

# Identification of Musculoskeletal Complaints on Online Ojek Drivers Using NBM and RULA Methods

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**Abstract**— As we all know, online motorcycle taxis have become a necessity in the current pandemic era. With the existence of online motorcycle taxis, many activities that we have been wary of doing, especially during a pandemic like the current one, have been resolved with the help of these drivers. His job online motorcycle taxi driver is influenced by work posture, body performance, and physical load—excessive workloads and work postures that are not ergonomic cause drivers to have to spend more energy. The drivers experience fatigue more quickly and can cause musculoskeletal complaints. This research is an observational analytic study with a total sample of 11 respondents. The research method used is an analytical method using a Nordic Body Map (NBM) questionnaire.

Meanwhile, the Rapid Upper Limb Assessment (RULA) measures ergonomic risk related to body posture. The data that has been collected was analyzed using Spearman correlation analysis. The analysis results show the value of sig. (2-tailed) the *t*-test is 0.000, which means a significant relationship between the NBM value and the perceived complaint status. The correlation coefficient value is 0.960, indicating a high association between the NBM value and the complaint status felt by online motorcycle taxi drivers. So the higher the NBM value, the higher the pain felt by online motorcycle taxi drivers.

**Keywords**— Musculoskeletal, NBM, work posture, RULA.

## I. INTRODUCTION

We often encounter online motorcycle taxis amid our routine activities, especially in the current conditions where people are anxious and even afraid to leave the house, even if it has to buy food or deliver goods. These activities can be resolved with online motorcycle taxi drivers who are always on standby (Agustin, 2017). In times of pandemic like today, online motorcycle taxis have become part of the needs that we live in every day. The activities that are often carried out (ordered) are for ordering food and delivering goods. Because only with an application on a cellphone (Sianipar, 2015) can we still complete all our activities without leaving the house and meeting many people as recommended by the government. Doing his job as an online motorcycle taxi driver is influenced by work posture, body performance, and physical load—excessive workloads, work postures that are not ergonomic cause drivers to have to spend more energy. The driver's body condition becomes tired more quickly and can experience musculoskeletal complaints (Batham, 2016; Padmathan, 2016).

Driving work is a job that is done manually, so it requires concentration and appropriate posture so that the work done can be carried out comfortably. Driving is classified as a static, repetitive, or repetitive job with monotonous work movements and the same work posture so that it has the potential to cause work fatigue (Akriyanto, 2015). The following work postures for online motorcycle taxi drivers while driving or carrying out their activities are shown in Figure 1. More about this source text required for additional translation information.

Figure 1 shows how the driver's body posture while driving, where the body position is slightly bent so that it is vulnerable to complaints that are often felt, namely pain around the back and neck because they often look down to look at gadgets (mobile phones) as a means of doing work. As

a result of this non-ideal posture, many drivers feel complaints ranging from pain and discomfort at work. The pain is due to improper posture while driving, making musculoskeletal complaints/muscles in certain limbs uncomfortable.



Fig. 1. Driver's posture while driving

Muscles are vital organs in charge of moving the body. All movements in the body, both conscious and involuntary movements, are controlled by muscles. Muscles in the body will produce heat which is helpful to keep the body warm and keep blood flow running smoothly. Muscles can contract, relax, expand and constrict, allowing for a lot of body movement (Vachhani, 2016).

Muscles that work too hard will experience fatigue and damage if left unchecked. Monotonous activities for a long time can also cause complaints to the musculoskeletal system. Musculoskeletal complaints are complaints in the skeletal muscles that a person feels, ranging from mild to very sick. If the muscles receive static loads repeatedly and for a long time, it will cause complaints in the form of damage to joints, ligaments, and tendons. These complaints are usually referred to as musculoskeletal disorders (MSDs) or injuries to the musculoskeletal system (Kroemer, 2001). Musculoskeletal disorders include excessive workload, frequency/repetition, exposure time, work posture, amount of mechanical load, risk quality (high strength intensity, repetition, great exertion,

muscle stretching, environmental and psychosocial conditions are not good). Fatigue or muscle damage can result in muscle cramps (spasms), muscle spasms, loss of balance, and sprains. Muscle fatigue can also cause severe pain that can lead to numbness (loss sensation) on the part of the burdened body (Swapna, 2011).

In order to achieve and maintain the physical condition of the drivers so that they are always in good condition, the work must be carried out according to the correct procedures. Not only that, the ergonomics of the work and the work environment must also be improved regularly. With the fulfillment of safety and comfort by studying ergonomics in work, the constraints and harmful risks can be minimized

## II. METHOD

The type of research used in this research is analytic observational. That is research that is directed to explain a situation or situation. According to (Arikunto, 2020) analytic observational research is directed to explain the causal relationship between two variables in an observational manner, where the form of the relationship is in the form of difference analysis. This research was carried out around the Kedungkandang sub-district in June-August 2021.

The population in this study were online motorcycle taxi drivers who usually rest or operate around the Kedungkandang sub-district, Malang city, totaling 11 people as the research sample. The variables in this study are work postures and complaints that are felt during activities. The significance of the variable relationship will be analyzed with the Spearman Correlation test. Namely, a statistical test to prove the relationship between work posture and the occurrence of MSDs complaints.

In assessing the driver's body posture, this study uses the RULA (Rapid Upper Limb Assessment) worksheet to assess the level of risk from driving work activities carried out. The process of using RULA can be explained into three (3) stages (Stanton, 2005), namely:

1. Choose the postures to be assessed
2. Assess posture using score sheets, body part diagrams, and tables
3. Change the resulting value into one of the four action levels to analyze the description of the risk level of MSDs.

The variables used as data analysis can be seen in Table 1.

TABLE 1. Operational Variables

No	Variable	How To Measure	Measuring instrument	Scale
1	Ergonomic risk level	Observation	RULA sheet	Ordinal
2	Musculoskeletal complaints	Observation	NBM Questionnaire	Ordinal

### Characteristics of Respondents

Respondents in this study were online motorcycle taxi drivers, most of whom were aged less than 30 years, namely seven people and over 30 years as many as four people with a total of 11 respondents. Male sex, has no history of certain diseases, balanced height, and weight, and is in good health both physically and spiritually. Good health is evidenced by the average oxygen saturation levels of the drivers, which are

in the range of 98-99%, so that it can be ascertained that a total of 11 respondents involved in this study are in good health both physically and mentally. For the period of service based on interviews with each driver, most of the drivers have a working period of more than two years, namely seven people and the rest under two years as many as four people. The working hours in a day range from 8-12 hours.

TABLE 2. Distribution of Online Driver Work Period

Years of service	n	%
< 2 th	4	36,36
> 2 th	7	63,64
	11	100

Table 2 shows that the driver's tenure of service is more than two years by 63.64% who will be included as respondents in this study, while the rest with a service period of fewer than two years are 36.36%. The result shows that much work as online motorcycle taxis is done and maintained by their persistence in the job. The study is evident from 11 respondents; seven respondents have been in this job for two years. Especially in the current pandemic season, their presence is necessary because it can help relieve people who are still anxious to get out of the house

## III. RESULTS AND DISCUSSION

### Description of MSDs

Musculoskeletal complaints (MSDs) are often experienced by online motorcycle taxi drivers, including aches, pains, aches, and others in the skeletal muscle system (musculoskeletal). Using the Nordic Body Map questionnaire shows the distribution of complaints based on the area of the body parts and the severity in each area. Severity is categorized into four, namely not sick, slightly sick, sick, and very sick. While the body areas identified, include the neck, shoulders, upper arms, upper back, waist, buttocks, elbows, forearms, wrists, hands, thighs, knees, calves, ankles, and feet on the right and left, respectively. Each respondent was allowed to fill out a questionnaire by putting a tick on the area of the body and the severity experienced. The results will be accumulated based on the number of respondents who feel complaints in each area and the severity they experience. The distribution of respondents based on the level of musculoskeletal complaints is presented in Table 3.

TABLE 3. Distribution of Driver Frequency Based on Body Parts that Often Experience Complaints Based on RULA

Complaints on Body Parts	n	Frekuensi (%)
<b>Neck Complaints</b>		
Painless	1	9,1
Kind a sick	2	18,18
Sick	5	45,45
Very ill	3	27,27
<b>Lower Back Complaints</b>		
Painless		
Kind a sick	2	18,19
Sick	4	36,36
Very ill	5	45,45
<b>Waist Complaints</b>		
Painless		
Kind a sick	2	18,19
Sick	5	45,45
Very ill	4	36,36

Based on the complaints felt by the drivers, three complaints often occur when the drivers carry out their work; these complaints are complaints on the neck (30%), complaints on the lower back (40%), and complaints on the waist (40%). The work demands that drivers have to do while driving carries out their work. The job of driving is monotonous and repetitive with a fixed posture when driving a vehicle; because of this fixed posture, many drivers experience muscle fatigue/complaints. The onset of muscle fatigue is characterized by stiffness in certain body parts, tingling, and muscle cramps due to a fixed posture so that blood flow to the heart is reduced.

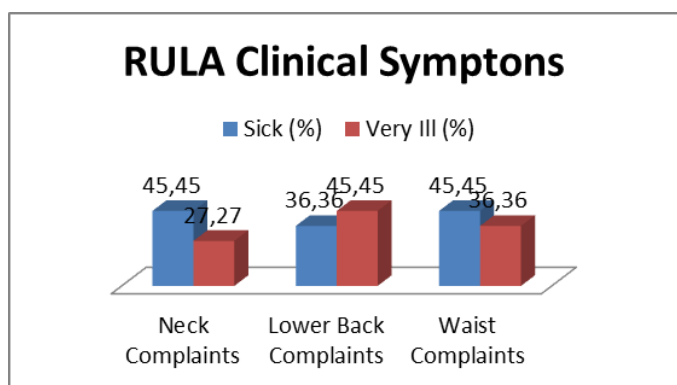


Fig. 2. RULA Questionnaire Clinical Symptoms

Figure 2 shows that almost 60%-80% of drivers who experience pain in certain body parts result from the wrong posture when doing work. Moreover, the driving work is carried out continuously with a monotonous work posture so that the pain felt in the body occurs more quickly.

*The Relationship of Driving Posture to MSDs*

In the sitting position, the muscles are subjected to static loading. Static muscle load occurs when muscles are in tension without experiencing hand or foot movement. Sitting requires less energy than standing, reducing the amount of static muscle load on the legs. However, the wrong sitting posture will be the cause of back problems. The pressure on the spine will increase when sitting compared to when standing or lying down. If it is assumed that the pressure is around 100%, then a tense and rigid way of sitting can cause the pressure to reach 140%, and the way of sitting that is done by bending forward causes the pressure to reach 190% (Nurmianto, 2008). A tense sitting posture requires more muscle or spinal cord activity than a forward-leaning sitting posture.

TABLE 4. Distribution of Posture Frequency While Driving Drivers

Posture while Driving	n	Frequency (%)
Upright less than 15 minutes	2	18,18
Upright between 15 – 30 minutes	-	-
Bend less than 15 minutes	3	27,27
Bending between 15 – 30 minutes	6	54,55
Amount	11	100

Table 4 shows that most of the respondents in this study have a posture while driving (sitting) that bends between 15-30 minutes, as many as six respondents (54.55%) as it is

known that after sitting for 15-20 minutes, the back muscles usually start to get tired and start to feel lower back pain (low back pain). In a fixed or stationary driving position for a long time, it causes pressure around the blood vessels due to the upper body's weight. In a situation like this, the muscles will feel tired, so it is necessary to change the position so that the blood vessels do not constrict and flow more smoothly. Smooth blood circulation means that it also facilitates the distribution of oxygen and nutrients so that the risk of accumulation of lactic acid, which causes fatigue, can be reduced.

In the driving position, the muscles are subjected to static loading. Static muscle load occurs when the muscles are in a state of tension (tension) without moving the hands or feet. The distribution of risk levels based on the results of the NBM questionnaire for online motorcycle taxi drivers as a result of appropriate and inappropriate fixed postures carried out during prolonged driving activities can be seen in Table 5.

TABLE 5. Distribution of NBM Risk Levels for Online Ojek Drivers

Driving Posture	NBM Risk Level								Total	
	Painless		Kind a sick		Sick		Very ill			
	n	%	n	%	n	%	n	%	N	%
In accordance	1	9,1	1	9,1						
It is not in accordance with	-		2	18,18	5	45,45	2	18,18	11	100

The results from table 5 show that drivers' highest number of complaints while driving is in the sick category of 45.45% and very sick 18.18%, a total of 63.63% or as many as seven people out of a total of 11 respondents. Drivers feel the highest musculoskeletal complaints due to inappropriate postures performed while driving, causing pain in certain limbs. The pain arises due to the discomfort felt due to inappropriate postures used while driving plus a long duration of time when carrying out these activities. The results of the cross-tabulation show a relationship between the results of the NBM questionnaire and the status of musculoskeletal complaints felt by the driver. So it can be concluded that the greater the value of the questionnaire results, the higher the level of musculoskeletal complaints felt by the drivers. The result is also supported by the results of data analysis with the Spearman correlation test in table 6.

TABLE 6. Spearman Correlation Results NBM Value and Complaint Status

		Correlations	
		NBM Value	Diagnosis Status
Spearman's rho	NBM	Correlation Coefficient	1,000
		Sig. (2-tailed)	.960**
	Diagnosis status	Correlation Coefficient	.960**
		Sig. (2-tailed)	1,000
		N	11
		N	11

\*\* . Correlation is significant at the 0.01 level (2-tailed).



From table 6, it is known that the number of respondents, in this case, the driver is 11 people, then the value of sig. (2-tailed) The T-test is 0.000, which means there is a significant relationship between the NBM value and the perceived complaint status. Furthermore, when viewed from the correlation coefficient of 0.960, this value indicates a high relationship between the NBM value and the status of complaints felt by online motorcycle taxi drivers. So it can be concluded that the higher the score obtained from the NBM questionnaire, the higher/severe the pain felt by online motorcycle taxi drivers in carrying out their driving work. The pain happens because of an inappropriate/wrong sitting position and sitting for a long time, causing skeletal muscle complaints, especially in low back pain. In an unnatural and fixed position, specific muscles will continue to work to react to the forces of gravity. When sitting, the sitting bones support the entire upper body through the spinal axis. The bones of the seat are in direct contact with the seat mat. The contact causes the area around the sitting organ to experience a static workload. A sitting position that is fixed or still for extended period results in pressure around the blood vessels due to the upper body's weight. The farther the body part's position from the center of gravity of the body, the higher the risk of skeletal muscle complaints.

Sitting posture can cause back pain if they sit for too long in the wrong position. Sitting in the wrong position causes the waist muscles to tense and damage the surrounding soft tissue. This position causes high pressure on the spinal nerve pads (Samara, 2005). After sitting for 30 minutes, the back muscles usually start to get tired. So, They started to feel lower back pain. However, people who sit up straight get tired more quickly because of the back muscles. While people who sit hunched over are lighter muscle work, the pressure on the nerve pads is more significant. A sitting position that is fixed or still for extended period results in pressure around the blood vessels due to the upper body's weight. In a situation like this, the muscles will feel tired, so it is necessary to change the position so that the blood vessels do not constrict and flow more smoothly.

Sitting requires less energy than standing because it can reduce the amount of static muscle load on the legs (Nurmianto, 2008). Good body position is significant because it can help the body optimally, make endurance and body movement more effective, and contribute to overall health.

However, according to Grandjean (1988) and Pheasant (1991), an incorrect sitting posture that is maintained for a long time will more quickly cause complaints in the musculoskeletal system (skeletal muscles) (Santoso, 2004). A bad sitting position is a sitting position that is fixed or still for a long period of time without any change in position. Sitting position that is not good causes the bones to become misaligned, the muscles, joints and ligaments (joint connective tissue) will be pulled harder, triggering fatigue, muscle tension and finally pain. Many people who suffer from back pain, it turns out that it starts from the wrong habits they do. As a result, the position and function of vital organs, especially in the abdominal area, have an effect (Ismayenti, 2017). The ideal work attitude is an ergonomic work attitude that is sitting

and standing alternately. So if the work is done in a sitting posture, then sit upright and sit bent alternately every 20-30 minutes because the more often a person changes position while sitting, the level of pain felt will be lighter, because changing positions can relax the back muscles. suffer from stress from sitting for long periods of time.

#### IV. CONCLUSION

There is a relationship between driving posture and complaints of musculoskeletal disorders in online motorcycle taxi drivers. The research obtained from the RULA questionnaire that almost 60% -80% of drivers experienced complaints in certain body parts, precisely the three highest, namely complaints in the neck area, complaints in the lower back, and complaints in the waist. The clinical symptom is the wrong posture while driving, so complaints and pain in the limbs are obtained due to a fixed and monotonous posture while driving. Meanwhile, based on the NBM (Nordic Body Map) questionnaire, a total of 7 people complained of pain and extreme pain in their limbs due to the wrong posture while driving, and this statement was supported by the results of the Spearman Correlation test, where the value of sig. (2-tailed) was 0.000, which means there is a significant relationship between the NBM score and the perceived complaint status. Furthermore, when viewed from the correlation coefficient of 0.960, this value indicates a high relationship between the NBM value and the complaint status felt by online motorcycle taxi drivers, where the higher the value obtained from the NBM questionnaire, the higher/severe the pain felt. Online motorcycle taxi drivers in carrying out their work.

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