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The Correlation Of Working Climate And Blood Pressure On The Volunteer Of Traffic Control (Supeltas) In Surakarta

Ulima Fadhilah Larasati[1], Sri Darnoto[2]
Universitas Muhammadiyah Surakarta
Jl. A. Yani Tromol Pos I Surakarta
darnoto@ums.ac.id

Abstract

Each workplace has a hazard factor that may affect the health of the workforce or may result in the onset of occupational diseases. Heat pressure is part of the physical stress that greatly affects workers' activity. Working climate or heat pressure can result in additional burden in blood circulation. The purpose of this research is to analyze the correlation between work climate and blood pressure at Volunteer of traffic control (Supeltas) in Surakarta in 2017. This type of research is non-experimental quantitative using survey analytic method with cross sectional design. The population in this study were members of Supeltas in Surakata as many as 49 people, with a minimum sample size of 43 people. Data sampling was conducted by using total sampling. From the results of the study, it was obtained that the lowest ISBB 29.24^{o}C and the highest is 32.23^{o}C and the result of blood pressure measurement at Supeltas Surakarta in the workplace that exceeds NAB hot work climate as much as 38 people (100%) experienced hypertension, while Supeltas who work in the workplace under the NAB who experienced hypertension as many as 7 people (63.6%) and who did not experience hypertension as many as 4 people (36.4%). The result of statistical test using fisher exact showed that there was a correlation between hot work climate with blood pressure (p = 0,002) on Surakarta traffic regulator volunteer in 2017.

Keywords: Working climate, Blood Pressure

1. Introduction

Each workplace has certain hazard factor influencing the workers' health or causing certain illness caused by the work (Tarwaka, 2014). In such workplace, a worker will face pressure from the surrounding environment. The pressure can be chemically, physically, and biologically as well as psychologically-induced. The pressure of heat is a part of the physical pressure, which has great influence on the worker's activity. The working environment, therefore, has to be made as comfortable as possible to achieve working efficiency and improve the productivity (Suma'mur, 2009).

According to Santoso (2004), working climate or hot pressure may cause additional load in the blood circulation. In performing physical work, blood gets additional load because it has to bring oxygen to the working muscle. The blood also brings heat from inside the body to the skin surface. It is also an additional load for heart which has to pump more blood. Of the working, the frequency of worker's heart beat is increasingly higher.

The high temperature of the workplace may cause health problem and threatens the safety of the worker. The research conducted by Donoghue and Bates (2000) on the underground iron mining worker in Australia, with range of Ball and Wet Temperature Index of 26-28^{o}C, found 65 cases of acute hot fatigue. According to Randell and Wexler (2002), about 6 million workers in the United States develop stress caused by heat with the most death case reported in the field of construction, farming, woods, and manufactures. Another research conducted by Tawatsupa et al. (2012) in Thailand find that almost 20% of the respondents have heat exposure. The result of the study shows that heat exposure has significant correlation with work accident.

The result of the study conducted by Dewi (2011) shows that there is correlation between heat pressure and blood pressure on the fermentation workers of PT. Indo Acidatama Tbk Kebakkramat Karanganyar. Another study conducted by Sugiyarto (2011) also shows that there is significant correlation between heat pressure and blood pressure of the workers in weaning unit of PT. Dan Liris Sukoharjo. However, the result of the study conducted by Telan (2012) shows that the heat pressure variable has no relation with systolic blood pressure with score p = 0.102 ($p > 0.05$) and there is no relation between heat pressure and change of diastolic blood pressure with score of p= 0.753 ($p > 0.05$).

Hot working condition is also developed by traffic control volunteer in Surakarta. The heat exposure is developed every day in their working shift. The working shift is divided into two: morning and afternoon shift. Morning shift begins from 08.00 to 12.00 and the afternoon shift lasts from 12.00 to 16.00. The traffic controls have been trained by traffic police officers in order to have traffic control skill. Initially, the members of the traffic control in Surakarta are 18 people. Currently, the members of the traffic control in Surakarta reported as official member are 50 people. The traffic controls perform their job in 20 places: Ursulin, the Junction of Garuda, the Junction of Tiga Serangkai, Wora-Wari, the Junction of Sriwedari, SMA 7, Dawung, Tanjung Anom, Joyontakan, Gilingan, Paragon, Kota Barat, Kampung Baru, Mangkunegaran, Pasar Legi, Keslatan, the Junction of SMA 5&6, Joglo, Kerten, Coyudan (Kristiyanto, 2015).

Based on the preliminary survey which has been conducted by using blood pressure measurement toward five people before their working shift, it is found that the average of the systole blood pressure is 119 mmHg and the diastole blood pressure is 70 mmHg. Meanwhile, the average of systole blood pressure after work is 128 mmHg and the diastole is 83 mmHg. It shows that there is an increase in the blood pressure of the traffic control before and after work. The result of the measurement uses QUESTemp °32 Thermal Environment Monitor to measure working climate in three different places which shows the ISBB on the junction of Sriwedari is 30.65ºC, SMA 7 is 34.76ºC and in Ursulin is 31.5ºC. The measurement of the working load based on the calorie needs shows its average is 16599 kilo calorie/hour. According to Tarwaka (2015), this working load is light. The regulation of Ministry of Labor and Transmigration No 13 of 2011 concerning the threshold of Physic and Chemical factor in a workplace, ISBB for outdoor working load in working time of 75% and 25% for rest is 31ºC.

The traffic controls have great risk toward heat exposure which may influence their health. The writer, therefore, is interested to conduct a study to find the correlation between heat working climate and blood pressure for the traffic control volunteers in Surakarta.

2. Research Method

The research is a quantitative non-experiment study using analytic survey design through cross sectional approach. The population of the study are the members of traffic control. The sample taken are 49 people. The sampling used is exhaustive sampling. The measurement of working climate uses Thermal Environment Monitor and the blood pressure is measured by digital Omron blood pressure measurement.

The data are analyzed by univariate and bivariate techniques. Univariate analysis is used to analyze each variable of the research result. It aims to describe the characteristics of each research variable. Bivariate analysis is used to know the relation between the independent variable which is working climate and the dependent variable which is blood pressure. The statistic test used is fisher exact.

3. Result of the Study and Discussion

3.1 The Characteristic of the Respondent

Table 1. Frequency Distribution of the Characteristic of the Respondent based on their Age

Age (year)	n	%	*Mean*
29	1	2.0	
30	1	2.0	
33	1	2.0	
35	1	2.0	
36	1	2.0	
37	6	12.2	
39	6	12.2	
40	4	8.2	
41	2	4.1	
42	3	6.1	
43	3	6.1	
44	3	6.1	
45	2	4.1	43.33
46	2	4.1	
47	1	2.0	
50	1	2.0	
51	2	4.1	
52	2	4.1	
53	2	4.1	
54	2	4.1	
57	1	2.0	
59	1	2.0	
60	1	2.0	
Total	**49**	**100**	

The average age of the traffic control volunteers is 43.33 years old, mostly aged 37 and 39 years old for 6 people (12.2%) subsequently. The youngest traffic control is 29 years old and the oldest one is 60 years old.

Table 2. Frequency Distribution of the Respondent Based on their working length

Working length (year)	n	%	Mean
1	6	12.2	
2	4	8.2	
3	5	10.2	
4	4	8.2	
5	4	8.2	
6	8	16.3	
7	4	8.2	5.69
8	5	10.2	
9	4	8.2	

10	2	4.1
11	1	2.0
12	1	2.0
19	1	2.0
Total	**49**	**100**

Based on Table 2, the average of the working length of the traffic control in Surakarta is 5.69 years, and the least working length is 11.12 and 19 years is 1 people (2.0%).

Table 3. Frequency Distribution of Hypertension Record

Hypertension Record	n	%
Yes	2	4.1
No	47	95.9
Total	49	100

The traffic controls having hypertension record are 2 people (4.1%) and those who have no hypertension record are 47 people (95.9%).

3.2 The Traffic Control Workplace

Table 4. Frequency Distribution of the Traffic Control Workplace

Location	n (%)	ISBB
Ursulin	2 (4.1)	31.34
Junction of Garuda	3 (6.1)	32.20
Junction of Tiga Serangkai	5 (10.2)	29.94
Wora-wari	2 (4.1)	30.25
Junction of Sriwedari	5 (10.2)	31.22
SMA 7	1 (2.0)	32.23
Dawung	2 (4.1)	31.44
Tanjung Anom	3 (6.1)	31.38
Joyontakan	1 (2.0)	31.30
Gilingan	2 (4.1)	31.37
Paragon	2 (4.1)	29.24
Kota Barat	2 (4.1)	31.23
Kampung Baru	1 (2.0)	31.10
Mangkunegaran	3 (6.1)	31.58
Pasar Legi	2 (4.1)	30.39
Keslatan	2 (4.1)	31.14
Junction of SMA 5 & 6	3 (6.1)	31.70
Joglo	2 (4.1)	31.93
Kerten	4 (8.2)	31.37
Coyudan	2 (4.1)	31.30
Total	**49 (100)**	

Table 4 shows that there are 20 studied locations of the traffic control. The most number of traffic control members is in the Junction of Sriwedari and the Junction of Tiga Serangkai,

which are 5 people (10.2%) and the least one is in Joyontakan, Kampung Baru and SMA 7, with only 1 people (2.0%).

3.3 Univariate Analysis

The univariate analysis showing the frequency distribution of the working climate and the blood pressure is presented in Table 5.

Table 5. The Description of working climate and blood pressure of the traffic control in Surakarta

Variable	n	(%)
Working climate		
Under NAB	11	22.4
Above NAB	38	77.6
Blood Pressure		
No Hypertension	4	8.2
Hypertension	45	91.8

Based on Table 5, it is known that the traffic control in the workplace under NAB are 11 people (22.4%), less than those who are in the workplace above NAB of 38 people (77.6%). The traffic controls have no hypertension are 4 people (8.2%), less than those who have hypertension of 45 people (91.8%).

3.4 Bivariate Analysis

The data analysis using Crosstabs with fisher exact test to know the relation between working climate and blood pressure displays the result in Table 6 :

Table 6. The Relation between Working climate and Blood Pressure

ISBB	No Hypertension		Hypertension		Total		*P Value*
	n	%	n	%	n	%	
Under NAB	4	36.4	7	63.6	11	100	0.002
Above NAB	0	0	38	100	38	100	

Table 6 shows that the traffic controls in the workplace under NAB who have hypertension are 7 people (63.6%) and those who have no hypertension are 4 people (36.3%) and the traffic controls in the location above NAB all have hypertension (38 people). Based on the result of fisher exact test the score of $p = 0.002 < 0.05$. Therefore, it can be concluded that there is correlation between working climate and blood pressure of the traffic control in Surakarta.
The result of the statistical analysis can be concluded that most members of Supeltas are hypertensive in locations exceeding NAB than Supeltas whose work site is under NAB. The working climate or heat pressure can result in additional burden on the blood circulation. The

results of this study are in line with research conducted by Dewi (2011), which states that the higher the heat work climate the higher the blood pressure.

4. Closing

4.1 Conclusion

4.1.1 There is a correlation between working climate and blood pressure of the volunteer traffic controls in Surakarta (p value 0.002).

4.1.2 The result of the working climate using QUESTemp °32 Thermal Environment Monitor shows the lowest ISBB is 29.24ºC and the highest one is 32.23ºC.

4.1.3 The result of the measurement of the blood pressure on the traffic controls in the workplace under NAB shows hypertension of 7 people (63.6%) and those who have no hypertension are 4 people (36.3%) and the traffic controls in the workplace above NAB all they have hypertension (38 people).

4.2 Suggestion

4.2.1 It is suggested that the traffic controls have to consume much water while they are working in purpose to avoid dehydration caused by heat exposure during work.

4.2.2 The workers should have used their break time well in shady place and avoid smoking.

4.2.3 The traffic controls uses working cloth which does not absorb heat such as the cotton isolative hot and wool.

4.2.4 It is not suggested to eat too-sweet food or over carbohydrate food because it will maintain fluid through kidneys or sweat.

Reference

Dewi D. (2011). *Hubungan Tekanan Panas dengan Tekanan Darah pada Karyawan di Unit Fermentasi PT. Indo Acidatama. Tbk. Kemiri, Kebakkramat, Karanganyar.* [Thesis]. Surakarta: Program Studi DIV Fakultas Kedokteran Universitas Sebelas Maret Surakarta.

Donoghue, A.M. & G.P. Bates. (2000) The Risk Of Heat Exhaustion at a Deep Underground Metalliferous Mine In Relation To Body-Mass Index and Predicted VO2 Max. *Occupational Environment Journal*. Vol. 50: 4 259-263.

Kristiyanto, T. (2015). *Buku Sejarah Supeltas Polresta Surakarta*. Surakarta: Satlantas Surakarta.

Peraturan Menteri Tenaga Kerja dan Transmigrasi Nomor 13 tahun 2011 tentang Nilai Ambang Batas Faktor Fisika dan Faktor Kimia di Tempat Kerja.

Randell, K. and M.D. Wexler. (2002). Evaluation and Treatment of Heat-Related Illnesses. *American Family Physician Journal*. 1 May 2017. http://www.aafp.org/afp/2002/0601/p2307.html.

Santoso. (2004). *Manajemen Keselamatan Kesehatan Kerja*. Jakarta: Prestasi Pustaka.

Sugiarto, A. (2011). *Peningkatan Tekanan Darah Tenaga Kerja Akibat Terpapar Tekanan Panas Melebihi Standar di Unit Weaving PT. Dan Liris Sukoharjo*. [Thesis]. Surakarta: Program DIV Kesehatan Kerja Fakultas Kedokteran Fakultas Kedokteran Universitas Sebelas Maret Surakarta.

Suma'mur, P.K. (2009). *Hygiene Perusahaan dan Keselamatan Kerja.* Jakarta: CV Haji Masagung.

Tarwaka. (2014). *Keselamatan dan Kesehatan Kerja (Manajnemen dan Implementasi K3 di Tempat Kerja).* Surakarta: HARAPAN PRESS.

_____. (2015). *Ergonomi Industri Dasar Dasar Pengetahuan Ergonomi dan Aplikasi di Tempat Kerja*. Surakarta: HARAPAN PRESS.

Tawatsupa, B dkk. (2012). Association between Heat Stress And Occupational Injury Among Thai Workers: Findings Of The Thai Cohort Study. *Industrial Health Journal.* Volume 5: 1 1-34.

Telan, A. (2012). *Pengaruh Tekanan Panas terhadap Perubahan Tekanan Darah dan Denyut Nadi pada Tenaga Kerja Industri Pandai Besi di Desa Hadipolo Kecamatan Jekulo Kabupaten Kudus Jawa Tengah*. [Thesis]. Semarang: Magister Kesehatan Lingkungan Program Pascasarjana Universitas Diponegoro Semarang.