

The Correlation of Job Stress and Metabolic Syndrome among Restaurant Employees in Peliatan Ubud Village

Susy Purnawati¹, Putu Astawa²

¹PhysiologyDepartement School of Medicine

² Members of Indonesian Physiological Society, Medical Faculty of Udayana University; Lecturer at Sports Physiology Master Program (majoring of Sports Injury) University of Udayana

Abstract: *Job stress is associated with several diseases, such as gastric ulcerations, nephrosclerosis, myocardial infarction, rheumatoid arthritis and other conditions are termed as "diseases of adaptation". Metabolic syndrome among workers is also has correlation with chronic job stress. The workers of busy restaurant in tourist destination are at risk of job stress which results in dysfunction of the body's adaptation system. This cross-sectional analytic study conducted in September to December 2014 with the participants were restaurant employees in the village of Peliatan Ubud, Bali Province. The aims of study was to determine the relationship between job stresses with metabolic syndrome among workers. From the six restaurants including the category of busy restaurants were selected two restaurants by randomly. Of the 50 subjects that were designated as study participants there were two incomplete in filling questionnaires and three subjects did not come when the time of data collection. We assessed job stress variable by job strain index (JSI), as measured using Brief Job Stress Questionnaire (BJSQ). While metabolic syndrome is determined based on abnormality at least 3 of the following 5 criteria, such as: central obesity (the waist circumference of more than 90 cm in men and 80 cm in women, hypertension for blood pressure is over 130/85 mmHg or under treatment with anti-hypertensive drugs, triglyceride levels over 150 mg / dl, HDL cholesterol <40 mg / dl in men or <50 mg / dl in women, and glucose intolerance for the fasting plasma glucose level of <100 mg / dl. The results of this study we found that: of the 45 study subjects, 32 (71%) men and 13 (29%) women with a mean age of 37 ± 10.96 years old. Thirteen subjects (24%) experiencing job stress (JSI > 1). The prevalence of metabolic syndrome in a restaurant in the Village Peliatan employees obtained 42% (male, 68%; women, 32%). Chi-square test results showed that no significant relationship between job stress and the metabolic syndrome, in which the value of $p = 0.314$ ($p > 0.05$). It can be concluded that in this study found no significant association between job stress and the metabolic syndrome in a restaurant employee in the District Peliatan village of Ubud.*

Keywords: metabolic syndrome, job stress, employee restaurants

1. Introduction

Bali as a tourist destination invites widespread of restaurant industry. To meet the demands of customers, in addition to the availability of the number of restaurants is certainly must have been supported by the speed and quality of service. Progression of the demanding customer service currently requires an increase of work speed and more excellence of service. An excellent work performance in both physical and mentally condition is necessary for restaurant employees. This condition have been forced worker in providing satisfactory service for consumers. Sometimes work demands is not matched with workers capacity and tend to increase risk of job stress^[1].

Stress, in general, as well as work stress can be linked to several diseases, such as gastric ulcerations, nephrosclerosis, rheumatoid arthritis and other conditions are termed as "Diseases of Adaptation"^[2] as well as coronary heart disease^[3]. Similarly, metabolic syndrome can be triggered as a result of chronic stress. In this condition, the response of the energy supply of the body are not suitable with the normal requirements. Metabolic syndrome is a collection of metabolic abnormalities both lipid and non-lipid which is a risk factor for cardiovascular disease. The symptoms consisting of central obesity, atherogenic dyslipidemia (high triglyceride levels and high level of Low Density Lipoprotein), hypertension, and abnormal plasma glucose. Abnormal glucose occurs due to insulin resistance.

The workers of the restaurants in the tourist destination areas with high traffic category (busy restaurant) are at risk of job stress which results in dysfunction of the body's adaptation system. Due to stress psychological triggered, the manifestations of metabolic disorders is as a result of the response to stimulation of the SAM (simpato-Adrenomedulary) -AXIS and HPA (hipothalamo-pituitary-adrenal) -AXIS leading to the pathological conditions.

The work process in serving food is demanding physical work demand that accompanied the fulfillment of the target completion time of quickly ordered of customer. This demanding situation gives the appearance of job stress tendencies. Workers who experience job stress may experience emotional instability that result in the behavior of over-eating and further increase the risk for metabolic syndrome. Currently the metabolic syndrome has been highly believed to be risk factors for coronary heart disease and cerebrovascular accident, or more commonly known as stroke.

Age factor also plays a role in the incidence of metabolic syndrome. Employees in the age category 45 years and over have the barriers to physical activity so that more people choose sedentary work attitude and result in the risk of metabolic syndrome being increase. Besides Factor of age, the body mass index category of overweight and obesity (especially central obesity) is also associated with the risk of metabolic syndrome.

Volume 6 Issue 3, March 2017

www.ijsr.net

Licensed Under Creative Commons Attribution CC BY

This study was conducted based on problem definition as: 1) what is the prevalence of metabolic syndrome and job stress among employee restaurants in Ubud Bali? 2) Is there any relationship between job stress and metabolic syndrome among employee restaurants in Ubud Bali?

2. Methods

The study was conducted in Peliatan Ubud Village in September to December 2014, using cross-sectional design, the sample are 50 person of restaurant workers were randomly assigned. Of the six restaurants including the category busy were selected randomly and two restaurants has a place where research subjects taken.

Job stress is defined as a condition of psychological distress caused by the mismatch between job demand and job control (ability to anticipate the task). Job stress data was assessed by job strain index that measured using a BJSQ (Brief Job Stress Questionnaire). Rated based on job strain index (JSI), as measured by a score of job demand (7 statements) and job control (3 statements) in the questionnaire Brief Job Stress Questionnaire (BJSQ) with 4 Likert scale. JSI is determined by a formula score of job demand divided by job control. Job stress was decided if the score of JSI is > 1 . While metabolic syndrome defined set of symptoms that the criteria for metabolic syndrome is based on the statement together from the IDF, NHLBI, WHF, IAS, and AHA, which is if found at least three abnormalities of the five following criteria: central obesity is the waist circumference of 90 cm in men and 80 cm in women, blood pressure over 130/85 mmHg or under treatment with anti-hypertension, triglyceride levels over 150 mg / dl, HDL cholesterol < 40 mg / dl in men or < 50 mg / dl in women, and glucose intolerance that fasting plasma glucose of over 100 mg / dl^[2]. Samples of blood taken for examination a complete lipid profile and blood sugar after fasting for 12 hours beforehand. Examination of waist circumference was measured with the subject standing upright position barefoot with legs distance of 25-30 cm. Measurements were made circular horizontally from the midpoint between the peak of the iliac crest and the lower edge of the last rib on the medium axillary line^[4]. Waist circumference is defined as abnormal when > 90 cm in men and > 80 cm in women^[5].

3. Result and Discussion

In this study, as many as 50 employees were selected as study participants. Based on the data collected, there are two incomplete questionnaires filled and the three subjects did not come when sampling data. They were absence from work permit reasons (absence for Hindu ceremony). Thus, in this study there are 45 data that analyzed. The results of the study are presented in the following description.

Characteristics of study participants

Subject of the study consisted of 32 (71%) men and 13 (29%) women with a mean age of 37 ± 10.96 years. The working environment in the form of the microclimates in the kitchen of the restaurant has a temperature of 30°C wet and dry temperature 27°C. The restaurant employees did the work of preparing dishes for the guests customized with incoming orders to the receipt of the order.

Table 1: Characteristics of study participants (N = 45)

Variable	Minimum	Maximum	Mean	SD
Age (year)	19	57	37	10.96
BMI (Kg/m ²)	16	34	22,7	4.78
Job strain index (JSI)	0.52	1.41	0.90	0.20
Waist circumference (cm)	64.0	116.0	81.87	14.30
Triglyceride (g/DL)	50.0	365.0	124.20	73.66
Fasting blood glucose (g/DL)	80.0	156.0	96.29	13.93
Cholesterol (g/DL)	116.0	246.0	171.62	30.71
LDL (g/DL)	61.0	169.0	112.60	26.44
HDL (g/DL)	26.0	73.0	41.89	8.94
Systolic blood pressure (mmHg)	100	150	117	12.9
Diastolic blood pressure (mmHg)	60	100	80	10.3

Table 2: Prevalence of the metabolic syndrome restaurant employees in Peliatan Village by gender

Variable	Gender		Total
	Male	Female	
Metabolic syndrome	no	7	26
	yes	6	19

In the Table 2, it can be seen that the prevalence of metabolic syndrome in the restaurant employees in the Peliatan Village obtained 42% (male, 68%; women, 32%).

Table 3: The prevalence of job stress on employee restaurant in the Village Peliatan by sex

		Gender		Total
		Male	Female	
Job stress	No	24	8	32
	Yes	8	5	13

According to Table 3, thirteen subjects (24%) consisted of 8 men and 5 women experiencing job stress (JSI > 1).

The relationship between work stress and the metabolic syndrome

Table 4: Results of statistical analysis of the relationship between job stress and Metabolic syndrome with chi-square test (n = 45)

	Metabolic Syndrome		p	Confidence Interval	
	no	yes		Lower	Upper
Job Stress					
No	20	12	0.314	0.556	7.497
Yes	6	7			

*Prevalence ratio (PR) in this study was 2.042.

Based on the Table 2, in this study chi square test results showed that no significant relationship between job stress and the metabolic syndrome in the restaurant employees in the village of Peliatan. The results of chi square test scores shows the value of $p = 0.314$ ($p > 0.05$). But, we found the prevalence ratio (PR) in this study was 2.042. It means that the risk for metabolic syndrome is increase 2 times among workers with job stress.

In this study, we found no significant correlation between job stress and the metabolic syndrome ($p = 0.314$ or value of $p > 0.05$). Small number of sample size and subjective

measurement of job stress by questionnaire could be as any reasons of un-significant founding. This study result was different from the meta-analysis study by Bergmann et al, who found significant relationship between the two variables from most studies that analyzed (Bergmann et al, 2014). The development of obesity may involve direct behavioral effects mediated by excess energy intake, physical inactivity and excess alcohol consumption, or both direct and indirect pathways^[6]. Direct neuroendocrine mechanisms may contribute to the development of obesity during long-term work stress. It has been proposed that chronic stress alters adrenocortical activity, leading to insulin resistance, abdominal obesity, and other features of the metabolic syndrome. Chronic stress that may stimulate or inhibit appetite^{[7],[8],[9]}. Low job control and a limited social network are link to sympathetic arousal and vagal withdrawal, and with large waist circumference¹⁰.

Other cons with findings of this study is until now there is synchronization findings of several studies that prove the correlation between work stress and the metabolic syndrome¹¹. Another explanation is also due to the theory of general mal-adaptation response to physical stress and psychological simultaneously able to drive mechanism subsequent to the HPA-axis and SAM-axis (Guyton and Hall, 2006), but there are variations in individual responses to psychological stress to mechanisms of hunger and satiety in the hypothalamus. Which resulted some people who experience job stress affect the anxiety and uncontrolled eating patterns that that will be the risk of developing metabolic syndrome. The small sample size can be a cause unfavorable effect or finding in this study.

Different than the research by Giang et al, (2014), which examines differences in job stress scores in 2687 workers in Shanghai who had metabolic syndrome and without the disease¹². In his study found a favorable effect of the outcome. Similarly, Chandola et al^[3] in the prospective cohort study looking at the relationship between stress in the workplace against metabolic syndrome to 10,308 people civil servants in London, who were followed up for an average of 14 years found dose-response relationship between exposure after 14 years of work stress on the risk of metabolic syndrome. Workers who experience chronic stress and have three or more kinds of exposure had a higher risk double than that experienced metabolic syndrome than workers who did not experience job stress. The study concluded that workplace stress is a risk factor essentially to the metabolic syndrome.

Another fact, metabolic syndrome is closely associated with physical inactivity, alcohol drinking history and abnormal liver function by other causes that are not explored in this study. Physical activity with exercise for example, proved to be very effective in preventing hypertension and its potential 10-fold compared to a low-salt diet. Exercise can eliminate feelings of depression and anxiety and gives a feeling of psychological wellbeing.¹³ According to Jim Henry, in theory, primary hypertension were found in the majority of cases of hypertension in the community, closely connected or often initiated by neuro-hormonal responses to psychosocial stress^{[12],[13]}. Polygenetic predisposition interacts with environmental factors are still believed to be

the cause of primary hypertension. Hypertension is also a symptom other than a combination of symptoms of dyslipidemia in determining the metabolic syndrome. The mechanism of hypertension related stress can be explained that the stimulation sympatho-adrenomedullary result in the activation of renin production is by β 1-receptor-mediated. Which in turn stimulates the renin-angiotensin-aldosterone axis. Positive energy balance is the major cause of obesity, and chronic stress maybe a contributory factor^[6]. A dose response relation was found between work stress and risk of general obesity and central obesity. Based on the Whitehall II Study provided information on duration and level of work stress, they examine dose-response effects on degree of obesity and abdominal obesity over 19 years of follow up. They reported that work stress was associated with higher odds of waist obesity among men in the models adjusted for age, height, employment grade, and health behaviors. The study explain that there were no significant gender differences in the effect of work stress.

According to Chandola et al in the Whitehall II study (5 years longitudinal study) found association between work stress and the metabolic syndrome, low physical activity, poor diet and lower heart rate variability^[3]. Thirty two percent of the effect of work stress on CHD can be explained by the effect of work stress on health behaviours (low physical activity and poor diet in particular) and the metabolic syndrome. Work stress is associated with smoking and exercise, whereas fatty food intake increases under stressful conditions^[3].

In our study was not done analysis of the relationship between job stresses with hypertension. And only 7 respondents in this study with a systolic blood pressure above 120 mmHg. According to the theory of Jim Henry, abdominal obesity, insulin resistance, lipid disturbances and other manifestations of the metabolic syndrome is a result of stress-related hormones that increase the secretion of glucocorticoid, and in psychosocial stress also increase secretion of catecholamine. Insulin resistance is part of the symptoms of metabolic syndrome that is often accompanied by symptoms of primary hypertension. Activation of the hypothalamic-pituitary-adrenal axis resulting an increase in cortisol and other hormones resulting in insulin resistance and increase deposit of visceral fat^{[12],[13]}.

Research on job stress conditions associated with metabolic syndrome is limited in Indonesia. But referring to the previous studies in other country can be a predictor that the relationship between these variables have a significant relationship^{[14]-[17]}. Research conducted in Makassar by Adam et al was study on the prevalence of metabolic syndrome in the community, but has not include variable of employment status as a risk factor^[4]. Those study was conducted among 1219 visitors of Polyclinic Internal Medicine / Clinical Diabetes, Obesity and Lipids, a private Hospital and a private clinic in Makassar who come to regular medical check during the period of October 2002 to December 2004. Adam et al found the prevalence of metabolic syndrome on study participants in women than men, respectively 47.1% and 19.6%. Studies of other metabolic syndrome in Indonesia is still limited in patients who come to clinics or hospitals when subjected to a

complaint of a physical symptom. For the future, to find a picture that is closer to the actual conditions in the community, of course, very important to conduct studies to find the prevalence of metabolic syndrome in workers in a variety of occupations which associated with work stress. Considerations for evidence of work stress using biomarkers would provide job stress condition data with the risk of metabolic syndrome are needed and would be more valid data for the future research in Indonesia.

4. Study Limitation

- 1) Assessment of job stress in this study used questionnaires that are subjective tool. Subjects in this study as well as an overview of Indonesian society did not express truthfully what actually their condition. There is a reluctance convey the actual conditions because of the influence of local culture and customs. So it is likely make the low score of job strain index.
- 2) Chance of confounding variables were not explored in this study were physical inactivity, history of drinking alcohol and impaired liver function by other causes associated with the metabolic syndrome.
- 3) The number of samples is small due to study period limitation and research funding

5. Conclusion

Based on this research can be concluded that: (1) Thirteen employees (24%) experiencing job stress (JSI > 1) and the prevalence of metabolic syndrome gained 42% (male, 68%; women, 32%); (2) There was no significant relationship between job stress and the metabolic syndrome in the restaurant workers in Peliatan Village, Ubud.

It can be suggested that more research is needed to prove the relationship between job stress and the metabolic syndrome using biological markers for measuring the condition of work stress on employees. So that the data on work stress were used to analyze the relationship between these variables are objective. For example by measuring salivary cortisol levels morning. As well as with a sample of a larger study.

References

- [1] Dean BB. and Robert AK. 2000. Stress. Occupational Health. Lippincott Williams Wilkins: Philadelphia.
- [2] Folkow B. 2014. Stress, Hypertension and the Metabolic Syndrome. Available from: <http://www.stress.org/stress-hypertension-and-the-metabolic-syndrome>.
- [3] Chandola T, Britton A, Brunner E, Hemingway H, Malik M., Kumari M, et al. 2008. Work stress and coronary heart disease: what are the mechanism? European Heart Journal. January
- [4] Adam JM, Herman Adriansjah H, Fabiola MSA. 2011. Metabolic syndrome at clinic, study result in Makassar. (in Indonesian lang.) Available from: <http://dokternetworkangk97/2011/02/sindroma-metabolik-di-klinik-hasil.html>. Access 1/12/2014
- [5] Rachmad S, Andi W, Sidartawan S, Tommy H. 2004. Estimating BMI and waist circumference cut-offs for obesity in Indonesia and health impact (ISSO Epidemiological Study). Proceeding 3rd National Obesity Symposium (NOS III). p. 1-12.
- [6] Brunner EJ, Chandola T, and Marmot MG. 2007. Prospective effect of job strain on general and central obesity in the Whitehall II study. American Journal of Epidemiology; 165(7).
- [7] Dallman MF¹, Pecoraro NC, la Fleur SE. 2005. Chronic stress and comfort foods: self-medication and abdominal obesity. Brain Behav Immun. Jul;19(4):275-80
- [8] Epel ES, Blackburn EH, Lin J, Dhabhar FS, Adler NE., Morrow JD, Cawthon RM. Accelerated and Ronald G. Psychological Stress, Telomeres, and Telomerase. Brain Behav Immun. 2010 May; 24(4): 529–530.
- [9] Hemingway H, Shipley M, Brunner E, et al. 2005. Does autonomic function link social position to coronary risk? The Whitehall II Study. Circulation; 111:3071–7
- [10] Heraclides AM, Chandola T, Witte DR & Brunner EJ. 2011. Work stress, obesity and the risk of type 2 diabetes: gender-specific bidirectional effect in the Whitehall II study. Obesity 20 (428) 33
- [11] Giang Z, Li X, Yunsheng M, Persuette G, Jinsong W, Miaozhao M, Liwu J and Li J. 2014. Relationship between job stress and metabolic syndrome in occupational population. J Am Coll Cardiol; 64(16_S).
- [12] Rosch PJ. 2014. Stress, Hypertension and the Metabolic Syndrome. Available from: <http://www.stress.org/stress-hypertension-and-the-metabolic-syndrome>. Access 1/12/2014
- [13] Alyssa BS. 2009. Metabolic syndrome and workplace outcomes. (Dissertation). Doctor of Philosophy (Kinesiology) in the University of Michigan.
- [14] Anne S. 2003. Working time. Its impact on safety and health. International Labour Office and Occupational Safety & Health Research Institute Korea Occupational Safety & Health Agency.
- [15] Bergmann, N., Gyntelberg F and Faber J. 2014. The appraisal of chronic stress and the development of the metabolic syndrome: a systematic review of prospective cohort studies. *Endocr Connect* 2014 vol. 3 no. 2.
- [16] Evolahti A, Hulcrantz M and Collins A. 2006. Women's work stress and cortisol levels: a longitudinal study of the association between the psychosocial work environment and serum cortisol. Journal of Psychosomatic Research, 61: 645 – 652
- [17] Sonnentag S and Fritz C. 2006. Endocrinological processes associated with job stress: catecholamine and cortisol responses to acute and chronic stressors. Employee Health, Coping and Methodologies Research in Occupational Stress and Wellbeing. Elsevier Ltd., 5: 1-59