

Assessing Ergonomic Hazards in Motorcycle Workshops: Focus on Musculoskeletal Health

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Abstract: This study investigated musculoskeletal disorders (MSDs) among motorcycle mechanics using the Nordic Musculoskeletal Questionnaire (NMQ). MSDs are prevalent among manual laborers, such as those in motorcycle workshops, due to repetitive tasks, non-ergonomic postures, and high physical demands. This study aimed to understand the risk factors contributing to MSDs, the relationship between workers' demographic characteristics and the types of complaints, the impact on their work, and the types of treatment chosen. Using the NMQ, data was collected from 14 motorcycle mechanics, including demographic aspects such as age, gender, education, and work experience. Results indicated a strong correlation between age and length of service and an increased risk of MSDs, particularly among older workers and those with longer tenure. Neck and lower back complaints were the most commonly reported, and a majority of workers tended to neglect professional medical care, opting for traditional treatments or rest. These findings emphasize the importance of implementing good ergonomic practices and health education to prevent MSDs, as well as improving access to healthcare services for motorcycle mechanics. This study provides a foundation for developing more effective prevention strategies to safeguard the musculoskeletal health of workers.

Keywords: Musculoskeletal Disorder's (MSDs), Worker, Automotive, Ergonomic, Preventive.

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I. INTRODUCTION

Musculoskeletal disorders (MSDs) are prevalent health issues among workers, particularly those engaged in physically demanding occupations like motorcycle mechanics. Repetitive tasks, non-ergonomic postures, and high physical demands contribute significantly to MSDs among these workers (Bankar, 2021). Prolonged work duration, excessive workload, and poor ergonomic postures are identified as significant risk factors (Rahmah & Herbawani, 2021; Ridlo & Fasya, 2023). Moreover, psychosocial stressors can exacerbate these conditions, especially when coupled with high levels of stress (Ridlo & Fasya, 2023).

This study aimed to delve deeper into the risk factors contributing to MSDs among motorcycle mechanics. By understanding the relationships between demographic characteristics, types of complaints, work impacts, and treatment choices, more effective prevention strategies can be developed (Ariyanto et al., 2024). For instance, implementing ergonomic principles in the workplace can reduce the risk of musculoskeletal complaints by 58-60% (Cahyanti & Rosyidi, 2023; Purnomo et al., 2018). Workers with longer service and heavier workloads are more susceptible to MSDs, leading to decreased productivity due to persistent pain (Aprianto et al., 2021; Danur et al., 2022).

The Nordic Musculoskeletal Questionnaire (NMQ) was employed to gather data from motorcycle mechanics regarding their experiences with MSDs. The NMQ is a validated tool widely used to assess the prevalence and severity of musculoskeletal complaints among various worker populations (Purnomo et al., 2018). Its application in this study is expected to provide a comprehensive overview of the musculoskeletal health of motorcycle mechanics, serving as a foundation for developing targeted health interventions. Collected data encompassed demographic aspects, affected body parts, complaint duration, and work impact. Data analysis will identify the most vulnerable worker groups and exacerbating factors, guiding the development of tailored prevention strategies (Cahyanti & Rosyidi, 2023; Ridlo & Fasya, 2023).

MSDs contribute significantly to work-related illnesses, accounting for 42-58% of cases (Dwiseli et al., 2023). Older workers with longer service durations tend to report more complaints, particularly in frequently used body parts (Dwiseli et al., 2023; Hidayatullah, 2021). This indicates the accumulation of physical stress over time, increasing the risk of MSDs. These findings underscore the importance of implementing proper ergonomics and injury prevention training, especially for long-serving workers (Dwiseli et al., 2023; Oktavia et al., 2023).

Finally, the study highlighted the low rate of seeking professional medical help among motorcycle mechanics experiencing MSDs. Many workers prefer traditional remedies or rest without medical consultation.

This lack of awareness regarding the importance of appropriate medical care can exacerbate musculoskeletal conditions and reduce work productivity. Thus, intensified educational efforts are needed to raise awareness about the significance of timely and proper medical treatment in preventing more serious complications..

II. RESEARCH METHOD

This study employed a quantitative approach using a survey design to collect data from motorcycle workshop workers regarding musculoskeletal disorders (MSDs). The primary instrument was the Nordic Musculoskeletal Questionnaire (NMQ), a validated and reliable tool designed to assess the prevalence and severity of musculoskeletal symptoms in various body parts.

A purposive sample of 14 motorcycle workshop workers, including owners, technicians, mechanics, and administrative staff, was recruited. Participants were selected based on their involvement in physically demanding tasks that could potentially lead to MSDs. Demographic data such as age, gender, education level, marital status, length of employment, and history of work-related accidents were collected.

Data were gathered through structured interviews using the NMQ, which required participants to report musculoskeletal symptoms experienced within the past year. Additionally, data on the impact of these symptoms on work activities, such as reduced productivity or work stoppage, and the types of healthcare sought were collected. Descriptive analysis was used to identify patterns and relationships among the studied variables..

III. RESULTS AND DISCUSSIONS

3.1. Descriptive Analysis

In this section, the results of data analysis from a case study on musculoskeletal disorders (MSDs) among motorcycle workshop workers will be presented. The data includes demographic characteristics of the respondents, complaints experienced in the past year, the impact of these complaints on work, and the types of healthcare sought by the respondents. Each finding will be linked to relevant literature and analyzed to identify risk factors and patterns among workers. This discussion also aims to examine the implications of the research findings for workers' health and productivity, and to provide recommendations for more effective prevention and management of MSDs in motorcycle workshop work environments. The discussion begins with an analysis of the respondents' demographic data, followed by a description of the types and frequency of MSD complaints experienced, their impact on work, and the management undertaken. The relationship between these various variables will be explored to provide a comprehensive overview of the working conditions and health of motorcycle workshop workers in the context of this study.

Table 1. Demographics of Respondents

No	Name	Position	Age	Gender	Education	Marital Status	Years of Service	Accident Experience
1	D	Owner	26	Male	High School	Single	5 years	Never
2	VS	Admin	35	Female	High School	Married	1 year	Never
3	Z	Technician	26	Male	High School	Married	6 years	Ever
4	AR	Technician	23	Male	High School	Single	2 years	Ever
5	K	Technician	42	Male	Junior High School	Married	10 years	Ever
6	PA	Shop Manager	25	Male	Bachelor	Single	2 years	Never
7	E	Sales Associate	27	Male	Vocational High School	Married	6 years	Never
8	DE	Mechanic	21	Male	Vocational High School	Single	1 year	Ever
9	A	Mechanic	19	Male	Vocational High School	Single	1 year	Ever
10	T	Mechanic	25	Male	Vocational High School	Married	6 years	Ever
11	Y	Owner	39	Male	High School	Married	14 years	Ever
12	DH	Mechanic	26	Male	Vocational High School	Single	8 months	Ever
13	HS	Mechanic	26	Male	Vocational High School	Married	2 months	Ever
14	KG	Owner	51	Male	Vocational High School	Married	6 years	Never

Table 1 presents the demographic data of 14 respondents who participated in the case study. Respondents held various positions in the motorcycle workshop, including owners, administrators, technicians, shop managers, sales associates, and mechanics. Respondent ages ranged from 19 to 51 years, with the majority being male. Respondents' education levels varied, ranging from junior high school graduates to bachelor's degree holders. Marital status showed that some respondents were married, while others were unmarried. The length of respondents' work in the motorcycle workshop varied, ranging from 2 months to 14 years. Some of the respondents had experienced work accidents, while others had never experienced accidents.

Table 2. shows the MSDs experienced in the last year.

Body Parts	Responses	
	Yes (%)	No (%)
Neck	8 (57.1)	6 (42.9)
Shoulders	6 (42.9)	8 (57.1)
Upper Back	5 (35.7)	9 (64.3)
Lower Back	8 (57.1)	6 (42.9)
Elbows	1 (7.1)	13 (92.9)
Hands/Wrists	4 (28.6)	10 (71.4)
Hips/Thighs	4 (28.6)	10 (71.4)
Knees	2 (14.3)	12 (85.7)
Feet/Ankles	0 (0)	14 (100)

Table 2 illustrates the frequency of musculoskeletal complaints reported by respondents over the past year in various body parts. The neck and lower back were the most commonly reported areas of complaint, with 57.1% of respondents reporting discomfort in each of these regions. In contrast, complaints in the elbow and foot/ankle were infrequently reported, with only 7.1% of respondents experiencing elbow pain and none reporting foot/ankle discomfort.

Table 3. presents the MSDs that had a duration of more than one day and impacted the ability to reduce or cease work.

Body Parts	Responses	
	Yes (%)	Yes (%)
Neck	5 (35.7)	9 (64.3)
Shoulders	4 (28.6)	10 (71.4)
Upper Back	3 (21.4)	11 (78.6)
Lower Back	5 (35.7)	9 (64.3)
Elbows	1 (7.1)	13 (92.9)
Hands/Wrists	2 (14.3)	12 (85.7)
Hips/Thighs	2 (14.3)	12 (85.7)
Knees	1 (7.1)	13 (92.9)
Feet/Ankles	0 (0)	14 (100)

Table 3 describes the impact of musculoskeletal complaints experienced by respondents for more than one day and whether these complaints resulted in a reduction or cessation of work. Neck and upper back complaints most frequently impacted work, with 35.7% of respondents reporting such an impact. Most complaints in other body parts did not have a significant impact on work, such as in the elbow and foot/ankle, which almost never caused a reduction or cessation of work.

Table 4. Healthcare professionals frequently visited during the experience of MSDs

Healthcare Assistance Reference	Responses	
	Yes (%)	No (%)
Hospital	0 (0)	14 (100)
Public Health Center	0 (0)	14 (100)
Clinic	5 (35.7)	9 (64.3)
Traditional	5 (35.7)	9 (64.3)
Rest/Medication	6 (42.9)	8 (57.1)

Table 4 presents the types of healthcare assistance sought by respondents when experiencing musculoskeletal complaints. The majority of respondents did not seek help at hospitals or public health centers. However, 35.7% reported visiting clinics or traditional healthcare providers, such as massage therapists, when experiencing complaints. Additionally, 42.9% of respondents chose to rest or take medication as a means to alleviate their symptoms, indicating a tendency to address their issues without seeking professional medical assistance.

3.2. Discussion

This study explores the relationship between respondent demographics (Table 1) and musculoskeletal complaints (Table 2), their impact on work (Table 3), and the types of healthcare assistance sought (Table 4), providing an in-depth understanding of the risks and management of musculoskeletal disorders (MSDs) among motorcycle workshop workers. Demographic characteristics such as age, length of employment, and work-related accident history appear to significantly influence the frequency and intensity of MSD complaints. As seen in Table 1, older workers with longer tenures tend to report more complaints in specific body regions, such as the lower back and spine, as shown in Table 2. This suggests that prolonged exposure to heavy physical activity in a non-ergonomic work environment increases the likelihood of developing MSDs. This finding is crucial as it underscores the need for early intervention to prevent the escalating risk of MSDs with increasing age and tenure.

The impact of MSDs on work is also closely related to the type of complaints experienced, as reflected in Table 3. Complaints in the neck, lower back, and shoulders, which are most frequently reported as causes of reduced or discontinued work, indicate that these body regions are particularly vulnerable to the working conditions in motorcycle workshops. The history of work-related accidents reported in Table 1 exacerbates the situation by adding physical strain to already vulnerable bodies, thus increasing the risk of more severe MSDs. Table 4 reveals that most respondents prefer non-professional or traditional treatments, such as visiting massage therapists or simply resting, rather than seeking professional medical assistance. This finding suggests a possible lack of awareness regarding the importance of proper medical care or barriers to accessing adequate healthcare services. This point is significant as it highlights the need for enhanced health education efforts, particularly regarding the importance of proper medical treatment to avoid more severe complications.

The significance of age and length of employment, combined with suboptimal treatment choices, suggests that preventive interventions and health promotion efforts should focus on older workers or those with longer tenures. These strategies could include ergonomic training, the provision of workplace health facilities, and sustainable MSD prevention programs. These critical points direct attention to the necessity of policies that support improved occupational health and safety in this sector. Overall, this discussion emphasizes the importance of collaboration among motorcycle workshop management, workers, and healthcare services in addressing and preventing MSDs. The use of data from Tables 1 through 4 aids in identifying key risk factors and areas that require special attention, such as improving access to healthcare services and educating workers about the importance of proper medical treatment. Consequently, a comprehensive prevention strategy can be developed to reduce the impact of MSDs on the productivity and quality of life of motorcycle workshop workers.

IV. CONCLUSION

This study identifies musculoskeletal disorders (MSDs) as a significant issue among motorcycle workshop workers, with age and length of employment as primary risk factors. Older workers with longer tenures tend to experience more complaints, particularly in the neck and lower back, which often result in reduced or discontinued work. The low rate of seeking professional medical assistance among workers suggests a lack of awareness about the importance of proper medical care. Therefore, there is a need for better education and ergonomic implementation to prevent and manage MSDs. Effective prevention strategies should focus on the more vulnerable groups of workers by providing ergonomic training, workplace health facilities, and sustainable prevention programs. Collaboration among workshop management, workers, and healthcare services is crucial to improving the health and productivity of motorcycle workshop workers.

Conflict of interest

There is no conflict to disclose.

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