International Research Journal of Pharmacy and Medical Sciences
ISSN (Online): 2581-3277

Cardiorespiratory Fitness for Online Motorcycle Taxi Drivers in Jakarta, Indonesia

Tarwoto[1], Wartonah[2], Mumpuni[3]
[1,3]Lecturer, Health Polytechnic Jakarta I, Indonesia
[2]Lecturer, Health Polytechnic Jakarta III, Indonesia

Abstract*— Background:** *Cardiorespiratory fitness is a reflection of the health of the human body. Measurement of cardiorespiratory fitness is needed to detect early health problems that may occur.* ***Objective*: This study was to determine what factors are associated with the level of cardiorespiratory fitness in online motorcycle taxi drivers in South Jakarta.* ***Methods****: The design of this study was descriptive analytical with a cross-sectional design. The research sample is respondents who work as online motorcycle taxis with a sample of 100 people, with incidental sampling technique. Data collection begins with respondents filling out a questionnaire, measuring their height and weight and blood pressure. Furthermore, respondents took a running test for 15 minutes, then measured how many meters were obtained and then the results were converted based on the balke test.* ***Results****: there was a significant relationship between smoking habits (p=0.004), coffee drinking habits (p=0.004), length of work as an online motorcycle taxi driver (p=0.017) and working hours for 1 week (p=0.036) with fitness level. cardiorespiratory. There is no relationship between body mass index (p=0.609) and systolic blood pressure (0.449) with the level of cardiorespiratory fitness among online motorcycle taxi workers in South Jakarta.*

Keywords*— Cardiorespiratory, fitness, online motorcycle taxi drivers.*

I. INTRODUCTION

Online motorcycle taxis are one of the means of transportation to facilitate fast and efficient community mobility in the midst of congested traffic conditions. This is felt by online motorcycle taxi users considering that online motorcycle taxis reach their destination faster than other types of vehicles. One aspect that is also considered in the use of online motorcycle taxis, in addition to the quality of the vehicle is also the physical health of the driver, considering that online motorcycle taxi workers are on roads with high levels of pollution, mainly due to motor vehicle exhaust. Exhaust substances from motor vehicles that cause air pollution include carbon monoxide (CO), various hydrocarbon compounds (HC), various nitrogen oxides (NOx) and sulfur oxide (SOx) and various dust particles including lead (PB). These pollutants are pollutants that endanger health [1,2].

One of the health problems that have a direct impact on air pollution is respiratory and cardiovascular disorders such as acute or upper respiratory infections, lung damage, hypertension. Carbon monoxide gas, for example, is a compound that when inhaled into the lungs will bind to hemoglobin (COHb) 140 times stronger than oxygen, this will affect the vital function of hemoglobin as an oxygen carrier. Pollution due to hydrocarbons can cause lung cancer, because these substances are toxic and carcinogenic. Another health problem caused by nitrogen oxides (NOx) is lung damage. NOx released by motorized vehicles will combine with the atmosphere to form nitrates that can penetrate and damage lung tissue. Another dangerous pollutant is sulfur oxide (SOx), this substance is in the form of an acid that can damage the epithelium and attack the mucous membranes so that it can cause irritation of the respiratory tract, nose, throat and lungs [3–6]. Elderly people are very susceptible to lung disorders because the adjustment of lung capacity and function decreases, and the immune defense is weak. Because the lung capacity of people with heart and lung disease is also low, this group is also very sensitive to air pollution [6,7].

Online motorcycle taxi workers are one of the communities whose health must be considered because they are often exposed to vehicle pollutants. They are people who are at risk of health problems because they are exposed to air pollution every day. There is no official data on the number of online motorcycle taxi workers, but it is predicted to reach tens of thousands of people. Health problems for a person can be recognized by how big the level of fitness of the heart and respiration (cardiorespiratory). Cardiorespiratory fitness is the ability of the heart and lungs to circulate blood and oxygen throughout the body optimally during continuous activity. Cardiorespiratory fitness can be determined by the value of the maximal oxygen uptake volume (VO2 max). VO2 max is a measure of how much oxygen the body can process to produce energy. It is measured in milli meters of oxygen per kilogram of body weight per minute (Levine, 2007). VO2 max is the result of maximal cardiac output and maximal O2 extraction by tissues, and both increase with exercise. Changes that occur in skeletal muscle with exercise are an increase in the number of mitochondria and enzymes that play a role in oxidative metabolism. There is an increase in the number of capillaries with better distribution of blood to muscle fibers. The final effect is a more complete O2 extraction and consequently for the same workload, a lower increase in lactate formation. The increase in blood flow to the muscles becomes lower and because of this, heart rate and cardiac output are less increased than in untrained people [8–11].

The level of cardiorespiratory fitness in online motorcycle taxi workers is one indicator of their health level so that they can predict health problems that may occur. Besides, the level of fitness of motorcycle taxi workers also greatly affects the safety of its passengers. Several factors that affect cardiorespiratory fitness, namely genetic factors, age, gender,

Tarwoto, Wartonah, and Mumpuni, "Cardiorespiratory Fitness for Online Motorcycle Taxi Drivers in Jakarta, Indonesia," *International Research Journal of Pharmacy and Medical Sciences (IRJPMS)*, Volume 5, Issue 3, pp. 42-45, 2022.

physical activity, blood pressure, body mass index. There are many other factors that affect the level of cardiovascular fitness such as heart and cardiovascular disease. This disease is closely related to smoking habits [12–15].

II. RESEARCH METHODOLOGY

The design of this study used descriptive analytic with a cross-sectional design. Data collection was carried out on online motorcycle taxi drivers who happened to pass by the research area and were willing to be research respondents in one measurement or incidental sampling. Respondent data was obtained by giving a questionnaire and testing the level of fitness. The number of respondents as many as 100 people who work as online motorcycle taxi drivers both as a single job or as a side job. Respondents filled out the questionnaire and then tested their fitness level using the Balke method. Measurement of the level of cardiorespiratory fitness was carried out by asking respondents to run as fast as possible for 15 minutes using a standing start, after being given a signal by the officer. The distance traveled in 15 minutes is recorded in meters. To calculate VO_2 max, the following formula is used: VO_2 MAX = (x meters / 15) -133) x 0.172 + 33,3).

The results of the VO2 Max measurement were then converted using the Heywood 1998 guidelines, so that the criteria for cardiorespiratory fitness were very poor, bad, moderate, good, very good and perfect. However, to simplify the classification, the researcher only grouped two parts, namely bad and good. The results of the measurement are very bad and bad are grouped as bad results while the other results are grouped good. The research data were then analyzed by univariate and bivariate.

III. RESEARCH RESULT

Table 1 shows that the highest proportion of respondents who have an abnormal body mass index category (53%), normal blood pressure (73%), have a smoking habit (55%), have the habit of drinking coffee (66%), with a length of work ≤ 2 years (79%), working ≤ 60 hours per week (67%) and having a bad level of cardiorespiratory fitness (58%).

TABLE 1. Frequency distribution of characteristics of respondents based on body mass index, blood pressure, coffee drinking habits, smoking habits, length of work, length of working hours and level of cardiorespiratory fitness

Variable	Category	Frequency	Percent
Body mass index	Normal	53	53
	Abnormal	47	47
Blood pressure	Normal	27	27
	Abnormal	73	73
Coffee drinking habits	Yes	55	55
	No	45	45
Smoking habits	Yes	66	66
	No	34	34
Length of work	> 2 years	21	21
	< 2 years	79	79
Hours worked in 1 week	> 60 hours	33	33
	< 60 hours	67	67
Cardiorespiratory fitness level	Good	42	42
	Bad	58	58

Table 2 shows that the relationship between respondents' characteristics and cardiorespiratory fitness level obtained body mass index category p=0.609, normal blood pressure p=0.449, smoking habit p=0.004, coffee drinking habit p=0.004, length of work p=0.017 and length of work every week. p=0.036

TABLE 2. Analysis of the relationship between body mass index, blood pressure, coffee drinking habits, smoking habits, length of work, hours of work with cardiorespiratory fitness level

Variable	Level of cardiorespiratory fitness				OR 95 % CI	P value
	Good		Bad			
	n	%	n	%		
Body mass index						
Normal	21	50	26	44.8	1.23	0.609
Abnormal	21	50	32	55.2	0.555-2.728	
Blood pressure						
Normal	29	69	44	75.9	0.710	0.449
Abnormal	13	31	14	24.1	0.292-1.726	
Smoking habits						
Yes	16	38,1	39	67.2	3.336	0.004
No	26	61,9	19	32.8	1.455-7.648	
Coffee drinking habits						
Yes	21	50	45	77.6	3.462	
No	21	50	13	22.4	1.459-8.214	0.004
Length of work						
> 2 years	4	9.5	17	29.3	3,939	0.017
≤ 2 yeras	38	90.5	41	70.7	1.216-1.275	
Hours worked in 1 week						
> 60 hours	9	21.4	24	41.4	2.588	0.036
≤ 60 hours	33	78.6	34	58.6	1.049-6.388	

Table 3 shows the results of the final multivariate modeling of factors related to the level of cardiorespiratory fitness in online motorcycle taxi workers, namely smoking habit p=0.030, coffee drinking habit p=0.046, length of work p=0.013

TABLE 3. Factors related to the level of cardiorespiratory fitness on online motorcycle taxi workers

Variable	B	Wald	P value	OR	OR (95%CI)
Smoking habits	-1.028	4.712	0.030	0.358	0.146-0.950
Coffee drinking habits	-0.986	3.994	0.046	0.373	0.148-1.044
Length of work	-1.595	6.111	0.013	0.203	0.063-0.834

IV. DISCUSSION

The results of the study show that most of the online motorcycle taxi workers (98%) are male, only 2% are female, this has become a reality because there are more male motorcyclists as drivers. Besides, this profession is required to always be on a motorbike, hot and required agility in driving.

The average age of online motorcycle taxi drivers is 37 years, the youngest age in this study is 21 years and the oldest age is 60 years. The age of motorcycle taxi drivers all productive age, which is a decent age to produce something meaningful. This means that all respondents have met the driver requirements, namely over 17 years of age.

The results showed that most of the online motorcycle taxi drivers had an abnormal body mass index (53%), the analysis concluded that there was no relationship between the state of the body mass index and the level of cardiorespiratory fitness

(p=0.609). The results of this study are in accordance with Lestari's research on the relationship between body mass index and physical activity with fitness levels in children aged 10-12 years at SDN 1 Sidodadi Masaran which stated that there was no relationship between BMI and physical fitness (p = 0.310). However, the results of Ekoparman's research, show that there is a weak negative correlation between BMI and physical fitness level (p=0.003 and r=-0.275), this indicates that the higher the BMI, the lower the level of physical fitness. Gumilar's research, also stated that there was a significant negative relationship between BMI and cardiorespiratory endurance in college students (p=0.02, r=-0.531). Thus, the higher the body mass index the lower the cardiorespiratory fitness and vice versa [16–18].

Body mass index is an index of assessment of body adipose tissue. Adipose tissue is inactive tissue as a result of body fat accumulation. Unlike the case with muscle tissue which is an active tissue so it is able to store and reuse oxygen [19,20].

Most of the respondents' systolic blood pressure had a normal systolic value (73%), only 27% were abnormal. The criteria for systolic blood pressure are between 80 to 139 mmHg. The results showed that there was no relationship between systolic blood pressure and the level of cardiorespiratory fitness (p=0.710). The results of this study are different from the research of Mursain, which showed that there was a negative relationship between cardiorespiratory fitness and systolic and diastolic blood pressure, meaning that subjects who had good cardiorespiratory fitness were characterized by the greater the VO2 max, the lower their systolic and diastolic blood pressure. The results of this study strengthen the results of research conducted by Buana which concluded that there was a significant relationship between cardiorespiratory fitness and blood pressure. The results showed that there was a negative relationship between VO2 max and systolic pressure, which was -0.443, meaning that there was a negative relationship between VO2 max and systolic blood pressure. Subjects with good cardiorespiratory conditions were characterized by a decrease in pulse rate, blood viscosity and the size of the diameter of the blood vessels, which resulted in a decrease in Total Peripheral Resistance (TPR). Although in fit subjects cardiac output increases, the decrease in TPR results in a significant decrease in blood pressure. The difference in the results of this study may be due to the relatively small number of respondents who have abnormal systolic pressure (27%) and their systolic blood pressure is still within the tolerance limit (no more than 200 mmHg). Systolic blood pressure is the ability of the heart to pump blood throughout the body. In a state of high pressure, it causes a high thrust so that the heart will work hard [21,22].

The smoking habit of the respondents was 55%, statistical results showed a significant relationship between smoking habits and the level of cardiorespiratory fitness (p = 0.004, r = 3.336). The results of this study mean that smoking contributes 3 times to the level of cardiorespiratory fitness. Research by Erawati showed a relationship between smoking habit and cardiorespiratory fitness level, p=0.001. Smoking can cause changes in the structure and function of the respiratory system, lung tissue, blood vessels and heart. Smoking habits can affect cardiovascular endurance or aerobic endurance. This will reduce the volume of oxygen inhaled by the body. Cardiovascular endurance is a basic element of physical fitness [23,24].

The habit of drinking coffee of respondents in this study was 66%, meaning more than those who did not have the habit of drinking coffee. The results showed that there was a positive and significant relationship between the habit of drinking coffee and the level of cardiorespiratory fitness (p = 0.004 and r = 3.462). Coffee is a drink that contains a lot of caffeine, which is a stimulant substance that has an impact on relaxing blood vessels and increasing blood flow. Caffeine can also stimulate increased production of catecholamine hormones which then stimulate autonomic nerves, including an increase in heart rate. In the long term can result in cardiovascular disorders such as heart failure.

The length of work of the respondent is more or the same as 2 years by 79%, more than that of less than 2 years. The results of the analysis showed that respondents who worked more than or equal to 2 years had a tendency to decrease their level of cardiorespiratory fitness (p = 0.017 and r = 3.939). Individuals who have worked as online motorcycle taxi drivers, especially in big cities, will be exposed to a lot of pollutants, which have an impact on health. The lungs are the main organs that feel the impact of vehicle exhaust substances such as carbon dioxide and monoxide, which in turn reduces the ability to capture oxygen. Carbon dioxide gas is a compound that when inhaled into the lungs will bind tightly to hemoglobin (COHb) about 140 times stronger than oxygen, this will affect the vital function of hemoglobin as a carrier of blood oxygen throughout the body. Hydrocarbon pollution can cause lung cancer because these substances are toxic and cardinogenic. Health problems caused by nitrogen oxides (NOx) are lung damage. NOx released by motorized vehicles will combine with the atmosphere to form nitrates that can penetrate and damage lung tissue. Another dangerous substance is sulfur oxide (SOx), this substance is in the form of an acid that can damage the epithelium and attack the mucous membranes so that it can cause irritation of the respiratory tract from the nose, throat to the lungs.

The average length of working hours in one week in this study is categorized into less than 60 hours and more or equal to 60 hours, this means that in one day the average is 8-9 hours. The results showed that the length of work in 1 week of more than 60 hours had a significant impact on the ability of cardiorespiratory fitness. This means that the longer the motorcycle taxi driver is on the road, the more at risk of cardiorespiratory fitness disorders.

V. CONCLUSION

Based on the results of the study, it can be concluded there is a significant relationship between coffee drinking habits (p=0.004), smoking habits (p=0.004), length of work (p=0.017) and length of time working for 1 week (0.036) on the level of cardiorespiratory fitness.

ACKNOWLEDGEMENT

The authors thank all participants and research assistants.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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