INTERNATIONAL JOURNAL OF INTEGRATED ENGINEERING
ISSN: 2229-838X e-ISSN: 2600-7916

IJIE

Vol. 16 No. 9 (2024) 218-229
https://publisher.uthm.edu.my/ojs/index.php/ijie

Impact of a Stretching Program on Musculoskeletal Discomfort in Online Motorcycle Taxi Drivers: A Pre-Post Intervention Study

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DOI: https://doi.org/10.30880/ijie.2024.16.09.017

Article Info

Received: 17 May 2024
Accepted: 20 November 2024
Available online: 16 December 2024

Keywords

Brainstorming, musculoskeletal discomfort, stretching

Abstract

The prevalence of musculoskeletal discomfort is a current issue for online motorcycle taxi drivers. Any work must cause muscle complaints. Therefore, this article will answer the problem regarding the impact of musculoskeletal discomfort before and after the stretching program. Statistical tests are needed, including chi-square and Wilcoxon and brainstorming the specifications of the stretching program movement to 70 respondents. It was stated that there was a relationship between the NBM instrument and the respondent's characteristics and the level of significant differences before and after the stretching program with the specification of 8 stretching movements that could be carried out at 10.00 WIB and 15.00 WIB with an estimated time of up to 24 minutes. It is hoped that this can be a development in reducing musculoskeletal discomfort complaints that is sustainable.

1. Introduction

Online motorcycle taxis are motorbike taxi activities with technology. Online motorcycle taxis use applications as a step to make it easier for service users to call motorcycle taxi drivers. We highlight work activity considerations, namely when online motorcycle taxis transport passengers. The passengers who are in the spotlight are their weight and gender. These two things are because they are parameters for online motorcycle taxi drivers to measure the level of musculoskeletal discomfort, one of the dominant pains is the back area.[1],[2]. This pain will be prolonged so that it will really interfere with the role of online motorcycle taxi drivers while working[3],[4]. Therefore, discomfort during driving occurs over a long period of time[5].

Cases of body pain experienced by online motorcycle taxi drivers, especially during driving sessions lasting less than 30 minutes, indicate significant health problems and have the potential to pose a serious threat to their productivity and well-being. Pain that predominantly occurs in the back, legs and hands indicates muscle tension and unergonomic body posture while driving. This condition worsens after drivers transport passengers 3 to 5 times, which often forces them to cancel orders because the pain has not subsided. Canceling orders not only harms drivers financially but also disrupt service to customers. The use of pain relief ointments by drivers as a temporary solution reflects the urgent need for more effective and sustainable interventions. Therefore, accurate and in-depth research is needed to identify the main causes of this pain, evaluate work posture, and develop appropriate prevention and treatment strategies. This research will contribute to improving the quality of life of online motorcycle taxi drivers and the efficiency of the services they provide.

A series of observations to deepen the case, referring to studies[6], [7], revealed that the level of lower back pain is very dominant in vehicle drivers. Findings[8],[9], proves that post-driving training patterns need to be

implemented intensively. Then[10], stated that the shoulder area, also experiences high levels of musculoskeletal discomfort. Not only that, the technique of minimizing muscle complaints in the neck and back area is a target for improving the welfare of online motorcycle taxi drivers and the level of importance of sports modifications as well as an ergonomics perspective as a reference in this research[11],[12], and[13].The opportunity for this research is determining stretching specifications using various movements, estimating movement time on the basis of statistical testing[14]–[16]. Studies[17], the safety of cyclists is threatened when drivers pass with reduced visibility or close to oncoming traffic. Practical application: Infrastructure decisions should prohibit overtaking in areas with reduced visibility or oncoming traffic. Studies[18]–[20],This break design study provides evidence of the importance of breaks for improving worker performance. By incorporating a stretching program into these breaks, we can potentially address a particular cause of fatigue (musculoskeletal discomfort) and produce even greater performance improvements for the workforce. Studies[21], different types of drivers based on acceleration/braking behavior by separating the intersection influence zone (IZOI) and mid-block using driver characteristics in terms of acceleration/braking. Studies[22]stated that with this model of driver characteristics, it is necessary to carry out independent stretching exercises 3 times a day, 5 days a week, for 4 weeks, with Kinesio taping applied while driving, which is applied while driving for 4 weeks. Pain intensity, stress intensity, PPT, neck disability, and CROM were assessed before the intervention, after the intervention, and 4 weeks after the intervention. These findings are complemented by[23], most truck drivers comply with rest requirements regarding driver fatigue, load type, driver changes, access to parking, and time spent on work-related activities in rest areas influence the time truck drivers take breaks, and these factors likely increase the risk of truck drivers not comply with driver fatigue regulations. Not only that,[24], relationship modeling suggested that there was a non-linear relationship between duration of autonomous driving and takeover performance, with one duration (15 minutes) appearing safer overall and performance mixed within groups. This is also stated to be true by[25], so that the intervention decision is to create sporadic commitment with digital physical activity behavior, physiotherapy exercises for people with musculoskeletal conditions. From this study, it will dominate the low back pain area[26], [27]. With this dominance, the potential to cause drowsiness and thus a significant cause of vehicle accidents, road safety can be improved if more effective methods are available to increase driver alertness[28].

Research shows that drivers often experience lower back pain and musculoskeletal discomfort in the shoulder area. Although post-riding exercise has been proven to be effective, there is no standard method for reducing neck and back pain. Further research is needed on specific stretching techniques and exercise frequency to improve driver well-being, especially for online motorcycle taxi drivers.

The aim of this research is to determine (1) the relationship between the Nordic Body Maps instrument and the characteristics of online motorcycle taxi drivers, (2) the level of difference in the level of musculoskeletal discomfort complaints for pre-program and post-program *Stretching, (3) Stretching program specifications for online motorcycle taxi drivers.* The scope of the research was online motorcycle taxi drivers with musculoskeletal discomfort complaints of 70 respondents. In the preparation of this research, there is a review of previous findings which are compared with the findings in this manuscript. The main methods are the chi square and Wilcoxon tests. These two methods are steps to achieve research objectives and provide specific role interventions program *Sustainability stretching.* The hope of the contribution of this research is that the stretching program is suitable for application to online motorcycle taxi drivers, knowing the areas of the body that are complaints of dominance, carrying out regular monitoring of the impact of the stretching program and can be applied to working people other than online motorcycle taxis in a sustainable manner.

2. Methods

The research design is quantitative based on case studies. Non-parametric tests use chi square and Wilcoxon as the main parameters in this study. The research was conducted at Kendedes Cultural Park, Singosari, Malang district, Indonesia. The research will take place from June 8 2022 to August 10 2022. The research population involved 70 online motorcycle taxi drivers, taken as a saturated sample. This research ensures comprehensive inclusion of the entire population, enabling in-depth analysis of behavior and preferences in the context of online motorcycle taxi services. Thus, the results will provide a comprehensive understanding of industry dynamics and user needs. Primary data comes from a field survey using the Nordic Body Maps questionnaire distribution technique to 70 respondents. The research secondary data is a scientific reference on the topic of ergonomics with the scope of the research object regarding the level of musculoskeletal discomfort complaints from pre-program stretching and post-program stretching.

In this study, the construct used includes measuring the level of pain at body points during driving activities, which is represented by Nordic body maps, as proposed by[29]. These measurements are carried out using the Nordic Body Maps worksheet using nominal measuring instruments. In addition, respondent characteristics were also identified from several perspectives, including gender, height, body shape and age. Gender was divided into male and female, while height was categorized as not tall and tall, and body shape was divided into not fat and fat. Respondents' ages were grouped into youth, middle-aged and old categories.

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Measurement of respondent characteristics was carried out through descriptive statistical analysis, Chi-Square correlation, and Wilcoxon test, using a nominal scale. By using this framework, research can identify and measure various relevant aspects related to the experience of pain in online motorcycle taxi drivers during driving activities, as well as understand the relationship between respondent characteristics and the level of complaints experienced. Research data analysis techniques with the following stages:

1. Distribution of the Nordic Body Maps questionnaire, questionnaire withdrawal and tabulation to a sample of online motorcycle taxi drivers.
2. Designing an instrument for the characteristics (gender, height category, body shape and age) of online motorcycle taxi drivers[30], [31].
3. Chi-Square statistical test of the Nordic body maps instrument (column) on respondent characteristics (row)[4], [32]. The chi square hypothesis formula for decision making is:
   H0 = If asymp. Sig < 0.1, it means there is no significant influence between row and column.
   Ha = If asymp. Sig > 0.1, it is stated that there is a significant influence between the row and column.
4. The Wilcoxon signed rank test statistical test uses pre-program instruments *stretching after the stretching program*[33].The Wilcoxon hypothesis formula for decision making is:
   H0 = If asymp. Sig > 0.05, it is stated that there is no difference in the level of musculoskeletal discomfort complaints for pre-program and post-program *Stretching*.
   Ha = If asymp. Sig < 0.05, it is stated that there is a difference in the level of musculoskeletal discomfort complaints for pre-program and post-program *Stretching.*
5. Brainstorm program movements *Stretching.*
6. Results of discussion and research interventions.

This research methodology involves a series of structured stages to analyze data obtained from research regarding the effect of stretching programs on the level of musculoskeletal discomfort complaints in online motorcycle taxi drivers. The first stage involved distributing a Nordic body maps questionnaire to a sample of online motorcycle taxi drivers, followed by drawing up the questionnaire and tabulating the data obtained. Furthermore, the online motorcycle taxi driver characteristics instrument was designed by considering factors such as gender, height category, body shape and age, referring to previous research by[30], [31].. Data analysis was carried out using the Chi-Square statistical test to evaluate the relationship between the Nordic body maps instrument (column) and respondent characteristics (row), using the adjusted chi-square hypothesis formula. Next, the Wilcoxon signed rank test statistic was used to compare the level of musculoskeletal discomfort complaints before and after the stretching program, with the appropriate Wilcoxon hypothesis formula. The next stage involves brainstorming to formulate movements that will be included in the stretching program. Finally, the results of the discussion and research interventions are presented to conclude the findings and their implications in the context of reducing complaints of musculoskeletal discomfort in online motorcycle taxi drivers. With this structured approach, this research methodology allows comprehensive data collection and valid analysis to evaluate the effectiveness of the stretching program in reducing musculoskeletal discomfort complaints in the population of online motorcycle taxi drivers.

3. Results and Discussion

The characteristics of the drivers are predominantly male, 51 people with a percentage of 72.9%, dominantly tall, 68 people with a percentage of 97.1, not fat, 56 people with a percentage of 80%, 62 people in the youth category with a percentage of 88.6. %. The rider's perspective is a motorbike with driver and passenger capacity. These two capacities take into consideration gender category, height and body shape as well as age so that it is not dangerous for the motorbike being used[4].

Table 1 *Characteristics of respondents*

	Sex		Height Category		Body shape		Ols		
	male	female	Not high	Tall	Not Fat	Fat	Youth	Half old	Old
Frequency	51	19	2	68	56	14	62	7	1
Percent (%)	72.9	27.1	2.9	97.1	80.0	20.0	88.6	10.0	1.4

Source: data analysis, 2022.

The dominant drivers are men with tall heights in proportion who are not fat and who are still young. Findings[12], [34], [35], also stated that the dominant drivers are young people. There is an advantage that the dominant young drivers aged < 36 years are in the category that requires high physical requirements. Therefore, it is supported by a body shape that is declared not fat, which makes driving easier [2]. Chi square test to determine

the significant level of the relationship between the 27 Nordic Body Maps instruments and the respondent characteristics instruments[36]. The recapitulation of the chi square test that we highlight is the asymp value. Sig (2-sided) < 0.10 states that the hypothesis Ho is rejected and Ha is accepted[14], [15], [37]. The chi square test stage is after driving by providing a stretching program[12], [15], [38]. *The stretching program is given as an effort to reduce muscle complaints using 27 Nordic Body Maps as a reference*[9], [11], [36]. The pre-program stretching chi square test with recapitulation only shows that the Ha hypothesis is accepted as follows:

Table 2 *Chi square pre stretching*

NBM Instruments		*Respondent characteristics instrument*	asymp. Sig < 0.10	*Decision*
Upper neck	→	*Height*	*0.034*	*Ha accepted*
Left shoulder	→	*Body mass index*	*0.022*	*Ha accepted*
Waist	→	*Age*	*0.091*	*Ha accepted*
Right knee	→	*Body mass index*	*0.044*	*Ha accepted*

There is discomfort in the posture of online motorcycle taxi drivers, namely the 4 Nordic Body Maps instruments which influence the characteristics of each respondent's instrument with ASYMP. Sig < 0.10. The chi square instruments that have a significant effect are the upper neck on body height, the left shoulder on body mass index, the waist on age and the right knee on body mass index. Meanwhile, the other 23 Nordic body maps items had no effect on respondent characteristics. *After obtaining the chi square value from complaints from online motorcycle taxi drivers, then* designing programs *stretching* using the brainstorming method[38]. The brainstorming method uses 6 actors, namely 1 gym instructor, 4 ergonomics experts. There are 8 movements that are mutually agreed upon. This movement is a step to determine the suspicion that the stretching program is thought to be able to reduce complaints of musculoskeletal discomfort. These movements include the following:

Table 3 *Stretching movement program specifications*

Movement: Neck Roll Function: 1. *relaxes the neck muscles* 2. *increases the supply of blood and oxygen to the neck muscles*	
Movement: shoulder roll Function: 1. *relaxes stiff shoulder muscles* 2. *reduces stress on the body* [39]	

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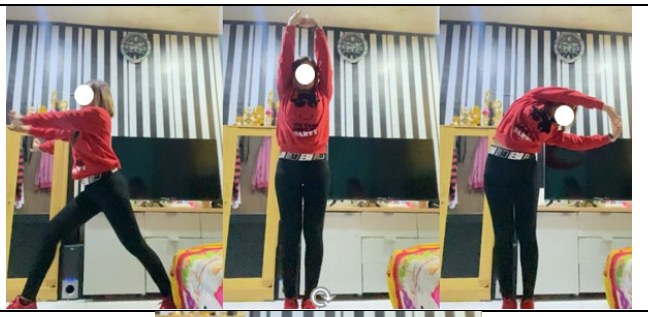
Movement: behind head triceps stretch Function:
1. *improve body posture*
2. *reduce the risk of injury*
3. *reduces back pain*



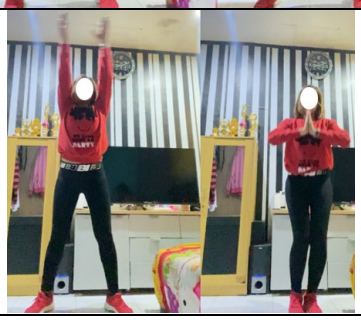
Movement: stand hip rotation Function:
1. *reduce foot injuries*
2. *supplies oxygen and blood to the muscles in the leg area*

Movement: child pose Function:
1. *reduce knee injuries*
2. *relaxes the muscles in the knee area*
3. *reduce the impact of foot injuries*

Movement: lunge with twist
Function:
1. *reduces the risk of pelvic injury*
2. *relaxes the muscles in the pelvic area*

Movement: golf ball roll
Function:
1. *relaxes the muscles in the leg area*
2. *supplies oxygen and blood to the sole area of the feet*

Movement: take a breath
Function:
1. *relaxes the mind, body to start activities*
2. *reduces stress and refreshes the body*



Movement program stretching with 8 movements. This movement has an estimated total implementation time of 16 minutes to 24 minutes. The stretching movement program was carried out 2 times a day with testing for 7 days totaling 70 people at 10.00 WIB and 15.00 WIB. After testing the entire research sample, a chi square test was carried out after the stretching program with a recapitulation only showing that the Ha hypothesis was accepted as in Table 4. There is a significant influence of the forearm on gender and body mass index, left wrist, right thigh and right calf on body mass index, right knee on gender, right calf and left foot on age with each chi square test value with significance < 0.10.

Table 4 *Chi square post stretching*

NBM Instruments		*Respondent characteristics instrument*	Asymp. Sig < 0.10	*Decision*
Forearm	→	*Gender*	*0.079*	*Ha accepted*
Forearm	→	*Body mass index*	*0.088*	*Ha accepted*
Left wrist	→	*Body mass index*	*0.029*	*Ha accepted*
Right thigh	→	*Body mass index*	*0.046*	*Ha accepted*
Right knee	→	*Gender*	*0.019*	*Ha accepted*
Right calf	→	*Body mass index*	*0.029*	*Ha accepted*
Right calf	→	*age*	*0.048*	*Ha accepted*
Left Foot	→	*age*	*0.066*	*Ha accepted*

Table 5 *Wilcoxon test*

Parts of body		Before Stretching		After Stretching		Wilcoxon test	
		n	%	n	%	Z	Sig.
Upper neck pain	Painless	22	31.4	58	82.9	-5,555	0,000
	Sick	48	68.6	12	17.1		
Lower neck pain	Painless	28	40.0	70	100.0	-6,481	0,000
	Sick	42	60.0	0	0.0		
Left Shoulder	Painless	31	44.3	70	100.0	-6,245	0,000
	Sick	39	55.7	0	0.0		
Right Shoulder	Painless	31	44.3	58	82.9	-4,564	0,000
	Sick	39	55.7	12	17.1		
Left upper arm	Painless	28	40.0	70	100.0	-6,481	0,000
	Sick	42	60.0	0	0.0		
Back	Painless	8	11.4	57	81.4	-6,731	0,000
	Sick	62	88.6	13	18.6		
Right Upper Arm	Painless	32	45.7	70	100.0	-6,164	0,000
	Sick	38	54.3	0	0.0		
Waist	Painless	17	24.3	59	84.3	-5,940	0,000
	Sick	53	75.7	11	15.7		
Butt	Painless	17	24.3	56	80.0	-5,814	0,000
	Sick	53	75.7	14	20.0		
Butt	Painless	21	30.0	55	78.6	-5,376	0,000
	Sick	49	70.0	15	21.4		
Left Elbow	Painless	51	72.9	56	80.0	-0.928	0.353
	Sick	19	27.1	14	20.0		
Right Elbow	Painless	53	75.7	70	100.0	-4.123	0,000
	Sick	17	24.3	0	0.0		
Left Forearm	Painless	52	74.3	70	100.0	-4,243	0,000
	Sick	18	25.7	0	0.0		
Right forearm	Painless	48	68.6	60	85.7	-2,449	0.014
	Sick	22	31.4	10	14.3		
Left wrist	Painless	38	54.3	55	78.6	-2,795	0.005
	Sick	32	45.7	15	21.4		

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Right Wrist	Painless	31	44.3	58	82.9	-4,439	0,000
	Sick	39	55.7	12	17.1		
Left hand	Painless	46	65.7	70	100.0	-4,899	0,000
	Sick	24	34.3	0	0.0		
Right hand	Painless	38	54.3	59	84.3	-3,656	0,000
	Sick	32	45.7	11	15.7		
Left Thigh	Painless	44	62.9	61	87.1	-3,272	0,000
	Sick	26	37.1	9	12.9		
Right Thigh	Painless	41	58.6	57	81.4	-2,828	0,000
	Sick	29	41.4	13	18.6		
Left Knee	Painless	43	61.4	49	70.0	-0.973	0.330
	Sick	27	38.6	21	30.0		
Right knee	Painless	46	65.7	68	97.1	-4,690	0,000
	Sick	24	34.3	2	2.9		
Left calf	Painless	38	54.3	57	81.4	-3,800	0,000
	Sick	32	45.7	13	18.6		
Right calf	Painless	41	58.6	55	78.6	-2,401	0.016
	Sick	29	41.4	15	21.4		
Left Ankle	Painless	48	68.6	55	78.6	-1,183	0.237
	Sick	22	31.4	15	21.4		
Right Ankle	Painless	47	67.1	70	100.0	-4,798	0,000
	Sick	23	32.9	0	0.0		
Left Foot	Painless	40	57.1	53	75.7	-2,137	0.033
	Sick	30	42.9	17	24.3		
Right foot	Painless	39	55.7	59	84.3	-3,651	0,000
	Sick	31	44.3	11	15.7		

Complaints about body areas before the stretching program dominant often sick reach reaches ≥ 70%. These body areas included the back of 62 respondents (88.6%), the waist of 53 respondents (75.5%) and the buttocks/hips of 53 respondents (75.7%). But post-program *stretching, the percentage level of body area complaints has decreased significantly*[9], [15], [36]. There was a predominance of the highest percentage of complaints of back pain at 88.6%, waist at 75.7% and buttocks at 75.7% for the pre-stretching program. This finding answers the statement [5], namely complaints that the back area is very high. Therefore, the role of flexion during driving is very supportive. Flexion activities can be done by reducing the angle between the bones, namely the head and back areas. Thus, moving the neck left and right every few minutes while driving is the lightest solution and requires in-depth movement specifications. Ergonomic intervention for this population is recommended for discomfort after the stretching program, there is still a pain complaint rate of ≥ 20%, namely the left leg, left ankle, left knee, left wrist, buttocks and buttocks.

4. Future Discussions and Ideas

In this study, physical health status, lifestyle, work trauma, or other stress that could cause musculoskeletal disorders were not explicitly seen. This physical health needs to be improved because the driver must be safe from the start to the destination while driving. These findings are supportive[17], that there is a risk to the safety of cyclists when being passed by a driver under conditions of reduced visibility or close to an oncoming vehicle colliding, so that the rider does not have a history of driving trauma. These findings strengthen evidence that driver behavior needs to reduce aggressiveness which will harm other drivers[21].

However, it is important to remember that these factors can greatly influence the results of the study. For example, the respondent's physical health condition, such as a history of certain injuries or illnesses, as well as lifestyle such as the level of physical activity and body posture habits in daily activities, can influence the level of musculoskeletal discomfort experienced. In addition, work trauma such as accidents or exposure to unergonomic working conditions, as well as high levels of stress, can also be relevant risk factors but were not accommodated in this study. However, this research provides a comprehensive picture of the characteristics of respondents, focusing on gender, height, body shape and age of online motorcycle taxi drivers. From the data presented in Table 1, the dominant drivers are men who tend to be tall, not fat, and young. This finding is consistent with previous research which shows that online motorcycle taxi drivers are generally young. However, this also raises questions about how other factors such as physical health status and lifestyle might influence the results of this study.

Data analysis using the Chi-Square statistical test shows a significant relationship between the Nordic Body Maps instrument and respondent characteristics. However, keep in mind that these results may be influenced by other factors not included in the study, such as work trauma or stress. The Wilcoxon test results also showed significant changes in the level of musculoskeletal discomfort complaints after the stretching program, however it is important to consider that external factors such as lifestyle or stress levels can influence these results. Chi square statistical testing pre-stretching program compared to post-stretching program shows a significant impact. Starting from the pre-stretching program, there is an influence of the upper neck on body height; left shoulder and right knee against body mass index; and waist against age. This finding is in line with [16], [40], [41], *that body posture that does not pay attention to the level of safety when driving is indeed the main complaint, namely the neck, shoulders, waist and knees. The function of the neck is to support the head which must focus while driving. Then the waist as a neck strengthener and body support. Therefore, the activities of online motorcycle taxi drivers with high work targets can cause body complaints in this area. Not only that, the characteristics of height, age and body mass index play a full role from the body's internal perspective*-program percentage level *trenching* statement [42], proves that the area of the body before undergoing the intervention program, indeed has an overall postural need for comfort as a suggestion for postural improvement. Therefore, the pre-program stretching of the back, waist and buttocks areas is the dominant area that must be carried out as a sustainability proposal.

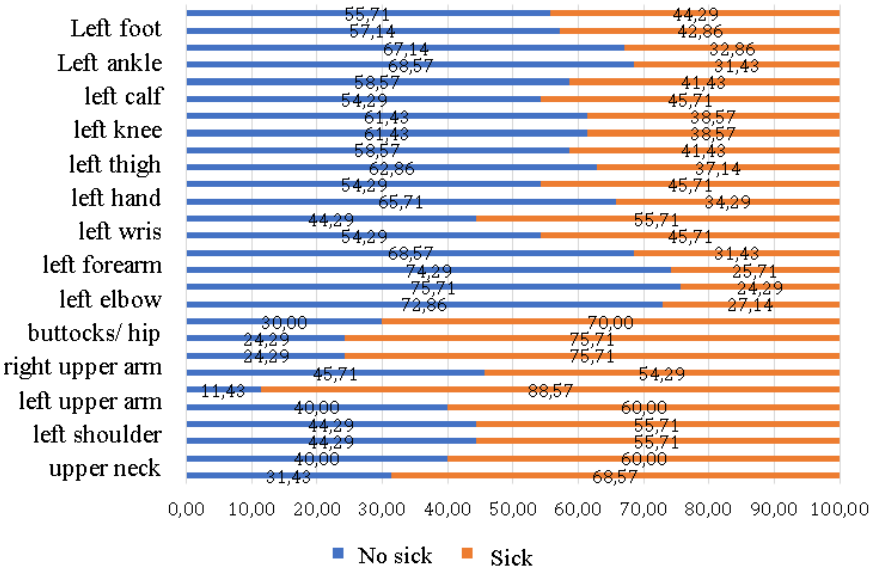

Fig. 1 *Percentage of number of complaints before stretching program*

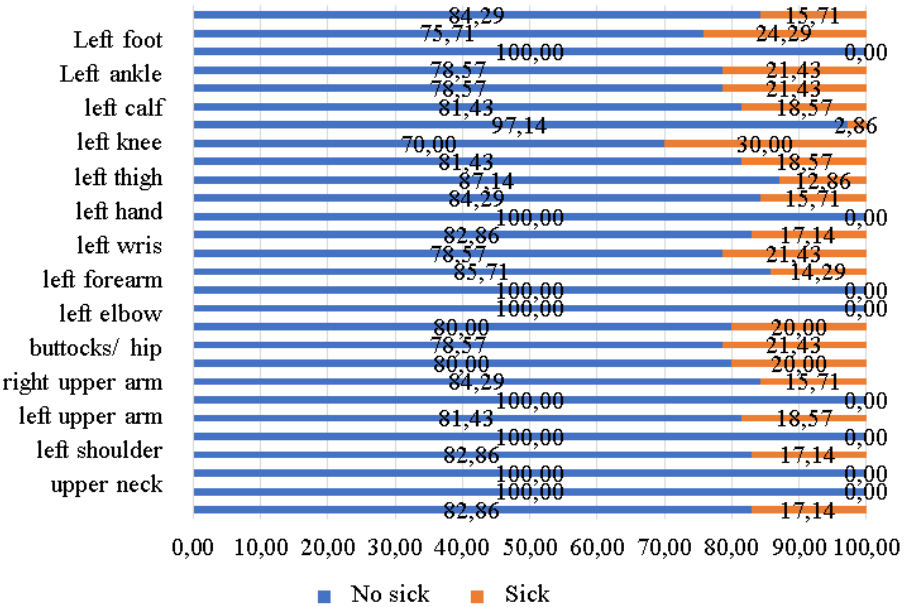

Fig. 2 *Percentage of number of complaints after stretching program*

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The post-stretching program stage increases the impact of the forearms on gender and body mass index; left wrist, right thigh, and right calf against body mass index; right knee to gender; right calf and left foot versus age. Findings [1], [7], [43], revealed that body mass index has an important role in the activity of online motorcycle taxi drivers. The lower the body mass index value (< 33kg), the level of complaints on the forearm, left wrist, right thigh and right calf can decrease. This is an important role as an effort to stabilize the level of body shape beyond the influence of age and gender[7]. Expression[1], also proves that the youth age range from 18 years to 35 years is a parameter for testing body posture. Nordic body maps posture that influences age is the right calf and left foot. The function of the right calf is to control the brake components and the left foot is to control the gears while driving. This is also strengthened by the findings[44], proving that increasing flexion activity during driving can provide optimal driving potential with very little risk of injury. Therefore, the opportunity to estimate the ideal driving time of 10 minutes to 30 minutes for each passenger is highly recommended based on the real conditions of the chi square test results.[3], [41], [45]. In accordance with the percentage of complaints after the stretching program, it is feasible to reduce complaints from 28 Nordic Body Map points to just 7 complaint points. This finding is in line with[45], that the prevalence of work activities is very significant in reducing postural point complaints. Whereas[34], revealed that the level of musculoskeletal discomfort intervention cannot be done just once. However, it requires sustainability. The finding of 7 complaint points which were not significant is clear evidence that the online motorcycle taxi driver stretching program can have a positive impact. Of course, it requires the support of an appropriate stretching schedule, controlled stretching movements and consistency in activities.

During 7 days of testing stretching movements on 70 online motorcycle taxi drivers, there was a significant difference in influence on the average number of respondents' complaints pre and post the stretching program. There were 25 complaints with a Wilcoxon test significance value of 0.000 (< 0.05)[16], [46], [47]. The left elbow, left knee and left ankle areas showed insignificant results between complaints pre and post stretching program with a statement of significance value > alpha 0.05. Statement[47]proves that the level of critical need to develop effective technical control includes driving methods that require a stretching program as a step to reduce complaints of musculoskeletal discomfort. *Movement* stretching with a total of 8 movements using an estimated time of 16 minutes to 24 minutes 2 times a day for 7 days at 10.00 WIB and 15.00 WIB. Therefore, areas of the body that are not yet significant require a further stretching program with a structured and ideal time estimate in order to reduce the risk in a sustainable manner.

This research found that factors such as physical health status, lifestyle, work trauma, or stress were not explicitly seen in this study. However, the importance of physical health for rider safety is highlighted. These findings support that drivers need to reduce aggressiveness that harms other drivers. However, these factors can significantly influence research results. This research provides a comprehensive picture of the characteristics of respondents, but keep in mind that other factors such as work trauma or stress can influence the results. Data analysis shows a significant relationship between the Nordic Body Maps instrument and respondent characteristics, but the results can be influenced by other factors. The stretching program was successful in reducing complaints of musculoskeletal discomfort, but it should be noted that external factors can influence the results. Testing over 7 days showed significant differences in complaints pre and post stretching program, with several areas of the body requiring a continued stretching program to reduce risk on an ongoing basis.

5. Conclusion

The conclusion of this research is to answer the objectives with evidence of findings. It is stated that (1) there is a relationship between the Nordic Body Maps instrument and the characteristics of online motorcycle taxi drivers before the stretching program, including: upper neck to body height, left shoulder to body mass index, waist to age and right knee to body mass index; (2) there is a relationship between the Nordic Body Maps instrument and the characteristics of online motorcycle taxi drivers after the stretching program, including: forearm to gender, forearm, left wrist, right thigh and right calf to body mass index, and right calf and left foot to age; (3) exists significant difference in the level of musculoskeletal discomfort complaints for pre-program and post-program Stretching except the areas of the left elbow, left knee and left ankle were not significant between complaints pre and post the stretching program with a statement of significance value > alpha 0.05; and (4) stretching program specifications for 8 movements, including: neck roll, shoulder roll, behind head triceps stretch, stand hip rotation, child pose, lunge with twist, golf ball roll, and take a breath. The estimated stretching program time is 16 minutes to 24 minutes with a frequency of 2 times a day for 7 days, at 10.00 WIB and 15.00 WIB. The factual contribution of this research is the feasibility of a stretching program for online motorcycle taxi drivers, it was found that areas of the body dominate complaints of musculoskeletal discomfort. Thus, regular control of the impact of the stretching program requires a sustainable role to realize the prediction of zero musculoskeletal discomfort for online motorcycle taxi drivers and other entities related to musculoskeletal discomfort. The suggestion of this research is that the level of sustainability of the stretching program really requires the role of sustainability. Of course, this is a step to answer global challenges so that social entities in the world of work do not have musculoskeletal discomfort complaints that can be resolved immediately. The level of musculoskeletal discomfort

for online motorcycle taxi workers is proof that any job will cause muscle complaints. With these findings, more innovative ergonomics-based work system design ideas can emerge.

Acknowledgement

We would like to thank the National Institute of Technology Malang, Indonesia, for this affiliation which provides the opportunity to conduct ongoing research. The support and facilities provided were very significant in carrying out this research. Thank you for the cooperation and support provided during the research process.

Conflict of Interest

Authors declare that there is no conflict of interest regarding the publication of the paper.

Author Contribution

Julianus Hutabarat: ***study conception and design, data collection, analysis and interpretation of results, and manuscript preparation****. Kohar Sulistyadi:* ***data collection, analysis, and interpretation of results, study design****.*

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