

THE RELATIONSHIP BETWEEN SHIFT WORK AND WORK STRESS, AND ITS IMPACT ON HYPERTENSION ON THE WOVEN BAG FACTORY WORKERS IN EAST JAVA INDONESIA

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Abstract— Shift work can make the shift workers experience stress work. This work stress can affect workers' health. Health problems that could be experienced by shift workers is hypertension. The purpose of this study was to analyze the relationship between shift work and work stress, and its impact on hypertension on woven bag factory workers in East Java Indonesia. This research was a case-control study, with a total sample of 66 people (33 people as the case group and 33 as the control group). This research was carried out in one of the woven factories in East Java, Indonesia, especially the part of the production division of CL (Circular Loom) and Division of ABM (Automatic Bag Machine). There is a relationship between shift work with work stress ($p = 0.014$). Work stress had a relationship with diastolic hypertension ($p = 0.045$), but there was no relationship between work stress with systolic hypertension ($p = 0,132$). The conclusion was work stress is intermediate factors for the relationship between shift work and hypertension.

Keywords—shift work, work stress, hypertension

I. INTRODUCTION

Shift work is non-standard working hours, where the standard hours of work are 8 hours, which begin at 8 a.m. and ends at 5 pm; starting from Monday until Friday; there is no rotation of the work [1]. Shift work can make the shift workers experience stress work. Work stress can occur due to the disruption of the circadian rhythm of natural phase. Because of this disruption of the circadian rhythm, shift work can make the workers feel the conflict of synchronization between works with social activity, for example, interfere the relationship with family and society [2][1]. Research Gerber, *et al.* [3] that examines the relationship of shift work with work stress on police in Switzerland, showed that shift work associated with increased social stress, where most of the male respondents in this research report that they feel the social pressure is high due to the high responsibility that they have to fill. Srivastava [4] also found a relationship between shift work with work stress. This relationship occurs because of the disruption of daily routine either, such as disruption of communication with family, eating habits, and habits of sleep. In addition to the stress due to the disruption of circadian rhythms and work-family conflict, there is a wide variety of stressor in the workplace that could aggravate work stress. Stressor in the workplace this can be noise, heat, heavy workloads and interpersonal conflicts between workers [5]. Work stress felt by workers of this shift can cause a variety of health problems in the worker's shift. Health problems that may occur on shift workers due to work stress is hypertension. Study on a meta-analysis conducted by Gasperin, *et al.* [6] reported that physiological stress could raise blood pressure in blood pressure in individuals between the ages of 18-64 years.

Based on that background that, this research wanted to examine the relationship between shift work and work stress, and the relationship between work stress and hypertension.

II. METHOD

2.1 Design, Sample, and Location

This study used a case-control study. A sample of these studies were 66 people, with 33 people as the case group (i.e. individuals who are experiencing hypertension), and 33 people as the control group (i.e. individuals who have normal blood pressure). This research conducted in one of the woven bag factory located in East Java, Indonesia. This research focuses on the operator machines, especially in Division CL (Circular Loom) and ABM (Automatic Bag Machine) of this factory. Both of that division had difference shift work patterns. Operators who work in CL Division worked for 5 days and 2 off while the division operators in ABM Division worked for 6 days and 1 holiday. Both division operator has a rotating shift.

2.2 Research Procedures

The total number of the population of this study of 125 people, i.e. the operator CL Division by as much as 80 people and as many as 45 people ABM Division. This research begins with a screening of the operator's blood pressure use digital sphygmomanometer TensiOne 1A. This measurement was performed twice, at the time before and after work. The measurement was done to ensure that the respondents have normal blood pressure or hypertension. Work stress was measured using a work stress questionnaire developed by Tarwaka [8]. Characteristic of workers, such where division workers work, age, and gender also obtained by questionnaires.

2.3 Data Analysis

This research data analysis using SPSS application ver. 21. Statistical tests were used to analyze the relationship of patterns of shift work with stress test work is chi-square to find out the relationship. The relationship between work stress and hypertension were tested using the test correlation Pearson.

III. RESULTS

Screening stage conducted in early research found that 33 people has hypertension, which then serves as the case group. The number of respondents for the control group in the study compared with the number of respondents in the case group so that the comparison group cases and a control group was 1:1. So samples in this research were 66 people. The majority of the respondents in this study were women with an average age of 41.27 ± 9.23 years and worked in the CL Division (Table 1). The difference in the pattern of shift work on research based on the name of the division where they worked, i.e. the CL division (5 working days and 2 days off) and ABM Division (6 working days and 1 day off).

Table 1. Characteristics of research respondents

Characteristics	n (%)	Mean ± SD
Shif work patterns		
CL	39 (59,1)	-
ABM	27 (40,9)	
Age		
19 – 23 years	10 (15,2)	
33 – 46 years	37 (56,1)	41,27 ± 9,23
47 – 60 years	19 (28,8)	
Gender		
Men	20 (30,3)	-
Women	46 (69,7)	
Work Stress		

Low	15 (22,7)	
Moderate	25 (37,9)	
High	18 (27,3)	119,44 ± 25,82
Very High	8 (12,1)	
Systolic Hypertension		
Normal	7 (10,6)	
Pre-hypertension	26 (39,4)	
Hypertension stage I	23 (34,8)	142,52 ± 22,19
Hypertension stage II	10 (15,2)	
Diastolic Hypertension		
Normal	21 (31,8)	
Pre- Hypertension	17 (25,8)	
Hypertension stage I	17 (25,8)	86,91 ± 14,72
Hypertension stage II	11 (16,7)	

The results of this study indicate that work stress experienced by the majority of respondents was moderate work stress. Thirty-three respondents (50%) experiencing hypertension on systole blood pressure and twenty-eight respondents (42.5%) experiencing hypertension on diastole blood pressure.

Test results correlation of chi-square on the research indicates that the pattern of shift work has a relationship with the stress of work ($p = 0.014$). Pearson correlation test showed that work stress did not have a relationship with systolic hypertension ($p = 0.132$) but had a relationship with diastolic hypertension ($p = 0,045$).

Table 2. The relationships between shift work patterns with work stress

Shift Work Pattern	Work Stress				p-value	r
	Low	Moderate	High	Very High		
CL	11 (28,2%)	19 (48,7%)	6 (15,4%)	3 (7,7%)	0,014	0,373
ABM	4 (14,8%)	6 (22,2%)	12 (44,4%)	5 (18,5%)		

Table 3. The relationships between work stress and hypertension

Work Stress	Hypertension			
	Systole		Diastole	
	p-value	r	p-value	r
	0,132	0,188	0,002	0,377

IV. DISCUSSION

The results of this research showed that there is a relationship between the shift work patterns with work stress. Shift workers often complain about feeling quickly angry, nervous and anxious. These feeling felt by workers shift caused by work stress and work-family conflict. The interference of weak-sleep cycle made body experienced stress due to the disruption of the circadian rhythm. Disruption of the circadian rhythm made workers feel the exhaustion caused by lack of sleeping hours [2].

The study also found that the respondents had a high-stress level was respondents who work in the ABM division, which this division has 6 work days and 1 day off or working hours in ABM division longer than CL division. Work hours of ABM division are 48 hours/week while CL are 40

hours/week. Long working hours (> 40 hours/week) can also be a factor that made workers experience work stress [8].

In line with research conducted by Owolabi et al. [9], the study reported that work stress did not have a relationship with systolic hypertension but has a relationship with diastolic hypertension. Stressors always exist in the workplace which can fluctuate over time. Chronic exposure of stressor in the workplace can be a factor in the onset of hypertension. In a study of 8395 workers in Canada, workers who had exposed to stress reported that an increase in blood pressure over a period of 7.5 years. These effects are stronger for workers with low social support [10].

V. CONCLUSION

There was a relationship between shift work and work stress and work stress with diastolic hypertension, but there is no relationship between the work stress with systolic hypertension. This research showed that work stress is an intermediate factor between the relationship between shift work and hypertension.

REFERENCES

- [1] Grzywacz, J.G. (2016) “Shift Work and Its Implication for Everyday Work and Family Life: A Foundation and Summary” in Iskra-Golec, I., Barnes-Farrel, J., & Bohle, P. (Ed), Social and Family Issues in Shift Work and Non-Standard Working Hours. Switzerland: Springer.
- [2] Costa, G. (2016) “Introduction to Problems of Shift Work” in Iskra-Golec, I., Barnes-Farrel, J., & Bohle, P. (Ed), Social and Family Issues in Shift Work and Non-Standard Working Hours. Switzerland: Springer.
- [3] Gerber, M. et al. (2010) ‘The relationship between shift work, perceived stress, sleep and health in Swiss police officers’, *Journal of Criminal Justice*. Elsevier Ltd, 38(6), pp. 1167–1175. doi: 10.1016/j.jcrimjus.2010.09.005.
- [4] Srivastava, U. R. (2010) ‘Shift work related to stress, health and mood states: A study of dairy workers’, *Journal of Health Management*, 12(2), pp. 173–200. doi: 10.1177/097206341001200205.
- [5] Landy, F.J. dan Conte, J.M. (2013). *Work in the 21st Century An Introduction to Industrial and Organizational Psychology Fourth Edition*. United States of America: Wiley
- [6] Gasperin, D. et al. (2009) ‘Effect of psychological stress on blood pressure increase: a meta-analysis of cohort studies.’, *Cadernos de saude publica / Ministerio da Saude, Fundacao Oswaldo Cruz, Escola Nacional de Saude Publica*, 25(4), pp. 715–726. doi: 10.1590/S0102-311X2009000400002
- [7] Tarwaka (2015) *Ergonomi Industri: Dasar-Dasar Pengetahuan Ergonomi dan Implementasi di Tempat Kerja*. Surakarta: Harapan Press
- [8] Lee, K. et al. (2017) ‘The impact of long working hours on psychosocial stress response among white-collar workers.(Original Article)(Report)’, *Industrial Health*, 55(1), p. 46. doi: 10.2486/indhealth.2015-0173.
- [9] Owolabi, A. O. et al. (2012) ‘Work-related stress perception and hypertension amongst health workers of a mission hospital in Oyo State, south-western Nigeria’, *African Journal of Primary Health Care and Family Medicine*, 4(1), pp. 1–7. doi: 10.4102/phcfm.v4i1.307
- [10] Spruill, T. (2013) ‘Chronic Psychological Stress and Hypertension’, *Current Hypertension Reports*, 12(1), pp. 10–16. doi: 10.1007/s11906-009-0084-8.Chronic.