



The Influence Of Workload And Work Attitude On Musculoskeletal Disorders In Motorcycle Workshop Workers In Indra Kasih Village, Medan City

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Abstract

Musculoskeletal disorders (MSDs) are conditions that affect the muscles, bones, and joints, often causing pain and decreased body function. These conditions can be caused by various factors such as repetitive movements, overuse, and poor posture, making them one of the leading causes of workplace injury and disability. The research objective of this final assignment is to analyze the influence of workload and work attitudes on musculoskeletal disorders in motorbike repair shop workers in Indra Kasih Village, Medan City.

This study uses a quantitative method with a cross-sectional design. The research was carried out at a motor vehicle repair shop in Indra Kasih Village, Medan Tembung District. The population in this study consisted of all mechanics in motorbike repair shops in the Indra Kasih sub-district area, which were divided into 27 workshops. The sample in this study comprised 48 motorbike mechanic respondents. This research uses primary data obtained through interviews, field observations, and physical examinations. Analysis was carried out using statistical tests, specifically the Pearson Correlation test. Multivariate analysis was conducted using multiple linear regression tests. The results of the research show that the linear regression test coefficient value of workload on musculoskeletal disorders, where workload (β_1) of 0.419 is positive with a p-value of 0.003 ($p < 0.05$), indicates that workload has a positive and significant effect on musculoskeletal disorders. The results of the linear regression test of work attitudes on musculoskeletal disorders, where work attitudes (β_2) of 0.366 are positive with a p-value of 0.010 ($p < 0.05$), indicate that work attitudes have a positive and significant effect on musculoskeletal disorders.

key words : Musculoskeletal disorders; mechanic; workshop; workload; work attitude

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Introduction

The development of science and technology (IPTEK) and the high current of globalization today have an impact on various sectors of human life (Cahyawati, 2022). One of the areas affected is the industrial world. Not all technological developments have a positive impact on work. One of the problems that arises is work accidents experienced by workers (Suma'mur, 2014).

international data estimates Labor Organisation (ILO), around 2.3 million female and male workers worldwide die due to work accidents every year, or an average of more than 6,000 deaths every day (ILO, 2021). Meanwhile, work accident data in Indonesia from BPJS has increased from 173,415 cases in 2018 to 182,835 cases in 2019. In 2018, 3,400 people died, 8,722 people were disabled and the remaining 161,293 people recovered. Meanwhile, in 2019, there were 3,171 deaths, 6,091 people with disabilities and the remaining 173,572 people recovered (BPJS Employment, 2019).

The World Health Organization (WHO) in 2022 stated that *musculoskeletal disorders* are the main cause of disability throughout the world with *low back pain* as the sole cause of disability in 160 countries. *Global Burden of Disease (GBD)* data states that in 2020 the number of cases of low back pain globally is estimated to reach 619 million cases. In line with this, in 2019 it was shown that around 1.71 billion people in the world live with *musculoskeletal disorders*.

Musculoskeletal Disorders are injuries or pain and disorders that affect parts of the human body or the Musculoskeletal Disorders system (Laksana and Srisantyorini, 2019). According to data from the UK *Labor Force Survey (LFS)* , it shows that the incidence of Musculoskeletal Disorders among employees is very high, namely 1.144 million cases with a division of 493,000 back diseases, 426,000 upper body diseases and 224,000 lower body diseases. A similar study in the United States found as many as 6 million incidents of Musculoskeletal Disorders every year, with a range of 300 to 400 incidents per 100,000 workers (Sekaaram and Ani, 2017). Based on RISKESDAS in 2018, the number of Musculoskeletal



Disorders cases based on workforce diagnosis was 7.9 % . The three provinces with the highest prevalence based on diagnosis are in Aceh (13.3 %) followed by Bengkulu (10.5%), and Bali (8.5%) (Ministry of Health of the Republic of Indonesia, 2018).

Disorders of the muscular and skeletal system are complaints in the parts of the skeletal muscles that are felt by a person ranging from very mild complaints to very painful. If muscles receive static loads repeatedly and for a long time, it can cause complaints in the form of damage to joints, ligaments and tendons. These complaints and damage are usually termed Musculoskeletal Disorders or injuries to the Musculoskeletal system. Disorders Grandjean, 1993 and Lemasters, 1996 (Tarwaka, 2014).

In 2015, *the Health and Safety Authority (HAS)* stated that the number of Occupational Diseases (PAK) that occurred in 2012 affected 27.1 out of 1000 workers. This case has continued to increase since 2012. Based on the number of recorded cases, it is known that around 32% are cases of Musculoskeletal Disorders injuries due to work activities such as lifting weights (43%). Based on the results of the report, it was found that Musculoskeletal Disorders in workers would affect a person's loss of working hours. Approximately 8,784,000 working days are lost due to Musculoskeletal Disorders that occur in the workplace according to *the Labor Force Survey*. Meanwhile around 34% of all working days are lost due to Musculoskeletal Disorders in the workplace (*Health and Safety Executive* , 2015). As many as 493,000 cases affected the back, 426,000 cases affected the neck, and 224,000 cases occurred in the lower back (Ferusgel, 2020).

Mechanics in motorbike repair shops see activities that pose ergonomic risks, such as awkward postures when doing work, repetitive movements, and working hours that exceed 8 hours. A workshop is a form of business so operationally it must be profitable (*profitable*) and feasible (Adhzani et al., 2016). Therefore, all activities must be oriented towards making a profit. However, we need to be reminded that profits must be obtained by increasing work productivity, because if this is not the case it will be very detrimental to the workshop itself (Soedarma, 2012). Work carried out manually using mechanical machines can result in complaints in the form of



waist or back pain, tension in the neck, pain around the wrists and feet, and fatigue (Adhzani et al., 2016).

Based on an initial survey, there are 27 motorbike repair shops in Indra Kasih Village, Medan Tembung District, with only one work shift. This workshop's working days are Monday to Sunday. There are no holidays except major holidays. Working hours at this workshop start from 08.30 WIB to 17.00 WIB. In this motorbike workshop there is no *Standard Operating Procedure* for every activity in the workshop. Vehicle maintenance activities are only carried out based on complaints from consumers or consumer requests for vehicle service.

Activities that pose ergonomic risks include awkward body postures when doing work, repetitive movements , and working hours that exceed 8 hours per day. The activities carried out by motorbike mechanics are checking and changing engine oil, cleaning and adjusting the bluator, carrying out light services such as cleaning spark plug gaps, cleaning air ducts, checking the clutch, checking the brakes, checking the battery, adjusting the wheel chain, checking the electricity, checking the air pressure. tires, checking radiator water and tightening engine bolts . This activity requires high levels of accuracy to avoid errors in vehicle servicing activities for customer satisfaction and safety. Activities like this provide quite a heavy workload for mechanics so they also risk causing a burden of Musculoskeletal Disorders.

In the 27 workshops in Indra Kasih sub-district, the average workforce consists of two to six workers depending on the size of the workshop and the number of customers in the workshop. Workshop workers on average complete 10 motorbikes per day for light service and on average complete 2 motorbikes for heavy service activities such as dismantling engines. Light service activities take around 30 to 60 minutes while heavy services take around 4 to 5 hours . This causes workers to work very long hours and exceed working hours which causes muscle and skeletal disorders in workers.

Inappropriate body position when doing work, for example squatting when changing oil, doing repetitive movements when tightening engine bolts, as a result mechanics are at risk of causing a burden of Musculoskeletal Disorders. Workers at this motorbike repair shop are paid



per day and have irregular rest periods due to chasing target customers and there are no medicine boxes that can be used by mechanics when they feel tired. This situation also makes mechanics not pay proper attention to their work attitudes and rest periods, which can cause health problems resulting from ergonomic hazards in the workplace. Apart from that, subjective complaints from several mechanics at this motorbike repair shop stated that there were complaints of back pain, low back pain and neck pain making it difficult to sit and lie down. Therefore, as part of efforts to control the risk of health problems that could be caused by ergonomic hazards, an assessment of work attitudes was carried out, especially in vehicle maintenance activities carried out by motorbike repair shop workers.

In connection with the problem above, cases of Musculoskeletal Disorders among informal sector workers in mechanical workshops are still quite high. In the informal sector, concern for the health level of workers is still low, plus the lack of knowledge of business owners and workers themselves about Occupational Safety and Health (K3) and diseases that can arise due to work, so it is necessary to conduct research on the influence of workload and work attitudes on musculoskeletal disorders in motorbike repair shop workers in Indra Kasih Village, Medan City.

Methods

Study This use method quantitative, with using a *cross-sectional design* . This research was carried out at a motor vehicle repair shop in Indra Kasih Village, Medan Tembung District. The population in this study were all mechanics in motorbike repair shops in the Indra Kasih sub-district area, which were divided into 27 workshops. The sample in this study was 48 motorbike mechanic respondents. This research uses primary data by conducting interviews, field observations and physical examinations. Analysis was carried out with statistical tests using the Pearson Correlation test. Multivariate analysis was carried out using multiple linear regression tests



Results

Characteristics of Motorcycle Workshop Workers in Indra Kasih Village . Based on table 15, it can be seen the characteristics of workers based on age and BMI. There were 7 workers aged ≤ 25 (14.6%), 22 people aged 26-35 years (45.8%), 17 people aged 36-45 years (35.4%) and 46-55 years old as many as 2 people (4.2%).

Based on the distribution of workers' BMI categories, the normal BMI category is dominated. Workers with a thin BMI category (<18.5) were 3 people (6.3%), workers with a normal BMI (18.5-24.99) were 37 people (77.1%), excessive BMI (25-29.99) as many as 5 people (10.4%), and obesity BMI (30-34.99) as many as 3 people (6.3%).

Based on the category of work period, the cumulative number of workers, namely in the 1-5 year category, was 18 people (37.5%). There were 18 workers in the 6-10 year category (37.5 %) and in the <10 year category there were 12 people (25.0%). And based on the category of work duration, 18 people worked for 8 hours (37.5%) and > 8 hours worked for 30 people (62.5%).

Workload . Based on table 16 above, it can be seen the physical workload experienced by workers. Workers with a light workload category ($<30\%$) were 16 people (33.3 %), in the medium category (30% - 60%) there were 31 people (64.4%) and in the high category (60% - 80%) as much as 1 person (2.1%).

The distribution of the results of assessing non-ergonomic work attitudes among motorbike repair shop workers using the REBA method can be seen in the table below.

Frequency Distribution Based on Work Attitudes

Variable	n	%
Unergonomic stance		
Medium (4-7)	22	45.8
High (8-10)	26	54.2



Based on the table above, the distribution of worker categories related to non-ergonomic work attitudes as seen through the REBA assessment, workers with non-ergonomic work attitudes in the medium category are 22 people (45.8 %), in the high category there are 26 people (54.2%).

Musculoskeletal Disorders. Assessment of musculoskeletal disorders experienced by workers using the attached questionnaire to SNI 9011:2021 (GOTRAK). When research was carried out, the following results were obtained:

Frequency Distribution of Motorcycle Workshop Workers Based on GOTRAK Questionnaire Results

Variable	n	%
Activity		
Light service	44	91.7
Heavy service	4	8.3
Bilateral	4	8.3
Mental fatigue		
Never	26	54.2
Sometimes	17	35.4
Often	4	8.3
Always	1	2.1
Physical exhaustion		
Never	-	-
Sometimes	11	22.9
Often	20	41.7
Always	17	35.4

Based on the table above, the distribution of service activity categories carried out by workers is that 44 people (91.7%) do light service and 4 people (8.3%) do heavy service. The tendency of workers to use their hands when carrying out actions can be classified as dominant on the right hand (right unilateral) as many as 39 people (81.3 %), dominant hand on the left hand (left unilateral) as many as 5 people (10.4%) , and dominant in both hands (bilateral) as many as 4 people (8.3%).



The cumulative distribution of mental fatigue categories among workers in the never category was 26 people (54.2 %). There were 17 workers in the sometimes category (25.4 %), in the frequent category there were 4 people (8.3%) and in the always category there were 1 person (2.1%). The distribution of categories of physical fatigue experienced by workers after work is that there are no workers who never feel physically tired, in the sometimes category there are 11 people (22.9%), the often category there are 20 people (41.7%) and the category always as many as 4 people (17%).

GOTRAK musculoskeletal complaints. Based on the data, it can be seen that workers experience musculoskeletal disorders in certain parts of the body. Each worker experiences different disorders. Problems with the neck were 16 people (33.3%), upper back 26 people (54.1%), arms 15 people (31.3%), lower back 6 people (12.5%), hands as many as 33 people (68.8%), hips as many as 19 people (39.6%), thighs as many as 10 people (20.8%), knees as many as 8 people (16.7%), calves as many as 11 people (%) and feet as many as 2 people (4.2%).

The identification results of the GOTRAK questionnaire can calculate the level of risk by looking at the color table which is based on the results of the severity level and frequency of Musculoskeletal Disorders.

Based on the data , it can be seen that workers are at risk of musculoskeletal disorders in certain parts of the body. Each worker experiences different levels of risk and different body parts. In the right neck, there were 13 people (27.1%) with 10 people in the low risk category, 2 people in the medium risk category and 1 person in the high risk category. The left neck was 10 people (20.8%) with 8 people in the low risk category, 1 person in the medium risk category and 1 person in the high risk category. There were 26 people (54.2%) in the right upper back, with 13 people in the low risk category, 7 people in the medium risk category and 6 people in the high risk category. The left upper back was 9 people (18.7%) with 5 people in the low risk category, 2 people in the medium risk category and 2 people in the high risk category. The right arm was 12



people (25%) with 12 people in the low risk category. The left arm was 2 people (4.2 %) with 2 people in the low risk category. The right lower back was 2 people (4.2 %) with 2 people in the low risk category. Left lower back was 1 person (2.1 %) with 1 person in the low risk category. Right handed were 25 people (52.1%) with 15 people in the low risk category, 7 people in the medium risk category and 3 people in the high risk category. There were 10 people (20.8%) with left hands, with 6 people in the low risk category, 3 people in the medium risk category and 1 person in the high risk category. The right hip was 16 people (33.3%) with 8 people in the low risk category, 3 people in the medium risk category and 5 people in the high risk category. The left hip was 10 people (20.8%) with 2 people in the low risk category, 4 people in the medium risk category and 4 people in the high risk category. The right thigh was 10 people (20.8%) with 6 people in the low risk category, 3 people in the medium risk category and 1 person in the high risk category. The left thigh was 9 people (18.7 %) with 5 people in the low risk category, 3 people in the medium risk category and 1 person in the high risk category. The right knee was 6 people (12.5 %) with 5 people in the low risk category, 1 person in the moderate risk category. The left knee was 3 people (6.2 %) with 3 people in the low risk category. There were 10 people in the right calf (20.8 %) with 9 people in the low risk category, 1 person in the moderate risk category. The left calf was 7 people (14.6 %) with 6 people in the low risk category and 1 person in the low risk category. The right leg was 1 person (2.1 %) with 1 person in the low risk category. The left leg was 1 person (6.2 %) with 1 person in the low risk category.

Bivariate Analysis Results

The results of the bivariate analysis are intended to determine the relationship between workload variables and work attitudes on musculoskeletal disorders in motorbike repair shop workers in Medan City. The data analysis used is the *Pearson correlation test* at a significance level of 0.05 , so that if the statistical analysis results find $p < 0.05$ then the variables are declared significantly related. The test results between workload and musculoskeletal disorders can be seen in the following table:



Correlation Test Results for Workload and Musculoskeletal Disorders in Motorcycle Workshop Workers in Indra Kasih Village, Medan City

Workload	R	Sign
Light		
Currently	0.419	0.003
Tall		

The results of the correlation test for workload and musculoskeletal disorders show a value of $p = 0.003$ ($p < 0.05$). So it can be concluded that H_0 is rejected so that there is a relationship between workload and musculoskeletal disorders in motorbike repair shop workers in Medan City. And for the correlation coefficient (r), the value obtained was 0.419 or the strength of the relationship between workload and musculoskeletal disorders was 0.419, which means a moderate correlation. The coefficient number is positive, namely 0.419, so it is unidirectional, which means that if the workload is high, the musculoskeletal disorders will also be high and vice versa. The test results between work attitudes and musculoskeletal disorders can be seen in the following table:

Correlation Test Results of Work Attitudes and Musculoskeletal Disorders in Motorcycle Workshop Workers in Medan City

Workload	R	Sign
Currently		
Tall	0.366	0.010

The results of the correlation test between work attitude variables and musculoskeletal disorders show a value of $p = 0.010$ ($p < 0.05$). So H_0 is rejected so that there is a relationship between work attitudes and musculoskeletal disorders in motorbike repair shop workers in Medan City. And for the correlation coefficient (r), the value obtained is 0.366 or the strength of the relationship between work attitudes and musculoskeletal disorders is 0.366, which means a moderate correlation. The coefficient number is positive, namely 0.366, so it is unidirectional, which means that if the work attitude is high, the musculoskeletal disorders will also be high and vice versa.



Multivariate Analysis

Multivariate analysis uses multiple linear regression tests to see the influence of workload and work attitudes on musculoskeletal disorders.

Multiple Linear Regression Test Results Workload and Work Attitudes on Musuloskeletal Disorders in Motorcycle Workshop Workers in Medan City

Variable	R square	F	(β)	Sig
Workload on musculoskeletal disorders	0.175	9,776	0.419	0.003
Work attitudes towards musculoskeletal disorders	0.134	7,135	0.366	0.010

Based on the table of linear regression test results for workload and work attitudes with musculoskelatal disorders, the workload regression coefficient (β_1) is 0.419, which is positive with a p-value of 0.003 ($p < 0.05$). This means that H_0 is rejected, the workload variable has a positive and significant effect on musculoskelatal disorders, meaning that if the workload value increases, musculoskelatal disorders will increase significantly, and vice versa.

The regression coefficient value of work attitude (β_2) is 0.366 , which is positive with a p-value of 0.010 ($p < 0.05$) . This means that H_0 is rejected, the work attitude variable has a positive and significant effect on musculoskelatal disorders, meaning that if the work attitude value increases, musculoskelatal disorders will increase significantly, and vice versa. Based on the results of the coefficient of determination test (R square) to measure how far the model's ability to explain the dependent variable. The results of the workload determination coefficient test for musculoskeletal disorders in this study obtained a value of 0.175. This can be interpreted that the independent variable, namely workload, influences musculoskeletal disorders by 17.5 % , while 82.5% is influenced by other factors. The results of the coefficient test for determining work attitudes towards musculoskeletal disorders in this study obtained a value of 0.134. This



can be interpreted that the independent variable, namely work attitude, influences musculoskeletal disorders by 13.4 % , while 86.6% is influenced by other factors.

Based on the F test, it is known that for the work attitude variable the F value is calculated $9.776 > F_{table\ 3.20}$. So the results of the F test show that there is a significant influence between workload on musculoskeletal disorders. For the work attitude variable, the F value is calculated $7.135 > F_{table\ 3.20}$. So the results of the F test show that there is a significant influence between work attitudes and musculoskeletal disorders

Discussion

Effect of workload on musculoskeletal disorders. In this study, it can be seen that there were 16 workers with a light workload category (<30%), 31 people (64.4 %) in the medium category (30% - 60%) and 31 people in the high category (64.4%). 60% - 80%) as much as 1 person (2.1%). Workshop workers in the informal sector do not have definite rules regarding rest hours, so there are times when workers will carry out their work continuously for long periods of time without a definite rest period. Workshop workers' working hours are when there are customers who want to service or repair vehicles, while workers' rest hours are when there are no customers. When there are many customer visits, workers will usually work together to take turns taking breaks for lunch and so on. Therefore, the workload experienced by workers every day can change according to the number of customers and the difficulty of doing the work.

The results of short interviews with workers show that on average workshop workers can complete 10 to 15 motorbikes for work such as repairs or light servicing. Repair work usually takes 15 minutes to 1 hour depending on the level of damage. Workers who carry out light services usually take up to 45 minutes to 1 hour. Light service activities usually consist of changing oil, carbulator water, replacing spark plugs, repairing brakes, checking the battery and cleaning the CVT. However, there are also customers who usually ask for help in checking the



condition of other vehicles such as brakes, tires, and others. If this is done continuously it will cause a high workload on workshop workers.

Workers who carry out heavy servicing or dismantle engines usually only work on 1 to 2 vehicles. Heavy service activities consist of replacing valve seals, cleaning carbon deposits, cleaning valve skirts, etc. This takes around 4 to 7 hours depending on the condition of the vehicle engine. When carrying out heavy services, workers will do the same work for a long time. A high workload will cause physical fatigue experienced by workers. When research was carried out, results were obtained from the physical fatigue experienced by workers. Physical fatigue experienced by workers after work was in the sometimes category as many as 11 people (22.9 %), the often category as many as 20 people (41.7%) and the always category as many as 4 people (17%).

The results of the regression test for workload and musculoskeletal disorders show a value of $p = 0.003$ ($p < 0.05$). So it can be concluded that there is an influence between workload and musculoskeletal disorders in motorbike repair shop workers in Indra Kasih Village, Medan City. And for the correlation coefficient (r), the value obtained is 0.419, which means moderate correlation. This means that H_0 is rejected, the workload variable has a positive and significant effect on musculoskeletal disorders, meaning that if the workload value increases, musculoskeletal disorders will increase significantly, and vice versa.

The results of the workload determination coefficient test for musculoskeletal disorders in this study obtained a value of 0.175. This can be interpreted that the independent variable, namely workload, influences musculoskeletal disorders by 17.5 % , while 82.5% is influenced by other factors. The results of the coefficient test for determining work attitudes towards musculoskeletal disorders in this study obtained a value of 0.134. This can be interpreted that the independent variable, namely work attitude, influences musculoskeletal disorders by 13.4 % , while 86.6% is influenced by other factors. This is in line with research conducted by Safithry (2023) which states that there is an influence of work activities and loads carried out by workers on complaints of musculoskeletal disorders.



The influence of work attitudes on musculoskeletal disorders. In research on work attitudes as measured by the REBA assessment, workers with non-ergonomic work attitudes were in the medium category as many as 22 people (45.8 %) and in the high category as many as 26 people (54.2%). This shows that it is important to carry out investigations and repairs as soon as possible for motorbike repair shop workers in the city of Medan.

When carrying out their work, workshop workers often make awkward movements or work attitudes that are not ergonomic. Awkward work attitudes occur in almost every work activity, be it light service, heavy service or motorbike repair and modification. This awkward working attitude will form an angle on the body and is of sufficient value to produce a high REBA value for each worker. With a high REBA value, there is also a high risk that workers will experience musculoskeletal disorders. This is in line with research conducted by Cheisaria and Wahyuningsih (2022) which states that work attitudes are carried out using REBA measurements, the less ergonomic the work attitude is, the more musculoskeletal complaints will be experienced. And every worker is different in their ways, positions and habits in completing their tasks.

Awkward work attitudes that commonly occur in workshop workers include bending, necks bending, hands raised and not in a normal position, legs bent, squatting and standing for long periods of time. Awkward work attitudes among workshop workers include all of the workers' upper and lower locomotion. This is because in carrying out their duties workers use their hands when working, walk to pick up tools and see the condition of the vehicle and carry out work standing, squatting or sitting. This work attitude will form various body angles and produce various REBA values with different levels of risk.

The results of the correlation test between the work attitude variable and musculoskeletal disorders show a value of $p = 0.010$ ($p < 0.05$) so that there is a relationship between work attitude and musculoskeletal disorders in motorbike repair shop workers in the Indra Kasih District, Medan City. This is in line with research conducted by Amri, Djano, Hamdan &



Suwandi (2023) which stated that there were 2 (6.7 %) workshop workers who experienced medium work posture and experienced complaints and those who experienced high work posture experienced complaints. As many as 23 (76.7%) obtained a p-value of 0.022 ($p < 0.05$), which means there is a significant relationship between work attitude or posture and musculoskeletal disorders in workshop workers in Malili. This is also in line with research by Silitonga (2018) which states that based on the REBA and Nordic Body Map values, it was found that the majority of mechanical workers were in the medium posture category, namely between 4 and 7 with a p value of 0.005 (< 0.05), meaning there is a significant relationship. between the working position of workshop workers and musculoskeletal complaints.

The results of the regression test between work attitude variables and musculoskeletal disorders show a value of $p = 0.010$ ($p < 0.05$) . And for the coefficient value, the value obtained is 0.366. The coefficient number is positive, namely 0.366, so it is unidirectional, which means that if the work attitude is high, the musculoskeletal disorders will also be high and vice versa. According to Bridger (2003), any work posture that does not correspond to the normal position (body angle 0°) of the normal joints or can be said to be an upright posture and minimum effort on working muscles is part of an ergonomic posture. Unergonomic postures used by workers can cause musculoskeletal disorders.

Musculoskeletal disorders. Musculoskeletal disorders experienced by workers in this study were measured using the GOTRAK questionnaire. The results of the questionnaire show that the tendency of hand use by workers when carrying out actions can be classified as dominant on the right hand (right unilateral) as many as 39 people (81.3 %), dominant hand on the left hand (left unilateral) as many as 5 people (10 .4%), and dominant in both hands (bilateral) as many as 4 people (8.3%). This causes many workers to experience musculoskeletal disorders on the right side of the body.

Based on research, it can be seen that workers experience musculoskeletal disorders in certain parts of the body. Each worker experiences different disorders. Problems with the neck



were 16 people (33.3%), upper back 26 people (54.1%), arms 15 people (31.3%), lower back 6 people (12.5%), hands as many as 33 people (68.8%), hips as many as 19 people (39.6%), thighs as many as 10 people (20.8%), knees as many as 8 people (16.7%), calves as many as 11 people (%) and feet of 2 people (4.2%)

Workshop workers experience musculoskeletal problems in the neck due to awkward working attitudes such as looking down to see the condition of the vehicle during repairs or service. In carrying out their work, workers unknowingly adopt awkward work attitudes, causing musculoskeletal disorders. Workers also experience complaints about their arms, back and hands, all of which are caused by doing their work. Workers use their hands to work for a long time and it is not natural, such as being too raised. This will also affect the condition of the worker's arms and upper back. This is exacerbated by workers' bent work attitudes and physical activity without breaks.



The influence of moderating factors on Musculoskeletal Disorders.

The influence of age in moderating workload and work attitudes towards musculoskeletal disorders. Bengel workers in Indra Kasih sub-district are dominated by the early adult age group, namely 26-35 years old, 22 people (45.8 %), followed by the late adult age group, namely 36-45 years old, 17 people (35.4%).), followed by the late teenage age group, namely 17-25 years old, as many as 7 people (14.6%), and at least the early elderly age group, namely 46-55 years old, 2 people (4.2%).

In the workload variable, age MRA results on musculoskeletal disorders have a p value of $0.818 > 0.05$, meaning there is no influence on musculoskeletal disorders. And the results of the workload analysis on musculoskeletal disorders which are moderated by age have a p value of $0.357 > 0.05$, meaning there is no influence on musculoskeletal disorders which are moderated by age. In the work attitude variable, the MRA results for age on musculoskeletal disorders have a p value of $0.973 > 0.05$, meaning there is no influence on musculoskeletal disorders. And the



results of the analysis of work attitudes towards musculoskeletal disorders which are moderated by age have a p value of $0.704 > 0.05$, meaning there is no influence on musculoskeletal disorders which are moderated by age. This is in line with research by Faisal, Marisdayana and Kurniawati (2022) which states that there is no relationship between age and complaints of musculoskeletal disorders. This is because the majority of respondents are under 35 years of age, while the first complaint is usually felt at the age of 35 years and will continue to increase with age. Researchers assume that in this study age is not a moderating variable because the age of workshop workers is dominated by early teens and early adults who are no more than 35 years old. Apart from that, the workload experienced by each worker is not based on the worker's age. The work carried out by workshop workers is based on visitors, so young workers cannot choose light workloads so that their workload is light, and on the other hand, workers in late adulthood cannot choose their jobs either. This causes the interaction between workload and moderation by age to not have a significant effect.



The influence of work experience in moderating workload and work attitudes on musculoskeletal disorders. In the workload variable, the results of MRA work period on musculoskeletal disorders have a p value of $0.114 > 0.05$, meaning there is no influence on musculoskeletal disorders. And the results of the workload analysis on musculoskeletal disorders which are moderated by years of work have a p value of $0.062 > 0.05$, meaning there is no influence on musculoskeletal disorders which are moderated by years of work. This research is in line with research conducted by Sari, Handayani and Saufi (2018) which states that there is no relationship between working years and musculoskeletal disorders. Researchers assume this is because the workload experienced by workers cannot be chosen by workers. All workers with new or old work periods have the same duties and responsibilities in completing their duties. Apart from that, not all workers with a long period of service will experience high levels of complaints, this is because the increase in muscle mass in each research subject is not the same. This can be influenced by factors such as genetics, body metabolism. The dominant muscle



fibers are also different for each individual, some have type I (*slow twitch*) fibers and some have type II (*fast twitch*) fibers. Different eating patterns also have an impact, consuming more protein will provide additional muscle mass. And physical activity such as workload and rest patterns which are not all the same have an influence on each subject (Tambing, et al, 2020).

In the work attitude variable, the results of MRA work period on musculoskeletal disorders have a p value of $0.056 < 0.05$, meaning there is no influence on musculoskeletal disorders. And the results of the analysis of work attitudes towards musculoskeletal disorders which are moderated by length of service have a p value of $0.039 < 0.05$, meaning that there is an influence on musculoskeletal disorders which are moderated by length of service. The existence of a working period can increase the influence of musculoskeletal problems experienced by workers.

The effect of length of work in moderating workload and work attitudes on musculoskeletal disorders. In the workload variable, the MRA results of length of work on musculoskeletal disorders have a p value of $0.056 > 0.05$, meaning there is no influence on musculoskeletal disorders. And the results of the workload analysis on musculoskeletal disorders which are moderated by length of work have a p value of $0.038 < 0.05$, meaning that there is an influence on musculoskeletal disorders which are moderated by length of work. In the work attitude variable, the MRA results of length of work on musculoskeletal disorders have a p value of $0.059 > 0.05$, meaning there is no influence on musculoskeletal disorders. And the results of the analysis of work attitudes towards musculoskeletal disorders which are moderated by length of work have a p value of $0.046 < 0.05$, meaning that there is an influence on musculoskeletal disorders which are moderated by length of work. This is in line with research conducted by Purandima, Roga and Salmun (2023) which states that work duration is related to musculoskeletal function. Work carried out for a long duration of time results in the body's abilities decreasing which will cause complaints in parts of the body. Muscle complaints are also due to short rest periods that are not balanced with the duration of work.



Conclusion

Based on research that has been conducted on the influence of workload and work attitudes on musculoskeletal disorders in motorbike repair shop workers in Indra Kasih Village, Medan City, it can be concluded that the results of the linear regression test of workload on musculoskeletal disorders, the workload regression coefficient (β_1) is 0.419, namely positive value with a p-value of 0.003 ($p < 0.05$). This means that H_0 is rejected, workload has a positive and significant effect on musculoskeletal disorders. The results of the linear regression test of work attitudes towards musculoskeletal disorders, the regression coefficient value of work attitudes (β_2) is 0.366, which is positive with a p-value of 0.010 ($p < 0.05$). This means that H_0 is rejected, work attitude has a positive and significant effect on musculoskeletal disorders. There is an influence of workload on musculoskeletal disorders which is moderated by length of work with a pure moderation type. There is an influence of work attitudes on musculoskeletal disorders which is moderated by length of service with a pure moderation type. And there is an influence of work attitudes on musculoskeletal disorders which is moderated by length of work with a pure moderation type.



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