

Risk Factors of an Online Motorcycle Taxi (Ojek Online) Fatigue in Medan

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Abstract—Ojek online is one of the on-trend informal jobs in Medan. Yet, an ojek online driver can face accidents and illnesses due to irregular times when doing this job. One of the complaints of the ojek online drivers is fatigue. The manifestation of fatigue is characterized by an increase of blood lactic acid concentration. The blood lactic acid is in concentration threshold of 4 mmol/l blood which indicates that muscle activity has become anaerobic (without oxygen supply). If the blood lactic acid concentration threshold reaches 8 mmol/l blood or more, it indicates that a person has begun to experience physical fatigue. This study was a quantitative research and it involved 40 drivers. The independent variables were ages, durations of work, working periods and workloads. Meanwhile, the fatigue was as the dependent variable. The result of research showed that majority of ojek online drivers experienced fatigue with an average lactic acid level of 2.3 mmol/l. The majority of ojek online drivers had worked for 12 months with an average working of 12 hours/day. The ojek online drivers' workload reached 150 Km/day. It showed that there were effects of ages (0.045) and workloads (0.000) on the fatigue of ojek online drivers.

Keywords: risk factors, fatigue, ojek online drivers

I. INTRODUCTION

Fatigue becomes a problem which can be a risk during working. The manifestation of fatigue is characterized by the increase of blood lactic acid concentration. According to Suma'mur, the word "fatigue" shows a different body condition either physical or mental. It does not only decrease the working efficiency but it also reduces the body resistance.

[1].

Tarwaka stated that muscle and general fatigue denote kinds of fatigue. Muscle fatigue is characterized by tremor or pain in the muscles. Meanwhile, the general fatigue is a feeling of extraordinary tiredness which can be restored by a rest.

Everyone has a different level of flexibility depending on several factors such as gender, age, nutritional states, and types of work. Yet, of all these factors that can cause fatigue, all of them still result the decreased endurance, loss of efficiency, and decline of work capacity [2].

Fatigue is a challenge for the quality of life and performance at work but it is difficult to be defined, understood, and repaired [3]. Fatigue arising on workers can cause weakening of physical strength and endurance then the body is not able to continue working. Fatigue is one of the factors of reduction in productivity, poor quality of work and increased risk of accidents [4].

Based on the data obtained, the level of fatigue of workers in an industry is between 7% to 45%. This depends on the measurement instrument of work flexibility. Most employees at companies visit industry clinics and consult with general practitioners due to complaints of fatigue. 67% of truck accidents in California is caused by fatigue. In England, it reached 10% - 25%. Other data found in the United States stated that 62 drivers (58%) of 107 drivers experienced truck accidents due to fatigue and sleepiness. [5].

The factors that can cause fatigue are monotonous conditions, burdens, and durations of work both physically and mentally, environmental conditions such as work climate, information, and noise, psychiatric conditions such as responsibility, worries or conflicts, feelings of pain, illness and nutritional conditions [6] [7].

Other causes of work fatigue include physiological factors, namely the accumulation of toxic substances and a decrease in blood. If many lactic acids are collected, the muscle will lose its ability. Limited blood flow and carrying oxygen causes fatigue [8].

Anaerobic glycolysis can easily produce lactic acid. Nearly 80% of lactate produced in anaerobic glycolysis is carried out from the muscles to blood circulation.

Anaerobic glycolysis process occurs when muscles need energy in a rapid time. Meanwhile, the lack of oxygen supply happens in someone who is doing exercise in high intensity. Under this lack of oxygen supply conditions, reoxidation of Hydrogen Nicotinamide Adenosine Dinucleotide (NADH) formed from NicotinamidAdenosine Dinucleotide (NAD +) is disrupted. In this condition, NADH is re-oxidized through a series of pyruvate reduction processes to lactate via anaerobic pathways by adding two hydrogen atoms to form lactic acid [9].

Lactic acid is an anaerobic metabolic process that is released from blood by liver. If there is a build-up of lactic acid or excessive lactic acidosis, muscle cramps will occur. Measurement of lactic acid in the body can be done by taking blood samples [10]. It is in the muscle that will inhibit the action of enzymes and interfere chemical reactions in the muscles. Then, it becomes weak and tired [11].

Ningrum states that fatigue arises due to lactic acid build-up in tissues. The severity of the activity is carried out due to the severity of the activity [12]. The results of a study conducted by Irmah Hidayah stated that the workers in apartment project experienced an increase of lactic acid levels by an average of 0.620 mmol/l after working all the day [13].

Later, Bal explains that the level of individual performance (duration of work and effort to do working) determines the level of increase in lactic acid [14]. The results of a study conducted by Carlos suggested that as many as 60.86% drivers of the fuel tanker in TBBM Kolaka experienced more severe fatigue and showed a relationship between driving duration, sleep quality, and time workload with driver fatigue tanker [6].

The development of industrialization in Indonesia has developed very rapidly in both the formal and informal sectors. The informal sector in the sense of the Central Bureau of Statistics is a non-directory company (PND) and household (RT) with a workforce of fewer than 20 people. The informal sector has special characteristics such as working for oneself, family businesses, irregular working hours and salaries, work often carried out at home, no government assistance and often not incorporated [15].

Informal workers that work as *ojek* online becomes on-trend recently. In the city of Medan alone, *ojek* online drivers have reached 2000 in numbers. Informal sector workers are also entitled to protection to avoid work-related illnesses or workplace accidents because in every workplace there are dangers/risks that can cause health problems that result in disability and death.

Working as an *ojek* online is vulnerable to fatigue due to the absence of working hours, the obligation to deliver passengers to various places, the inhalation of polluted air. The forms of fatigue which they feel are the pulse vibrating faster, shortness of breath, weakness and immediate hunger. The aim of this study is to analyze the

influence of age, workload, work period and duration of work on the *ojek* online drivers in Medan.

II. MATERIALS AND METHODS

The method of this research is an analytic study, where observations and measurements of variables to be linked are carried out at the same time or period. In terms of data analysis, this study included descriptive analytical research which was supported by examination of blood samples on the subject of the study. The population and samples in this study were 40 *ojek* online drivers. In this study, the independent variables were ages, workloads, work periods and duration of work. The fatigue that is measured by lactic acid levels in the blood is as dependent variable.

The measurement of lactic acid levels in the blood used the Roche Accutrend Plus Brand. The measurement of lactic acid levels in the blood of workers was done at night when the drivers finished working. Blood taking sampling was performed by nursing staffs of Helvetia Nursing Academy

The primary data were collected by asking questions directly to the drivers guided by the questionnaire and checking the blood of the drivers. The data obtained were presented in the form of tables and narratives. Then, they were analyzed descriptively and the statistical tests of linear regression were also done.

III. RESULTS

Ojek online can be said to be more advanced because they have been integrated with technological advancement. *Ojek* online is meant to make people carry out daily activities more easily by using increasingly advanced technology.

The general description of respondents of this study includes age, gender and education. The analysis characteristics that the majority of 25-28 years old *ojek* online drivers were 10 respondents (25%) and the minority of *ojek* online drivers that were 41-45 years old were 4 respondents (10%). All respondents were 40 men (100%). The majority of drivers that had high school level education was 20 respondents (50%).

TABLE I. SAMPLE CHARACTERISTIC BASED ON AGE, GENDER, AND OJEK ONLINE DRIVER EDUCATION IN MEDAN (N=40)

Characteristics	n	%
Age		
21-28	15	37.5
29-36	12	30.0
37-45	13	32.5
Gender		
Men	40	100.0
Women	0	0.0
Education		
Primary	1	2.5
Lower high school	14	35.0
high school	20	50.0
Bachelor	5	12.5

The analysis work period and duration that the majority of *ojek* online drivers that worked for 1 - 2 years was 30 respondents (75%) and the majority of *ojek* online drivers who had >8 hours duration of work per day was 36 respondents (90%).

TABLE II. WORK PERIOD AND DURATION OF OJEK ONLINE DRIVERS IN MEDAN (N=40)

Variable	n	%
Respondents' Period		
< 1	3	7.5
1-2	30	75.0
>2	7	17.5
Duration of work(hours)		
≤ 8	4	10.0
>8	36	90.0

The analysis of workloads and lactic Acid Levels that the average workload of *ojek* online drivers is 150 Km/day. The workload taken by *ojek* online drivers was a maximum of 215 Km/day and a minimum of 110 Km/day. Th lactic acid levels in the blood of *ojek* online drivers averaged 2.3 mmol/l. The lactic acid levels in the blood of *ojek* online drivers were the highest 3.6 mmol/l and as low as 1.2 mmol/l.

TABLE III. WORKLOADS AND RESULTS OF LACTIC ACID INSPECTION OJEK ONLINE DRIVERS IN MEDAN (N=40)

Variable	Mean	Mak	Min	SD
Workloads (km/day)	150	215	110	27.82
Fatigue (mmol/l)	2.3	3.6	1.2	0.62

The risk factors of *ojek* online fatigue in Medan was that there was an effect of ages ($p = 0.045$) and workloads (0.000) on the fatigue of *ojek* online drivers in Medan. There was no effect on working periods and duration on fatigue of *ojek* online drivers. The most dominant affecting factor fatigue on *ojek* online drivers was workloads.

TABLE IV. AFFECTING FACTORS FATIGUE ON OJEK ONLINE DRIVERS IN MEDAN

Variabel	B	p-
Constanta	-0.682	
Age	0.230	0,045
Work Period	-	0,457
Working Duration	-	0,119
Workload	0.667	0,000

The regression determination coefficient shows that the value of 0.755. It indicates that the ages variable and is also able to explain variations in fatigue of skin health complaints in *ojek* online drivers in Medan which is 75.5%. The remaining 24.5% is influenced or explained by other variables that is not included in the regression model used.

TABLE IV DETERMINATION OF REGRESSION

R ²	F	P
0,755	24.587	0,000

IV. DISCUSSION

The profession of *ojek* online driver has begun developing in Medan since 2015. This work was able to improve the

economy of the community and also reduce unemployment rates. In terms of the health of the profession, *ojek* online drivers are at risk of experiencing health complaints because there are no binding in working hours rules.

The results showed that the majority of 25-28 years old *ojek* online drivers were 25%. This age group is still in the productive age. The statistical results using linear regression test were 0.045. It means that the magnitude of the risk of fatigue can be influenced by ages. Meanwhile, the regression value of 0.230 which showed a positive direction. The fatigue experienced by a high level can be seen from high blood acid levels. Entering the age of 40, the workers tend to experience heavy work fatigue. Based on a research, the age of the driver and length of driving were the factors associated with driving performance and safety[16].

According to Glazner, based on the ages, workers will find it difficult to adjust their body health due to modifications in rhythm and circadian health and the ability to overcome triggers at work [17]. According to the researchers, increasing of age can be due to degeneration process of organ functions so that the organ's ability will decrease, causing the workforce to become more fatigued. However, it is known that complaints of skeletal muscle begin at 40 years and continues to increase by age. [2]

Budiono S. states that the phenomenon of reduced muscle performance after physical stress for a time is called physiological muscle fatigue. [8] In addition, *ojek* online drivers who are older decrease their muscle strength which is the results in fatigue. Also, there is a decrease in muscle strength which will cause muscle fatigue due to the accumulation of lactic acid in the muscles.

Fadle states, in his research, that drivers aged over 35 years experience tiredness [18] Januar Atiqoh (2014) states that positive correlation among ages and fatigue are found on sewing workers CV, Aneka Garment Gunungpati Semarang. [19] Based on a research conducted by Triyunita (2013) on weaving workers in PT. X Batang, ages and work fatigue had a significant relationship [20].

The working periods can affect both positive and negative workers. They will give a positive influence if the longer a person works, the more experienced in doing his work. This is because long physical activity will cause the muscles to become strong. Improvement of muscle function, especially the respiratory muscles, causes the inhalation to be more efficient at rest. Pulmonary ventilation in trained and non-trained people is relatively large, but experienced people breathe more slowly and more deeply. This makes the oxygen needed for muscle work in the ventilation process decrease so that with the same amount of oxygen, the trained muscle will work more effectively [21].

75% of the *ojek* online drivers in Medan have a working period of 1-2 years at . This study showed no influence

between years of work and fatigue with a p-value > 0.05. So, it is not always a longer working period which causes more fatigue or vice versa. Ator Nataria's research mentions that the tank truck drivers who have fatigue is not caused by their working period (0.124), but it is caused by age (0000) and the long drive (0000) [22]. The fatigue of *lumpia* leather workers in Kranggan sub-district, Indonesia, also shows that there is no correlation of years of work found but it is caused by their workload [23].

The duration of work for *ojek* online drivers has no time limit and depends on the ability of workers. The majority of *ojek* online drivers has the length of work around 10 -

13 hours per day. The results showed no influence between the duration of work and fatigue with a p-value > 0.05. A study of fatigue in building construction workers at PT Nusa Raya has different states from other research that the longer of working period can evoke of fatigue [24]. In this study, the duration of work of *ojek* online drivers does not affect fatigue because the duration of work is not always used to carry out activities in carrying passengers or orders. Some of the time is used to wait for orders, to enter their applications or to rest

The workloads of *ojek* online drivers are assessed by the length of the driver's mileage each day. The average distance traveled by a driver is 150 km/day. The statistical results using linear regression test obtained p-value 0.000. It means that there is a significant influence between age and fatigue. Meanwhile, the regression value was 0.667 which shows a positive direction is the greater the workload The fatigue experienced is higher seen from the high acid levels in the blood. A research conducted in Sweden on physical workloads and fatigue shows that heavy workloads can cause fatigue scales to reach 30% higher. [25].

In daily work, the weight of the work is determined by the conditions of the work environment. Light work in a comfortable environment will be heavy if it is done in a hot environment. Long distances with non-conductive working environment conditions such as overheating during the day can also increase the risk of fatigue in *ojek* online drivers. Fatigue can trigger anger due to high emotional feelings, headaches, less focus, tiredness and digestive tract problem [2].

Static loading of muscles for a long time will cause pain in muscles, bones, tendons, etc., caused by repetitive types of work. Working atmosphere with static muscles, blood flow decreases, so lactic acid accumulates and results in local muscle fatigue [26]. A high workload can be measured by pulse work. The pulse > 100-125 beats / minute at higher risk of fatigue compared with workers who have a pulse rate of 75-100 beats / min [27].

Employees rolling in Surakarta having normal a pulse rate before work and after a pulse workload tends to increase. Effect of fatigue on the workload against the employee by 63.5% [28]. Workload experienced by employees in the electronics industry is also a risk factor causing work

stress [29]. The comparative study of workload on CNC lathe machine operators and assembly also showed differences in fatigue on each worker [30].

Physical working was indicative related to bodily and mental fatigue [31]. Research problem on fatigue issues so far have not found the appropriate measurement standards. Yet, the weariness is positive related to risk factor with decreased performance and health. This finding is confirmed by a research conducted in Salatiga [32]. Nørgaard Line Remmen states that adjusted analysis shows that doing physical work is an indication related to ordinary fatigue [33].

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