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Research Article

Work Duration and Working Posture on Musculoskeletal Disorders (MSDs) in Inter-City Inter-Provincial Bus Drivers at Mengwi Terminal

Dewa Gede Bagus Wira Laksana[1], Putu Indah Budiapsari[1*], Ni Wayan Rusni[1]

[1]Faculty of Medicine and Health Sciences, Warmadewa University, Bali, Indonesia

*Corresponding author: putuindah51@yahoo.com

ABSTRACT

Background: Every job has risks caused by the work environment, tools, and processes. One of the diseases resulting from work risks that most often appears among workers is Musculoskeletal Disorders (MSDs). One of the factors that can influence the occurrence of musculoskeletal complaints is work duration and work posture. MSDs complaints can be measured using the Nordic Body Map (NBM). This work posture is measured by the Rapid Upper Limb Assessment (RULA) questionnaire. **Purposes**: This study aims to determine the correlation between duration and work posture toward musculoskeletal disorders in inter-city inter-provincial bus drivers at Mengwi Terminal. **Methods:** This research uses an analytical design with a cross-sectional study or cross-sectional approach. Sampling was carried out by consecutive sampling. Based on the sample size formula, a minimum 30 plus 10% sample was obtained to make 33 respondents. In this research, the author will use 40 respondents. The data received will be analyzed univariately and bivariately using the SPSS version 25 application with the Spearman correlation test. The significance level is $p < 0.05$ with a CI of 95%. **Results:** The research results show the following: there is a significant correlation between work duration and attitude with MSDs (r=0.674) for work duration and (r=0.574) for working posture. **Conclusion:** It can be concluded that the correlation between duration and work attitudes and MSDs is strong. Employees are recommended to minimize work duration and have a work attitude with an ergonomic approach.

Keywords: bus driver, musculoskeletal disorders, work duration, working posture

INTRODUCTION

Every type of work has risks caused by the work environment, work tools, and work processes. Diseases resulting from occupational risks due to conditions like these are called Occupational Diseases (1). More broadly, it means that occupational related diseases, a health disorder resulting from occupational risks, both physical and spiritual, arising from work activities or related to work. According to *International Labor Organization* (ILO) data in 2013 noted that the death rate due to work accidents and PAK was 2 million cases every year (2).

One of the diseases resulting from occupational risks that most often appears among workers is m*usculoskeletal Disorders* (MSDs). The dangers of MSDs can be caused by work which can increase a worker's risk of developing MSDs. MSDs is a disorder or complaint in

the musculoskeletal system caused by a person's work factors when doing work. The impacts of MSDs include pain in body parts such as the neck, shoulders, hips, knees and heels (3).

According to data from *Bureau of Labor Statistics* (BLS), Musculoskeletal disorders accounted for 32% of all cases of injury and illness, the incidence rate of MSDs reached 33.8 cases per 10,000 part-time workers in 2014. Based on research conducted on 9,482 workers in 12 districts or cities inIn Indonesia, what is generally found are musculoskeletal diseases (16%), cardiovascular (8%), nervous disorders (3%) and ENT disorders (1.5%) (4). Of the various types of work, almost all of them have a high risk of developing this musculoskeletal disorder. The highest risk of developing musculoskeletal disorders is work in the fields of health facilities, transportation, mining, food processing, and construction workers. In the transportation sector in particular, workers who are often exposed to cases of musculoskeletal disorders are bus drivers, the number of which is currently recorded at 1,000 in Bali, especially at the Mengwi Terminal. This is because bus drivers often work sitting for long periods. As a result of working sitting for long periods, health problems that arise in bus drivers include musculoskeletal disorders in the form of psychological problems such as fatigue and tension, intestinal disorders and sleep disorders (5).

The main causes of MSDs complaints related to work are workload, static posture, and repetition (6). Factors that can influence the occurrence of musculoskeletal complaints, one of which is long duration of work. Musculoskeletal complaints will increase if the muscles receive too heavy and repeated loads over a long period (7). Where work duration is the length of an activity or work carried out by someone in carrying out work. Apart from that, something that workers often don't realize can cause health problems is an incorrect work attitude. Complaints in the form of fatigue, pain and accidents are examples of health problems caused by poor work attitudes (8). Work in a long time in static position, standing or sit, will cause discomfort. The job requires workers fordo static working posture or uncomfortable result fatigue and additional workload indirectly for workers, moreover for that job stasis and old, When can not meet the implementation of ergonomics, then cause discomfort or pain in a few parts of workers' bodies (9). According to Law of the Republic of Indonesia Number 22 of 2009 concerning Road Traffic and Transportation, drivers of public motorized vehicles after driving a vehicle for 4 (four) consecutive hours are required to rest for at least 30 minutes. However, if working hours are extended, there will be an increase in the workload on drivers. This can have negative effects, especially in terms of health, especially musculoskeletal complaints. A driver who sits for too long and in an uncomfortable sitting position will cause his back muscles to become tense and cause the surrounding soft tissue to become damaged (10). Based on the background description above, the author is interested in researching "The correlation between Duration and Working Posture towards *Musculoskeletal Disorders* to Inter-City Inter-Provincial Bus Drivers at Mengwi Terminal".

METHODS

This research design uses an observational analytical method with an approach *cross sectional*, namely by making observations at one time at the same time. This research *was* used to determine the correlation between duration and work attitudes towards *Musculoskeletal Disorders* (MSDs) to the Inter-City Inter-Provincial in Bus Driver at Mengwi Terminal. This

research was carried out at Mengwi Terminal for 3 months, namely July 2023 to October 2023. The target population of this research is inter-regional bus drivers and the affordable population from this research is Inter-City Inter-Provincial Bus Drivers, the respondents in this research were Inter-City Inter-Provincial Bus Drivers. Samples were selected based on inclusion and exclusion criteria. Inclusion criteria were: inter-provincial bus driver, driving more than 2 hours a day, willing to be a research respondent. Exclusion criteria were respondents who had a history of trauma or musculoskeletal surgery before examination and congenital musculoskeletal abnormalities before starting work.

Primary data was collected from respondents. Respondents in this study were determined using the method non-probability sampling, that is consecutive sampling, where all subjects who come and meet the selection criteria are included in the study until the required number of subjects is met. To determine the sample size, this research uses the minimum sample formula, Based on the formula, a minimum sample of 30 samples was obtained plus 10% to 33 respondents. In this research the author will use 40 bus driver respondents. The research data will be analyzed statistically using the program *Statistical Package for the Social Sciences* (SPSS) *for windows*. The data analysis carried out, namely univariate analysis, was carried out to see a picture of the basic characteristics of the research subjects in the form of a frequency distribution table and bivariate analysis to determine the correlation between duration and work attitudes towards MSDs where these variables were on an ordinal scale, so a correlative hypothesis test was used using the Spearman correlation test because the data is not normally distributed. The level of significance is expressed as $p < 0.05$ with a CI of 95%. When using this test, no conditions are set regarding the distribution of the data population, so the data used does not have to be normally distributed.

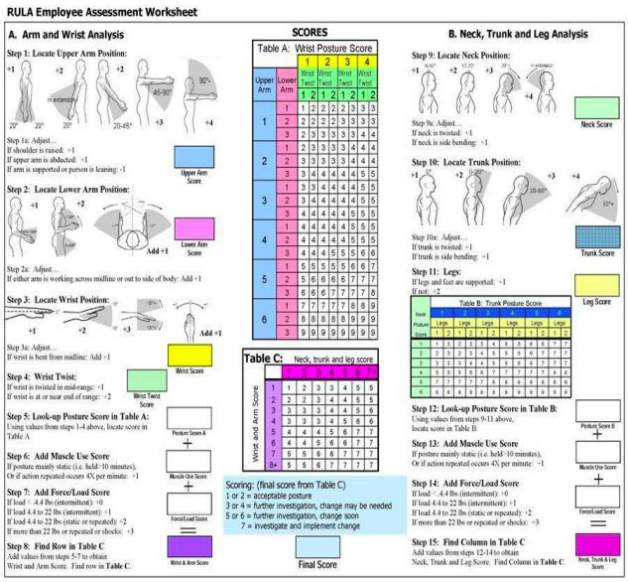

Figure 1. Rula Questionnaires form (11)

The RULA method divides body parts into two parts to produce a method that is quick to use, namely groups A and B. Group A includes the upper and lower arms and wrists. Meanwhile group B includes the neck, body and legs. This ensures that the entire body posture is recorded so that limited leg, trunk and neck postures that may affect upper body posture can

be included in the examination. After obtaining the total score, the values from 1 to 7 indicate the action level as follows: Action level 1, A score of 1 or 2 indicates that this posture is acceptable if it is not maintained or repeated over a long period. Action level 2, A score of 3 or 4 indicates that further examination is needed and changes are also needed. Action level 3, A score of 5 or indicates that checks and changes need to be made immediately. Action level 4, A score of 7 indicates that the condition is dangerous so inspection and changes are needed immediately.

Nordic Body Map (NBM) is a measuring tool that is useful for measuring the level of MSDs in workers and knowing the location of pain or discomfort in the workers' bodies. Filling out this questionnaire is done using a picture or sketch of the human body which has been divided into 28 muscle parts in the muscle and bone system on both the left and right sides of the body. This questionnaire (NBM) has high validity and reliability, therefore it is often used by ergonomists widely to assess the severity of damage and disorders in the musculoskeletal system. It is assessed by Likert Scale Description: (0) No pain or discomfort or no pain at all (No pain): (1) Feeling a slight stiffness or pain in the skeletal muscles (Slightly Painful). (2) Respondents feel a feeling of numbness or soreness or pain in the skeletal muscles (Sick) (3) Respondents feel very sick or very painful in the skeletal muscles (Very Painful). Score will be tabulated and classified into NBM Score Level of 0-20 Low difficulty, 21-41 Moderate, 42-62 High severity, 62-84 Very high difficulty. This research was approved by the ethical Committee of faculty of Medicine and Health sciences by ethic number 62/Unwar/FKIK/EC-KEPK/IX/2023.

RESULTS

Respondents in this study were selected using consecutive sampling techniques, namely the Inter-City Inter-Provincial bus driver at Mengwi Terminal. The sample consisted of 40 people who met the inclusion and exclusion criteria. The distribution of respondent characteristics is presented in the following table.

Table 1. Characteristics of Research Respondents

Characteristics (n=40)	Min.	Max.	Mean	SD
Age (years)	21	56	40	10.23
body height (cm)	155	188	166.48	8.18
Body weight (kg)	54	85	67.52	6.40
BMI (kg/m^2)	19.70	29.70	24.42	2.40
Working duration (hours)	8	12	9.70	1.54
RULA	1	8	4.35	1.70
NBM	14	60	32.43	11.81

Abbreviation: BMI: Body mass index, Rula: Rapid Upper Limb Assessment, NBM: Nordic Body Map

The average age of drivers is 40 years, with the youngest driver being 21 years and the oldest being 56 years, with an average of 40 years. The average height and weight of drivers is 166.48 cm and 67.52 kg, while the BMI ranges from 19.70 to 29.70 with an average of 24.42. A driver's most prolonged work duration is 12 hours, with an average duration of 9.70 hours.

Table 2. Results of Spearman Correlation Test Analysis of the Correlation between Work Duration and Attitudes towards *Musculoskeletal Disorders*

Variable (n=40)	Musculoskeletal Disorders		
	Low (n=7)	Currently (n=25)	Height (n=8)
Duration of work			
<12 Hours (No risk)	4 (30.8%)	9 (69.2%)	0 (0%)
>12 hours (at Risk)	3 (11.1%)	16 (59.3%)	8 (29.6%)
Work attitude			
Action level 1	3 (50%)	3 (50%)	0 (0%)
Action level 2	3 (20%)	10 (66.7%)	2 (13.3%)
Action level 3	1 (11.1%)	8 (88.9%)	0 (0%)
Action level 4	0 (0%)	4 (40%)	6 (60%)

Table 3. Correlation between work duration and work attitudes with MSDs

Variable	r	p
Duration of Work with MSDs	0.674	0.001
Work Attitudes with MSDs	0.574	0.001

Table 2 explains that as many as 69.2% of drivers with work duration are not at risk *musculoskeletal disorders* medium and 30.8% low. As many as 59.3% of drivers who work at risk have it *musculoskeletal disorders* medium, 29.6% high, and 11.1% low. Results of correlation test analysis *spearman* obtained. The significance value is 0.016 with a significance level of 0.05, which means there is a correlation between work attitudes towards *musculoskeletal disorders*. The correlation coefficient figure shows 0.378, meaning the strength of the correlation is weak. The correlation coefficient number is positive so that the correlation between the two variables is in the same direction, so it can be interpreted that the higher the workload, the higher the workload *musculoskeletal disorders* height.

Judging from work attitudes, 50% of drivers with work attitudes are classified as at *action level 1* has *musculoskeletal disorders* currently. As many as 66.7% of drivers with work attitudes at *action level 2* (work attitudes that require further examination) suffer medium *musculoskeletal disorders* medium, 20% low, and 13.3% high. As many as 88.9% of drivers with work attitudes at *action level 3* (checks and changes need to be made immediately) experience *musculoskeletal disorders* and 11.1% low. As many as 60% of drivers have a work attitude *action level 4* (checks and changes are required very urgently on the spot) have *musculoskeletal disorders* high and 40% medium. Table 3 The results of the correlation test using the Spearman test show that the correlation coefficient between work attitude and MSDs is 0.574 (r > 0.5) and work duration and MSDs is 0.674 (r>0.5), which means there is a strong correlation between duration and work attitude towards musculoskeletal disorders if r>0.5. The correlation coefficient number is positive so that the correlation between the two variables is in the same direction, so it can be interpreted that the higher the duration of work and the level of risk, the higher the risk of work attitudes *musculoskeletal disorders*.

DISCUSSION

Based on the research results, it shows that the ages of the respondents are very diverse, namely from 21-56 years old with an average age of 40 years. According to the Ministry of Health (2019), the age group that is included in working or productive age is the 15-64 year age group. The older you get, the more productive you are because you are considered to have more work experience than those who are young, except for workers who are entering retirement (12). Based on the research results, it shows that the respondents' work duration varies from 8-12 hours per day with an average of 9.70 hours per day. This is not by research conducted by Sawitri (2017). The duration of work in a day is generally six to eight hours so that the rest can be used for resting, chatting, etc. Working duration that is too long will result in fatigue, health problems, accidents, as well as decreased productivity and effectiveness (13,14).

Based on the research results, it shows that the majority of research respondents have work attitudes that are classified as high risk. The results of this research show that only 6 drivers have a good work attitude, while the rest require further examination and very immediate examination. This is in line with research conducted by Pebruanto et al. (2020), one of the studies conducted was to determine the correlation between sitting work attitudes and musculoskeletal disorders in respondents who work as public transport drivers (14,15). And from this research, the results showed that the driver's working attitude in a sitting position had a high RULA value, so investigation and implementation of changes were needed. Based on the research results, it shows that some drivers have moderate complaints, namely 25 people and 7 and 8 people respectively with low and high complaints (16,17). The results of this research are in accordance with research by Dwiseli et al., (2020) which examined one of the influences of work attitudes on MSDs complaints among car driver workers at the Makassar City Daya Terminal, where the majority of respondents experienced MSDs complaints (18,19).

The results of the research show that the higher the risk of the AKAP bus driver's work attitude, the higher the risk of experiencing an incident of *musculoskeletal Disorders* (MSDs). This is also by the research results of Triwati (2021). This is confirmed by the test results *spearman correlation* which shows the sig value at the time of the test *Spearman Correlation* amounting to 0.001 (< 0.05) with a correlation coefficient value of 0.674 for work duration and 0.574 for work attitude. So it shows that there is a correlation between duration and work attitude and complaints of *Musculoskeletal Disorders* (MSDs) to AKAP bus drivers at Mengwi Terminal. Working posture plays a significant role in the development of musculoskeletal disorders (MSDs). Poor posture can contribute to these musculoskeletal disorders. Maintaining awkward or static positions can lead to muscle fatigue and strain. For example, hunching over a desk can stress the neck, shoulders, and back. Poor posture can restrict blood circulation, leading to muscle tension and discomfort. Prolonged pressure on certain areas can also cause nerve compression. Incorrect alignment of the body can increase stress on joints, leading to wear and tear over time. For instance, sitting with knees higher than hips can strain the lower back. Many jobs involve repetitive tasks, which can exacerbate the effects of poor posture. This combination can lead to injuries like tendonitis and carpal tunnel syndrome. Inadequate ergonomic support from furniture or equipment can force the body into harmful positions. For instance, a chair without proper lumbar support can lead to slouching. Poor posture can also

influence mental well-being, leading to stress and tension, which may further contribute to physical discomfort. To mitigate these risks, it's essential to adopt ergonomic practices, such as adjusting workspace setups, taking regular breaks, and being mindful of body alignment. (20,21).

The results of this research are in line with several previous studies conducted by Pebruanto and Wiatama (2020) which were conducted on Damri Mataram bus drivers with an average working attitude duration in the medium category with the most common musculoskeletal complaints being pain in the right shoulder, left shoulder and waist (22). The results of this research are also following research conducted by Rahmawati (2020) which states that there is a correlation between work attitudes and incidents of *Musculoskeletal Disorders* (MSDs) (23,24).

The strength of the current research compared to previous research lies in the range of assessments for work attitudes and complaints *Musculoskeletal Disorders* (MSDs) which uses four (4) assessments, namely mild, moderate, severe and very severe, while previous studies only used two assessments such as complaints and no complaints, and at most used 3 assessments such as mild, moderate and severe (25).

CONCLUSION

Based on the analysis and discussion in the previous chapter, it can be concluded that there was a strong correlation between duration, work attitude, and Musculoskeletal Disorders (MSDs) for bus drivers. Further research must be conducted to analyze other factors that affect musculoskeletal disorders, especially in bus drivers. As advice to bus drivers, they must work in an ergonomic position to avoid musculoskeletal disorders.

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CONFLICT OF INTEREST

None declared.

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