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ABSTRACT

Musculoskeletal pain refers to the discomfort experienced in the musculoskeletal system as a result of various pain-inducing factors. Musculoskeletal pain is a leading cause of disability and absenteeism in the workplace. The primary causes of declining health among workers include occupational injuries (29.5%), overtime (25.9%), and ergonomic factors (13.7%), significantly influence occupational health and can adversely affect organ function. The study was conducted through observational approach with a cross-sectional design and primary data collected using the Nordic Body Map (NBM) questionnaire and the Rapid Entire Body Assessment (REBA). The study population is mini market employees and sample comprises were employees who fulfil inclusion and exclusion criteria as many as 50 respondents by using non-probability sampling technique. The results of study were obtained that the majority of workers belong to the age group of under 35 years, as many as 49 individuals (98%) and more than half of the respondents are predominantly female, accounting for 52% of the total. Furthermore, the study indicates that the dominant "Very Painful" predilection criterion is most frequently reported in the back and waist of the respondents, accounting for 40% of the total respondents. Next, the majority of minimarket workers exhibit a moderate level of risk in their work posture, with 21 individuals (42%) falling into this category. Based on the results, it is recommended that respondents engage more actively in physical exercise and massage therapy.

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1. Introduction

Musculoskeletal Disorder (MSD) refers to an injury or dysfunction that results in abnormalities in muscles, nerves, tendons, joints, cartilage, and spinal discs, leading to musculoskeletal pain [1]. According to the Global Burden of Disease (GBD) 2019 data, approximately 1.71 billion individuals across all age groups experience musculoskeletal pain at some point in their lives [2]. Data from Ministry of Health of Indonesia (2018) indicates that around 713,783 people in Indonesia suffer from joint diseases classified as musculoskeletal complaints [3]. Chronic musculoskeletal disorders can significantly impair work quality and adversely affect both physical and mental health. Furthermore, musculoskeletal pain is a leading cause of disability and absenteeism in the workplace. This type of pain is characterized as an unpleasant sensory and emotional experience associated with actual or potential damage to musculoskeletal tissue [1]. Musculoskeletal pain can also arise from fatigue resulting from a series of oxidative metabolic reactions. Intense oxidative processes can lead to an increased production of free radicals. Therefore, maintaining a balance between antioxidant levels and free radical production is crucial for optimal musculoskeletal function [4]. A comprehensive, systematic, and logical analysis of musculoskeletal pain is essential to ensure the best opportunity for accurate diagnosis and to develop appropriate testing and follow-up treatment plans. Consequently, analyzing the risk of musculoskeletal pain can help determine the presence or absence of musculoskeletal disorders [5].

The primary causes of declining health among workers include occupational injuries (29.5%), overtime (25.9%), and ergonomic factors (13.7%). Ergonomic factors, such as the intensity of work, repetitive activities, lifting, and prolonged exertion, significantly influence occupational health and can adversely affect organ function [6]. One study indicated that manual work attitudes and weight-shifting behaviors, such as bending, contribute to pain in various parts of workers' bodies. Poor ergonomic working positions can lead to rapid fatigue and increase the risk of musculoskeletal injuries [7].

One of the ergonomic factors that cause musculoskeletal disorders is incorrect working posture. Ergonomic posture refers to a position that does not alter the natural angles of the body. Work posture encompasses the actions taken by workers and the positions they adopt while performing their tasks [8]. Proper work posture engages all muscle groups, making it essential to maintain correct alignment to prevent musculoskeletal pain. In the short term, improper work posture can lead to physical fatigue. However, if sustained over a long period, it can result in damage to muscles, joints, ligaments, and tendons [9].

In addition, work posture significantly influences employee quality and productivity. Previous research reported that standing posture is less dominant in determining job satisfaction. When operators experience fatigue, it can lead to headaches, muscle pain, and even spinal fractures [10]. Conversely, other studies have shown that office workers who are permitted to adjust their working positions–alternating between sitting and standing–

report that approximately 6.5% are more productive when working in a standing position compared to a sitting position [11].

Retail workers, including minimarket employees, engage in a variety of tasks that require different work postures. The impact of work posture on minimarket workers experiencing musculoskeletal pain in Indonesia remains inadequately understood. This gap in knowledge is largely due to the incomplete management of data on occupational diseases in the country, as reporting from relevant agencies has not been optimal [12]. To establish rational priorities for effective prevention and treatment, it is essential to gather information on musculoskeletal disorders through research that examines the risk of musculoskeletal pain associated with work. In light of this need, the author conducted a study analyzing the risk of musculoskeletal pain by observing the work postures of minimarket workers.

2. Method

The study employs an observational approach with a cross-sectional design. The research data consists of primary data collected using the Nordic Body Map (NBM) questionnaire and the Rapid Entire Body Assessment (REBA) measurement tool. The study population is mini market employees in Palembang City, and the research sample comprises those employees who meet the inclusion and exclusion criteria. A non-probability sampling technique was utilized, resulting in a sample size of 50 respondents. The data were analyzed using descriptive analysis techniques to determine frequencies and percentages, employing SPSS version 27.0.

3. Results and Discussion

3.1 . Results

The research conducted has yielded several results, including respondent characteristics, the distribution of musculoskeletal pain predilection and the frequency of work posture risks. The descriptive analysis of respondent characteristics included age and gender, as presented in Table 1.

Table 1. Characteristics of respondents

Characteristics of Respondents	Frequency	Percentage
Age		
< 35 years old	49	98
≥ 35 years old	1	2
Total	50	100
Gender		
Male	24	48
Female	26	52
Total	50	100

The distribution of age and gender frequency within the sample is presented in Table 1. The research sample, which consists of 50 minimarket workers in Palembang City, reveals that the majority of workers belong to the age group of under 35 years, as many as 49 individuals (98%). Furthermore, the data indicates that more than half of the respondents

are predominantly female, accounting for 52% of the total. In contrast, male respondents are fewer in number, comprising 24 individuals, or 48% of the overall sample.

The distribution of musculoskeletal pain predilection is analyzed based on the perception of pain experienced in various parts of the body, ranging from the upper neck to the legs. The results of the analysis were tabulated, presenting frequency and percentage data categorized by pain levels: no pain, slight pain, pain and severe pain, as shown in Table 2.

Table 2. Predilection for musculoskeletal pain of respondents

Body Segment	Predilection for Musculoskeletal Pain							
	No pain		Moderate pain		Pain		Very pain	
	n	%	n	%	n	%	n	%
Upper neck	20	40	9	18	11	22	10	20
Lower neck	24	38	7	14	9	18	10	20
Left Shoulder	21	42	8	16	10	20	11	**22**
Right Shoulder	20	40	9	18	9	18	12	**24**
Left upper arm	30	60	11	22	5	10	4	8
Back	12	24	10	20	8	16	20	**40**
Right upper arm	26	52	9	18	10	20	5	10
Waist	11	22	5	10	14	**28**	20	**40**
Buttock	32	64	12	24	3	6	3	6
Bottom	36	72	11	22	1	2	2	4
Left elbow	41	82	5	10	4	8	0	0
Right elbow	39	78	6	12	5	10	0	0
Left lower arm	30	60	11	22	5	10	4	8
Right lower arm	29	58	11	22	7	14	3	6
Left wrist	20	40	10	20	12	**24**	8	16
Right wrist	19	38	10	20	13	**26**	8	16
Left hand	24	48	9	18	11	22	6	12
Right hand	22	44	9	18	11	22	8	16
Left thigh	25	50	11	22	12	24	2	4
Right thigh	24	48	10	20	14	**28**	2	4
Left knee	27	54	11	22	7	14	5	10
Right knee	27	54	10	20	8	16	5	10
Left calf	20	40	19	38	5	10	6	12
Right calf	21	42	18	36	6	12	5	10
Left ankle	26	52	7	14	12	**24**	5	10
Right ankle	25	50	9	18	13	**26**	3	6
Left foot	20	40	7	14	10	20	13	**26**
Right foot	20	40	7	14	10	20	13	**26**

Based on the purpose of the study, which is to analyze the risk of musculoskeletal pain, Table 2 indicates that the dominant "Very Painful" predilection criterion is most frequently reported in the back and waist of the respondents, accounting for 40% of the total respondents. Furthermore, the right and left shoulders demonstrated relatively high percentage of "Very Painful" was the leg organs, which was 26% of the total respondents. Next, another body with a fairly high predilection rate of 24% and 22% of the total respondents, respectively.

Meanwhile, as shown in Table 2, the predilection of "Pain" reported by mini market workers is the waist and right thigh, affecting 28% of the total respondents. This is followed by pain in the wrists and ankles, which affects between 24% and 26% of the total

respondents. The research findings regarding work posture were presented as frequency distributions and percentages based on the risk levels associated with the respondents' work postures, as shown in Table 3.

Table 3. Distribution of respondents work posture risk

Work Posture Risk Levels	Frequency	Percentage
Very Low	0	0
Low	11	22
Moderate	21	42
High	13	26
Very High	5	10
Total	50	100

Table 3 presents the frequency distribution of the risk level of work posture risk levels among minimarket workers, as determined by REBA analysis. The majority of minimarket workers exhibit a moderate level of risk in their work posture, with 21 individuals (42%) falling into this category. Notably, there are no minimarket workers classified as having a very low risk posture. Conversely, 10% of the total respondents are identified as having a very high level of risk work posture.

3.2. Discussion

3.2.1. Characteristics of Respondents

Data obtained through questionnaires and interviews with convenience store workers indicated that over 90% of respondents were under 35 years old. This finding aligns with research conducted in 2023, which suggests that the average worker falls within the 20-29 age range, categorizing them as young adults [13]. According to employment data from 2021, the working-age population in Indonesia includes approximately 22.14 million individuals aged 15-19 years, representing about 10.78% of the total workforce. The second largest demographic is the population aged 20-24 years, comprising around 21.95 million people or 10.69%, followed closely by those aged 25-29 years, total 21.71 million individuals or 10.57%. However, the average age of the working population in Indonesia is between 30 and 44 years. Young adults in the retail sector are capable of performing physically demanding tasks, whereas older individuals may experience a decline in their capacity for heavy work due to bodily degeneration. Nevertheless, it is possible for elderly workers to be employed in minimarkets, as job assignments and positions within this sector can vary significantly [14].

Based on univariate data, the distribution of dominant workers is predominantly female, comprising 52% of the workforce. This finding aligns with the research conducted in 2023, which indicated that the majority of minimarket workers are female, accounting for 59.4% [13]. In contrast, research conducted in Korea reveals that the ratio of female to male workers in the retail and administrative sectors is approximately equal [15]. Employment data from February 2021 recorded around 4.43 million young people employed in the large and retail trade sectors, with approximately 2.4 million of these being female. Female workers tend to dominate the retail sector, as they often excel in job roles that require greater precision compared to their male counterparts [14].

3.2.2. Predilection for Musculoskeletal Pain of Respondents

The lower back region is the most commonly reported area of pain, followed by the wrists and legs. This aligns with a study indicating that convenience store workers experience the highest incidence of back pain (38 individuals) and waist pain (39 individuals) [15]. Additionally, research conducted in Kuala Lumpur revealed that approximately 61.29% of supermarket workers reported the most complaints of shoulder pain, followed by pain in the legs and lower back [16]. This finding is consistent with the research conducted in 2022, which reported that pain complaints are primarily due to prolonged standing and the extensive use of hands during tasks such as arranging goods [17].

3.2.3. Distribution of Respondents Work Posture Risk

The results of the REBA measurement in this study indicated that most minimarket workers were at medium risk (42%) and high risk (26%). A similar study conducted in a supermarket found that cashiers are at a greater risk of developing musculoskeletal pain due to awkward body positions [18]. This underscores the urgent need for corrective action. Complaints of muscle pain can arise from sustained pressure due to continuous workloads without adequate relaxation [6]. This assertion is supported by research conducted in 2019, which reported that adopting ergonomic work postures can enable employees to work safely, comfortably, and productively [19].

Unergonomic work postures increase the risk of musculoskeletal pain. This is supported by a study of production workers in Bandung, which demonstrated a significant relationship between musculoskeletal pain and work posture [20]. Workers with unergonomic postures, particularly those involved in transporting heavy loads, are more likely to experience complaints related to musculoskeletal disorders (MSDs). Loading can place stress on the spine when goods are manually moved with improper posture [6].

Research conducted in Yogyakarta indicates a correlation between work posture and musculoskeletal pain among workers. Unnatural work postures may arise when the workplace does not accommodate the anthropometric measurements of employees, such as using chairs that are too short. Improper work posture can result from bending the upper and lower body during tasks such as lifting, transferring, and moving luggage [21]. This finding aligns with research on convenience store workers, whose responsibilities include serving customers and handling the transfer of goods (storage) [15].

In the course of their work, employees adopt a variety of postures. Consequently, researchers focus on the most prolonged and hazardous working postures for each individual, including static postures and the lifting of objects. The findings of this study align with the theory that work posture is a significant factor influencing the occurrence of musculoskeletal disorders (MSDs) among workers who engage in repetitive tasks or maintain static positions for extended periods. Continuous use of muscles can lead to fatigue, diminishing their maximum capacity [22]. Prolonged standing requires workers to constantly adjust their body position, resulting in a static workload on the back and leg muscles. Work posture becomes a risk factor when the duration exceeds 10 seconds and the frequency reaches two times [23].

Various studies in the retail sector have been conducted to assess work posture in relation to musculoskeletal pain complaints. The research was conducted in 2021 reported that

examined mild musculoskeletal disorders (MSDs) among young adult participants [22]. A study conducted in Kuala Lumpur reported that complaints of musculoskeletal pain were at moderate risk due to non-ergonomic postures.92 In addition to causing pain, non-ergonomic postures can lead to functional disorders, one of which is osteoarthritis, characterized by the degeneration of intervertebral discs due to chronic spinal load. Furthermore, the position of the wrist during prolonged repetitive movements can also contribute to the development of carpal tunnel syndrome [24].

There are several recommended interventions to reduce the risk of musculoskeletal disorders (MSDs), including training and the implementation of standard operating procedures for handling items in supermarkets. Repetitive movements involved in arranging goods can be alleviated by using short-handle scoops. Implementing rotation systems for task assignments can mitigate ergonomic risks associated with prolonged stagnation. Additionally, the availability of online shopping and e-commerce can decrease the risk of injuries related to manual handling, particularly for stockers in the retail sector.

4. Conclusion

The age distribution among minimarket workers in Palembang City shows that the highest percentage, 98%, falls within the under-35 age group. In terms of gender distribution, female workers represent the majority at 52%. An assessment of musculoskeletal pain complaints among convenience store workers in Palembang City indicates that the most commonly reported areas of discomfort are the back, waist, lower neck, and right wrist. Furthermore, an evaluation of work posture risk among minimarket workers revealed that 42% are at moderate risk.

Based on the results of the study, it is essential to conduct additional relevant research, including the analysis of other factors that may influence the risk of musculoskeletal pain, such as body fat percentage, sleep quality, and smoking habits. This further research aims to enhance and expand our understanding of work-related musculoskeletal disorders. Additionally, the upcoming studies should focus on health measures and treatments that can be provided to patients suffering from musculoskeletal health issues.

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