CIGARETTE AND CARDIORESPIRATORY FITNESS

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ARTICLE INFO	ABSTRACT
	Cigarettes are substances that contain various ingredients that have a negative impact on the body for both active and passive smokers. This study aims to investigate the effect of smoking habits on cardiorespiratory fitness. The design of the analysis used a crosectional sampling method with a sample of 100 online motorcycle taxi drivers. Data collection through questionnaires and measurements of cardiorespiratory fitness. Cardiorespiratory fitness measurements were carried out by the respondents, running for 15 minutes, and the results were converted to the Heywood scale. The results showed that of the 100 respondents, 55 people (55%) smoked and 45 people (45%) did not smoke. The statistical analysis revealed a significant relationship between smoking behavior and cardiorespiratory fitness in online motorcycle taxi drivers, with a value of p = 0.004 (α <0.05). The recommendations in this study are for smoking behavior factors to be considered in determining the degree of cardiorespiratory fitness.

Introduction

There are currently more application-based motorcycle taxis (online motorcycle taxis), both on motorbikes and cars. This phenomenon is inseparable from the efforts of road users to reach their destination faster, more effectively, and efficiently. The problem then arises about the health status of the online motorcycle taxi drivers, considering that they are often exposed to air pollution due to motor vehicle exhaust gases. In urban areas, almost 70-80% of air pollution is caused by exhaust gases from motorized vehicles, both four-wheeled and two-wheeled. Several motor vehicle exhaust gases cause pollution and are hazardous to health, including carbon monoxide (CO), hydrocarbon compounds (HC), various oxides of nitrogen (NOx), sulfur (SOx) and various dust particles, including lead (Pb). Gas released from motorized vehicles enters the body through inhalation and, combined with other substances, affects health (Rinayu, 2013).

One of the health problems that directly impacts air pollution is respiratory and cardiovascular disorders such as acute or upper respiratory infections, lung damage, and hypertension. Globally, cardiovascular diseases (CVD) are the leading cause of death, accounting for 31% of all deaths (Isomura et al., 2021). Several factors, including physical activity, smoking behaviors, and others, might influence a person's cardiorespiratory fitness, which is tightly linked and favorably linked to physical activity (Wibowo, 2021). Pollution due to hydrocarbons can cause lung cancer because these substances are toxic and carcinogenic. Carbon monoxide gas, for example, is a compound that, when inhaled into the lungs, will bind to hemoglobin (COHb), 240 times stronger than oxygen (Muslim, 2018). This will affect the vital function of hemoglobin as an oxygen carrier. 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 (source). Another dangerous pollutant is sulphur 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 irritate the respiratory tract, nose, throat, and lungs (Sugiarti, 2009).

Online motorcycle taxi workers are one of the communities whose health must be considered because they are often exposed to vehicle pollutants. Their health are at risk because of daily air pollution expose. There is no official data on the number of online motorcycle taxi workers, but it is predicted to reach up to million of people (Triatmojo, 2018). Health problems for a person can be recognized by their heart's fitness level 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 maximal oxygen uptake volume (VO_2 max) value. VO_2 max measures how much oxygen the body can process to produce energy. It is measured in millimetres of oxygen per kilogram of body weight per minute (Levine, 2008). VO_2 max results from maximal cardiac output and maximal O_2 extraction by tissues, and both increase with exercise. Changes that occur in skeletal muscle with exercise increase the number of mitochondria and enzymes that play a role in oxidative metabolism. There is an increase in capillaries with a better distribution of blood to muscle fibres. The final effect is a complete O_2 extraction and, consequently, a lower increase in lactate formation for the same workload. 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 (William & Ganong, 2003).

The level of cardiorespiratory fitness in online motorcycle taxi workers is one indicator of their health level to predict health problems that may occur. Besides, the level of fitness of motorcycle taxi workers also dramatically affects the safety of its passengers. Many factors affect cardiovascular fitness, such as heart disease and cardiovascular disease. This disease is closely related to smoking habits (Benjamin, 2010). Moreover, cigarette smokers were more likely to acquire cardiovascular disease, including heart disease, stroke, and peripheral artery disease (Ding et al., 2019).

The results from preliminary research in 2018 saw an increase in smokers among young people from 7.2% to 9.1%. This condition is very worrying because of the increase in disease caused by smoking, which reduces health status.

Cigarettes contain tobacco, which has about 2,500 components. The elements such as tar, nicotine, carbon monoxide gas, and nitrogen monoxide are harmful to health. Nicotine, for example, can cause addiction as well as heart and lung disorders (Tirtosastro & Murdiyati, 2010).

Method

The design of this study used a descriptive- analysis with a cross-sectional sampling method. Data collection was carried out on online motorcycle taxi drivers. Data were obtained through questionnaires and fitness level measurements. The samples were 100 online motorcycle taxi drivers, both as single or side jobs. Respondents filled out the questionnaire and then tested their fitness level using the Balke method. Researchers made the criteria for smokers' respondents, namely, respondents who smoked regularly every day or on a frequently-smoking scale regardless of the amount. At the same time, non-smokers were respondents who did not smoke or rarely smoked. Measurement of the level of cardiorespiratory fitness was carried out by requesting respondents to run as fast as possible for 15 minutes using a standing start. The results obtained for 15 minutes are then recorded in meters. The calculation of VO_2 max used the formula:
VO_2 max = (total meters/ 15) -133) x 0.172 + 33,3).
The results of the VO_2 Max measurement were then converted using the Heywood 1998 guidelines. Therefore the cardiorespiratory fitness can be categorised to terrible, bad, moderate, good, excellent, and perfect. However, the researcher only grouped two parts to simplify the classification: bad and good. The measurement results, terrible, and bad results are grouped as bad results while the other results are grouped as good result. The research data were then analyzed using univariate and bivariate statistics.

Results And Discussion
A. Results
1. Respondents' characteristics

The respondents in this study were online motorcycle taxi drivers, with the characteristics of the respondents in this study being 98% males and 2% females. The average age of respondents is 37 years old, the youngest age is 21 years old, and the oldest age is 60 years old.

1.1 Univariate Analysis

Table 1
Distribution of Respondents By Gender

Gender	n	Percentage
Male	98	98
Female	2	2
Total	100	100

Table 2
Distribution of Respondents By Age

Variable	Mean	SD	Minimum-Maximum
Age	37.45	8.5	21 – 60 years old

Table 3
Respondent's Smoking Habits and Cardiorespiratory Fitness

Variable	Category	Frequency	Percentage
Smoking habits	Smoker	55	55
	Non smoker	45	45
Cardiorespiratory fitness	Good	58	58
	Bad	42	42

The results of the analysis of online motorcycle taxi workers show that most of the respondents have a smoking habit (55%), and the respondents' cardiorespiratory fitness level is mostly poor (58%).

1.2 Bivariat Analysis

Table 4
Bivariat Analysis

| Variable | Fitness level | | Total | OR 95 % | P |
| | Good | Bad | | | |
	n	n	n	CI	*Value*
Smoker	16	39	55	3,336	
Non smoker	26	19	45	1,455-7,648	0,004

Respondents who have a smoking habit have a poor fitness level of 67.2%, while those who do not smoke have a poor fitness level of 32.8%.

According to the results of the analysis, smoking habits showed an OR value of 3.336 and p-value = 0.004. It can be concluded that smoking habits are significantly related to the level of cardiorespiratory fitness. With an OR value of 3.336, smoking habits contribute three times to the level of cardiorespiratory fitness.

B. Discussion

This study showed that from 100 respondents, 55 respondents had a smoking habit. The statistical tests obtained a p-value = 0.004 with a value of r = 3.336. This indicates a significant relationship between smoking habits and the level of cardiorespiratory fitness. The results of this study show the value of r, which means that smoking contributes

three times to the level of cardiorespiratory fitness. The results of this study are under the results of research (Erawati, Azrin, & Yovi, 2014), which showed a significant relationship between smoking habits and cardiorespiratory endurance with a p-value = of 0.001.

From a health perspective, smoking habits are considered harmful because they can interfere health. Smoking can cause various impacts on the human body, such as changes in the structure and function of the respiratory tracts and lung tissues. While the heart is a significant factor in cardiovascular disease, but also has an impact on coronary heart disease, even the worst effects on cerebral and peripheral blood vessels. Individuals who smoke will affect cardiovascular and aerobic fitness. Smoking habits will affect the intake of oxygen into the body, resulting in getting tired quickly (Windiar, 2014). Other studies have shown that young men who smoke have decreased cardiovascular fitness and peripheral muscle function compared to active young men and not smokers (Sperandio et al., 2014). The results of other studies show that there is a significant effect of cardiorespiratory fitness between nonsmokers and smokers. People who do not smoke have a higher VO_2 max than people who smoke (de Borba et al., 2014).

Cigarettes are one of the substances that contain many chemicals. When a cigarette is burned, more than 4,000 chemicals contain toxic substances (Milner, 2004). The main toxic components of cigarettes are acrolein, formaldehyde, carbon dioxide, nicotine, cotinine, phenol, and tar, which can damage the respiratory tract epithelium (Tamashiro, Cohen, Palmer, & Lima, 2009). Toxic substances from cigarettes enter the bronchi into the terminal bronchioles to damage the cilia and mucosa of the respiratory tract and result in squamous metaplasia, smooth muscle hypertrophy, and fibrosis. This situation triggers an inflammatory response, namely the emergence of many antibodies such as immunoglobulin M and immunoglobulin E (Milner, 2004). Inflammatory processes in the respiratory tract can cause lung disease, which in turn can reduce lung function. People who smoke many cigarettes can result in their lungs containing high carbon monoxide levels and low oxygen levels. Carbon monoxide is a gas with a stronger bond than oxygen with hemoglobin.

Smoking can increase blood pressure and accelerate heart rate and coronary thrombosis so that the heart's function as a blood pump decreases (Hammado, 2014). Toxic substances in cigarettes also cause blood vessel damage and can stimulate autonomic nerves, especially the heart. Inadequate heart and lung function will result in decreased cardiorespiratory fitness.

Fitness is the degree of adequacy of body functions. Cardiorespiratory fitness is one indicator of health status in individuals because the heart and lungs are essential organs that determine life. The cardiorespiratory fitness indicator is determined by how much oxygen the body can take in to produce energy (VO_2 max). The heart is an organ that functions as a pump of blood throughout the body, while the lungs play a role in taking in oxygen and removing carbon dioxide. Both organs work together to meet the body's needs for oxygen, glucose, electrolytes, and other important things.

Conclusion

The results of statistical analysis illustrate a significant relationship between smoking and non-smoking habits on the level of cardiorespiratory fitness. A study conducted on 100 online motorcycle taxi drivers in Jakarta in 2017 showed that most (55%) smoked, and only 45% did not smoke. Respondents who smoke tend to decrease their cardiorespiratory fitness level by three times compared to non-smokers, from this resarch we need conduct further research on cardiopulmonary health for online motorcycle taxi drivers.

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