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Relationship between a sitting position and complaints of nonspecific low back pain among the Buton Sorong weavers

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ABSTRACT

Background: Weaving has risk for experiencing nonspecific low back pain (LBP) that caused by bad posture and prolonged sitting duration. Poor sitting position causes musculoskeletal disorders, one of which is pain. Complaints of pain that is felt in the waist, causing functional limitation of movement when moving due to postural errors, are called nonspecific LBP. Weavers with good body positions have a low risk of nonspecific LBP complaints and increased productivity. This study aimed to determine the relationship between sitting position and nonspecific LBP complaints in Buton Sarong weavers in Baubau City.
Methods: This study used an analytic observational research design with a cross-sectional approach. The research subjects were taken using probability and purposive sampling techniques. The independent variable measured was the sitting position using the rapid entire body assessment (REBA). The dependent variable measured was nonspecific LBP using a physiotherapy history-taking process.
Results: There were 63 weavers in this study, 51 people (81%) had a low sitting position, and 12 (19%) had medium risk. The *Spearman's rho* non-parametric analysis test showed no relationship between sitting position and nonspecific LBP complaints in this population (p=0.819).
Conclusion: There is no significant relationship between sitting position and nonspecific LBP complaints.

Keywords: nonspecific LBP, pain, posture, sitting position, weavers.
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INTRODUCTION

Indonesia is rich in culture and creativity, and this wealth grows from the role of community leaders who maintain their culture from generation to generation.[1] Weavers work in a sitting position where traditional looms do not show ergonomic aspects.[2] Sitting represents an upright posture with the head and torso in a straight line, the lower legs bent at the hips and knees at roughly 90 degrees, and the feet flat on the floor.[3] According to one study, workers who sit for half or more of their work shift had a higher risk of low back pain.[4]

Aside from muscle fatigue, another cause of low back pain is excessive pressure on the intervertebral discs caused by prolonged sitting and inhibition of the diffusion of cerebrospinal fluid into the intervertebral discs, resulting in a lack of oxygenation and nutrition to the intervertebral disc.[5] Weaving activities are still traditional and use Non-Machine Weaving Tools (NMWT). Weaving activities are divided into several stages, starting from yarn spinning, making motifs, and applying colour to the weaving process to produce cloth according to the desired motif. In the weaving process stage, they generally sit on the cross-legged tabletop without a backrest and work for a relatively long period, with an average of 8 hours per day.

This situation can cause muscle pain weavers to feel, such as aches, pain, tingling, stiffness and pain in certain body parts. The weaving process also gives the weavers a static work attitude compared to the other stages, so the process has a more ranged level of LBP.[6,7] Individuals with nonspecific LBP were shown to have social issues and avoid work, lowering their quality of life.[8,9] The decision to seek therapy for nonspecific LBP was influenced by the patient's age, gender, willingness, and other characteristics.[10]

One of the risk factors for LBP is the occupational factor, namely work attitude. Work attitude is the position of the body in carrying out work activities. Among others, working attitudes can be seen standing, sitting, bending, squatting, walking, etc. Working attitude, if done in an unsafe and static position for a long time, can result in the risk of developing LBP.[11,12] The results of previous studies indicate a significant relationship between work attitude variables and LBP complaints. Work attitude was assessed based on respondents with high risk with age at risk of more than 35 years and working time of more than 8 hours per day. Respondents who do weaving work with a bent backbone will tend to experience LBP complaints.[13]

Based on the background above, the researchers believe that work positions

can affect LBP in weavers. So far, there has been no research on work attitudes, especially sitting position on LBP in weavers. Researchers also consider it essential to find the relationship between traditional weavers' sitting and LBP to see the risk factors of the sitting position. This research can also help inform weavers about occupational safety and health, especially correct working posture. Therefore, the authors brought this topic into the study to help inform weavers about occupational safety and health, especially correct working posture in Buton Sarong weavers.

METHODS

This observational study used an analytic research design with a cross-sectional method to determine the relationship between sitting position to nonspecific low back pain complaints in Buton Sarong weavers in Baubau city. This research was conducted from January to February 2023 in Baubau. The sample in this study amounted to 63 people with a purposive sampling technique, a type of non-probability sampling.

The number of samples that met the inclusion and exclusion criteria was included in the study until the required number was completed. The inclusion criteria were Buton Sarong weavers in Baubau city, aged 35-60, using handlooms. These female weavers could read and write, willing to be the research sample by signing informed consent. At the same time, those included in the exclusion criteria were respondents with a history of back disease (fractures, HNP, spondylitis, spondylolysis). The independent variable in this study was sitting position, the dependent variable was nonspecific LBP, and the control variables were age, gender, years of service, length of work, duration of employment, and history of trauma.

The research procedure is to carry out the permitting process for the code of ethics first. Furthermore, the researcher made an informed consent which had to be signed by the subject, that the issue was willing to be the sample of this study until it was finished. The researcher provided information about the benefits, objectives, and how this research was carried out, after which the researcher provided personal data forms, questionnaires, and LBP examination to include and exclude samples (Figure 1). After fulfilling the minimum number of samples, the researchers conducted a physiotherapy history-taking process to discover nonspecific LBP complaints.

Data from the overall results of these measurements will be processed statistically with SPSS version 25. Data analysis is in the form of univariate tests to find out the description of each variable, and bivariate tests with *Spearman's rho* are used to find out the relationship, the strength of the relationship, and the direction of the independent variables to the dependent variable. The significance level used is 90% which means α=0.05. The value of $p>\alpha$ indicates no relationship between sitting position and nonspecific LBP complaints in Buton Sarong weavers in Baubau city.

RESULTS

The number of samples that met the inclusion and exclusion criteria was 63 people. Respondent characteristics based on age, duration of service, length of work, sitting position work attitude, nonspecific LBP complaints, and distribution of nonspecific LBP based on sitting position.

Table 1 shows that of the 63 respondents of Buton Sarong weavers in Baubau city, the age group of 35-40 years was 14 people (22.2%), the age group 41-45 years was 11 people (17.5%), the age group 46-50 years five people (7.9%), 51-55 years age group 15 people (23.8%), and 56-60 years group 18 people (28.6%). Based on years of service, the frequency of Buton Sarong weavers in the group with working period of <5 years was two people (3.2%), working period of 5-10 years was four people (6.3%), and working period >10 years was 57 people (90.5%). Based on the length of work, the results obtained were 24 people (38.1%) working <6 hours long, 37 people (58.7%) working 6-10 hours, and two people working >10 hours (3.2%). Based on the duration of work, the results obtained were one person (1.6%) working duration <1 hour, 43 people (68.3%) working duration of 1-2 hours, and 19 people working duration >2 hours (30.2%). Based on the table above, the results also showed that 51 people (81.0%) were in the low-risk group, and 12 people (19.0%) were in the medium-risk group. For nonspecific LBP complaints, out of 63 respondents, 51 people (81.0%) experienced nonspecific LBP complaints, and 12 people (19.0%) did not experience nonspecific LBP complaints.

Table 2 shows that both variables have values $p<0.05$, which means that these variables have an abnormal distribution. Table 3 shows the results of the output data showing that it is known that the p-value for the sitting position is 0.819, which

Figure 1. Assessment process on buton sarong weavers.

Table 1. Characteristics of Research Samples

Characteristic	Frequency (n)	Percentage (%)
Age		
35-40	14	22.2%
41-45	11	17.5%
46-50	5	7.9%
51-55	15	23.8%
56-60	18	28.6%
Working Period		
<5 years	2	3.2%
5-10 years	4	6.3%
>10 years	57	90.5%
Length of Work		
<6 hours	24	38.1%
6-10 hours	37	58.7%
>10 hours	2	3.2%
Working Duration		
<1 hours	1	1.6%
1-2 hours	43	68.3%
>2 hours	19	30.2%
Sitting Position (REBA)		
Low risk	51	81.0%
Medium risk	12	19.0%
Nonspecific Low Back Pain Complaint		
Complaints	51	81.0%
No complaints	12	19.0%

Table 2. *Shapiro-Wilk* Normality Test

Variable	*P*-value
Nonspecific Low Back Pain Complaints	0.000
Sitting Positions	0.000

Table 3. *Spearman's rho* correlation test of physical activity level with body mass index

Variable Correlation	*P*-value
Sitting Position and Complaints of Nonspecific Low Back Pain	0.000

means it is greater than the significance value of 0.05, so it can be declared not significant. The *r* value (correlation coefficient) of the sitting position is -0.029, which indicates no correlation and is negative so that it can be concluded that the risk of sitting position for nonspecific LBP complaints in Buton Sarong weavers in Baubau city has no relationship and is inversely proportional.

DISCUSSION

Based on the study's results, 51 people (81%) had a low-risk sitting position, and 12 (19%) had a medium-risk sitting position. This research aligns with the results of research conducted on weavers at Pandai Sikek, as many as 82 people (82%) have a low-risk work attitude.[14] Low risk means the job position is low, and changes may be needed. Low risk can occur because the work being done can pay attention to good posture, such as a back that tends to be straight. One of the NMWTs in weaving the people of Buton calls a tondu, a tool for resting on the back during the weaving process. Tondu functions in the weaving process are two things that are positively correlated because to keep the woven thread straight. The body will be pulled backwards so that the body posture becomes upright. The upright position will put the lumbar lordosis in a state so that the body is in the correct position. As explained in Hadi & Hasmar's research (2021), the leaning position is the best because it does not cause pressure on the ligaments, and the muscles remain in a good position in the back.[15]

Based on the results of this study, it was found that 51 people (81%) had nonspecific LBP complaints, and 12 people (19%) had no complaints. These results align with research conducted by Rohmah & Windurasi (2019) regarding LBP complaints among songket weavers in Muara Penimbung Ulu Village, where 42 people (76.4%) experienced LBP complaints. LBP complaints are caused by the body sitting static on the loom.[16] Static sitting position, if done for a long time, will result in muscle tension around the lower back which is at risk for MSDs such as LBP. In therapy, a long static sitting position, if accompanied by sufficient rest time, will minimize the occurrence of LBP. Notasbi & Jaji's research (2016) concerning the effect of ergonomic position on the incidence of LBP in songket weavers in BNI 46 village said that an ergonomic sitting position such as adequate rest, using cushions when weaving and sitting with a backrest can reduce LBP complaints.[13]

Nonspecific LBP complaints are low back pain caused by myofascial syndrome, muscle spasms, mechanical LBP, back sprains, and back strains. This condition makes the body experience limited movement and complains of pain in the lumbar area. Pain is frequently caused by the body's defensive mechanism in response to an injury. Nociceptors near the tissue lesion will transmit signals to the spinal cord, then send signals to the brain, resulting in pain. The brain will then send instructions to the muscle to contract to protect the muscle in that area. Muscle contraction happens continuously, resulting in hypoxia, tissue damage, and increased pain and incapacity.[17,18]

One of the factors that can influence nonspecific LBP complaints is work attitude.[8] Working attitudes such as standing and sitting will adjust to the conditions of the existing workstation. Poor work attitude regarding ergonomics can result in the risk of LBP complaints in workers. However, work attitudes that are applied ergonomically, according to Adiatmika et al. (2007), among others, adjusting work attitudes and providing

rest periods can reduce musculoskeletal complaints and fatigue and increase productivity and income of mental employees and entrepreneurs in Kediri, Tabanan Regency. Adjusting the work attitude and providing rest time will cause the muscles to contract optimally so that the effects of nonspecific LBP can be avoided.[19]

Previous research states that the sitting position has no significant correlation with LBP complaints. Research conducted by Riza (2016) stated there was no significant relationship between work attitudes and the incidence of LBP, with a value of p=0.557 (p>.05). This is because the weavers have sufficient working and resting time. Adequate work and rest time will avoid muscle tension and fatigue, which is the cause of LBP complaints.[20]

Another study with results that were not much different was conducted by Pratami et al. (2019) on first and second-year YARSI Faculty of Medicine students. Researchers stated that there was no significant relationship between sitting posture and the incidence of LBP, with a value of p=0.645 (p>0.05). This is because students have carried out good sitting postures, such as sitting in a reclining position and often stretching while sitting. The leaning position will make the sitting position upright to reduce pressure on the discs. In addition, muscle stretching is needed to avoid muscle tension when sitting upright.[21]

Some studies do not support the results of this study. Munawarah & Segita (2021), in their research looking for the relationship between tenure and work attitude towards the occurrence of LBP in weavers at Pandai Sikek, found that there was a relationship between work attitude and the occurrence of LBP with p=0.011 (p<0.05). This study used as many as 100 active male and female weavers as subjects who spent a long time working in a sitting position for too long. In addition, inappropriate sitting postures, such as bending the head, can add pressure to the lower back and are the leading cause of LBP.[14]

Women have a higher risk than men of experiencing LBP complaints. Research conducted by Mahfira & Utami (2021) states that there is a relationship between work attitude and LBP complaints among weavers in Batubara Regency. As many as 70 female weavers have been studied to have work attitudes in the medium and high categories. This is due to the weaver's repetitive work attitude and unnatural sitting, such as the head tends to bend and there is no backrest when sitting, which will cause the back to bend, triggering LBP.[22]

In this study, Buton Sarong weavers in Baubau worked with the most extended working duration of 1-2 hours and between 2-3 rest periods. Working in a static sitting position will cause fatigue and muscle weakness in the lower back. To overcome this, the weaver will rest and start weaving again. In addition, nonspecific LBP complaints were measured using a physiotherapy assessment questionnaire and are still subjective, thus affecting the diagnosis of nonspecific LBP complaints. This limitation is a factor that affects the significance value of the sitting position and nonspecific LBP complaints. In addition, physical activity is a factor that influences the occurrence of LBP and is not measured in this study. Regular physical activity can increase the oxygen supply to the muscles, thereby preventing LBP complaints.[6]

This study has several limitations. First, consider the limited sample size. Second, because this was a cross-sectional survey, we could not monitor control variables such as physical activity, and it wasn't easy to investigate the causal links between the variables. This research can be used as input and a reference source for research related to sitting positions and nonspecific LBP complaints. It is hoped that further research can develop this research through different methods and populations and can add control variables, namely physical activity. It is also recommended that Buton Sarong weavers in Baubau City always maintain their working posture and balance it with adequate rest.

CONCLUSION

Based on the results of the research, it can be concluded that there is no significant correlation between a sitting position and nonspecific LBP complaints in Buton Sarong weavers in Baubau City.

ETHICAL CLEARANCE

This research has been approved by the Research Ethics Commission of the Faculty of Medicine, Udayana University. Ethical clearance with letter number 1490/UN14.2.2.VII.14/LT/2022 and protocol number 2022.01.1.0727.

CONFLICT OF INTEREST

This study has no conflicts of interest.

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AUTHOR CONTRIBUTIONS

ZMM prepares study designs, collects data, processes data, and writes manuscripts. AAGESU, PASS, and NLNA are directing data collection and revising the manuscript.

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