Vol 9 No 2, Juni 2025
ABDI DOSEN
Jurnal Pengabdian Pada Masyarakat
pISSN: 2614-6509
eISSN: 2620-5156

FACTORS ASSOCIATED WITH MUSCULOSKELETAL DISORDERS AMONG ONLINE MOTORCYCLE TAXI DRIVERS IN THE GRAB SIMPANG NEGARA (GSN) COMMUNITY, MEDAN AREA DISTRICT

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Abstract

Musculoskeletal Disorders (MSDs) are one of the most common occupational health problems experienced by online motorcycle taxi drivers, primarily due to repetitive physical activity, non-ergonomic working positions, and high work pressure. This study aims to analyze the factors associated with the incidence of MSDs among online motorcycle taxi drivers in the Grab Simpang Negara (GSN) Community, Medan Area District. The research used a cross-sectional design with a quantitative approach involving 77 respondents. The instruments used were the Nordic Body Map questionnaire to assess MSDs complaints and the HSE (Health and Safety Executive) questionnaire to evaluate work-related stress levels. Data analysis was conducted using univariate and bivariate methods (Chi-square test), and multivariate analysis using logistic regression. The results showed that 59.7% of respondents experienced symptoms of MSDs. There was a significant relationship between age, length of employment, and work stress level with the incidence of MSDs ($p \leq 0.05$), with work stress being the dominant factor. These findings highlight the importance of preventive efforts through improved working conditions and integrated stress management for online motorcycle taxi drivers.

Keywords: Musculoskeletal Disorders, Online Motorcycle Taxi, Age, Body Mass Index, Length of Employment, Working Duration, Work Stress

INTRODUCTION

Occupational health efforts need to be comprehensively implemented for all workers, both in the formal and informal sectors, as workers are valuable assets for companies, industries, and business partners. According to the United Nations Global Compact (UNGC) estimate in 2021, approximately 2.78 million workers die each year due to work-related accidents and occupational diseases (Pega et al., 2023). In Indonesia, official reporting of occupational diseases (ODs) remains very limited, despite a rising trend in workplace accident cases from year to year. Data from the Social Security Agency for Employment (BPJS Ketenagakerjaan) show that in 2023, there were 370,747 recorded cases of work-related accidents, including cases associated with musculoskeletal disorders (MSDs).

Submitted: May-2025 Received: May-2025 Available online: June-2025

According to data from the Labour Force Survey (LFS) cited in Rafifah Humaero et al. (2024), approximately 480,000 workers experience work-related musculoskeletal disorders (MSDs). These complaints can affect the muscles, joints, and tendons in various parts of the body. The most commonly affected areas are the upper limbs and neck (41% of cases), back (40% of cases), and lower limbs (19% of cases). A mismatch between the workstation and the worker may trigger musculoskeletal complaints or disorders, particularly in the joints and muscles, as a result of non-ergonomic body posture. This condition is referred to as Musculoskeletal Disorders (MSDs).(Tjahayuningtyas, 2019)

Musculoskeletal disorder is a condition in which parts of the muscular and skeletal systems experience impairment or pain (Suriya & Zuriati, 2019). When muscle function is impaired, an individual's ability to perform daily activities, including work-related tasks, may decline. This is due to the crucial role of muscle strength in supporting body movement. Muscle pain or tension not only causes discomfort but also negatively impacts work productivity. Muscle strength depends on the number of muscle fibers that can actively contract within a certain period. This condition is commonly caused by excessive muscle stretching and prolonged loading, which may result in damage to joints, ligaments, and tendons. In its early stages, this disorder is marked by symptoms such as pain, soreness, numbness, tingling, swelling, stiffness, trembling, sleep disturbances, and burning sensations. Consequently, individuals may experience difficulties in movement and body coordination, leading to decreased work efficiency, loss of working hours, and reduced productivity (Fahmiawati et al., 2021).

Musculoskeletal disorders (MSDs) are among the most common types of occupational diseases experienced by workers across various sectors, including the transportation sector. One of the most prevalent occupational health issues in the transportation industry is musculoskeletal disorders. According to a study conducted by (Ferusgel, Agnes., Masni., Arti, 2020), It is known that the prevalence of musculoskeletal disorders (MSDs) among female online motorcycle taxi drivers in Medan City reaches 62.5%. Online motorcycle taxi driving is one of the occupations that is highly prone to musculoskeletal disorders.

The profession of online motorcycle taxi driving requires long working hours, accompanied by static and repetitive sitting positions, as well as a high level of physical workload. These conditions significantly increase the risk of developing musculoskeletal system disorders, commonly known as Musculoskeletal Disorders (MSDs)(Mukti & Ma'ruf, 2025). The profession of online motorcycle taxi driving is highly susceptible to musculoskeletal complaints. Musculoskeletal complaints among workers are influenced by three categories of risk factors: individual factors (such as age, gender, length of employment, exercise habits, and body mass index), occupational factors (including body posture, workload and duration, as well as repetitive activities), and psychosocial factors, particularly work-related stress (Rahmah & Herbawani, 2021). This study examines age, body mass index (BMI), length of employment, working duration, and work-related stress.

Work-related stress can trigger increased muscle tension, and if it occurs continuously, this condition has the potential to cause musculoskeletal disorders (Aprianto et al., 2021). Drivers who work under high-pressure conditions and lack effective time management are more susceptible to physical and mental fatigue (Samosir et al., 2024).

Based on the issues mentioned above, the researcher is interested in studying the factors associated with musculoskeletal disorder (MSD) complaints among online motorcycle taxi drivers in Medan City in 2025. This study aims to identify the risk factors contributing to the occurrence of MSDs among online motorcycle taxi drivers.

METHOD

This research is an observational analytic study with a quantitative approach, employing a cross-sectional design. It aims to evaluate the relationship between risk factors as independent variables and their effects as dependent variables. Data collection was conducted simultaneously at a single point in time (point-time approach), meaning that all variables were observed concurrently within the same time frame (Syapitri et al., 2010)

The study was conducted in the Grab Simpang Negara (GSN) Community, located in the Medan Area District, Medan City, from July 2025 until completion. The population in this study consisted of all online motorcycle taxi drivers who were members of the GSN community, totaling 77 individuals. The sampling technique used was total sampling, in which all members of the population who met the inclusion criteria were included as research subjects (Sugiyono, 2023).

The research instruments used in this study consisted of three parts. First, a questionnaire was used to collect respondent characteristic data, including age, body mass index (BMI), length of employment, and working hours. Second, to assess MSD complaints, the Nordic Body Map (NBM) questionnaire was used, which has been widely applied in various ergonomic studies to identify the locations of musculoskeletal complaints (Ummah, 2017). Third, to measure the level of work-related stress, the Health and Safety Executive (HSE) questionnaire was used. This instrument was developed by the HSE agency in the United Kingdom and has been validated across various working populations (Kou, 1997).

The collected data were statistically analyzed using the SPSS program. Univariate analysis was conducted to determine the frequency distribution of each variable. Bivariate analysis was performed using the Chi-square test to examine the relationship between independent variables and the occurrence of MSDs. Furthermore, multivariate analysis using logistic regression was carried out to identify the most dominant variable associated with the incidence of MSDs among online motorcycle taxi drivers (Hosmer et al., 2013).

RESULTS

Table 1 Univariate analysis of the 77 respondents showed that the majority were male (83.1%) and aged ≥ 35 years (59.7%). Most respondents had a normal body mass index (64.9%), with 31.2% classified as overweight and 3.9% as underweight. A total of 71.4% of respondents reported working ≥ 8 hours per day, and 71.4% had been working for ≥ 3 years. Regarding work-related stress levels, 55.8% of respondents were categorized as having good stress levels, while 44.2% were in the poor category. In addition, musculoskeletal disorder (MSD) complaints were reported by 59.7% of respondents, whereas 40.3% did not report experiencing MSDs.

Table 2 "Bivariate analysis using the Chi-square test revealed a significant association between age, length of employment, and work-related stress with musculoskeletal disorder (MSD) complaints among respondents. Respondents aged ≥ 35 years had a 5.8 times higher risk of experiencing MSD complaints compared to those aged ≤ 35 years ($p < 0.001$; OR = 5.785; 95% CI = 2.128–15.728). Similarly, respondents with ≥ 3 years of employment had a 5.2 times higher risk of experiencing MSDs compared to those with ≤ 3 years of employment ($p = 0.002$; OR = 5.223; 95% CI = 1.793–15.217). In addition, respondents with poor work-related stress levels were 3.7 times more likely to experience MSD complaints compared to those with good stress levels ($p = 0.008$; OR = 3.738; 95% CI = 1.384–10.094).

Conversely, body mass index (BMI) and working duration did not show a significant association with MSD complaints ($p > 0.05$). These findings indicate that age, length of employment, and work-related stress are the dominant factors influencing the occurrence of MSD complaints among the respondents in this study.

Table 3 Multivariate analysis using logistic regression showed that work-related stress was the most dominant factor associated with the occurrence of MSDs among online motorcycle taxi drivers, with a p-value of 0.008 and an odds ratio (OR) of 3.738. This indicates that drivers experiencing work-related stress are 3.8 times more likely to suffer from MSD complaints compared to those who do not experience stress.

hese findings indicate that psychosocial factors, particularly work-related stress, have a stronger influence on MSD complaints than physical factors such as working duration or body mass index. Therefore, intervention efforts to reduce the incidence of MSD complaints among online motorcycle taxi drivers should place greater emphasis on work stress management.

Table 1. Results of Univariate Analysis

Respondent Characteristics	Frequency (n)	Precentage (%)
Gender		
Male	64	83,1
Female	13	16,9
Age		
≤ 35 Years	31	59,7
≥ 35 Years	46	40,3
Body Mass Index (BMI)		
Underwight	3	3,9
Normal	50	64,9
Overweight	24	31,2
Working Duration		
≤ 8 hours	22	28.6
≥ 8 hours	55	71.4
Length of Employment		
≤ 3 Years	22	28,6
≥ 3 Years	55	71,4
Work-Related Stress		
Good	43	55.8
Poor	34	44.2
MSDs Complaint		
With MSDs Complaint	46	59,7
Without MSDs Complaint	31	40,3

Table 2. Bivariate Analysis Results

variable	*Muscoluskeletal Disorder*				Total		*P-Value*	OR	CI 95%
	With Complaint		Without Complaint						
	n	%	n	%	n	%			
Age									
35 Years /≥ 35 Years	35	76,1	11	23,9	46	100	<0,001	5,785	2,128 – 15,728
≤ 35 Tahun	11	35,5	20	64,5	31	100			
Total	46	59,7	31	40,2	77	100			
IMT									
Underweight	2	66,7	1	33,3	3	100			
Normal	27	54	23	46	50	100	0.373	-	-
Overweight	17	70,8	7	29,2	24	100			
Total	46	59,7	31	40,2	77	100			
Work Duration									
3Years/≥3 Years	39	70,9	16	29,1	55	100	0,002	5,223	1,793-15,217
≤ 3 Years	7	31,8	15	68,2	22	100			
Total	46	59,7	31	40,2	77	100			
Work Duration									
8hours/≥8 hours	34	61,8	21	38,2	55	100	0,557	1,349	496 -3,668
≤ 8 hours	12	54,5	10	45,5	22	100			
Total	46	59,7	31	40,2	77	100			
Work – Stress									
Poor	26	76,5	8	23,5	34	100	0,008	3,738	1,384-10,094
Good	20	46,5	23	53,5	43	100			
Total	46	59,7	31	40,2	77	100			

Table 3. Results of Multivariate Analysis

Variable	***p value*;OR(95%CI)**		
	Model 1	**Model 2**	**Model 3**
Work Stress	0.002; 8.556 (2.159 – 33.907)	0.002; 8.530 (2.159 – 33.696)	0.002; 8.075 (2.116 – 30.812
Age	0.012;6.603 (1.512 – 28.828)	0.009; 6.105 (1.561 – 23.870)	0.012; 5.575 (1.468 – 21.168)
Length of Employment	0.037; 5.640 (1.107 – 28.742)	0.038; 5.613 (1.097 – 28.727)	0.068; 3.785 (0.907 – 15.789)
Work Duration	0.274; 0.427 (0.093 – 1.959)	0.287; 0.439 (0.096 – 2.001)	-
Body Mass Index	0.777; 1.180 (0.375 – 3.715)	-	-

DISCUSSION

The results of this study indicate that age is significantly associated with the occurrence of musculoskeletal disorders (MSDs). This finding is supported by a study conducted by (Tatik & Eko, 2023) on 46 workers at CV. Sada Wahyu, Bantul, Yogyakarta, which also found a significant relationship between workers' age and complaints of MSDs, with a p-value of 0.012 ($p \leq 0.05$). This aligns with the statements of Chaffin (1979) and Guo et al. (1995) in (Tarwaka & Bakri, 2016) which explain that musculoskeletal complaints generally begin to emerge during productive age. Initial symptoms often appear around the age of 35, and the intensity of these complaints tends to increase with age. This is due to a natural decline in muscular strength and endurance during middle age, which increases the risk of musculoskeletal problems. As individuals age, their work capacity tends to decrease, particularly due to changes in the strength and resilience of muscles and other body functions.

The findings also show that length of employment is significantly associated with the incidence of musculoskeletal disorders. This is supported by research by (Oktavia et al., 2023) which found a significant relationship between years of employment and musculoskeletal complaints among traditional weavers in Sade Village, Central Lombok. The Chi-square test produced a p-value of 0.000 ($p \leq 0.05$), indicating that the longer someone works, the greater their risk of experiencing MSDs. Work duration contributes to this risk because prolonged exposure to repetitive tasks and static work postures over time can accumulate strain on the musculoskeletal system (Yosineba et al., 2020).

The study also revealed a significant association between work-related stress and musculoskeletal disorders. This is supported by findings from (Pratiwi et al., 2024) which demonstrated a significant relationship between stress levels and musculoskeletal complaints among online motorcycle taxi drivers in Depok City. Using Kendall's tau-b test, the analysis produced a p-value of 0.032 ($p \leq 0.05$), indicating that higher levels of work stress are linked to a greater likelihood of MSD complaints. This reinforces the theory that psychosocial factors in the workplace, such as job stress, can trigger involuntary muscle contractions, hinder muscle recovery, and reduce the body's ability to tolerate physical strain. The combination of mental pressure and physically demanding activities can exacerbate conditions in muscles and joints, especially in the neck, shoulders, and lower back.

Therefore, it can be concluded that work stress not only affects mental health but also has a direct impact on physical well-being, particularly in the form of musculoskeletal complaints. For this reason, it is crucial for organizations to pay attention to workers' psychological well-being by implementing ergonomic strategies, workload management, and social support in the workplace to reduce the risk of MSDs (Tewal et al., 2025)

Contrary to initial assumptions, Body Mass Index (BMI) and working hours did not show a significant association with the occurrence of MSDs. Although BMI is often linked to biomechanical stress on the body, in the context of online motorcycle taxi drivers—whose work tends to be more static—its role may not be as prominent. Similarly, while long working hours may pose a physical burden, the impact may vary depending on individual work-rest strategies and activity patterns.

CONCLUSION

Based on the results of the study, it can be concluded that most online motorcycle taxi drivers who are members of the Grab Simpang Negara (GSN) Community experience complaints of Musculoskeletal Disorders (MSDs), with the most frequent complaints occurring in the neck, lower back, and shoulders. Factors that were found to have a significant relationship with the incidence of MSDs include age, length of work, and work-related stress. Among these factors, work-related stress was identified as the most dominant factor influencing the occurrence of MSD complaints among the respondents.

Considering the high prevalence of MSD complaints and the significant impact of work-related stress, it is recommended to implement preventive and promotive efforts focusing on increasing drivers' awareness of proper working posture, stress management, and balanced work schedules. Additionally, ergonomic training and psychosocial support from both the community and online transportation service providers are needed to reduce the risk of musculoskeletal disorders and enhance the overall well-being of the drivers.

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