KnE Social Sciences

ICEMSIT
International Conference on Engineering Management and Sustainable Innovative Technology
Volume 2024

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Research Article

Intervention of Musculoskeletal Discomfort Risk: A Cross-Sectional Study

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Abstract.
Driving activity for online motorcycle taxi drivers is dominantly causing static activity. This static activity plays a role in creating complaints of musculoskeletal disorders. This study aimed to determine the point on the body that is affected by static activity and the value of the Nordic Body Maps (NBM) of the characteristics of the respondents. The methodology used is a chi-square test with 70 respondents as the sample. The research stage began with distributing NBM questionnaires and then assessed descriptively. Furthermore, the chi-square test played a role in assessing the significant relationship. It was found that the dominant complaint point was the back. The influential correlations include the left shoulder on Body Mass Index (BMI) correlation, waist to height and age, hips to height, left elbow to height, and right knee to BMI. It is hoped that an intervention is needed to minimize musculoskeletal disorders with post-driving stretching activities.

Keywords: static activity, musculoskeletal disorders, Nordic Body Map

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Published: 22 March 2024

Publishing services provided by Knowledge E

Selection and Peer-review under the responsibility of the ICEMSIT Conference Committee.

1. Introduction

Two-wheeled transportation has become an important role in the industrial era 4.0. The existence of transportation provides activities that can cut time from conventional to technology. Activities using the dominant transportation experience static. Static activity caused by driving has a serious impact in the long term called musculoskeletal discomfort with symptoms that are closely related to muscle tissue, ligaments, tendons, and the nervous system. These complaints range from mild to fatal with advanced consequences, namely the inability of the body to carry out movement activities and coordinate movements [1,2]. Slowly the activities carried out by an online motorcycle taxi driver are not able to reach the work target and result in a decrease in body movement power, because musculoskeletal discomfort complaints often occur [3,4].

An online motorcycle taxi driver has an estimated working time as a dominant online motorcycle taxi driver 8 hours per day with an average of 20 passengers per day with an average delivery duration of 15 minutes to the destination location. This means that at least the total working hours used are 300 minutes and the remaining time is used to rest while waiting for passenger orders. The highlight that occurred during the break was that the driver was only doing sitting activities while communicating with other drivers. Thus, the time spent by the driver is more directed to static activity and involves the buttocks body point to sit. This is the cause of the emergence of complaints of musculoskeletal discomfort [5,6].

Findings Dorado et al. [7], Kee et al. [8], revealed that discomfort in static body areas poses a risk. The risks that arise ranging from mild pain to severe pain. Meanwhile, Kuta et al. [9], states that the role of convenience in using transportation is an important benchmark. Where the role of a comfortable position for the dominant driver occurs incessant contractions. This is evidence that driving comfort requires constructs of gender, body mass index, height and age which are associated with the point of complaint Nordic body maps [10]. While the findings Oestergaard et al. [2], Intani [11], revealed that musculoskeletal disorders are due to high physical work demands and neglect of health due to the dominant driver activity pursuing daily targets. This is evidence that high performance can exacerbate neglected areas of the body. This is the basis for providing an achievement on the issues raised in this research. In the daily life of online motorcycle taxi drivers, the dominant work only relies on the targets achieved from the order application. In the period of observation that has been done, it is seen that during the delivery of passengers while riding the vehicle, the dominant sitting position is bent forward, the position of the hips is not appropriate in the seat because the dominant posture is tall and the dimensions of the vehicle are not suitable. This is an issue that needs to be discussed in depth. Thus, Nordic body maps are associated with respondent characteristics to measure how high the impact of musculoskeletal discomfort is [12-14].

Based on the previous findings, it is stated that the point of complaint that has arisen has not provided the right intervention and the analysis has not been revealed critically. Therefore, the opportunities used as research gaps are to answer the research objectives, namely (1) assessment of the point of complaint using Nordic body maps which dominates the point of complaint from Nordic body maps how high is based on the answers of online motorcycle taxi drivers, (2) Nordic chi square correlation testing body maps on the characteristics of online motorcycle taxi drivers. The scope of research is that respondents come from online motorcycle taxi drivers, chi square test

to determine how high the relationship between Nordic body maps is to determine the right intervention for online motorcycle taxi drivers and estimates used only passenger motorcycle taxi activities.

2. Methods

2.1. Research design

This study uses a quantitative design. The quantitative design uses a qualitative test technique. The qualitative test serves to determine how high the relationship between Nordic body maps and the characteristics of respondents is descriptively and analytically [15].

2.2. Place and time of research

The research site is Kendedes Cultural Park, Singosari, Malang district. The research time for the survey agenda is from 8 June 2022 to 10 August 2022.

2.3. Population and sample of research

The research population using online motorcycle taxi drivers is 70 respondents. The number of respondents is used as a sample with the type of saturated sample.

2.4. Source of data

The primary data of the study came from a field survey by distributing Nordic body maps questionnaires to 70 respondents. Secondary research data is a scientific reference that has the topic of ergonomics with the scope of the research object regarding Nordic body maps to measure how high the level of musculoskeletal discomfort is [16].

2.5. Definition of variable operationalization

Operationalization of variables there is a presentation of information to reach the conclusions of the study:

TABLE 1: Variable operations.

Construct	Perspective	Measurement	Measuring Instrument	Scale
Nordic body maps	28 body points that measure pain levels during driving activities [17], [18]	Nordic Body Maps	Nordic Body Maps sheet	Nominal
Characteristics of Respondents	Gender is the biological difference between men and women Height is the maximum distance from the vertex to the sole of the foot Physical condition is the level of physical condition before, during Age is the level of life in terms of year of birth	Male and female Not tall and tall Not fat and fat Youth, Middle-old and Old	Descriptive statistics Chi-Square Correlation [19], [20]	Nominal

2.6. Analysis data method

Research data analysis techniques with the following stages:

1. Distribution of Nordic Body Maps questionnaires and withdrawal of Nordic Body Maps questionnaires to respondents of online motorcycle taxi drivers [21].
2. Descriptively tabulated the results of filling out the Nordic Body Maps questionnaire.
3. Non-parametric statistical test of Chi-Square correlation of respondent characteristics (columns) to Nordic Body Maps (rows).

The decision-making hypothesis is:

1. H0 = If asymp. Sig < 0.1, it is stated that there is a significant effect between rows and columns.
2. H1 = If asymp. Sig > 0.1, it is stated that there is no significant effect between rows and columns.

3. Discussion

Based on the results of research data processing, the results of the discussion are analyzed as follows:

3.1. Characteristics of respondents

TABLE 2: Characteristics of respondents.

Characteristics of Respondents		Gender		Category High		BMI		Age		
		Male	Female	Not high	High	Not Fat	Fat	Young	Middle old	Old
	Frequency	51	19	1	69	56	14	62	7	1
	Percent	72.9	27.1	1.4	98.6	80.0	20.0	88.6	10.0	1.4
	TOTAL	70		70		70		70		

The characteristics of the respondents from this study that dominated for gender were male with a percentage of 72.9%; height category high by 98.6%; not fat by 80% and youth by 88.6%. It means that respondents who do not dominate are women who are not tall and not fat and are in the middle-aged category.

3.2. Descriptive analysis

Based on the ranking of pain levels, the focus is on the back of 86.6% with a frequency of 62 respondents; waist and hips each of 75.7% with a frequency of 53 respondents.

Figure 1, The highest percentage corresponds to what is a complaint for online motorcycle taxi drivers, namely the back, waist and hips area. These three areas of the body were measured using a Nordic body maps questionnaire and then graphed that the back had the highest percentage, then the waist and hips. Impacts that arise using the identification of sick and not sick. While those who do not dominate in the area of the left forearm and right elbow. The left forearm is not dominantly sore due to dynamic activities.

3.3. Correlation analysis

Nordic body maps fatigue point correlation with respondent characteristics using chi square statistical test. It is stated that there is an effect on height on pain results with the results of the Pearson Chi-Square test being greater than 10%, this indicates that there is no relationship between gender and pain in any part of the body. The Pearson Chi-Square test of 0.075 showed that there was a relationship between height and pain in the waist and hips with an error rate of 10%. In addition to the waist and hips, there is a relationship between height and pain in the left elbow as indicated by the Pearson

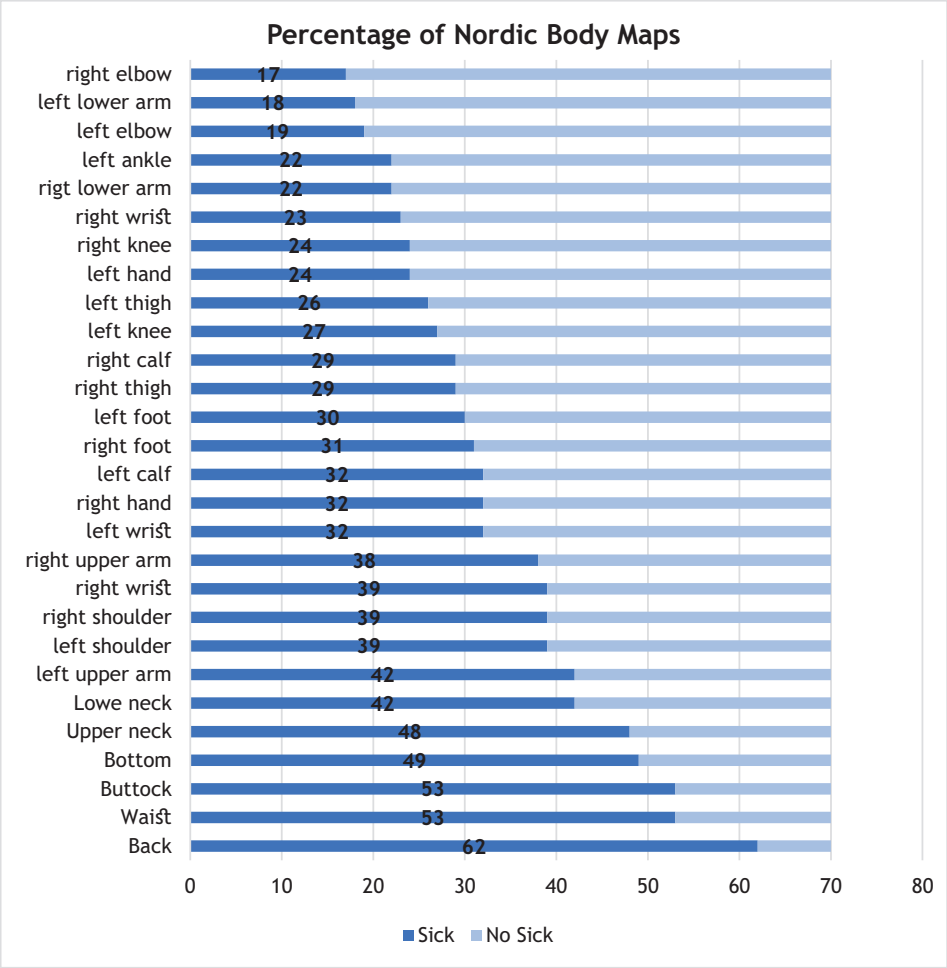

Figure 1: Percentage of Nordic body maps.

Chi-Square test result value of 0.099 with an error rate of 10%. While in other body parts there is no relationship. The results of the Pearson Chi-Square test of 0.022 show that there is a relationship between BMI and pain in the left shoulder with an error rate of 5%. In addition to the left shoulder, there is a relationship between height and pain in the right knee as indicated by the Pearson Chi-Square test result value of 0.044 with an error rate of 5%. While in other body parts there is no relationship and the Pearson Chi-Square test of 0.091 shows that there is a relationship between age and pain, especially in the waist with an error rate of 10%. While in other body parts there is no relationship.

There is a relationship between height and pain because the dimensions of the vehicle play an important role while the driver is driving. There is a relationship between BMI and pain because the left shoulder area has a balance function when driving. This balance is needed because the driver during driving must put the smartphone on the motorcycle steering wheel. Therefore, finger activity roams on a smartphone. Be it,

replying to passenger messages or reviewing google maps while driving. The position of the index finger of the dominant hand makes the upper arm area contract and the end point is on the shoulder. Although the right hand looks to pull the gas motor. However, the dominant gas pulling activity is stable. This is because the activity of the right hand is more directed at a constant period. In contrast to the left hand area, which must monitor both google maps and chat from passengers in the online motorcycle taxi application. Gradually the activity of the right hand gives the potential for tingling to the left shoulder area. This is one of the effects of musculoskeletal discomfort complaints. There is a relationship between BMI and pain in the right knee which is stated to have a relationship with BMI because of the driving position. Right knee relationship causes pain because the knee joint is in a static position. When the knee is in a static position, it causes slow blood flow, causing cramps. This will feel cramping if not given immediate intervention. Gradually, if left unchecked, it will cause difficulty in moving, causing a crackling sound and swelling. The knee position is because the vehicle facilities used can occur because the type of vehicle does not match body posture. So that there is a chance for musculoskeletal discomfort to arise due to static conditions while carrying passengers. There is a relationship between waist and height. Where the role of the dimensions of the vehicle will have an impact on the waist during driving. A body that is in the high category will often experience musculoskeletal discomfort in the waist area, because the motor dimensions are too low. Thus, a straight body position during driving will not make you comfortable and a forward bending position during driving will also not cause comfort. Thus, this is an important highlight with the intervention of vehicle seat dimensions. There is a relationship between the waist and age, i.e. the more the age exceeds 30 years, it will have an impact on the waist. The impact on the waist is the emergence of muscle and joint injuries and also has an impact on the spinal cord. During driving the age factor is indeed a benchmark that arises and attacks various respondents. This is the reason that maintaining driving and post-driving patterns requires activities that are able to suppress the occurrence of back pain. There is a relationship between hips and height. Where the hips are used to sit will have a negative role on height, if the sitting posture is not appropriate. Dominant online motorcycle taxi drivers do not think about vehicles that are suitable for body posture. So, if you are tall, using a small category of vehicles will make the hips area uncomfortable while sitting. This is because the dimensions of the seat do not match the posture area for the hips. There is a relationship between the left elbow and height. For tall posture, the left elbow will experience an angle position of less than 900 during driving if the dimensions of the motor used are not appropriate. This is what causes

blood circulation in the left elbow area to be problematic. In addition, it is related to the left standard, namely the activity of the fingers roaming on the smartphone. Be it, replying to passenger messages or reviewing google maps while driving. The position of the index finger of the dominant hand makes the upper arm area contract and the end point is on the shoulder.

3.4. Discussion and intervention

The back plays an important role as a support for the body that is used to stand straight, walk, sit and perform activities flexibly. For online motorcycle taxi drivers, the dominant activity is sitting while driving. This has an impact on the back being the main complaint, then the waist and hips.

Figure 2: Path diagram of structural model in PLS.

Figure 2, is a point of complaint, namely on the back caused by a bent position during work without a break. On the other hand, the posture is static and once moves in a sudden manner. Once moving in a sudden way makes the nerves in areas of the body, especially the back, become shocked and contract. In addition, it will have an impact on the waist and hips with this static sitting position. Waist and hips are complaints of musculoskeletal discomfort due to overuse. Overuse is the use of the dominant body area during driving activities. On the other hand, those who did not become dominant

were ranked 27 and 28, namely, dynamic activities carried out by the left forearm, namely relating to the left hand when concentrating while driving, replying to the chat of the passengers to be visited and sliding the smartphone screen to check the direction of the destination on the phone. maps application. Although the left forearm does not feel pain, it does not mean that there is relaxation. This is most likely the beginning of the pain that will arise, if dynamic activities are still often carried out unmonitored. Unlike the right elbow, which has a static role during driving. The right elbow has a small chance of getting musculoskeletal discomfort. This is because the right elbow is not directly related to the driving position, because the right elbow is a joint that does not receive a load that is out of control.

The relationship of the left shoulder to BMI, waist to height and age, hips to height, left elbow to height and right knee to BMI. The potential relationship using chi square analysis is related and significant. The five areas of the body further clarify the role of Nordic body maps. That, the critical body areas through the Nordic body maps and the chi square test are the hips and waist. The two areas of the body are interconnected. Driving activity in one passenger with an estimated 10 minutes to 20 minutes. Although the estimate for the ride does not exceed 1 hour, what is being discussed is how long online motorcycle taxi drivers carry out sitting activities after carrying passengers. It is stated that the dominant during the working period from 8 am to 8 pm, dominant sitting even though there is no transportation. This causes the muscles in the hips and waist area to tense up and reach the point of the back area. In addition, other activities that cause the left elbow, left shoulder are interconnected with activity patterns when concentrating while driving, replying to passenger chats that will be visited and sliding the smartphone screen to check the direction of the destination on the maps application. Then the right knee which is in a static position causes slow blood flow, causing cramps. This will feel cramping if not given immediate intervention. Gradually, if left unchecked, it will cause difficulty in moving, causing a crackling sound and swelling.

The point of complaint of musculoskeletal discomfort using Nordic body maps is the back, waist and buttocks caused by static activity during driving. There is no relationship between the point of musculoskeletal discomfort complaints to gender. There is a relationship between the points of musculoskeletal discomfort, namely the waist, hips, and left elbow. There is a relationship between the point of complaint of musculoskeletal discomfort, namely the left shoulder and right knee. There is a relationship between the point of complaint of musculoskeletal discomfort, namely the waist. This area of the body is a critical visualization that requires continuous prevention. Prevention was carried out in the findings Hutabarat et al. [22], by conducting a pre test and post test

with the results of a decrease in complaints of musculoskeletal discomfort in the left shoulder point area from 80% down to 47%. Findings Hutabarat et al. [10], Sofyan and Amir [18], with the statement that the back, waist and hips are indeed the dominant complaint because they are areas of the body called overus. Statements Houshyar and Kim [23], Pradana et al. [24], that the frequency of work with common disorders include back, knees, neck and shoulders. It can be stated that the findings of the research are in line with the findings of the predecessors. Therefore, the importance of minimizing complaints of musculoskeletal disorders needs to be studied in depth in the future with several intervention solutions. The intervention given in this case is the need for stretching [25,26]. Stretching activities are given to respondents by doing it every 2 hours during work activities. If in one day work activities are carried out for 8 hours, online motorcycle taxi drivers do stretching 4 times. Stretching activities are carried out according to the point of complaint, namely: back, waist, hips, left elbow, left shoulder, and right knee.

4. Conclusions, Implications and Suggestions

The conclusions reached in this study were (1) the point of complaint from the Nordic body maps covering the back with a percentage of 88.6%; waist with a percentage of 75.7% and hips with a percentage of 75.7%, (2) correlation tests that have an effect include the left shoulder on BMI correlation 0.022; plate to height correlation 0.07 and age correlation 0.091; buttocks to height correlation 0.07; left elbow to height correlation 0.099; right knee to BMI correlation 0.044. The implication of this research is the need to do stretching modeling in the complaint point area. The advice given is stretching intervention with pre-test and post-test and estimation of the right stretching time after driving.

Acknowledge

Our thanks go to the team from various alma maters. We thank the team who were united and contributed to this research.

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