



## The correlation between work posture and lower back pain among tailors

Putu Ayu Bintang Anjali<sup>1\*</sup>, Sayu Aryantari Putri Thanaya<sup>2</sup>,  
Agung Wiwiek Indrayani<sup>3</sup>, Ni Komang Ayu Juni Antari<sup>2</sup>

<sup>1</sup>Bachelor and Professional Program of Physical Therapy, College of Medicine, Universitas Udayana, Bali, Indonesia;  
<sup>2</sup>Department of Physical Therapy, College of Medicine, Universitas Udayana, Bali, Indonesia;  
<sup>3</sup>Department of Pharmacology and Therapy, College of Medicine, Universitas Udayana, Bali, Indonesia.

\*Corresponding author:  
Putu Ayu Bintang Anjali;  
Bachelor and Professional Program of Physiotherapy, Faculty of Medicine, Universitas Udayana, Denpasar, Bali, Indonesia;  
bintanganjaliii@gmail.com

Received: 2024-02-02  
Accepted: 2024-04-29  
Published: 2024-05-31

### ABSTRACT

**Background:** Tailoring is an occupation pursued by a significant portion of the Indonesian population, and it is closely associated with working in a seated position. Tailors often experience rigid work postures and static muscle loads, which, if left unaddressed for extended periods, can increase the risk of work-related illnesses, one of which is lower back pain.

**Methods:** This study employed an analytical observational method with a cross-sectional approach. The research subjects were determined using a total sampling technique. The total number of research subjects involved in this study was 37, adjusted based on inclusion and exclusion criteria. The research data included the level of work posture risk which was measured by the Rapid Upper Limb Assessment (RULA) and lower back pain measured by the Numeric Pain Rating Scale (NPRS).

**Results:** The Spearman's rho hypothesis test was used to analyze the relationship between work posture and the occurrence of lower back pain at the garment in Bali, yielding a result of  $p = 0.000$  ( $p < 0.05$ ), indicating a significant correlation.

**Conclusions:** This research concluded that a significant correlation between work posture and lower back pain among tailors in Bali.

**Keywords:** lower back pain, NPRS, RULA, tailors, work posture.

**Cite This Article:** Anjali, P.A.B., Thanaya, S.A.P., Indrayani, A.W., Antari, N.K.A.J. 2024. The correlation between work posture and lower back pain among tailors. *Physical Therapy Journal of Indonesia* 5(1): 91-94. DOI: 10.51559/ptji.v5i1.198

### INTRODUCTION

A significant portion of the Indonesian population pursues the profession of tailors, both individually and in the garment industry.<sup>1</sup> The garment industry is closely related to tailors, one of its essential pillars, contributing to the growth in the number of tailors.<sup>2</sup> The entire sewing process is directly handled by human labor, requiring specific postures during execution. Sewing work is closely associated with unnatural work postures such as static sitting and repetitive movements.<sup>3</sup> Unnatural work postures refer to working positions that deviate from the body's natural alignment, such as excessively hunched back, tilted or strained neck, and other positions that are not in accordance with their natural posture. Poor work posture can affect workers' health and may trigger work-related illnesses.<sup>4</sup>

Lower back pain is one of the work-related illnesses commonly experienced by tailors. Tailors are often exposed to prolonged sitting or bending positions during their work.<sup>5</sup> Activities such as

sewing with machines or repetitive fabric cutting can cause tension in the lower back muscles. Additionally, using non-ergonomic work equipment or chairs that do not support good body posture can exacerbate the condition.<sup>4</sup> Lower back pain among seamstresses can significantly disrupt their daily activities and work productivity. When experiencing lower back pain, tailors may struggle with tasks requiring body movements, such as bending, lifting, or sewing with precision. Prolonged pain can lead to a decrease in work quality.<sup>6</sup>

According to the World Health Organization (WHO), the lifetime prevalence of nonspecific (common) lower back pain is estimated at 60% to 70% in industrialized countries (one-year prevalence 15% to 45%, adult incidence 5% per year). The prevalence rates for children and adolescents are lower than those in adults but continue to rise (WHO, 2022).<sup>7</sup> An article published by the Center for Disease Control and Prevention (CDC) states that among all

workers with back pain, professionals attribute 20% of their pain to work.<sup>8</sup> Lower back pain affects a person's quality of life as it can hinder activities of daily living (ADL), such as walking or bending, up to more complex activities, such as cooking, bathing, or dressing; in other words, activities that enable independent living.<sup>9</sup> This often affects all domains of life, from fairly basic self-care activities to complex social interactions, work, and recreational activities, ultimately greatly impacting quality of life.<sup>10</sup> Previous studies have indicated a strong positive relationship between work posture and lower back pain in various seated occupations. This study highlights the importance of ergonomics in the workplace, focusing on a specific work situation, namely seamstresses, thus shedding light on nuances and risk factors that may be overlooked in broader studies.

Considering the negative impact of non-ergonomic work postures, which can lead to lower back pain, and recognizing the detrimental effects of lower back pain on body health and work quality, it is

important to understand the correlation between work posture and lower back pain. This knowledge is crucial for establishing appropriate boundaries in ergonomic work postures, especially for tailors who are vulnerable to work-related illnesses.

## METHODS

This research employed an analytical observational method with a cross-sectional approach, conducted at the garment in Bali on September 2023. The research subjects were determined through total sampling, meeting pre-established inclusion and exclusion criteria. Inclusion criteria included tailors using modern sewing machines, working for more than 5 hours per day, having work experience of over 1 year, and being willing to provide informed consent. Exclusion criteria involved subjects experiencing musculoskeletal disorders, confirmed through medical diagnosis/past medical history/assessment by a physiotherapist. The total number of research subjects was 37 individuals. The independent variable in this study was work posture, while the dependent variable was lower back pain. There were control variables: work duration, work experience, and workstation.

This study's assessment of work posture risk utilized the Rapid Upper Limb Assessment (RULA).<sup>11</sup> To measure work posture risk, a photogrammetry technique involved mapping through images processed using the Kinovea application to determine angles formed in the subject's posture. Measurements were conducted by instructing the subjects to assume their working positions while capturing images in their entirety with a lateral view. Lower back pain measurement used the Numeric Pain Rating Scale (NPRS), where subjects were asked to rate their pain on a scale corresponding to their current pain, best, and worst pain experienced in the last 24 hours.<sup>12</sup>

This study employed two statistical tests, namely univariate analysis and bivariate analysis. Univariate analysis was conducted to provide an overview of age, gender, work duration, work experience, work posture risk level, and pain level. Bivariate analysis in this study utilized

Spearman's rho test. The Spearman's rho test was used to analyze the relationship between categorical variables, such as work posture and the occurrence of lower back pain.

## RESULTS

Table 1 shows that the youngest age among tailors at the garment in Bali is 28, and the oldest is 45, with an average value of 33.22. For work duration among tailors, the shortest period observed is 1 year, and the longest is 5 years, with an average value of 2.70. Table 1 indicates that the risk of work posture among the samples is classified into 4 categories: negligible, low, medium, and very high. There are 6 samples with negligible work posture risk, accounting for 16.2%, 10 samples with low work posture risk, accounting for 27%, 17 samples with medium work posture risk, which also represent the majority, accounting for 45.9%, and 4 samples with very high work posture risk, accounting for 10.8%. The characteristics of the research samples based on lower back pain parameters can be classified into 3 categories: mild, moderate, and severe. There are 17 samples with mild pain, representing the majority, accounting for 45.9%, 14 samples with moderate pain, accounting for 37.8%, and 6 samples with severe pain, accounting for 16.2%.

Table 2 statistically demonstrates, using the Spearman's Rho correlation

test, a significant relationship between work posture and the incidence of lower back pain with a Sig. (2-tailed) value of 0.000, where the Sig. (2-tailed) value is smaller than 0.05. Additionally, the test results yield a correlation coefficient value of 0.775, indicating a strong positive correlation as the value falls between 0.76 and 1.00.

## DISCUSSION

Based on the research findings, it is known that the sample in this study is predominantly composed of workers aged 28 to 45 years. This refers to the productive working-age population in Indonesia, which, according to the Central Statistics Agency (2022), is generally defined as individuals aged 15 to 64 years.<sup>13</sup> This age range encompasses the working population typically considered to have the physical and mental capacity to contribute productively to economic activities. Furthermore, the prospective subjects underwent a selection process with inclusion criteria, one of which was working for more than 5 hours per day. This is supported by research from Butte et al. (2022), which indicates that prolonged sitting (4 to 10 hours per day) and repetitive activities, especially during work and leisure time, are associated with lower back pain. The research findings also demonstrate that another inclusion criterion met was the work experience of

**Table 1. Distribution of 37 tailors' characteristics**

Variable	n (percentage (%) or min - max)
Level of work posture risk	
Negligible	6 (16.2)
Low	10 (27)
Medium	17 (45.9)
Very high	4 (10.8)
Low back pain	
Mild	17 (45.9)
Moderate	14 (37.8)
Severe	6 (16.2)
Age	33.22 (28-45)
Work period (year)	2.7 (1-5)

**Table 2. The correlation between work posture and the occurrence of lower back pain in tailors at the garment in Bali**

	Correlations
Correlations coefficient	0.775
Sig. (2-tailed)	0.000
N	37

seamstresses falling within the range of 1 to 5 years.<sup>14</sup>

Tailors engaged in prolonged static sitting positions often face risks related to poor work posture, which can ultimately contribute to the onset of lower back pain. Tailors often sit in front of sewing machines or work tables for extended periods.<sup>15</sup> This position can exert excessive pressure on the lower back area, especially if the chair and work table are not ergonomically adjusted. Suboptimal posture and a lack of movement variation can lead to tension in the lower back muscles, causing pain and discomfort.<sup>16</sup> Lower back pain is a complex issue involving various types of tissues in the body. Tissues such as intervertebral discs, facet joints, muscles, tendons, ligaments, and others have pain receptors called nociceptors. One type of stimulus that can activate nociceptors is physical pressure. Prolonged pressure can activate these receptors, resulting in sensations of pain.<sup>17</sup> Over time, repeated or sustained pressure on tissues can lead to the formation of chronic pain pathways. The brain's interpretation and processing of pain signals may change, leading to continuous pain even after removing the initial pressure stimulus. Central sensitization involves changes in neuron function and neurotransmitter systems in the spinal cord and brain. Factors such as poor body posture can contribute to the persistence of chronic pain associated with pressure.<sup>18</sup>

Research by Ahmad and Budiman (2014) conducted on denim tailors in the Tanak Pasir market showed a significant relationship between sitting posture and lower back pain in tailors with a value of  $p < 0.05$ .<sup>19</sup> Similar results were also shown by Bontrup's study in 2019, which targeted workers with sedentary lifestyles. It indicated a possible trend ( $0.011 < p < 0.453$ ) towards more static sitting behavior among most participants experiencing pain and/or facing pain-related disabilities.<sup>20</sup> The explanation is that sitting in a standard chair for 30 minutes results in increased lumbar flattening and decreased thoracolumbar curvature, which can lead to local muscle fatigue in the lumbosacral area due to decreased average strength or median frequency. Static sitting posture is one of the factors causing lower back pain because postural

activities can affect muscle activity and tissue microcirculation.<sup>21</sup>

This study has several limitations. One of them only examines the influence of lower back pain related to poor work posture, while age also plays a significant role in increasing the risk of lower back pain. Second, tailors often maintain static postures for prolonged periods, typically involving bending, twisting, and sitting in awkward positions. These static postures are significant risk factors for developing lower back pain (LBP), and the repetitive nature of tailoring tasks, such as cutting, sewing, and measuring, can lead to musculoskeletal disorders, including LBP. The continuous strain on the lower back muscles contributes to pain and discomfort.

## CONCLUSION

The research findings indicate a notable correlation between work posture and the occurrence of lower back pain among tailors in Bali. Elevated levels of risk associated with poor work posture correlate with an increased likelihood of experiencing lower back pain. Seamstresses are encouraged to utilize ergonomic chairs equipped with lumbar support, uphold proper body alignment, and incorporate regular breaks every 30-60 minutes for movement or muscle stretching. Furthermore, garment business proprietors are urged to establish an ergonomic workspace by furnishing equipment designed in accordance with ergonomic principles, such as chairs featuring lumbar support and adjustable height work tables.

## ETHICAL CLEARANCE

The Research Ethics Commission, College of Medicine, Universitas Udayana, stated that this research was ethically feasible with number 1854/UN14.2.2.VII.14/LT/2023.

## CONFLICT OF INTEREST

The author declares that there is no conflict of interest.

## FUNDING

No organization has provided funding for or sponsorship of this study.

## AUTHOR CONTRIBUTIONS

PABA prepares study designs, collects data, processes data, and writes manuscripts. SAPT, AWI, and NKAJA are directing data collection and revising the manuscript

## REFERENCES

- Rachmat N, Utomo PC, Sambada ER, Andyarini EN. Hubungan lama duduk dan sikap duduk terhadap keluhan nyeri punggung bawah pada penjahit rumahan di kecamatan tasikmadu. *Journal of Health Science and Prevention*. 2019; 3(2):79–85.
- Badan Pusat Statistik. Keadaan pekerja di Indonesia Agustus 2019. Jakarta Pusat: Badan Pusat Statistik. 2019;2(1):20-25.
- Jung KS, Jung JH, In TS, Cho HY. Effects of prolonged sitting with slumped posture on trunk muscular fatigue in adolescents with and without chronic lower back pain. *Medicina*. 2021; 57(3):1-8.
- Suryadi I, Rachmawati S. Work posture relations with low back pain complaint on partners part of pt 'x' manufacture tobacco products. *Journal of Vocational Health Studies*. 2020;1(3):126–130.
- Sihombing AP, Kalsum, Sinaga MM. Hubungan sikap kerja dengan musculoskeletal disorders pada penjahit di pusat industri kecil menteng medan 2015. *Jurnal Medan : Departemen Keselamatan dan Kesehatan Kerja*. 2015;4(1):15-20.
- Gupta N, Christiansen CS, Hallman DM, Korshøj M, Carneiro IG, Holtermann A. Is objectively measured sitting time associated with low back pain? A cross-sectional investigation in the NOMAD study. *PLoS One*. 2015; 10(3):130-136.
- World Health Organization. Musculoskeletal health. United States: World Health Organization. 2022;2(4):24-28.
- Iker K, Luckhaupt SE. Low back pain among workers: the problem and what to do about it. *Centers for Disease Control and Prevention*. 2019;3(1):30-36.
- NIOSH. Ergonomics and musculoskeletal disorders. *Workplace Safety & Health Topics*. United States: National Institute for Occupational Safety and Health. 2013;4(1):29-35.
- Grabovac I, Dorner TE. Association between low back pain and various everyday performances : activities of daily living, ability to work and sexual function. *Wien Klin Wochenschr*. 2019;13(2):541-549.
- Rimando CRD, Batay CML, Canita VES, dela Cruz AMC, Egos GAD, Ladisla NKE, Panlilio JKS, Ramos AMP, Tayo PAB, Villamor ZMF, Rimando CRD. Validity and reliability of the modified rula (mrula) among public and private office workers. *Journal of Physics: Conference Series*. 2020;1(5):29-38.
- Chiarotto A, Boers M, Deyo RA, Buchbinder R, Corbin TP, Costa LOP, Foster NE, Grotle M, Koes BW, Kovacs FM, Lin CC, Maher CG,

- Pearson AM, Peul WC, Schoene ML, Turk DC, van Tulder MW, Terwee CB, Ostelo RW. Core outcome measurement instruments for clinical trials in nonspecific low back pain. *Journal of Vocational Health Studies*. 2018;159(3):481-495.
13. Badan Pusat Statistik DKI Jakarta. *Tenaga kerja*. Jakarta Pusat: Badan Pusat Statistik. 2022;2(1):50-55.
  14. Butte KT, Cannavan D, Hossler J, Travis C, Geiger J. The relationship between objectively measured sitting time, posture, and low back pain in sedentary employees during COVID-19. *Sport Sciences for Health*. 2023; 19(1), 259–266.
  15. Setyowati DL, Fathimahhayati LD. Sikap kerja ergonomis untuk mengurangi keluhan muskuloskeletal pada pengrajin manik-manik. *Insan Cendekia Mandiri*. 2021;1(1):20-26.
  16. Chatchawan U, Jupamatangb U, Chanchitc S, Yamauchi J. Immediate effects of dynamic sitting exercise on the lower back mobility of sedentary young adults. *J Phys Ther Sci*. 2015; 27(11): 359–363.
  17. Yam M, Loh Y, Tan C, Khadijah Adam S, Abdul Manan N, Basir R. General pathways of pain sensation and the major neurotransmitters involved in pain regulation. *International Journal of Molecular Sciences*. 2018; 19(8): 216.
  18. Li W, Gong Y, Liu J, Guo Y, Tang H, Qin S, Zhao Y, Wang S, Xu Z, Chen B. Peripheral and central pathological mechanisms of chronic low back pain: A narrative review. *Journal of Pain Research*, 2021;14(1):183–194.
  19. Ahmad A, Budiman F. Hubungan posisi duduk dengan nyeri punggung bawah pada penjahit vermak levis di pasar ttanah pasir kelurahan penjaringan jakarta utara tahun 2014. *Forum Ilmiah indonusa*. 2014; 11(3):412–420.
  20. Bontrup C, Taylor WR, Fliesser M, Visscher R, Green T, Wippert M, Zemp R. Low back pain and its relationship with sitting behaviour among sedentary office workers. *Applied Ergonomics*. 2019;8(1):1-8.
  21. Kett AR, Milani TL, Sichtung F. Sitting for too long, moving too little: regular muscle contractions can reduce muscle stiffness during prolonged periods of chair-sitting. *front. Sports Act. Living*. 2021;3(1):76-85.



This work is licensed under a Creative Commons Attribution