ORIGINAL ARTICLE

Physical Therapy Journal of Indonesia (*PTJI*) 2024, Volume 5, Number 2: 182-186
E-ISSN : 2722-6034 ; P-ISSN : 2722-0125

The duration and position of sitting associated with the occurrence of low back pain in e-sports players

Ida Bagus Adi Wahyu Wiraduta Kemenuh[1*], I Dewa Gede Alit Kamayoga[2], Nila Wahyuni[3], Govinda Vittala[2]

[1]Bachelor and Professional Program of Physical Therapy, College of Medicine, Universitas Udayana, Denpasar, Bali, Indonesia;
[2]Physical Therapy Department, College of Medicine;
[3]Physiology Department, College of Medicine, Universitas Udayana, Denpasar, Bali, Indonesia.

*Corresponding author:
Ida Bagus Adi Wahyu Wiraduta Kemenuh;
Bachelor and Professional Program of Physical Therapy, College of Medicine, Universitas Udayana, Bali, Indonesia;
gusadi16032002@gmail.com

Received: 2024-03-13
Accepted: 2024-06-16
Published: 2024-07-19

ABSTRACT

Background: In the modern era, the rapid development of technology has affected many aspects of life, including the increasing popularity of online gaming among teenagers and adults. As a form of professional video game competition, e-sports has been recognized globally and nationally. However, prolonged gaming activities in a static sitting position often lead to health problems, one of which is low back pain (LBP). This study aimed to assess the association between sitting position and sitting duration with the incidence of LBP in e-sports players.

Methods: This study used an observational design with a cross-sectional approach. The study sample totaled 68 e-sports players in East Denpasar who were selected through a purposive sampling method. The inclusion criteria were 20-30 years old and had an average body mass index (BMI), while the exclusion criteria had injuries to the wrist or spine. Data were collected using the rapid whole body assessment (REBA) worksheet questionnaire to assess the sitting position and the modified oswestry low back pain disability questionnaire (M-ODI) to determine the incidence of LBP. Data were analyzed using the Spearman correlation test.

Results: The results showed that most of the sample had a moderate risk of sitting position (95.7%) and sitting more than 4 hours per day (67.6%). Correlation analysis showed a significant relationship between sitting position and LBP incidence ($r = 0.371$; $p < 0.05$) and between sitting duration and LBP incidence ($r = 0.585$; $p < 0.05$). The positive correlation value indicates that the worse the sitting position and the longer the sitting duration, the higher the risk of LBP.

Conclusion: This study concludes that sitting position and duration are significantly associated with the incidence of LBP in e-sports players. This study is expected to educate e-sports players on the importance of ergonomic sitting positions and limiting sitting duration to reduce the risk of LBP.

Keywords: e-sports, length of sitting, low back pain, sitting position.
Cite This Article: Kemenuh, I.B.A.W.W., Kamayoga, I.D.G.A., Wahyuni, N., Vittala, G. 2024. The duration and position of sitting associated with the occurrence of low back pain in e-sports players. *Physical Therapy Journal of Indonesia* 5(2): 182-186. DOI: 10.51559/ptji.v5i2.222

INTRODUCTION

In the modern era of technology's rapid development, many changes occur in our lives.[1] One trend that is very popular among teenagers and adults is online gaming.[2] The gaming world has increased, and gaming is now an entertainment to fill spare time and an electronic sport known as E-sports. E-sports is a video game competition between players, making the game an alternative to official sports.[3] Based on this phenomenon, more and more official matches and e-sports in Indonesia (ESI) are formed. ESI is the parent organization of e-sports under the auspices of the Indonesian National Sports Committee (KONI).[4] Tournaments, such as the e-sports presidential cup, PON XX, Asian Games 2022, and the IESF or World e-sports Championship 2022, which was attended by 120 countries and held in Bali, indicate that e-sports have been recognized in Indonesia and the world. However, gamers feel adverse effects when playing games and staying in a static position in their seats. Usually, gamers can spend more than 4 hours per day playing games. This causes e-sports players to often experience pain in the buttocks, one of which is LBP. In addition, e-sports players also often experience pain when getting up from their seats and changing sitting positions.[5]

In general, the usual symptom of LBP is pain in the spinal region of the back, which is usually caused by muscle stretching.[6] LBP can arise due to several factors, such as sitting position and prolonged sitting duration. Gamers maintain a static sitting position that lacks ergonomics, such as sitting in a reclined position. This can lead to intense and prolonged muscle work without enough recovery and obstructed muscle flow. If done repeatedly, this will lead to pain.[7] As many as 80% of the adult population will experience low back pain in their lifetime. The pain is commonly felt in the lumbar or lumbosacral region and can be localized, radicular, or both.[8] faulty ergonomics often cause LBP. In Indonesia, LBP is a relatively common complaint. The government estimates that the number of LBP sufferers is between 76% and 37%.[9]

Also, the prevalence of LBP due to sitting position reaches 39.7%.[10]

Based on these problems, the impact felt by gamers needs attention and exceptional education for them. Previous studies have stated that a less ergonomic sitting posture with a long duration can cause a person to experience LBP. However, further research is still needed to assess the impact of long sitting positions and duration on e-sport players.[11] Therefore, the researcher wishes to dig deeper into the relationship between position and duration of sitting with the incidence of Low Back Pain in e-sports players. This study differs from previous studies because it uses newer and more valid instruments to assess sitting posture and duration and focuses on e-sports players. This study aimed to provide helpful information for physiotherapists and other readers about the impact of position and duration of sitting while playing games.

METHODS

This study used an observational design with a cross-sectional approach to investigate the relationship between the independent and dependent variables. The independent variables in this study were sitting position and sitting duration, while the dependent variable was the incidence of LBP. This study was conducted in the e-sports community in Denpasar City in June 2024. The study population included e-sports players aged 20 to 30 in East Denpasar City. The study sample consisted of 68 e-sports players selected through purposive sampling based on predetermined inclusion and exclusion criteria. Inclusion criteria included e-sports players aged 20-30 with normal BMI willing to become research subjects and fill out informed consent. Exclusion criteria included individuals who had fractured their wrists in the last three months or had a history of spinal cord injury.

The sample size was determined using the cross-sectional formula according to Lemeshow et al. (1991), with the calculation results showing that a sample of 68 people was needed for this study. The sampling technique used was purposive sampling, where researchers took samples based on predetermined criteria. This study used several instruments, including the Rapid Entire Body Assessment (REBA) Worksheet to assess sitting position, the Modified Oswestry Low Back Pain Disability Questionnaire (M-ODI) to assess the incidence of LBP, as well as scales, meters, informed consent sheets, Google forms, paper and stationery, mobile phone cameras for documentation, and laptops.

The research procedure began with the preliminary stage, where the researcher made a thesis and initial observations of the place that would be used as the research location and applied for permits from related parties. The researcher also prepared various instruments and tools that would be used and made informed consent, which the research subject had to sign. Sampling was done by observing the population and asking for personal identity and inclusion and exclusion criteria.

In the implementation stage, the researcher explained the study's purpose, benefits, and procedures to the subject and distributed informed consent that had to be filled out by the subject. After that, the researcher measured the subject's weight, height, and sitting duration using Google Forms. The sitting position was calculated using the REBA Worksheet questionnaire through several stages, including taking work posture data by video or photo, determining the angles of body parts, determining the weight of the load lifted, and scoring the worker's posture. The researcher also measured the incidence of LBP using the M-ODI questionnaire, which involved the completion of the questionnaire by the subject with the assistance of the researcher if needed.

Data were analyzed through univariate and bivariate analyses. Univariate analysis aimed to explain the characteristics of each variable studied, such as age, BMI, gender, sitting position, sitting duration, and incidence of LBP. Bivariate analysis aimed to assess the relationship between the independent variable and the dependent variable using the non-parametric Spearman's rho statistical test. This test was used to determine whether there was a significant relationship between sitting position and LBP incidence and between sitting duration and LBP incidence in e-sports players in Denpasar City.

The data analysis was conducted using IBM SPSS 25 software. The ethics commission of Udayana University reviewed and approved the ethical feasibility of this research with the number 1709/UN14.2.2.VII.14/LT/2024.

RESULTS

Table 1 shows the characteristics of the sample studied, including age, sitting position, sitting duration, and LBP complaints. Most of the samples were between 20-25 years old, with 58 people (85.4%). Regarding sitting position, it is known that the sample tends to have moderate risk, as many as 65 people (95.7%), and high risk, as many as three people (4.4%). In addition, most of the sample, 46 people (67.6%), sat for more than 4 hours per day. LBP complaints in e-sports players showed that 27 people (39.7%) had minimal disability, 34 people (50.0%) had moderate disability, and seven people (10.3%) had severe disability.

Table 2 shows that the correlation analysis between sitting position and LBP incidence using Spearman's rho non-parametric test shows a significant relationship with a *p-value* = 0.002 ($p < 0.05$) and a correlation coefficient value of 0.371. This positive value indicates a unidirectional relationship with a sufficient correlation between the sitting position and the incidence of LBP. This means that the worse the sitting position, the higher the risk of LBP.

Table 3 the relationship between sitting duration and the incidence of LBP was also analyzed using Spearman's rho non-parametric test. The analysis showed a p-value = 0.000 ($p < 0.05$) and a correlation coefficient of 0.585. This positive value indicates a unidirectional relationship with a strong correlation between sitting duration and LBP incidence. This means that the longer the sitting duration, the higher the risk of LBP in e-sports players.

DISCUSSION

The results of the analysis of the relationship between sitting position and the incidence of low back pain using the Spearman rho non-parametric analysis method contained in Table 2 show a

Table 1. Frequency distribution of study sample characteristics

Variables	n (%)
Age	
20-25 years old	58 (85.4%)
26-30 years old	10 (14.6%)
Sitting position	
Low risk	0 (00.0%)
Medium risk	65 (95.7%)
High risk	3 (4.4%)
Length of sitting	
< 4 hours/day	22 (32.4%)
> 4 hours/day	46 (67,6%)
LBP complaints	
Minimal disability	27 (39.7%)
Moderate disability	34 (50.0%)
Severe disability	7 (10.3%)

%, percentage; LBP, low back pain; n, frequency

Table 2. Relationship between a sitting position and LBP

Correlation of variables	Correlation	*p*-value
Sitting position with LBP	0.371	0.002

LBP, low back pain

Table 3. Relationship between sitting duration and LBP

Correlation of variables	Correlation	*p*-value
Length of sitting with LBP	0.585	0.000

LBP, low back pain

p-value = 0.002 ($p < 0.05$) and a correlation coefficient value of 0.371 which means that there is a significant relationship between sitting position and the incidence of low back pain in e-sport players. The positive value shown by the correlation coefficient indicates a unidirectional relationship; the worse the sitting position performed by the sample, the higher their risk of experiencing lower back pain. The level of correlation between the two variables is included in the moderate category because it falls into the range of values 0.26 - 0.50.

These results align with research that assesses how the influence of a sitting position on the incidence of low back pain already exists. One of them is a study conducted by Anggraika et al. in 2019, where, after the chi-square test, the results stated that there was a relationship between sitting position and the incidence of LBP in working employees aged 17-45 years. The sitting position of the sample is assessed based on the observations that determine whether the position is ergonomic or not. It is known from the research that has been done that the samples in the study who sat in an unergonomic position felt more pain than those who sat in a good position.[12]

Similar findings were also obtained by Wijaya et al. in 2019, who assessed online game players' sitting positions with low back pain incidence. In their research, the sitting position of the sample was evaluated using the rapid upper limb assessment (RULA) instrument. From the analysis conducted, it was found that most online game players tend to have a bad sitting posture when they play games, so they often feel pain in the lower back area.[5]

In addition, research by Abdu et al. in 2022, which assessed the factors that influence the incidence of low back pain in university students, also stated the same thing. Their study evaluated the sample based on age, BMI, gender, sitting duration, sitting position, and LBP risk. The sitting position analysis test results using chi-square obtained a p-value of 0.004. In addition, from the results of the Nagelkerke R Square test, a value of 0.225 was obtained, which stated that sitting position was the most dominant variable affecting the incidence of LBP. Based on these results, it is known that samples who sit in the wrong position have a higher risk of experiencing LBP.[13]

In general, a person's sitting position is influenced by various factors, such as the angle of the chair seat, the softness of the foam, the presence of armrests, and the angle of the backrest. The ideal sitting position is a 92 cm high table, which can influence how one sits. In the sitting position, it is best to use a high chair equipped with comfortable footrests so that the person can work more flexibly and ergonomically.[14]

An example of a lousy sitting position is sitting with a hunched back. This position causes the back muscles to contract strongly and constantly to maintain body balance. In addition, this position compresses the spinal discs, which can cause back problems.[15,16] Many e-sport players tend to sit hunched over while playing games. They also often sit with their legs crossed or lean back too much as they find comfortable. However, this incorrect and persistent sitting position can increase the risk of LBP as it can damage soft tissues and cause health complaints in the spine. Crossing the legs can also tilt the hips upwards, putting pressure on the spinal cord and causing pain.[13]

This study's findings align with previous studies' results regarding the relationship between sitting duration and the incidence of low back pain. Triwulandari & Zaidah's 2019 research found that the duration of work affects the incidence of low back pain. The samples used in this study were batik makers who could sit for 8 hours daily. The chi-square test with a *p-value* = 0.027 shows that sitting for more than 4 hours significantly correlates with the incidence of LBP. Based on these results, it is known that workers who sit for more than 4 hours complain of pain in the lower back compared to those who sit for less than 4 hours. In addition to these results, it is also said that workers over 30 years old with a sitting duration of more than 4 hours have a higher risk of experiencing low back pain.[17]

The same thing was stated by Hutasuhut et al. in 2021, who examined the relationship between sitting duration and complaints of low back pain. The sample collection technique used simple random sampling to calculate

the Slovin formula. One hundred sixty-one people were obtained. The results showed that LBP did not increase during sitting 1-4 hours per day, but LBP would increase with a sitting duration of 5-8 hours per day. In addition, it was also explained that mechanical factors such as continuous muscle contraction during sitting and improper sitting position are also supporting factors for pain caused by prolonged sitting, which will cause discomfort. When sitting, the body will generate opposing pressure forces and will exert a load that is influenced by the force of gravity. The resulting pressure will affect the spine's physical condition, resulting in damage slowly because the pressure on the intervertebral discs will be more significant when sitting in an improper position, such as slouching and sitting without a backrest.[18]

Based on these results, sitting for more than 4 hours per day is a risk factor for low back pain. It is associated with back pain and muscle fatigue.[18] This discomfort can result from prolonged sitting in an improper position. When sitting, the body receives a load that is influenced by the force of gravity, resulting in opposing and equal pressures. Exposure to these pressures affects the physical condition and can cause damage to the spinal system.[19]

Gaming is one example of an activity that requires players to be able to sit in front of a computer monitor or mobile phone for long periods. Gamers are generally able to sit for long periods to finish their games. Typically, they can spend more than 4 hours playing games daily, resulting in less physical activity. This habit often leads to lower back pain in e-sports players.[5]

In addition, e-sport players generally tend to maintain a static sitting position, such as sitting in a hunched position for a long duration. According to Sari et al., sitting for a long time in a static position can cause a static load on the muscles, resulting in obstructed blood flow and insufficient oxygen supply for aerobic metabolism. Sitting for too long also makes the muscles contract for an extended period. This constant contraction leads to lactic acid build-up, which then causes pain.[20]

However, it is also known that sitting for a long time without a backrest can increase the risk of lower back pain because the pressure on the intervertebral discs will be more significant when sitting in a reclined position.[18] As stated by Ahmad in 2014, sitting with a backrest is the recommended sitting position because using a backrest helps a person maintain a sitting position for longer and with more comfort. Biomechanically, this maintains the lumbar lordotic curve and reduces intradiscal compression, thus lowering the risk of low back pain.[21]

Based on this, gamers should also pay attention to the chairs they use to play games, which require them to sit in front of a computer monitor or mobile phone for a long time (Sambo, 2021). In addition, gamers can also take the time to stretch for at least 15 minutes, which can prevent and help the recovery of back pain caused by sitting too long or being in an improper working position. Stretching can also train muscles to achieve an average level of flexibility, widening capillary blood vessels in the muscles and resulting in better blood circulation. This helps reduce the build-up of metabolic products and increase the supply of oxygen to muscle cells, which can reduce back pain.[22]

In this study, the researcher faced the limitation of not controlling the type of chair used by the sample while gaming. It was essential to know the kind of chair gamers use while playing, especially one that has a good backrest, was adjustable in height, has adjustable armrests, and comes with a comfortable seat cushion. In addition, the chair should feature a headrest and leg support to ensure comfort during prolonged gaming. This can also help prevent the onset of lower back pain often experienced while gaming.

CONCLUSION

Most of the sample was 20-25 and tended to have moderate-risk sitting positions. Most of the e-sports players sat for more than 4 hours per day, and many of them had LBP complaints with moderate levels of disability. The positive correlation coefficient indicates a unidirectional relationship between sitting position and sitting duration with the incidence of LBP, which means that improving sitting position and reducing sitting duration can reduce the risk of LBP.

ETHICAL CLEARANCE

The research ethics commission of the Faculty of Medicine, Universitas Udayana, stated that this research was ethically feasible with number 1709/UN14.2.2.VII.14/LT/2024.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

FUNDING

No organization provided funding or sponsored this research.

AUTHOR CONTRIBUTIONS

KAS developed the research design, collected and processed the data, and wrote the manuscript. NKAJA, IWS, and MW directed data collection and revised the manuscript.

REFERENCES

1. Novy Purnama N. Dampak perkembangan teknologi komu-nikasi terhadap kehidupan sosial budaya. Gema Eksos. 2009;5(1):39-46.
2. Dharma IK, Andika NW, Dewi NL, Paramurthi IP, Kurniawati I. Online game duration associated to neck functional disability in esports athletes. Physical Therapy Journal of Indonesia. 2020;1(2):26-8.
3. Wahid M, Fauzan A. Game online sebagai pola perilaku. Kinesik. 2021;8(3):275-83.
4. Maulidea C, Mahyani A. Pencegahan Pembajakan Atlet E-Sports Melalui perlindungan hukum kepada tim e-sports. Bureaucracy Journal: Indonesia Journal of Law and Social-Political Governance. 2022;2(3):760-82.
5. Wijaya PGPM, Wijayanthi IAS, Widyastuti K. Hubungan posisi dan lama duduk dengan nyeri punggung bawah pada pemain game online. Intisari Sains Medis. 2019;10(3).
6. Umami AR, Hartanti RI, Sujoso AD. Hubungan antara karakteristik responden dan sikap kerja duduk dengan keluhan nyeri punggung bawah (low back pain) pada pekerja batik tulis. Pustaka Kesehatan. 2014;2(1):72-8.
7. Aprilia A, Tantriani T. Hubungan lama dan posisi duduk dengan keluhan nyeri punggung bawah pada penjahit baju di pasar sentral polewali dan pasar wonomulyo kab. polewali mandar. Jurnal Kesehatan Bina Generasi. 2017;9(1).

8. Harkian Y. Hubungan antara lama dan sikap duduk terhadap kejadian nyeri punggung bawah di poliklinik saraf rsud dokter soedarso pontianak. Jurnal Mahasiswa PSPD FK Universitas Tanjungpura. 2014;3(1).
9. Lailani TM. Hubungan antara peningkatan indeks massa tubuh dengan kejadian nyeri punggung bawah pada pasien rawat jalan di poliklinik saraf RSUD Dokter Soedarso Pontianak. Jurnal Mahasiswa PSPD FK Universitas Tanjungpura. 2013;3(1).
10. Rara EA, Roshinta D, Putri EA. Hubungan lama duduk dan indeks massa tubuh terhadap keluhan nyeri punggung bawah (low back pain) pada pegawai rektorat untan. Jurnal Mahasiswa PSPD FK Universitas Tanjungpura. 2019;1(1).
11. Lam WK, Liu RT, Chen B, Huang XZ, Yi J, Wong DW. Health risks and musculoskeletal problems of elite mobile esports players: a cross-sectional descriptive study. Sports Medicine-Open. 2022;8(1):65.
12. Anggraika P, Apriany A, Pujiana D, Medika A. Hubungan posisi duduk dengan kejadian low back pain (lbp) pada pegawai stikes. Jurnal'Aisyiyah Medika. 2019;4(1):1-0.
13. Abdu S, Beda NS, Nencyani ML, Mentodo R. Analisis faktor determinan risiko low back pain (lbp) pada mahasiswa. Jurnal Keperawatan Florence Nightingale. 2022 Jun 30;5(1):5-13.
14. Sambo NS. Hubungan posisi belajar dan lama duduk dengan disabilitas akibat nyeri punggung bawah pada mahasiswa fakultas kedokteran usu. Jurnal Kedokteran. 2020;2(3):10-15.
15. Rahayu SY, Dayanti R. Faktor-faktor yang berhubungan dengan keluhan low back pain pada mahasiswa sarjana keperawatan non reguler. Jurnal Sehat Masada. 2021;15(02):371-9.
16. Adhitya IPGS, Yu WY, Bass P, Kinandana GP, Lin MR. Effects of kinesio taping and transcutaneous electrical nerve stimulation combined with active stretching on hamstring flexibility. The Journal of Strength & Conditioning Research. 2022;36(11):3087-92.
17. Triwulandari N, Zaidah L. Hubungan usia dan durasi lama duduk dengan keluhan nyeri punggung bawah pada pembatik dikampung batik giriloyo. Jurnal Ilmiah Fisioterapi. 20192(2):80-92.
18. Hutasuhut RO, Lintong F, Rumampuk JF. Hubungan lama duduk terhadap keluhan nyeri punggung bawah. EBiomedik. 2021;9(2).
19. Aggarwal N, Anand T, Kishore J, Ingle GK. Low back pain and associated risk factors among undergraduate students of a medical college in Delhi. Education for health. 2013;26(2):103-8.
20. Sari NP, Mogi TI, Angliadi E. Hubungan lama duduk dengan kejadian low back pain pada operator komputer perusahaan travel di Manado. e-CliniC. 2015;3(2).
21. Ahmad A, Budiman F. Hubungan posisi duduk dengan nyeri punggung bawah pada penjahit vermak levis di pasar tanah pasir kelurahan penjaringan jakarta utara tahun 2014. InForum Ilmiah 2014;11(3):412-420.
22. Rania R, Susilo TE, Devi RS, Yusrianti UI, Mardhatillah M, Nugroho KA. Low back pain prevention for interntship student at yayasan sayap ibu bintaro. Prosiding Webinar Pengabdian Masyarakat. 2022:229-33.