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Association Between Work Fatigue and Musculoskeletal Disorders Among Online Motorcycle Taxi Drivers

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Abstract

Research Objective: Online motorcycle taxi drivers are exposed to prolonged working hours and repetitive physical activities that may increase the risk of work fatigue and musculoskeletal disorders (MSDs). These conditions can negatively affect drivers' health and productivity. Understanding the relationship between work fatigue and musculoskeletal complaints is important for developing effective occupational health interventions. This study aimed to analyze the association between work fatigue and musculoskeletal complaints among online motorcycle taxi drivers. **Methodology:** This study employed a quantitative analytic design with a cross-sectional approach. A total of 100 online motorcycle taxi drivers in Jakarta and Bekasi were selected using accidental sampling techniques. Work fatigue was measured using the Industrial Fatigue Research Committee (IFRC) questionnaire, while musculoskeletal complaints were assessed using the Nordic Body Map (NBM) instrument. Data were analyzed using descriptive statistics and Chi-square tests with a 95% confidence level. **Results:** The results showed that 44% of respondents experienced high fatigue, while 29% experienced moderate fatigue. Musculoskeletal complaints were most commonly reported in the neck (62%), lower back (58%), and waist (55%). Statistical analysis indicated a significant association between work fatigue and musculoskeletal disorders ($p = 0.002$). Drivers with high fatigue levels had a 4.1-times greater risk of experiencing musculoskeletal complaints compared to those with low fatigue levels (OR = 4.1; 95% CI: 1.8–9.2). **Conclusion:** There is a significant association between work fatigue and musculoskeletal complaints among online motorcycle taxi drivers. These findings highlight the importance of fatigue management and ergonomic awareness to reduce occupational health risks and improve drivers' well-being.

Keywords: *work fatigue; musculoskeletal disorders; occupational health; online motorcycle taxi; ergonomics*

INTRODUCTION

The rapid growth of digital transportation services has significantly increased the number of online motorcycle taxi drivers in Indonesia. These drivers play an important role in urban mobility by providing flexible and accessible transportation services. However, the nature of their work often requires prolonged sitting, long working hours, and repetitive physical activities, which may contribute to occupational health problems.

Work fatigue is a physiological and psychological condition characterized by decreased physical and mental performance resulting from prolonged workload and insufficient recovery time. In occupational settings, fatigue may reduce concentration, slow reaction time, and increase the risk of accidents and injuries. Several studies have shown that excessive working hours and repetitive work patterns are significant contributors to work fatigue among transportation workers.

Musculoskeletal Disorders (MSDs) represent one of the most common occupational health problems associated with work fatigue. MSDs include injuries or pain affecting muscles, tendons, by repetitive movement, awkward posture, or prolonged static ligaments, joints, and nerves, often caused by repetitive movement movement, akward posture or prolonged static positions. Workers who spend extended periods sitting while performing repetitive tasks are particularly vulnerable to MSDs.

Online motorcycle taxi drivers are exposed to multiple ergonomic risk factors, including prolonged riding duration, road vibration, and static sitting posture. These factors may contribute to the

development of musculoskeletal complaints, particularly in the neck, shoulders, and lower back regions. Previous studies have reported that fatigue and ergonomic stress significantly influence the occurrence of MSDs among transportation workers.

Despite the growing number of online motorcycle taxi drivers in Indonesia, research examining the relationship between work fatigue and musculoskeletal disorders in this occupational group remains limited. Therefore, this study aims to analyze the association between work fatigue and musculoskeletal disorders among online motorcycle taxi drivers in Jakarta and Bekasi.

Based on the literature, it was hypothesized that online motorcycle taxi drivers with higher levels of work fatigue would be more likely to experience musculoskeletal disorders compared to drivers with lower fatigue levels.

Although previous studies have investigated occupational fatigue among transportation workers, evidence regarding the association between work fatigue and musculoskeletal disorders among app-based motorcycle taxi drivers in Indonesia remains limited. This occupational group has unique work characteristics, including flexible schedules, prolonged riding duration, and dependence on digital platform systems, which may influence occupational health risks differently from conventional transportation workers.

METHODS

This study employed a quantitative analytic design using a cross-sectional approach. The research was conducted among online motorcycle taxi drivers operating in urban areas of Jakarta and Bekasi. Inclusion criteria were active online motorcycle taxi drivers, aged ≥18 years, actively working during the study period, and willing to participate by signing informed consent. Respondents were approached at driver gathering points and public locations frequently used by online motorcycle taxi drivers in Jakarta and Bekasi.

A sample of 100 respondents was considered adequate for exploratory analysis and was determined based on resource availability and previous studies involving similar populations. Data collection was conducted using structured questionnaires. Work fatigue was assessed using the Industrial Fatigue Research Committee (IFRC) questionnaire, which is commonly used to measure subjective fatigue levels among workers. Musculoskeletal complaints were evaluated using the Nordic Body Map (NBM) instrument, which identifies the location and severity of musculoskeletal discomfort in different parts of the body.

The IFRC questionnaire has been widely used to assess subjective work fatigue among workers and has demonstrated acceptable validity and reliability in previous occupational health studies. The Nordic Body Map (NBM) instrument is a standardized tool commonly used to assess musculoskeletal complaints and has shown good reliability in ergonomic research.

The variables analyzed in this study included: Age, Body Mass Index (BMI), Working duration, Daily working hours, Work fatigue level, and musculoskeletal complaints.

Descriptive statistics were used to describe the characteristics of respondents. Bivariate analysis using the Chi-square test was performed to determine the association between work fatigue and musculoskeletal disorders. Statistical significance was determined at $p < 0.05$.

RESULTS

This study involved 100 online motorcycle taxi drivers who met the inclusion criteria and agreed to participate in the study. The characteristics of respondents included age, working duration, body mass index (BMI), and fatigue level.

Respondent Characteristics

Table 1. Respondent Characteristics

Variable	Frequency	%
Age < 30 years	42	42
Age ≥ 30 years	58	58
Working ≤ 8 hours/day	43	43
Working > 8 hours/day	57	57
Normal BMI	59	59
Abnormal BMI	41	41

Based on Table 1, most respondents were aged ≥30 years (58%) and worked more than 8 hours per day (57%). These findings indicate that online motorcycle taxi drivers often work extended hours to increase their income. Similar findings were reported in a previous study conducted among online motorcycle taxi drivers in East Jakarta, where the majority of drivers worked more than eight hours per day

Distribution of Work Fatigue Levels

Table 2. Distribution of Work Fatigue Levels

Variable	Frequency	%
Low fatigue	27	27
Moderate fatigue	29	29
High fatigue	44	44

Based on Table 2, the results showed that 44% of respondents experienced high fatigue, while 29% experienced moderate fatigue and 27% experienced low fatigue. These findings indicate that fatigue is a common condition experienced by online motorcycle taxi drivers due to long working hours and repetitive physical activities.

Previous research also reported that the majority of online motorcycle taxi drivers experienced work fatigue, although most cases were classified as mild fatigue.

Relationship Between Fatigue and Musculoskeletal Disorders

Table 3. Relationship Between Fatigue Level and MSDs

Variable	MSDs Complaints	No MSDs
Low fatigue	8	19
Moderate fatigue	14	15
High fatigue	32	12
Total	**27**	**29**

Chi-square test result: **p = 0.002**
Odds Ratio (OR) = **4.1**
95% Confidence Interval (CI) = **1.8 – 9.2**

Based on Table 3, the results showed a statistically significant relationship between work fatigue and musculoskeletal disorders ($p = 0.002$). Drivers with high fatigue levels had a significantly higher risk of experiencing musculoskeletal complaints compared to those with lower fatigue levels.

This finding is consistent with previous research conducted among online motorcycle taxi drivers in Bekasi, which also reported a significant relationship between fatigue level and musculoskeletal disorders among drivers.

The most frequently reported musculoskeletal complaints in this study were pain in the neck, waist, and lower back areas. These complaints are commonly associated with prolonged sitting posture and repetitive riding activities.

DISCUSSION

The findings of this study indicate that a considerable proportion of online motorcycle taxi drivers experience high levels of work fatigue. Long working hours and prolonged static posture during motorcycle riding contribute significantly to physical strain and fatigue among drivers.

The results also demonstrate a significant relationship between work fatigue and musculoskeletal disorders. Drivers who experienced higher levels of fatigue were more likely to report musculoskeletal complaints, particularly in the neck, shoulders, and lower back areas. These findings are consistent with previous studies indicating that fatigue can reduce muscle endurance and increase biomechanical stress on the musculoskeletal system.

Prolonged sitting posture while riding motorcycles may also contribute to increased pressure on the spinal column and surrounding muscles. Continuous exposure to road vibrations and repetitive movements may further aggravate musculoskeletal strain.

In addition, age and body mass index may also influence the occurrence of musculoskeletal disorders. Older drivers and those with abnormal BMI may have reduced physical capacity and increased mechanical load on the musculoskeletal system, which increases their vulnerability to MSDs.

These findings highlight the importance of implementing occupational health interventions for online motorcycle taxi drivers. Strategies such as ergonomic education, regular rest breaks, and fatigue management programs may help reduce the risk of musculoskeletal disorders among drivers.

Age, body mass index, and prolonged working duration may act as important contributing factors to the development of musculoskeletal disorders. Older workers generally experience decreased muscle flexibility and recovery capacity, whereas abnormal BMI increases mechanical stress on joints and supporting structures.

Similar findings have been reported among ride-hailing drivers in Southeast Asia, where prolonged working hours and physical fatigue were significantly associated with musculoskeletal complaints, particularly in the neck and lower back regions.

Ergonomic interventions such as posture education, stretching exercises during work breaks, adjustment of motorcycle seating position, and fatigue management programs may help reduce musculoskeletal strain among online motorcycle taxi drivers.

Transportation platform companies should consider implementing occupational health promotion programs, including ergonomic training, health monitoring, and fatigue prevention strategies. Policymakers may also use these findings to develop occupational health guidelines for gig economy workers.

Occupational health programs focusing on fatigue management, ergonomic awareness, regular stretching exercises, and adequate rest periods should be promoted among online motorcycle taxi drivers. Transportation platform companies are encouraged to support health promotion initiatives to improve worker well-being and reduce musculoskeletal health risks.

Study Limitations

This study has several limitations. First, the cross-sectional design does not allow causal relationships to be established between work fatigue and musculoskeletal disorders. Second, the use of accidental sampling may limit the generalizability of the findings. Third, data were collected using self-reported questionnaires, which may be subject to reporting bias.

Future studies are recommended to use longitudinal designs and larger sample sizes to better understand the causal relationship between work fatigue and musculoskeletal disorders among transportation workers.

The use of accidental sampling may have introduced selection bias because respondents were recruited based on availability rather than probability sampling methods. Therefore, the findings may not fully represent all online motorcycle taxi drivers.

Potential confounding variables such as age, body mass index, and working duration were not controlled through multivariate analysis and may have influenced the observed association between work fatigue and musculoskeletal disorders.

CONCLUSION

This study found a significant association between work fatigue and musculoskeletal disorders among online motorcycle taxi drivers. Drivers with higher levels of fatigue were more likely to experience musculoskeletal complaints, particularly in the neck, waist, and lower back areas.

Preventive strategies such as improving work-rest balance, increasing ergonomic awareness, and promoting occupational health education are necessary to reduce the risk of musculoskeletal disorders among online motorcycle taxi drivers.

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Data Availability Statement: The data presented in this study are available from the corresponding author upon reasonable request. The data are not publicly available due to ethical and privacy considerations.

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