

# Work posture and work-related Musculoskeletal disorders on online transportation drivers

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## ABSTRACT

Indonesia is developing country that need decent public transportation, it is caused the traffic jam that often occur, principally in Jakarta as capital city. Online transportation provided faster and cheaper travel than taxis and now is becoming popular. Besides that, usage of the mobile phone application is easier by anyone with competitive price. Because of this, the driver transportation become busier, but the company itself did not implement the regulation regarding time off and shift work. The objective of this study is to understand the drivers' knowledge and awareness regarding their job and the effect to the work-related musculoskeletal disorders (WMSDs). The design in this study is cross sectional design by interviewing the drivers and using Nordic Body Map, Rapid Entire Body Assessment (REBA) questionnaire. The total sample included 13 online transportation drivers. The result showed that all respondents understand and are aware of the time off and shift work for their safety. However, it was found that there were lack of information on regulation and standard for shift work. Even though the drivers have flexible time, they tend to work to pursue the bonus.

**Keywords:** Work-related Musculoskeletal disorders (WMSDs), ergonomic, online transportation, motorbike riders/drivers, Nordic Body Map, Rapid Entire Body Assessment (REBA).

## Introduction

Nowadays, motorbike development in Indonesia has been very advanced since it was introduced in the 19<sup>th</sup> century. Motorbikes entered Indonesia in 1893, and in 1950 increasingly sought. People were excited to ride a motorbike, not only for male but also female. It is because the motorbike is sportier, stylish, efficient, fuel efficient, and cheap.

Generally, motorbike riders often exposed with vibration and have high risks to exposed the work-related musculoskeletal disorders (WMSDs) <sup>[1]</sup>. The exposure of vibration can occur on arms or whole body <sup>[2]</sup>. the vibration also can be occurred on motorbike seat <sup>[3]</sup>.

Body heat loss due to helmet use can occur during driving by sweating due to changes the temperature and humidity <sup>[4, 5]</sup>. The clothes that are used by drivers also have a negative impact that can cause thermal stress <sup>[6]</sup>. The concentration, level of noise that enter, air ventilation and the weight of the helmet is a consideration for motorbike drivers to wear helmets <sup>[7, 8]</sup>. The change environmental temperature and the intensity of light can cause condition changes in the motorbike driver's body <sup>[8, 9]</sup>.

Drivers posture when driving the transportation also affect the risk of WMSDs, seat position, body dimension, quality of transportation seats, how long the driver sits, and how comfortable when driving <sup>[10]</sup>. The type and form of motorbike, anthropometry also determine the drivers when driving. Gender, age, weight, and height can affect fatigue when driving <sup>[8]</sup>. Driver behavior, perception, and capability or awareness to identify the hazard also affect the safety driving or safety riding <sup>[11]</sup>. The drivers also exposed the particulate from emission of motorized vehicles and pollutants in atmosphere <sup>[12]</sup>.

Within two years, online transportation has been developing along with the launched of online transportation application on Android and iOS phone. With working hours in 24 hours a day, as well as work with static position for hours and repetitive movement, can cause musculoskeletal complaints. The

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complaints could occur from very mild to very severe. In this study, the researcher wants to assess work posture and work-related musculoskeletal disorder symptoms to online transportation drivers.

### Methods

This study is descriptive observational research with qualitative design study. In this research observation, interview, and review of documents were conducted by cross-sectional approach survey. Instrument used in this study was Nordic Body Map questionnaire to get individual data (age, work years, body mass index, exercise habit) and the level of WMSDs complaint that perceived by respondents for driving activities. The Rapid Entire Body Assessment forms are to assess risk level of work posture. The digital camera was used for documentation of the body position and posture while working.

### Results

When the study was conducted on 13 online transportation drivers as respondents, all drivers gave response by complaint in aches of muscle and joint.

Most Emerge of Joint Complaints			
10	Before work/driving	2	15,38
	When working/driving	1	7,69
	After work/driving	10	76,92
Things to do to Eliminate the Complaints			
11	Take a rest	8	61,53
	Drink medicine	1	7,69
	Drink herb medicine	1	7,69
	Massaged	3	23,07
	Others	-	-

Table 2. Distribution of WMSDs Complaints based on Nordic Body Map

No	Part of Body	Keluhan WMSDs							
		No Pain Felt		Moderate Pain		Pain		Very Painful	
		Jumlah	%	Jumlah	%	Jumlah	%	Jumlah	%
0	Upper neck	3	23,07	5	38,46	5	38,46	-	-
1	Lower neck	8	61,53	3	23,07	2	15,38	-	-
2	Left shoulder	4	30,76	5	38,46	3	23,07	1	7,69
3	Right shoulder	5	38,46	4	30,76	3	23,07	1	7,69
4	Left upper arm	8	61,53	3	23,07	2	15,38	-	-
5	Right Back	2	15,38	7	53,84	4	30,76	-	-
6	Left upper arm	5	38,46	4	30,76	4	30,76	-	-
7	Waist	3	23,07	5	38,46	5	38,46	-	-
8	Buttock	6	46,15	5	38,46	1	7,69	1	7,69
9	Buttom	5	38,46	5	38,46	2	15,38	1	7,69
10	Left elbow	9	69,23	3	23,07	1	7,69	-	-
11	Right elbow	8	61,53	3	23,07	1	7,69	1	7,69
12	Left forearm	6	46,15	5	38,46	1	7,69	1	7,69
13	Right forearm	7	53,84	5	38,46	1	7,69	-	-
14	Left wrist	6	46,15	6	46,15	1	7,69	-	-
15	Right wrist	3	23,07	6	46,15	4	30,76	-	-
16	Left hand	4	30,76	5	38,46	3	23,07	1	7,69
17	Right hand	6	46,15	5	38,46	2	15,38	-	-
18	Left thigh	6	46,15	4	30,76	3	23,07	-	-
19	Right thigh	8	61,53	2	15,38	3	23,07	-	-
20	Left knee	7	53,84	3	23,07	3	23,07	-	-
21	Right knee	7	53,84	2	15,38	3	23,07	1	7,69
22	Left shank	6	46,15	5	38,46	2	15,38	-	-
23	Right shnak	9	69,23	3	23,07	1	7,69	-	-
24	Left ankle	7	53,84	2	15,38	4	30,76	-	-

Table 1. Description of WMSDs based on Risk Factors

No	Risk Factor	WMSDs Complaint	
		n	Percentage (%)
1	<b>Age</b>		
	16 – 30 years old	3	23,07
	31 – 45 years old	8	61,53
	45 – 60 years old	2	15,38
2	>60 years old	-	-
	<b>Work years</b>		
	< 1 year	4	30,76
3	1 – 2 years	5	38,46
	>2 years	4	30,76
3	<b>Body Mass Index</b>		
	Underweight	1	7,69
	Normal	7	53,84
	Overweight	2	15,38
4	Obesity	3	23,07
	<b>Safety Driving/Riding Training</b>		
5	Yes	12	92,30
	No	1	7,69
5	<b>Work Duration (Everyday)</b>		
	<6 hours	2	15,38
	6 – 10 hours	4	30,76
	>10 hours	7	53,84
6	<b>Time off while Working</b>		
	Uncertain	6	46,15
	Every 1 hour	6	46,15
7	Every 1 hours	1	7,69
	<b>Knowledge of Stretching</b>		
8	Yes	9	69,23
	No	4	30,76
8	<b>Smoking Behavior</b>		
	Active	11	84,61
9	Passive	2	15,38
	<b>Exercise Habit/Routine</b>		
	Yes	10	76,92
	No	3	23,07

25	Right ankle	8	61,53	2	15,38	3	23,07	-	-
26	Left foot	8	61,53	2	15,38	2	15,38	1	7,69
27	Right foot	9	69,23	3	23,07	1	7,69	-	-

**Table 3. Classification based on Individual Range Score**

No	Total Score of Nordic Body Map	Number of Respondents	Percentage (%)
1	28 - 49	7	53,84
2	50 - 70	5	38,46
3	71 - 91	1	7,69
4	92 - 112	-	-

Survey result from Nordic Body Map can be scored to determine the range by adding up all the joint complaints on the checklist by the driver online with the score that has been determined, i.e.:

- No pain felt: score 1
- Moderate pain: score 2
- Pain: score 3
- Very painful: score 4

Hence, the Nordic Body Map minimum range limit was 28, and the maximum score was 114. The next step was grouping the score based on range, where the range is determined as follows:

- a. Score 28 – 49 interpreted as low, no action needed.
- b. Score 50 – 70 interpreted as moderate, action may be needed.
- c. Score 71 – 91 interpreted as high, action is needed as soon as possible.
- d. Score 92 – 112 interpreted as very high, comprehensive action as quickly as possible.

The result from table 3 showed, most respondents (53,84%) were in score range of 28 – 49, which means low risk level that accordingly no action needed. 5 respondents were in score range of 50 – 70, which means action may be needed at later time due to their job risks. 1 respondent was in score range of 71 -91, which means he is in high risk level and action is needed as soon as possible.

The assessment of work posture with REBA method is to assess posture from head to the feet considering load and handhold.



**Figure 1.** Online Transportation Driver

Online transportation drivers work with sitting body position. The distance of driver' sitting from saddle tip was approximately 30 cm. The angle upper arms form was 30 – 60 degrees. The angle forearms form was 0 – 60 degrees. The angle forms of wrist were 15 degrees. The angle forms of foot were 70 – 90 degrees. The angle form of trunk was 40 – 60 degrees.

The score for both neck and trunk was 1. The score for leg postures were 2. The score of work posture in A Group based on calculation of REBA assessment form was 2. Body posture when doing static work added with vibration, the score will be added 1. The load less than 5 kg will obtain score 1. The total score for A Group was 2 + 1 + 0 = 3.

For upper body posture, upper arm obtained score 3. The forearm obtained score 2. Forwrist obtained score 3. In total score for B Group based on calculation of REBA assessment form was 7. Afterwards, 0 was added because the hand position was still right.

The total result of REBA was 7. Score of REBA = 7, which means the score showed moderate risk level that requires further research and assessment.

## Discussion

The objective of this study is to see the risk of online transportation drivers regarding WMSDs effect while they do their jobs. The obtained results vary based on the driver's subjective complaints. This corporation is a new type of public transportation in Indonesia, it started in 2010<sup>1</sup>. Because of that, the research for the drivers was still few, including the WMSDs researches. However, this job has high risk of getting WMSDs due to the vibration from the motorcycle's machine, road, and work posture during driving<sup>2</sup>.

In this study, 13 online transportation drivers were studied to see the WMSDs subjective complaints, and the result revealed they complaint of pain and aches in some parts of body. Online transportation drivers' age range between 31–45 years old which is the productive age. Mostly, they had worked for 10 hours per day which is longer than recommendation for working hours, 8 hours per day. However, it cannot be applied because there was no clear regulation of working hours for online transportation drivers. The occurrence of WMSDs complaints that most often appears when they finish their work. This complaint is because of the repetitive work, static work, and bad posture for longer time<sup>6</sup>. Gunawan dan Tirtayasa (2014) reported that the riding sport motor is riskier than matic motorcycle to get WMSDs<sup>3</sup>. Unergonomics postur is related with motorcycle's design which could make the effect of MSDs more severe<sup>4,5</sup>, then it could be high risky for road crash<sup>5</sup>.

Study of Hossain M, Et all (2018) showed age affects the WMSDs signs. The signs were increasing since 35 years old<sup>7</sup>. The age of respondents of this research are mostly over 35 years old, so all respondents complained WMSDs. Besides that, the duration of work also influenced the WMSDs subjective's sigh<sup>6</sup>. Work time which did not managed well will be one of the risk factors for

severe of WMSDs<sup>8,9</sup>, the respondents usually ignore their sign of MSDs due to bonus if they can take many trips.

11 respondents were active smokers; the previous researches found the cigarette could make worse the muscle, joint, and blood vessel in human body<sup>10,11</sup>, so it will make more severe the MSDs signs among the drivers. One of the treatments to decrease the MSDs complaints is stretching or conducting physical activity, such as regular exercises<sup>6</sup>. Those treatments had done by the driver when they felt stiffness and pain in their muscles.

REBA method can be used to assess almost all parts of the body, i.e. neck, trunk, upper and lower limbs<sup>12</sup>. It also can be used to assess static and dynamic posture, unstable posture that change rapidly<sup>12</sup>. But, it did not reveal the duration and frequency of work of workers. The result showed the REBA score to be 7, which can be interpreted that the job of online transportation drivers is at medium risk level that requires further research and assessment, including the duration and frequencies. However, this research was very limited in assessing the risk level of online transportation drivers affected by WMSDs.

## Conclusion

Based on results, analysis and discussion of this research, it can be concluded all respondents have subjective of joint complaints of WMSDs, even though there were differences in age of respondents, work years, body mass index, and duration of work. The biggest complaint of joints was on the shoulder, waist, wrist, and ankle. Based on the results of assessment of work posture the score was in moderate risk level, which means it requires the further research and assessment.

## Conflict of Interest

None

## Ethical Clearance

The study was approved by the Ethical Committee of Faculty of Public Health, University of Indonesia, Indonesia with approval number of 366/UN2.F10/PPM.00.02/2018.

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