



Nutritional Status Related to Work Fatigue in Police Officers at the Traffic Police Directorate of East Java

Original Article

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Abstract

Work fatigue can cause a decrease in performance which can lead to work accidents. Fatigue can be caused by several factors including nutritional status and work environment. This study aimed to determine the relationship between nutritional status and work environment with work fatigue of Police Officer at The Traffic Police Directorate of East Java. The design of this study was cross sectional, with 44 subjects aged 21-40 years. Data collection includes body weight and body height, subject identity data and work fatigue levels with the Industrial Fatigue Research Committee (IFRC) questionnaire. The independent variables were nutritional status and work environment and the dependent variables was work fatigue. Spearman's Rank and Kolmogorov Smirnov test was used to analyze the relationship between nutritional status and work environment variables with work fatigue on the subjects. The correlation analysis between nutritional status and work fatigue was $p = 0,000$. The analysis between work environment and work fatigue was $p = 1,000$. There was a relationship between nutritional status and work fatigue, but there was no relationship between work environment and work fatigue of Police Officer at The Traffic Police Directorate of East Java.

Keywords: *fitness and health, work environment, performance*

INTRODUCTION

Every day an average of 6000 people or 2.2 million workers die each year due to work accidents caused by fatigue [1]. Surveys in developed countries report that between 10-50% of the working population experience work fatigue [2]. This is indicated by the prevalence of fatigue is around 20% of patients who require treatment [3]. According to the Ministry of Manpower in 2013 in Indonesia there were 27.8% of work accidents caused by fatigue which was quite high where 9.5% of accidents resulted in disability [4]. Fatigue is a problem that must be addressed and get attention.

Fatigue shows a different condition for each individual. Fatigue is a protective mechanism of the body so that the body avoids further damage so that recovery occurs after rest [5]. Nutritional status is one of the important factors that affect work fatigue. Based on the results of research in 2014 it was found that there was a relationship between nutritional status and work fatigue in the employees of the tofu company Bu Pudji in Ungaran who experienced work fatigue had abnormal nutritional status [6]. Nutritional status and good health conditions will affect thinking power and physical fitness Those who are good at doing their jobs, supported by good nutritional

status will work more actively, productively and conscientiously in their work. Meanwhile, workers with insufficient and excess nutritional status will have less physical abilities, lack of motivation and enthusiasm, and are also slow and apathetic which can ultimately increase work fatigue and will reduce work productivity [7].

In addition to nutritional status, another factor that has the potential to cause work fatigue is the work environment. The work environment in a workplace, both open and closed, greatly affects the various types of work processes carried out. Hot work environments such as working outdoors in the hot sun can cause workers to experience heat stress. Excessive heat in the work environment will result in an increase in body temperature. High body temperature can cause health problems. The dangers of a hot work environment cause workers to tire quickly due to loss of fluids and salt [8]. Based on research in 2016 shows that there is a relationship between the temperature of a hot work environment and work fatigue experienced by workers in the production section of PT. Remco (SBG) Jambi City [9]. Excessive heat conditions in the body either due to the body's metabolic processes or exposure to heat from the work environment can cause health problems [10]. Each type of work will experience different work fatigue. One of the jobs that can experience high work fatigue is the police.

Police members carry out different daily tasks based on work units or divisions. One of the differences between each division is the difference in the work environment, some work indoors and some work directly in the field. In carrying out their duties, those who have a balanced proportion of place concentration and high work intensity are members of the Traffic Directorate Police (Ditlantas). The Ditlantas Police officers who work in the room are part of the administration where they spend most of their time sitting. Meanwhile, Ditlantas Police officers on duty in the field are more susceptible to exposure to hot temperatures and more physical activity. This job is likely to experience work fatigue which has an impact on work productivity. Meanwhile, police officers are required to be ready both physically and psychologically, always ready at any time to protect, serve and secure the community and the state. This study aims to determine the relationship between nutritional status and work environment with work fatigue in officers of The Traffic Police Directorate of East Java.

MATERIAL AND METHODS

This research is included in the scope of community nutrition conducted at the The Traffic Police Directorate of East Java. The research was an analytical observational study with a cross sectional approach. This research has been submitted and approved by the Health Research Ethics Committee of RSI Sultan Agung Semarang No.107/EC/KEPK/2021.

The total subjects were calculated using the Lemeshow formula method and the minimum number of subjects was 38 people. The results of these calculations are added with 10% to anticipate dropping out, so that the number of subjects is 43 people. In this study, the number of subjects taken was 44 people. Subjects were taken by consecutive sampling. The subject's inclusion criteria included members of the East Java Police Ditlantas Police aged 21-40 years, a minimum working period of 1 year, working for 6 hours a day. While the exclusion criteria once the subject could not complete the data collection and resigned as the research subject.

The independent variables in this study were nutritional status and work environment and the dependent variable was work fatigue. The data collected included the identity of the subject, anthropometric data including weight and height, and the level of work fatigue of the subject. Data collection during the COVID-19 pandemic was carried out in accordance with health protocols, namely always wearing masks, maintaining distance and always keeping tools and hands clean with sanitizers. Subject identity data was obtained by filling out an online questionnaire containing name, age, gender, work unit, years of service, length of service and history of illness. In this questionnaire can be known the work environment of each subject.

Nutritional status was obtained from the calculation of Body Mass Index (BMI). This method uses the parameters of body weight (BB) and height (TB). Through these two parameters, it can be calculated using the formula $BMI = BB \text{ (kg)} / [TB \text{ (m)}]^2$. Body weight was measured using a digital tread scale with an accuracy of 0.1 kg. Height was measured using a microtoise with an accuracy of 0.1 cm. Classification of nutritional status based on BMI, namely very thin ($<17 \text{ kg/m}^2$), thin ($17.0\text{-}18.4 \text{ kg/m}^2$), normal ($18.5\text{-}25 \text{ kg/m}^2$), fat ($25.1\text{-}27 \text{ kg/m}^2$) and obesity ($>27 \text{ kg/m}^2$) [11].

Work fatigue level data was measured using an online Industrial Fatigue Research Committee (IFRC) questionnaire. This questionnaire is a questionnaire containing thirty different feelings of fatigue. Questions 1 to 10 are about activity impairment, questions 11 to 20 are about weakened motivation, and questions 21 to 30 are about physical exhaustion. Each question is scored on a Likert scale (4 scales), namely a score of 1 = never feel, a score of 2 = sometimes feel, a score of 3 = often feel, and a score of 4 = often feel. Based on the total individual score, the level of fatigue can be classified as follows, mild (total score 30-52), moderate (total score 53-75), high (total score 76-98), very high (total score 99-120) [12].

Data analysis using SPSS software. The statistical test used in this study consisted of univariate and bivariate tests. Univariate analysis by entering data in the frequency distribution table to describe the data on the characteristics of the subject and each research variable. Bivariate analysis to determine the relationship between the independent variable and the dependent variable. Spearman's Rank test was used to analyze the relationship between nutritional status variables and work fatigue in subjects and the Kolmogorov Smirnov test was used to analyze the relationship between work environment variables and work fatigue in subjects as an alternative to the Chi Square test.

RESULTS

Table 1. Characteristics of the subject

Variables	N	Percentage (%)
Age (years)		
21 – 29	18	40.9
30 – 39	26	59.1
Sex		
Male	34	77.3
Female	10	22.7
Nutritional status		
Normal	14	31.8
Overweight	9	20.5
Obese	21	47.7
Work environment		
Regident/Office	22	50
PJR/Field	22	50
Period of service (years)		
1 – 5	4	9.1
6 – 10	20	45.5
11 – 15	9	10.5
16 – 20	11	25
Duration of work (hours)		
8	8	18.2
9	7	15.9
10	2	4.5
11	9	20.5
12	18	40.9
Level of work fatigue		
Low	22	50
Moderate	16	36.5
High	5	11.4
Very high	1	2.3

The number of subjects in this study were 44 subjects. The subjects in this study included the division or work unit of the Registration and Identification Administration (Regident) who

worked in the office and the Highway Patrol (PJR) who worked in the field. The age range of the subjects was between 21-39 years. There were 18 (40.9%) subjects aged 21-29 years and 26 (59.1%) subjects aged 30-39 years. Most of the subjects in this study were male $n= 34$ (77.3%) while female $n= 10$ (22.7%). From the calculation of the nutritional status of subjects based on Body Mass Index (BMI) showed 14 (31.8%) normal, 9 (20.5%) overweight and 21 (47.7%) obese. In this study, the most recent period of service for the subject was 3 years and the longest was 20 years. The duration of the work of the subject ranges from 8-12 hours in one day. Measurement of the level of work fatigue in subjects measured using the Industrial Fatigue Research Committee (IFRC) questionnaire showed 22 (50%) low, 16 (36.4%) moderate, 5 (11.4%) high and 1 (2.3%) very high (Table 1).

Table 2. Correlation Between Nutritional Status, Work Environment and Level of Work Fatigue

Variables	Level of Work Fatigue	
	r	p
Nutritional Status ^a	0,648 ^{**}	0,000
Work environment ^b	0,302	1,000

^aRank Spearman; ^bKolmogorov Smirnov

Based on the results of the Spearman Rank correlation analysis between nutritional status and work fatigue, the correlation value (r) = 0.648 shows a strong relationship, meaning that a higher of nutritional status correlates with a higher level of work fatigue. Based on the analysis there is a relationship between nutritional status and work fatigue ($p = 0.000$). Analysis test results between work environment and work fatigue found that there is no relationship between work environment and work fatigue ($p = 1.000$).

DISCUSSION

Body Mass Index (BMI) is a simple anthropometric index to monitor the nutritional status of adults. The results of the study on 44 subjects of the police officers of The Traffic Police Directorate of East Java showed that most of the 21 (47.7%) subjects had obesity nutritional status. Based on the results of the Rank Spearman test, it was found that $p = 0.000$, which indicates that there is a significant relationship between nutritional status and work fatigue in police officers of The Traffic Police Directorate of East Java with a strong relationship ($r = 0,648$). It means that a higher of nutritional status correlates with a higher level of work fatigue that a higher of nutritional status correlates with a higher level of work fatigue. This study is in line with the research conducted by Triana (2017) based on the results of the Chi Square statistical test showing a significant relationship between nutritional status and work fatigue on mechanics at PT. X Plant Jakarta, with $p = 0.005$ [13].

Nutritional status is related to work fatigue because it directly affects one's work productivity. A person's nutritional status is influenced by consumption patterns and physical activity. Inappropriate consumption patterns can affect a person's nutritional status. Energy intake is the main factor needed by workers to carry out activities and also carry out their work [14]. Carbohydrates are the main source of energy to meet nutritional needs. Carbohydrate intake is needed to form liver and muscle glycogen [15]. In a contracted state, the blood vessels contained in muscle fibres will be pinched, so that blood circulation can be obstructed. The oxygen needed by the body is reduced because the blood that functions to carry nutrients and oxygen cannot flow smoothly [16]. Energy intake supplies glycogen and oxygen which are used by muscles to contract. Glycogen becomes the main supplier of energy used for muscle contraction, when the body's glucose has started to decline. Glycogen is converted into glucose and directly undergoes glycolysis to produce pyruvic acid and form adenosine triphosphate (ATP) which is used for muscle contraction. In this formation, if in the breakdown of pyruvic acid there is no oxygen supply, it is formed into lactic acid. Lactic acid that is formed continuously can cause build up in the muscles. Therefore, when energy intake is lacking, the intake of glycogen used for muscle contraction becomes very less. This causes the regeneration or production of ATP cannot

be balanced with the use of ATP coupled with a lack of oxygen which causes a build-up of lactic acid [17,18]. The build-up of lactic acid will affect muscle fatigue making it easier for workers to experience work fatigue [19].

Good nutritional status has a positive effect on work productivity. On the other hand, lack of or excess nutritional status causes low work resistance or slowed movement so that it becomes an obstacle for workers in carrying out their activities [20]. The traffic police work routine starts early in the morning so that physical activity that used to be carried out is decreasing. Although work as a traffic policeman causes physical fatigue, this is different from physical activities such as regular exercise. Nutritional problems in adults are an important problem, because apart from having a certain risk of disease, nutritional status is a determining factor in the degree of one's work productivity.

In research based on the work environment in accordance with their respective work units, namely the Registration and Identification Administration Unit (Regident) who is in charge of registration and identification of motorized vehicles as well as in the matter of issuing a Driving License (SIM) by working in the office and Patrol Unit Highway (PJR) which works directly in the field and is tasked with realizing security, safety, order and smoothness on highways and toll roads. The analysis between the work environment and work fatigue indicating a weak relationship with the statistical test results $p = 1,000$ which means there is no relationship between the work environment and work fatigue on Police Officer at The Traffic Police Directorate of East Java. This study is not in line with the research conducted by Harahap (2017) which showed that there is a significant relationship between the temperature of the hot working environment and the fatigue of workers in the production of PT. Remco (SBG) Jambi City [9]. When working the body will interact with environmental conditions consisting of air temperature, humidity, and movement or airflow. In a hot work environment, the workforce gets an additional workload in the form of heat stress, plus the body also produces heat through metabolic processes [21]. When the environmental temperature increases, the body temperature will increase, the hypothalamus gland will activate the body's heat regulation mechanism by providing a reaction to maintain constant heat by balancing heat received from outside the body with heat loss from within the body through the process of evaporation, namely breathing and sweating. Most evaporation occurs through sweat. Excessive sweating can lead to dehydration if not followed by adequate fluid intake. The sweating can cause work fatigue [22].

High temperatures quickly make concentration decrease and drain energy so that it triggers higher work fatigue than lower temperatures. However, temperature and work fatigue have no significant relationship. The absence of this relationship is because there are still many factors that can support the occurrence of work fatigue such as workload, rest time, consumption of food and water, even though the air temperature of the work environment is hot. Another cause that can affect workers is that they are used to working in hot temperatures. This study is in line with the results of Andriani's (2016) research which states that there is no significant relationship between environmental temperature and work fatigue [23].

CONCLUSION

There is a relationship between nutritional status and work fatigue and there is no relationship between work environment and work fatigue in members of the East Java Police Ditlantas Police.

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CONFLICTS OF INTEREST

Conflict of interest : Authors state no conflict of interest.

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