

Research Article

The Influence of Workplace Stretching Exercise on Work fatigue of Production Workers PT. Maruki International Indonesia

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Abstract: Work fatigue is a feeling of pain, drowsiness, dizziness, feeling bored, heart palpitations and lazy activities felt by workers. Causes of work fatigue include high work intensity and mental and physical work endurance, work climate, lighting, noise, or other inadequate work environments, psychological factors, sense of responsibility, tension and conflict, the presence of illness, pain and status nutrition, and biological circadian/clock rhythms. The purpose of this study was to look at the effect of workplace-stretching-exercise on work fatigue in workers at factory production 2 PT. Maruki International Indonesia. A total of 34 samples were selected by simple random sampling that met the inclusion criteria, namely men, working period of at least 1 year, experiencing work fatigue, and willing to participate in this study. The research instrument used a digital reaction timer, analog scales, and stature meters by providing workplace-stretching-exercise intervention for 15 days. The results of the study are the average work fatigue before workplace-stretching-exercise (pre-test) intervention is 453,856 and the average work fatigue after being given workplace-stretching-exercise (Post-test) intervention is 322,712 so the average work fatigue between before and after giving workplace-stretching-exercise intervention that is 131.1441 with sig 0.001 <0.05. The conclusion of the study is that there are differences in work fatigue before being given an intervention after being given an intervention at factory workers 2 PT. Maruki International Indonesia. Efforts to prevent and reduce work fatigue must be done both within the scope of the company through the application of stretching every day for workers and the personal worker with increased awareness of the importance of stretching while on the move.

Keywords: Occupational Safety and Health, Occupational Diseases, Workplace Stretching Exercise, Work fatigue.

INTRODUCTION

Occupational safety and health (K3) are not only important for improving social security and worker welfare but can also maintain and increase worker productivity (Ferdystari *et al.*, 2018). Currently complying with regulations (K3) is not only an obligation for workers. However, every company must also apply K3 to their companies. K3 is an important aspect to improve workers' welfare and productivity because if the safety level of workers is high, the risk of accidents, illness, disability will be reduced. In other words, K3 is really needed by workers and any form of work (Ukhisia *et al.*, 2013).

Occupational diseases are all health conditions that occur due to exposure to risk factors arising from work related activities. According to the World Health

Organization (WHO) that the working population currently accounts for around 50% of the global population. The International Labor Organization (ILO) reports that 2.34 million deaths are caused by work-related accidents or illnesses worldwide and as many as 2.02 million of them are from work-related diseases (Ting Xia *et al.*, 2019). Then, as many as 160 million people suffer from non-fatal work-related illnesses. Occupational diseases have become the leading cause of death among workers. Economic losses caused by occupational diseases and accidents account for 4.0% - 6.0% of the gross domestic product of the countries and regions concerned in the world (Yaoqin Lu *et al.*, 2019).

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According to the ILO that as many as two million workers die every year due to work accidents caused by fatigue. In the study explained that of 58,115 samples and 18,828 of them (32.8%) experienced fatigue. Meanwhile, if workers experience work accidents caused by fatigue, then it has a direct impact on the level of work productivity. Therefore, human factors greatly affect the level of work productivity, such as sleep problems, biological needs and work fatigue (Muizzudin, 2013).

Fatigue is part of a common problem that is often found in labor, especially labor with manual handling activities. Work fatigue that is often experienced by workers can be in the form of feelings of pain, drowsiness, dizziness, feeling bored, palpitations and lazy activity. Causes of work fatigue include high work intensity and mental and physical work endurance, work climate, lighting, noise, or other inadequate work environments, psychological factors, sense of responsibility, tension and conflict, the presence of illness, pain and status nutrition, and biological circadian / clock rhythm (da Costa and Vieira, 2008).

The results of a survey conducted in developed countries reported that 10-50% of the population experienced fatigue. Then, based on data released by the International Labor Organization (ILO) in 2010 that every year as many as two million workers die due to work accidents caused by fatigue. This study states that of 58,115 samples, 18,828 (32.8%) suffered from fatigue. Research on transportation accidents in New Zealand in 2002 to 2004 reported that there were 134 fatal accidents and 11% were due to fatigue (Dewita, 2018).

PT. Maruki Internasional Indonesia is one of the largest wood processing companies in the city of Makassar. The main products are furniture for the storage of ashes for Japanese people called Butsudan. This company has 4 factories which are still operating today. At factory 1 the wood cutting or cutting process, wood sanding factory 2, factory 3 painting and factory 4 assembly and packing, there are also wood drying machines, boilers, several wood warehouses and 2 offices. The long production process requires that the company has a stretching program as part of the company's efforts to prevent workers from experiencing diseases related to muscles and skeletons.

Factory 2 PT. Maruki International is a processing site in the second stage which is sanding process. Most of the workers in factory 2 are men who do almost the same work of sanding and delivering the wood that has been sanded to the next factory. Selection of factory 2 is chosen on the basis of the highest number of workers compared to other factories. The length of the wood processing process to become

butsudan and the target of the sandpaper that must be achieved requires them to do work from 8 to 12 noon without any break for stretching. Based on the results of previous studies that the percentage of work fatigue of 58.5% experienced by workers at PT. Maruki Internasional Indonesia (Rachman, 2013).

This research was intended to find out the benefits of workplace stretching exercise for work fatigue in factory workers 2 PT. Maruki International Indonesia. This research was intended to obtain safe, healthy and productive working conditions for workers. The provision of WSE training is given at 10 am after workers work for 2 hours starting at 8 am and lasts for 15 days (Indrawati *et al.*, 2018). Based on this, the researcher wanted to conduct a study by looking at the effect of Workplace-Stretching-Exercise on work fatigue in factory production workers 2 PT. Maruki International Indonesia.

METHODOLOGY

Research Design

The type of research used is quasi-experiment using one group pre-test post-test design. This research was conducted at PT. Maruki Internasional Indonesia, Makassar City, South Sulawesi.

Population and Sample

The population is all factory production workers 2 PT. Maruki International Indonesia. A total of 34 samples were selected by simple random sampling that fulfilled the inclusion criteria, namely men, working period of at least 1 year, experiencing work fatigue, and were willing to participate in this study by signing an informed consent issued by the Ethics Committee of the Faculty of Public Health, Hasanuddin University.

Data Collection

Data collection was carried out by researchers using questionnaires and instruments with analog scales and stature meters. Data on individual factors (age, body mass index, smoking status and exercise habits). Weight and height were measured using analog scales and stature meters. In addition, measurement of work fatigue by using a digital reaction timer which is done as much as 2 times the measurement of fatigue, namely measurement before given workplace stretching exercise intervention and after workplace stretching exercise intervention (Tarwaka and Sudiajeng, 2004).

Data Analysis

Data on individual factors (age, body mass index, smoking status and exercise habits) and work fatigue before and after the workplace stretching exercise intervention were processed using SPSS for windows 23. For differences in work fatigue before the intervention and after the intervention paired sample T-Test analysis was used.

RESULTS

Table1. Characteristics of respondents

Characteristics of Respondents		n (%)	Mean	Standar Deviasi
Age	≥ 30 years	20.6	38.4	7.5
	< 30 years	74.9		
Work Period	High (≥ 6 years)	82.4	13.9	6.1
	Low (<6 years)	17.6		
Sports Habits	Ordinary	23.5		
	Unusual	76.5		
Smoking status	Smoke	17.6		
	Do not smoke	82.4		
BMI	Normal	61.8	24.906	2.7
	Overweight	26.5		
	Obesity	11.8		

Table 1 shows the characteristics of factory workers 2 PT. Maruki Internasional Indonesia in this study. The average factory 2 workers are 38.4 years old and most are <30 years old which means that they are still in productive age. The highest number of years of service is dengan6 years with an average working time of 13.9 years. Based on the variable exercise habits of

factory 2 workers, most did not exercise every day as much as 76.5%. As many as 82.4% of factory 2 workers have non-smoking status. As for the Body Mass Index based on factory 2 workers, it shows that 61.8% of the best status are normal, 26.5% are overweight and 11.8% are obese with an average of 24,906.

Tabel 2. Distribution based on work fatigue at factory workers 2 PT. Maruki International Indonesia

Category of work fatigue	Measurement of Work Fatigue			
	Pre-Test		Post-Test	
	n	%	n	%
Normal	0	0	0	0
Light	11	32.4	32	94.1
moderate	16	47.1	2	5.9
Weight	7	20.6	0	0

Table 2 shows that in the measurement of work fatigue before the intervention workplace stretching exercise (pre-test) workers who experienced mild fatigue were 32.4%, moderate fatigue by 47.1% and severe fatigue by 20.6%. Then the results of the measurement of work fatigue after given workplace stretching exercise intervention (post-test) where mild fatigue is 94.1% and moderate fatigue is 5.9%.

Table 3. Paired sample T-Test analysis

Work Fatigue	Mean	Mean	t-count	Standard deviation	Sig
Pre-Test	453.856	131.1441	11.336	67.4560	0.001
Post-Test	322.712				

Table 3 shows that the average work fatigue prior to the workplace stretching exercise (pre-test) intervention was 453,856 and the average work fatigue after being given a workplace stretching exercise (Post-test) intervention was 322,712. so the average work fatigue between before and after giving workplace stretching exercise intervention is 131.1441 with sig 0.001 <0.05 which means there is a difference in work fatigue before being given an intervention and after being given an intervention at factory workers 2 PT. Maruki International Indonesia.

DISCUSSION

The relationship between worker's age and work fatigue can occur because physiological functions in a person's body have undergone changes caused by age and affect the resilience and physical capacity of

human labor. Young workers will be able to do heavy work and vice versa workers who have passed the productive age have endurance that has begun to decline and will quickly feel tired, unable to move nimbly and affect their productivity (Susihono and Adiatmika, 2017). Research conducted by Budiman *et al.*, (2016) that the more a person's age increases, the fatigue level will be faster because mental and social functional capacity will decrease before the age of 45 years.

A person's age increases the more susceptible to fatigue. The existence of aging causes gradual damage to the physiological system, chyrcardian, and hours of sleep (Kusgiyanto *et al.*, 2017). Another study conducted by Marcela in 2019 that age affects human physical capacity and reaches its peak at the age of 25

years. Then the age of 50-60 years will experience a decrease in muscle strength by 25%, a decrease in sensory abilities by 60%, and followed by a decrease in visual acuity, speed of distinguishing things, making decisions, and the ability to remember short-term (Amin *et al.*, 2019).

The working period of work fatigue to date there are still studies that state that there is no significant relationship between work time and work fatigue (Atiqoh *et al.*, 2014). This is consistent with the statement of a study conducted by Salasa *et al.*, (2017) that there is no relationship between work period and work fatigue in Loining workers at PT. Sinar Pure Foods International Bitung. This happens because the work period is the time when workers start to join certain companies. Thus, the more work done in his status as a worker, the more skilled and more ability he gets.

PT. Maruki Internasional Indonesia works every day with the usual work duration of 7 hours per day and 1 hour of rest. So that if this is repeated it will create directed habits and not be the reason for fatigue problems can occur at work. This is not in line with research conducted by Prakoso *et al.*, (2018) which states that there is a relationship between tenure and work fatigue because the longer a person's work tenure, the higher the risk of fatigue.

Nutrition in the workforce will increase the degree of health, efficiency, high productivity, maintain and increase endurance and can balance the nutritional and calorie needs of the work done. Body Mass Index is one of the factors of work fatigue in workers. This is because workers who work with good nutritional status will have better work capacity and endurance compared to workers who have less and more nutritional status. This is in accordance with research conducted by Langgar and Setyawati (2014) that there is a relationship between nutritional status and work fatigue in the employees of Tahu Baxo bu Pudji company on the Market.

Workers need nutritious food intake in order to maintain the body, repair tissue cells for growth at certain times so that someone can do his work. This is in accordance with research conducted by Diana *et al.*, (2017) that a worker with a thin nutritional condition has a poor work capacity and endurance compared to workers with normal status. Food is a necessity for humans as a source of energy, a source of protein, vitamins and minerals. These substances are burned in the body and then used as a source of energy for work.

Workplace stretching exercise (WSE) is a design exercise with the principle of muscle stretching movements and aims to extend the muscles so that the muscles become relaxed and supple. In addition, some of the main benefits of stretching exercises are

improved circulation, better posture, improved coordination, stress relief, increased flexibility, and range of joint motion (Chen *et al.*, 2014). The WSE program is intended to reduce the incidence and / or severity of injuries by increasing flexibility. Flexibility is generally defined as the range of motion that is possible around a particular joint or series of joints; this definition is applied in most clinical studies. It is generally believed that workers who are less flexible are more likely to experience muscle pain and work fatigue (Hess and Hecker, 2003).

PT. Maruki International is a company engaged in manufacturing with the main product being Butsudan. In America, manufacturing is an economic contributor of 14% of U.S. gross domestic product. Manufacturing work is one of the jobs that has the potential to increase workload and mental workers because of the target work that must be completed. The effects of increasing mental and physical burden of workers are work fatigue, reducing performance, reducing work productivity, quality of work, increasing the incidence of workplace accidents and causing human error at work (Lu *et al.*, 2017).

Fatigue is a common complaint experienced in the working population. Work fatigue will appear usually after the workers work which is both acute and chronic. Fatigue is often associated with a decrease in physical and cognitive function of the body. The effects of fatigue can be serious effects such as disability and absenteeism (Aryal *et al.*, 2017). According to Professor T Meijman that fatigue is not a negative effect but a physiological adaptation to save the body from the risk of excessive energy released by the body. While physiological fatigue is a feedback from the body that arises to reduce drive and motivation in terms of fatigue can cause mental or physical effects (Van Dijk and Swaen, 2013).

In addition, other activity factors outside working hours affect work fatigue in workers such as lifestyle, activities at home before going to work, nutrition. Factors outside of working hours will make it difficult for workers to pay attention to family responsibilities and it is difficult to rest enough outside of work due to lack of time. Eating unhealthy foods or snacks, and irregular eating times can result in health and fatigue. In addition, some workers do not eat at work due to poor conditions and lack of time (Pelders and Nelson, 2018).

Based on the results of paired sample T Tests showed that the intervention Workplace stretching exercise can reduce work fatigue in factory workers 2 PT. Maruki International Indonesia. This happens because the intervention can extend the muscles for relaxation or rest so as to prevent the occurrence of muscle tension. If this exercise is used as a routine in a

eating company, it will affect the flexibility, namely the joint's ability to move fully.

This is consistent with research conducted by Hastuti (2013) that there is an effect of stretching on the reduction in fatigue experienced by workers. The results in this study are also consistent with research conducted by Kim *et al.*, (2006) that giving stretching also has an impact on reducing fatigue and increasing concentration of learning in students in Busan, Korea.

Another study conducted by de Vries *et al.*, (2017) states that giving stretching to workers is effective in reducing emotional fatigue and physical fatigue, then stretching exercises that are sufficient and compliant are needed in order to provide benefits to workers. In a study conducted by Lin *et al.*, (2015) that giving stretching for 6 weeks and 12 weeks overall stated that stretching can reduce emotional exhaustion and physical fatigue.

Another study conducted by de Zeeuw *et al.*, (2010) on the effect of workplace stretching on depression in pilots in the Netherlands, this study states that giving stretching to pilots has a positive effect on psychological complaints such as depression on pilots. The study compared physical exercise with relaxation to pilots and both interventions were effective in reducing psychological complaints, fatigue and stress levels.

Recovering from work fatigue depends on each individual to regulate physical, emotional and psychological in order to manage work-related stress and stay motivated to work. Conservation of resources (COR) theory states that every individual will try to get and maintain the things they value so they don't experience work stress. In addition, activities outside working hours such as relaxation and psychological release from work (Garrick *et al.*, 2017). According to research conducted by Craft (2005) several efforts that can be applied in the workplace are health promotion such as counseling, stress management, improving the health level of the work environment.

CONCLUSION

The provision of workplace stretching exercise exercises has an influence on the reduction of work fatigue in workers at the factory 2 production of PT. Maruki Internasional Indonesia in this study. In addition, there are factors that influence the occurrence of work fatigue, including age, years of service, body mass index, and other factors not controlled in this study. Efforts to prevent and reduce work fatigue must continue to be done both within the scope of the company's program through the implementation of stretching every day for workers and the scope of workers in the form of increasing awareness of the importance of stretching while on the move.

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