

# Relationship between Fatigue and Musculoskeletal Complaints on Pedicab drivers in the Pedicab Association Solo Balapan Station

Novvini Miriam Suaebo<sup>1</sup>, Kinanti Anggraini Dewi<sup>2</sup>, Abdul Rohim Tualeka<sup>1</sup>

<sup>1</sup>Department of Occupational Health and Safety, Faculty of Public Health, Airlangga, University, Indonesia,

<sup>2</sup>Faculty of Health Science, Muhammadiyah University, Surakarta, Indonesia

## Abstract

Musculoskeletal complaints can occur when muscles or skeletons receive a load or work is done repeatedly and the work is done for a long time. Pedaling a pedicab every day for a long time can cause fatigue. The fatigue felt by the pedicab drivers will have an impact on the pain in the muscles both in the legs, back, hands, shoulders, and neck. The aim of the study was to determine the relationship between the level of work fatigue and musculoskeletal complaints on pedicab drivers in the pedicab association Solo Balapan Station. This type of research is quantitative research. The research method used observational research. The study design was *cross-sectional*. The population in this study were 35 pedicab drivers, a sample of 33 people. Instrument research uses a questionnaire. Data analysis used the test *Fisher exact*. The results showed that there was a relationship between the level of work fatigue and musculoskeletal complaints ( $p=0.001$ ). There is no relationship between age of workers and musculoskeletal complaints ( $p=1$ ). There is no relationship between work periods drivers and musculoskeletal complaints ( $p=1$ ). There is no relationship between the length of work/day with musculoskeletal complaints ( $p=0.273$ ). There is no relationship between the average distance traveled with musculoskeletal complaints ( $p = 0.273$ )

**Keywords:** *Fatigue, Musculoskeletal, Pedicab drivers*

## Introduction

The human body is designed to be able to carry out daily work activities. The existence of a muscle mass that weighs more than half the weight of the body makes it possible to move the body and do work. Every job is a burden for the person concerned. The burden is in the form of physical workload and mental workload. In practice the workload encountered is a combination of physical burden and mental burden<sup>1</sup>.

Fatigue is a condition characterized by feeling tired and decreasing alertness and influencing work productivity. According to Grandjean (1993) work fatigue is a symptom characterized by feelings of fatigue and decreased alertness<sup>2</sup>.

Exhaustion of work can have an impact on decreased attention, slowing and barriers to perception, slow and difficult thinking, decreased motivation to work, decreased alertness, decreased concentration and accuracy, low work performance, low work quality, and

decreased reaction speed. These things will cause a lot of mistakes so that workers experience musculoskeletal complaints, work stress, work-related diseases, workplace accidents, and ultimately productivity decreases<sup>3</sup>.

According to Setyawati (2010), work fatigue occurs due to the accumulation of lactic acid. At work the body needs energy. The energy is obtained from the results of glycogen breakdown. In addition to energy, lactic acid is one result of the breakdown of glycogen. When the muscles contract, the lactic acid buildup will occur. This lactic acid inhibits muscle action and causes fatigue<sup>4</sup>.

Work exhaustion is a condition of weakening activities, motivate, and physical fatigue to do work. According to Cameron (1973) in Setyawati (2010), work fatigue involves a decrease in physical performance, a feeling of fatigue, a decrease in motivation, and a decrease in work productivity<sup>4</sup>. Work exhaustion cannot be defined but can be felt so that the determination of

work fatigue can be known subjectively based on the feelings experienced by the workforce. According to Suma'mur (2009), that work fatigue does not only occur at the end of work time but can also occur before work<sup>5</sup>.

Complaints of the musculoskeletal system are complaints to parts of the skeletal muscles that are felt by someone starting from very mild complaints to very sick. If the muscle receives a static load repeatedly over a long period of time it will cause complaints in the form of damage to joints, ligaments, and tendons<sup>2</sup>.

Work activities carried out by pedicab drivers include pedaling and lifting weights. During pedaling activities, the posture is sitting upright or bent, right and left foot pedaling alternately, with a pattern of movement of both feet pedaling, and intense limbs moving the hips, thighs, calves, soles of the feet. When the pedicab lifts the weight, the posture is in the position of the back straight or bent, hands raised, feet become the foundation of the body with a pattern of movement of the hand holding the load and lifting it, and intense limbs move the hands, back, and legs. As a result of the activity of pedaling a pedicab, pedicab drivers can be at risk of developing musculoskeletal complaints. Based on the background, the researchers wanted to examine further the relationship between the level of work fatigue and musculoskeletal complaints on pedicab drivers in the pedicab association Solo Balapan Station. The purpose of this study was to determine the relationship between the level of work fatigue with musculoskeletal complaints on pedicab drivers in the pedicab association Solo Balapan Station.

## Material and Method

This study is an observational study. The design in this study uses *cross-sectional*. The population in this study are all 33 pedicab drivers who are members of the association of Solo Balapan Station rickshaw. The sampling technique used in this study was using *total* bivariate analysis using the Fisher exact test.

## Findings

### 3.1 Characteristics of Respondents

**Table 1. Distribution of respondents**

Variable	Amount	Percentage (%)
Age		
Risky	32	97.0
No risky	1	3.0
Fatigue		
Positive	19	57.6
Negative	14	42.4
Musculoskeletal complaints		
Positive	21	63.6
Negative	12	36.4
Length of work		
Old	30	90.9
New	3	9.1
hours per day		
Risky	19	57.6
No risky	14	42.4
mileage / day		
Long	22	66.7
Short	11	33.3

Based on Table 1 unknown 32 respondents (97%) > 35 years old, while 1 respondent (3%) does not include the age at musculoskeletal risk. It is known that 19 respondents (57.6%) experienced mild fatigue. A total of 14 respondents did not experience fatigue (14%). Many respondents complained of musculoskeletal pain as many as 21 people (63.6%), 12 respondents did not complain musculoskeletal (36.4%). The length of work known to 30 respondents (90.9%) have long been pedicab drivers. 3 respondents worked <7 years (9.1%). Many respondents worked 8 hours per day as many as 19 people (57.6%) while 14 people worked <8 hours per day (42.4%). A total of 22 respondents (66.7%) pedaled pedicabs in long distances, while 11 respondents (33.3%) pedaled pedicabs in short distances.

**Table 2. Relationship between fatigue and complaints musculoskeletal on pedicab drivers at Solo Balapan Station**

Fatigue	Musculoskeletal complaints		N	P-value
	Positive	Negative		
Positive	17 89.5%	2 10.5%	19 100%	0,001
Negative	4 28.6%	10 71.4%	14 100%	
Total	21 63.6%	12 36.4%	33 100%	

The results of testing the statistics are *Fisher Exact* known to be  $p = 0.001$  ( $p < 0.05$ ) with 95% CI = 3.280-137,667. These results indicate fatigue associated with musculoskeletal complaints in pedicab drivers at Balapan Station.

Based on the results of the study it was found that there was a relationship between fatigue and musculoskeletal complaints on pedicab drivers at Balapan Station. The results of this study explain fatigue as one of the factors causing musculoskeletal disorders. Fatigue is a condition where the body feels tired and not energized at any given time. This condition is actually a warning or sign from the body so that the body can be rested for a moment. Important rest is done as an effort so that the body can avoid more serious damage due to fatigue<sup>6</sup>. Musculoskeletal disorders can develop into disability and loss of ability and working time<sup>7</sup>.

Symptoms Muscle fatigue can be seen in symptoms that appear from the outside. There is a general theory of chemistry explaining that fatigue is a result of reduced energy reserves and increased metabolic waste as a cause of loss of muscle efficiency. While changes in electric current in the muscles and nerves are secondary causes. Whereas the central nervous theory explains that chemical changes are only supporting processes. Chemical changes that occur result in the delivery of nerve stimulation through sensory nerves to the brain that is recognized as muscle fatigue. This afferent stimulation inhibits the brain centers in controlling movement so that the potential frequency of activity in nerve cells is reduced. The reduced frequency will

reduce the strength and speed of muscle contraction and movement on the orders of will to be slow. This the slower the movement of a person will show the more tired the condition of one's muscles. With conditions that are tired of the respondent, the greater the experience of musculoskeletal complaints.

The results of this study indicate that failure is associated with musculoskeletal complaints. The fatigue of these respondents can also be caused by the existence of a long working period of more than 8 hours a day. This condition is very possible for workers to experience musculoskeletal complaints because a long time a person works well no more than 8 hours a day. The longer the work time spent, the greater the likelihood of things that are not desirable, even though the results of the analysis of statistical tests that the length of work per day does not show a relationship to musculoskeletal complaints, thus that duration of work is not directly related to musculoskeletal output, but the long work process in the respondent will result in fatigue, resulting in musculoskeletal complaints.

Based on the results of the study it is known that the respondent's working hours are erratic so that if the respondent feels tired or sick, the respondent will reduce working hours or even not work. But on the other hand, if the respondent gets a lot of passengers when working, then the respondents tend to be less rested, even though the respondents already feel tired. Based on interviews with respondents, that the income factor of passengers is a factor that can influence respondents to reduce rest, especially when competition in the Railway Station is increasingly tight, such as conventional taxis and taxis *online*, while the presence of *online* motorcycle taxi or base rent does not become competition because motorcycle taxis *online* only carry passengers without large capacity goods. With a lack of attention to the wife, the respondents who experienced fatigue resulted in musculoskeletal complaints. The aim is to deliver the feeder from the train station at most with the aim of the Tirtonadi bus terminal with a distance of around 700 m. Other objectives that were also frequently sent by respondents were Klewer market, Beteng market, Solo Wholesale Center (PGS) or arrived at the Surakarta Palace. Usually, after arriving at the destination, the respondent also gets a new passenger before returning to the train station. With a large number of passengers, the wife's time is reduced and results in complaints of pain such as hand injury.

Injuries that most respondents feel the body like the wrist. A wrist injury can occur due to work such as bending the body and lifting the rear wheel of the rickshaw and holding it when the passenger rides a rickshaw and sits down. The weight of the pressure resulting from holding the load by hand results in the respondent experiencing complaints to the wrist. According to Tarwaka (2010), there are several types of musculoskeletal disorders that occur in the hands, including tendinitis, inflammation (swelling) or irritation of the tendons. It usually occurs at the point where the muscles attach to the bone. This situation will continue to develop if the continuous tendon is used to do unusual things such as strong pressure on the hand, bending the wrist while working or moving the wrist repeatedly<sup>3</sup>.

Another complaint felt by respondents was a pain in the shoulder and neck. This shoulder and neck pain occur because of the position of the body when pedaling so that the rickshaw starts to run after the respondent pushes the rickshaw. Shoulder and neck pain will be increasingly felt when the respondent carries passengers or heavy items so that when the foot pedal the pedicab firmly, then the neck will feel tense due to the energy released so that the pedicab continues. The pedicab design used causes the position of the body to move away from its natural position, so pedicab drivers generally complain of upper neck, lower neck, back, right upper arm, waist, buttocks, buttocks, left forearm, right forearm, left hand, right hand, left thigh, right thigh, right knee, left calf, right calf, left foot and right foot.

Respondents' complaints on the part of the foot most felt at the knee. This working condition occurs when pedaling a good rickshaw when pushing on a ramp, thinking of the rear wheel of a rickshaw when raising and lowering passengers, pedaling with heavy loads and carried out at a considerable distance. NIOSH (2007) states injuries to the back and knees such as - *Low Back Pain* due to bent back posture<sup>8</sup>. If this bending posture continues it will weaken the disc and can cause disc discontinuation or herniation. At the knee is very much related to the pressure on the fluid between the bones and tendons. The pressure that occurs on the knee for a long time can cause inflammation or bursitis.

Based on the results of the study that respondents who experience pain complaints, the way to reduce pain is to rest, especially during lunch hours. Respondents sometimes sleep in passenger rickshaw seats. Fatigue can be reduced in various ways, namely by providing

enough calories as input for the body, working by using good working methods, for example by working with the economic principles of movement, paying attention to the body's ability, meaning that the expenditure of energy does not exceed income by paying attention to its limits, paying attention to regular work time by making arrangements for working hours, rest periods and facilities, during holidays and recreation and others, and trying to reduce monotony and work-related tension. The incidence of shirt injury is caused by exposure with awkward postures and the burden raised exceeds the capacity of the worker itself.

## Conclusion

- a. A large number of respondents are > 35 years old, over 7 years of working time, length of work above 8 hours per day and the average distance above 5 km.
- b. Most respondents had fatigue.
- c. Most respondents had complaints of the musculoskeletal system.
- d. There was a correlation between the level of fatigue and complaints of the musculoskeletal system in pedicab drivers in the pedicab community, Solo Balapan Station.

**Conflicts of Interest:** All authors have no conflicts of interest to declare.

**Source of Funding:** The source of this research costs from self.

**Ethical Clearance:** The study was approved by the Institutional Ethical Board of Faculty of Public Health, Airlangga University.

All subjects were fully informed about the procedures and objectives of this study each subject prior to the study signed an informed consent form.

## References

1. Pulat B. *Fundamental of Industrial Ergonomics*. Englewood. New Jersey; 1992.
2. Grandjean E. *Fitting the Task to the Man*. London: Taylor & Francis Inc.; 1993.
3. Tarwaka SHA and LSB. *Ergonomics for Safety, Occupational Health, and productivity*. Surakarta: UNIBA Press; 2010.
4. Setyawati L. *A Glimpse of Exhaustion of Work*.

- Yogyakarta: Amara Books; 2010.
5. Suma'mur PK. Corporate Hygiene and Occupational Health. Jakarta: Gunung Agung; 2009.
  6. Sucipto. Musculoskeletal Adaptation to Exercise. Bandung: Indonesian Education; 2006.
  7. Buckle P. Ergonomic And Musculoskeletal Disorder. Occup Med (Chic Ill). 2005;55.
  8. NIOSH. Atamney and Corlet. Scoring Of Posture Body With Rula Method. America; 2007.