analyzed the differences in anthropometric profile, nutritional intake, and physical activity level between contact and non-contact sport athletes at Universitas Negeri Yogyakarta, Indonesia.

Methods: This analytic observational study employed a cross-sectional design. The research was conducted at Universitas Negeri Yogyakarta, Indonesia, involving student-athletes from contact and non-contact sport types. Anthropometric data were obtained through Body Mass Index (BMI) and waist circumference measurements. Nutritional intake data were collected through 3-days food recall and subsequently analyzed using Nutrisurvey. Physical activity level was assessed using the Global Physical Activity Questionnaire (GPAQ) and quantified as Metabolic Equivalent of Task (METs). Data analyses were performed statistically using SPSS version 25 ($p<0.05$).

Results: There were 40 student-athletes, consisting of 20 contact and 20 non-contact athletes participated in this study. Most athletes in both categories had normal BMI and high activity level. Contact athletes had significant higher macronutrient (carbohydrate, protein, and lipid) and micronutrient intake (Vitamin A, B, C, calcium and zink) than non-contact ones. No significant differences were observed regarding their anthropometric profile, physical activity level, and iron intake.

Conclusion: Differences in sport characteristics were associated with differences in nutritional intake, but not with anthropometric profile and activity levels.

Keywords: anthropometry, dietary pattern, metabolic equivalent of task, sport performance, student athletes.


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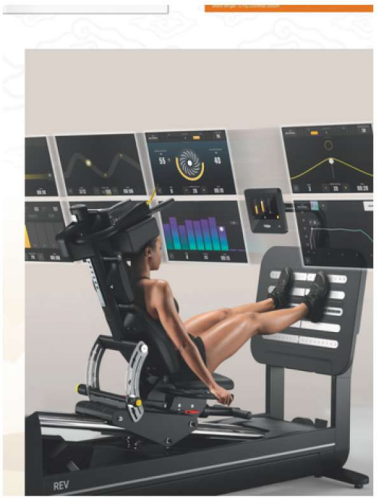

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