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ORIGINAL ARTICLE

Factors Associated with Complaints of Low Back Pain in Areca Peeling Workers

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ABSTRACT

Introduction: An unnatural working attitude causing the body to deviate from its default posture is one of the contributing factors to the low back pain (LBP) experienced by workers. For instance, areca peeling workers often adopt a posture of sitting hunched over for extended periods. Therefore, this research aimed to identify factors related to a history of LBP among areca peeling workers in Dataran Pinang Village, Kuala Betara District, West Tanjung Jabung Regency. **Methods:** Using a sample size of 66 respondents, this quantitative research adopted a cross-sectional design and a simple random sampling method. The instruments used included questionnaires, observation, and documentation, and the data were analyzed both univariately and bivariately, with chi-square analysis as the statistical test. **Results:** The statistical analysis showed no correlation between work time, work duration, repetition, and LBP. However, there was a correlation between LBP and work attitude (0.051<0.05) in areca peeling workers. **Conclusion:** A relationship exists between work attitude of areca peeling workers and the occurrence of LBP. Therefore, it is advisable for workers who experienced complaints of LBP to perform tasks correctly. This approach would reduce the number of repetitive activities (repetitions) conducted.

Keywords: low back pain, work time, work attitude, work duration, repetition

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INTRODUCTION

Low back pain (LBP) is the discomfort in the lower back resulting from a prolonged non-neutral position under static conditions, leading to excessive muscle contraction and stiffness. Factors contributing to LBP include personal aspects (age, gender, anthropometry, physical activity, education), physical factors (posture during activities, duration of engagement), and stress-related factors (Arma, Septadina and Legiran, 2019). According to an investigation conducted by Riningrum (2016) examining the impact of work attitudes, age, and length of service on LBP complaints in PTS In the Apac Inti Corpora sewing department, work attitudes and length of service were associated with LBP complaints.

Work time refers to the period during which a worker performs tasks at a specific location, starting from the commencement of work until the interview is conducted. This duration can have both positive and negative influences on workforce performance. Positive impacts arise from increased work experience, enhancing an individual proficiency. However, negative effects may arise due to prolonged working hours, leading to the development of monotonous work habits and eventual muscle-related complaints (Verawati, 2016). Natural working postures are those that cause body parts to deviate from their natural position, such as lying on the stomach. Examples include hand movements, excessive back arching, head raising, and others. The greater the deviation of a body part from the center of gravity, the higher the risk of musculoskeletal disorders. This unnatural work attitude typically results from a misalignment between task requirements, work equipment, workplace characteristics, and the workers' abilities and limitations. Working hours refer to the duration an individual is exposed to occupational risk factors, and repetition consists of the recurring execution of work actions in the same pattern. Muscle issues are caused by constant stress on the muscles and an inability to relax (Rohmawan and Hariyono, 2017).

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According to Wulan, Hilal and Entianopa (2020), univariate analysis showed that 27 (56.2%) respondents were aged ≥35 years, 25 (52.1%) had worked for ≥10 years, and 13 (54.4%) had experience in writing batik. Additionally, LBP was reported at levels 1-3, and 16 (66.7%) respondents who had never engaged in batik-making experienced LBP at levels 1-3. The results of the bivariate analysis showed differences in LBP complaints between batik workers who engaged in writing and stamped batik. Furthermore, the occurrence of LBP in tie-dye workers was found to be associated with both age and length of service.

The extensive cultivation of areca nut contributes to its substantial export, which is facilitated by expansive plantations. According to data from the Jambi Provincial Plantation Service, the areca nut plantation area reached 22 hectares in 2020, with nearly ¾ of the land dedicated to productive crops. Concentrated primarily in Tanjung Jabung Timur and Tanjung Jabung Barat districts, the plantations constitute 40% and 50% of the land, respectively (Badan Pusat Statistik Provinsi Jambi, 2022). Areca peeling workers engage in a prolonged sitting position, often hunched over, with a working time exceeding seven hours. Initial survey results from interviews with seven areca nut peeling workers in Dataran Pinang Village showed that five of them had encountered LBP. The likelihood of experiencing LBP is significant, evident in the work attitude and duration observed during betel nut stripping tasks.

According to the results by Ahmad *et al*. (2022), of the 246 flight attendants surveyed, 55.3% were male, with a mean age of 39.83 ± 9.289 years. The average flight time was 85 hours, with the longest recorded flight time being 123 hours. A significant portion (55.7%) of the participating crew members reported experiencing musculoskeletal disorders, primarily affecting the lower back, shoulders, neck, and knees. These disorders were attributed to poor ergonomic factors, including improper posture, repetitive motion, weight-bearing, and prolonged standing. Logistic analysis showed that increasing age and extended flight time were also contributors to musculoskeletal disorders. Based on the information above and the results, this research aimed to investigate factors related to complaints of LBP among areca peeling workers in Dataran Pinang Village, Kuala Betara District, West Tanjung Jabung Regency.

METHODS

This research adopted a quantitative approach with a cross-sectional design. The target population comprised all areca peeling workers in Dataran Pinang Village, West Tanjung Jabung Regency, Jambi Province, totaling 208 individuals. The investigation was conducted from May 2, 2023, to June 20, 2023, and questionnaires and interviews were the instruments used for data collection. The sample, consisting of 66 areca nut peeling workers in the village of Dataran Pinang Suka, was selected through a simple random sampling method. Bivariate analysis was conducted to determine the relationship between independent and dependent variables. Furthermore, statistical tests were performed using the Product and Service Statistics Program solutions (SPSS), specifically adopting the chi-square test.

Enumerators were briefed on research objectives and data collection procedures before collecting the data. Respondents were explicitly informed that their participation was voluntary, with the option to withdraw without any repercussions. Additionally, respondents were assured that collected information would be held confidential, maintaining the anonymity of their identities. Observations served to understand work stages and attitude, as well as identify repetitive tasks. Simultaneously, surveys were adopted to gather information on workers complaints of LBP.

Using the Rapid Upper Limb Assessment (RULA) control form, observations explained workstations and stages of work. The Nordic Body Map questionnaire acted as a tool for acquiring data on musculoskeletal disorders. Job position data were processed by providing parent position values at all stages of work. The collected data were then analyzed to determine the RULA core (Jensen, 2015).

Muscle complaint data were subjected to processing through the assessment of individuals on a predetermined Likert scale to derive a total score. Analysis of point calculations was performed to propose improvement measures. This was conducted by comparing individual scores with subjective musculoskeletal risk classification (Tarwaka., 2010).

Work time was considered at risk when ≥10 years, and not at risk when <10 years. The then-current work attitude was categorized as low when the score was 3-4 and high when the score was 1-2. For work duration, there was a risk when >3 hours, no risk when ≤3 hours. Repetition was identified as

repetitive motion when >30 movements, and non-repetitive when ≤30 movements, with complaints observed when the questionnaire scored 36-80. No complaints were recorded when the questionnaire scored 0-35. This research obtained ethical approval number 1701/UN21.8/PT.01.04/2023 from the Health Research Ethics Committee, Faculty of Medicine and Health Sciences, Jambi University.

Table 1. Frequency Distribution of Work Time, Work Attitude, Work Duration, and Repetition at Dataran Pinang Village 2023

Variable	Total	Percentage (%)
Work time		
At risk	41	63
No risk	25	38
Work attitude		
Currently	59	89
Low	7	11
Work duration		
At risk	46	70
No risk	20	30
Repetition		
Repetitive motion	36	55
Non-Movement	30	45
Complaints LBP		
Experiencing complaints	37	56
Have no com plaints	29	44

RESULT

The work statistics showed that 63% of work time was considered at risk, with a moderate work attitude at 89%, and a 70% risk associated with the duration of work. Additionally, 55% experienced complaints related to repetitive motion, and 56% reported experiencing complaints of LBP.

Bivariate

Table 2 presents that 61% of workers facing work time risks also experienced LBP complaints, with a p-value of 0.439 ($p < 0.05$). The results suggested no relationship between length of service and complaints of LBP in areca nut peeling workers. As many as 61% of workers with a moderate work attitude reported LBP complaints, showing a significant relationship with a p-value of 0.051 ($p < 0.05$). A duration of work at risk (57%), on the other hand, did not have a substantial relationship with LBP complaints, obtaining a p-value of 0.699 ($p>0.05$). Similarly, 53% of workers engaged in repetitive movements reported LBP complaints, indicating a p-value of 0.957 ($p> 0.005$). The results showed no significant relationship between repetitive motion and complaints of LBP in areca nut peeling workers.

DISCUSSION

This research contradicted the observation of Rohmawan at PT Surya Besindo Sakti Serang, which indicated a relationship between the work duration

Table 2. Relationship between Work Time, Work Attitude, Work Duration, and Repetition with Complaints of LBP at Dataran Pinang Village 2023

Variable	Complaints LBP				Total		p-value
	There is		Nothing				
	n	%	n	%	N	%	
Work Time							
At risk	25	61	16	39	41	100	0.439
No Risk	12	48	13	52	25	100	
Work Attitude							
Currently	36	61	23	39	59	100	0.051
Low	1	14	6	86	7	100	
Work Duration							
At risk	26	57	20	43	46	100	1.00
No Risk	11	55	9	45	20	100	
Repetition							
Repetitive motion	19	53	17	47	36	100	0.734
Non-Movement	18	60	12	40	30	100	

and complaints of LBP among production workers (Rohmawan and Hariyono, 2017). It was stated that skeletal muscle complaints typically began during the working age, specifically between 25 and 65 years. The first complaint tended to manifest around the age of 35, with complaint levels progressively increasing with age. This phenomenon was attributed to the decline in muscle strength and endurance during middle age, elevating the risk of developing muscle complaints (Tarwaka, 2011).

The ability of human bones to withstand pressure from occupational loads diminishes over an individual's working life. Consequently, the longer a person works, the higher the risk of contracting work-related diseases. Working for more than five years poses a greater risk than a working period of five years or less. This was linked to the cumulative exposure to daily workloads over five years, thereby leading to complaints of LBP (Arminas, 2017). The present research was consistent with previous reviews on batik workers, showing a relationship between ergonomic work attitude and complaints of LBP (p-value = 0.001) (Umami, 2019).

The relationship between work attitude and LBP complaints was supported by the literature, signifying that incorrect, awkward, and unconventional work attitude increased the risk of musculoskeletal injuries. An inappropriate work attitude led to muscle fatigue, resulting in inefficiency. Over time, this contributed to both physical and psychological disorders with complaints manifested in the back (Mangkunegara and Octorend, 2015). The body position consisting of flexion, extension, and rotation of the back during work could weaken the abdominal muscles, leading to excessive lordosis. Anatomically, excessive lordosis in the lumbar region narrows the canal, compresses spinal nerves, and causes the backward protrusion of cartilage (intervertebral disc), thereby resulting in LBP (Tarwaka, 2004). It was crucial for areca nut peeling workers to promptly detect LBP complaints, prioritize adequate rest, and adjust work attitude to enhance worker comfort and minimize the risk of the pain.

In this research, respondents with years of service were at risk of experiencing LBP complaints because continuous engagement in activities over the years could undoubtedly disrupt the body. Prolonged work without adequate rest diminished the body resilience and could lead to limb pain. Conversely, individuals with a shorter working period had a reduced likelihood of developing LBP complaints. To prevent areca peeling workers in Dataran Pinang village from experiencing LBP complaints, specifically those with extensive work experience, it was recommended that they engage in more muscle stretching or relaxation.

In occupations comprising prolonged sitting, muscle contractions quickly became static, and the load pattern is intensified compared to dynamic contractions. Unnatural work behaviors, additional workloads, and subjective complaints might arise. A study reported that waist pain was felt due to unergonomic working positions and extended working hours. Uncomfortable conditions exerted pressure on the body, resulting in back pain and discomfort (Saptiansyah, Haqi and Juwono, 2023).

When working in awkward positions, there would be an increase in the energy required for the task. Awkward positions refer to body postures that deviate from the natural condition of skeletal muscles, easily causing fatigue. Activities included in such positions are body tilting, kneeling, squatting, holding static positions, repetitive or prolonged reaching, turning, and pinching with the hands. These positions impact various body areas, with shoulders, back, and knees being the most susceptible to injuries (Andini, 2015). Engaging in work with inappropriate positions and repetitive movements could lead to muscle overloading, resulting in muscle complaints (Sahara and Pristya, 2020).

In the bivariate analysis using chi-square analysis, the obtained results were a P-value of 0.072, indicating no connection between complaints of LBP and work attitude among tailors in Kuta Malaka District, Aceh Besar District in 2014 (Susanti, Zulfadhli and Mahdinursyah, 2014). The results showed no relationship between the length of labor and complaints of LBP among areca peeling workers. Work activities were intermittent, and the duration was influenced by the amount of rest time. Areca nut peeling work was typically performed for 2-3 hours, with the longest working duration being eight hours a day, allowing for significant downtime afterward. Workers used the break time for rest or other activities, such as female respondents engaging in household chores and male respondents pursuing other work activities. The short duration of action prevented continuous muscle contractions and avoided blood vessel constriction, reducing the likelihood of pain. Pain could occur when reduced blood flow leads to vessel constriction, causing ischemia, tissue lacking nutrition and oxygen, and prolonged lactic acid production due to muscle

contraction accumulation (Prahastuti, Djaali and Usman, 2021).

Work time referred to the period during which a worker performed tasks at a specific location, starting from the commencement of work until the interview was conducted. This duration significantly impacted performance, having both positive and negative consequences. A longer work period could positively influence personal performance by increasing experience in job functions. However, as the working period extended, workers might have experienced complaints leading to muscle discomfort problems (Suma'mur, 2014). The length of the work period played a role in the occurrence of LBP. Prolonged sitting positions place a burden on the spine, elevating the risk of LBP due to the weakening of muscles, fascia, and ligaments (Hutasuhut *et al*., 2021).

Activities consisting of repetitive actions, particularly wood splitting, digging, and frequent lifting, could result in pain due to the accumulation of metabolic waste in muscles. Repetitive tasks often lead to weakness and cramps in the hands or forearms, specifically with sudden movements (Tarwaka., 2015). The relationship between repetition and LBP arises from the consistent engagement of the same muscles. The repetitive movements, coupled with incorrect work postures and static or monotonous positions over an extended time, might contribute to LBP (Wulan, Hilal and Entianopa, 2020). Respondents were advised to manage the duration of work when peeling areca nuts, as research results showed that the duration of work did not significantly affect complaints of LBP. Workers with a work duration exceeding three hours were encouraged to stretch their bodies, preventing muscle tension and minimizing the occurrence of LBP complaints. Stretching muscles acts as a way to change the body position and avoid prolonged static sitting.

The longer an individual work period increases, the repetition of the same movements triggers fatigue in muscle tissue thereby causing muscle spasms. According to Ministry of Manpower of Republic of Indonesia (2003), Law No. 13 of 2003 stipulates that the standard working time is 8 hours/day or 40 hours/week. Exceeding this specified time could lead to decreased productivity and skeletal muscle fatigue. This research contrasted with the results that showed significant connections between repetitive activities and musculoskeletal issues in PT. Bahari Gembira Ria, Muaro Jambi Regency, in 2017, with a p-value of 0.040 (p-value <0.05) (Harahap, Sari and Rachman, 2018). The duration of awkward postures was considered risky when maintained for more than 10 seconds. Frequent and repetitive movements posed a physiological risk associated with muscle fatigue. When repetitive movements were too fast and oxygen did not reach the tissue, muscle fatigue occurred (Afia and Oktaria, 2018).

The absence of a relationship between the repetition variable and complaints of LBP in areca peeling workers could be attributed to the fact that repetitive movements did not dominate each work process. The process of peeling areca nuts, using tools such as machetes and pickaxes in the field, did not require supporting weights to prevent complaints. Repetition in this context referred to movements that were carried out in the same pattern. Frequent movements could lead to fatigue and tension in muscles, which could recover with sufficient rest time. The impact of repetitive movements increased when performed incorrectly and for an extended duration, causing muscle complaints due to continuous pressure without adequate relaxation opportunities (Sahara and Pristya, 2020).

Repetitive or static engagement in unusual postures induces stress in muscles, resulting in edema or scar tissue formation. This could adversely affect nerve function, leading to muscle weakness and pain. Workload includes a set of activities that individuals or groups have to complete over a specified time under normal conditions. Tasks consisting of force exertion impose substantial mechanical loads on muscles, tendons, ligaments, and joints. Excessive weight could cause irritation, inflammation, muscle fatigue, and damage to muscles, tendons, and other tissues (Suma'mur, 2013).

Work duration was another factor that influenced the absence of a relationship between repetition and complaints of LBP. In this research, the work duration was limited to more than three hours with sufficient rest time, preventing prolonged repetition of work movements, and thereby allowing muscles the opportunity for relaxation. Repetition, in such context, referred to a short cycle of repeated movements within a work activity. Jobs with extended periods and the potential for repetitive motions should carefully consider the duration of the cycle timeframe. Cycle time refers to tasks performed more than once without interruption (Shiri *et al*., 2019). Excessive repetition over a continuous period could cause damage to joints,

bones, muscles, tendons, ligaments, and blood vessels. The damage results from the sustained loads on the lower back area caused by activities performed with the upper limbs. In the case of onion skin cleaners, they engaged in repetitions ranging from 3 to 11 times per minute, posing a significant risk, particularly for those exceeding four repetitions per minute. The results were in line with the conclusions of the research panel (Nurhayati, 2020). Therefore, it was advisable for areca nut peeling workers experiencing LBP complaints to perform tasks correctly, minimizing the number of repetitive activities (repetitions) undertaken.

CONCLUSION

In conclusion, a relationship existed between the work attitude of areca peeling workers and the occurrence of LBP. Therefore, it is advisable for areca nut peeling workers experiencing complaints of LBP to perform their tasks correctly. This approach would reduce the frequency of repetitive activities (repetitions) conducted.

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