A Cross Sectional Study: Metabolic Syndrome in Yogyakarta

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Abstract— Metabolic syndrome (MetS) (at least 3 of the following: abdominal adiposity, low HDL cholesterol, high triglycerides, hypertension, and impaired fasting glucose) increase the risk of incidence of cardiovascular disease, stroke and mortality of young people. Still, there are less data about MetS in Yogyakarta. So, the aim of this study is to detect the incidence of MetS in Yogyakarta and other variable related to MetS. A cross sectional study was done on a total of 141 subjects in Yogyakarta Province in September 2018. The subject was chosen by cluster sampling (4 Primary Health Care from 2 districts of 5 districts in Yogyakarta Province) then the researcher chose again who met the criteria. To detect metabolic syndrome in subjects, blood pressure, waist circumference, and blood triglyceride level were measured. 141 subjects were studied with 35 males and 106 females. There are 26,24 % subjects with MetS (34 females, 3 males). The positive correlation is between waist circumference and triglyceride level of subject (correlation coefficient = 0,4212). The significant correlation is among sexes and MetS, hypertension, triglyceride level ($p < 0,05$). The bigger waist circumference, the higher the triglyceride level is. Sex variable is related to blood pressure and triglyceride level incidence. Subjects with MetS, hypertension, and hyper triglyceride are higher in women compared with men.
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Keywords : metabolic syndrome, waist circumference, blood pressure, triglyceride

1. INTRODUCTION

Metabolic Syndrome (MetS) is a combination of several metabolic abnormality and psychology experienced by people including insulin resistance, obesity, atherogenic dyslipidemia and hypertension [1]. Metabolic Syndrome related to the increasing risk of cardiovascular disease, type 2 diabetes mellitus, and death in a young age[2]. Age, sex, obesity, inadequate fruits intake, socioeconomic, and hyper cholesterol contribute to the increase of metabolic syndrome in the urban population in India[3].

Nationally in Indonesia, less data have been provided about prevalence of MetS. However, the analysis of secondary data of Basic Health Research in 2007 shows that prevalence of metabolic syndrome is 21,3 % for female and 12,9% for male[4]. The Basic Health Research in 2013 not even mention the MetS national prevalence, only states components of MetS. Based on Basic Health Research in 2013, prevalence of undiagnosed diabetes is highest in Yogyakarta Special Region (2,6%). The prevalence of diagnosed hypertension by health workers and central obesity in Yogyakarta is higher than the national prevalence. The prevalence of diagnosed hypertension by health workers at the age of more than 18 years in Yogyakarta is over 12%[5].

There are various definitions form several organizations using various terminologies to identify metabolic syndrome such as WHO[6], NCEP ATP III[7], and IDF[8]. There are a study using secondary data of IFLS 4 in 2017 about prevalence of Metabolic Syndrome in Yogyakarta, and a study using IDF definition (prevalence of MetS was 13,19%)[9]. However, there is less data using NCEP ATP III definition in Yogyakarta. This research aims to detect the incidence of MetS in Yogyakarta and other variable related to MetS, because of less data about MetS in Yogyakarta [5].

2. MATERIALS AND METHOD

The population of this research is in Yogyakarta Special Region. The participants were selected by randomized two districts in Yogyakarta Special Region, and two sub-districts represented by Primary Health Care from each district was chosen for sampling area. Then, the Primary Health Care visitors

from the end of August to September 2018 who met the inclusion and exclusion criteria enrolled in the research (male and female). Minimum sample is n=90. Minimum sample was calculated by sample size formula for cross-sectional study from Lameshow. 141 participants were selected during the end of August - September 2018. The inclusion criteria of the research were adult participant ≥ 26 years, staying in Yogyakarta for a past year, and willing to enrolled this research. The exclusion criteria were having 1) diabetes or history of diabetes 2) chronic disease (Cardiovascular Disease, cancer) 3) pregnant. Metabolic syndrome was defined according to the criteria of the National Cholesterol Education Program's Adult Treatment Panel III (NCEP ATP III) : 1) Abdominal obesity (Female WC >88 cm; Male > 102 cm); 2) Triglycerides level ≥ 150 mg/dl or 3) HDL cholesterol < 40 mg/dl (female), < 50 ml (mg/dl); 4) Blood pressure ≥ 130 / ≥ 85 mmHg; 5) Fasting glucose ≥ 110 mg/dl. HDL cholesterol and fasting glucose did not measure, because of limited source and funding in this research. Triglyceride level was measured using Triglycerides Home Test 3 in 1 (Multicare in). The data were analyzed by chi square test and correlation test.

3. RESULTS AND DISCUSSION

Table 1 Prevalence of Metabolic Syndrome in Yogyakarta Special Region

Variable	N	%
Sex		
Male	35	24,82%
Female	106	75,18%
Waist Circumference		
Central Obesity	89	63,12%
Normal	52	36,88%
Triglycerides Level		
Hyper triglyceride	81	57,45%
Normal	60	42,55%
Blood Pressure		
Hypertension	50	35,46%
Normal	91	64,54%
Metabolic Syndrome Status		
Metabolic Syndrome	37	26,24 %
Normal	104	73,76 %

This research confirmed the prevalence of metabolic syndrome which is 26,24%. Other studies showed the variation of metabolic syndrome prevalence[3]. These included data from India 33,5%, Suriname 39,2%[10], South Korea 30,52%[11] and data from Jakarta, Indonesia 28,4%. Comparing to these data, the result of this research shows lower prevalence than in Asia and other big city in Indonesia[12]. Total population, standard references for determining metabolic syndrome status, and source of secondary data become specific consideration of the variation of prevalence. This research provided data from two regencies in Yogyakarta. The data from other regency did not recorded recently. This finding is particularly corresponding to these area of study.

Table 2. Sex, Waist Circumference, Triglyceride Level, and Blood Pressure

Waist Circumference	**Triglycerides Level**		**Total**	**P value**
	Hyper triglyceride	**Normal**		
Normal	40	49	89	0,000
Central Obesity	41	11	52	
Total	81	60	141	
Sex	**Waist Circumference**		**Total**	**P value**
	Central Obesity	**Normal**		
Male	6	29	35	0,005
Female	46	60	106	
Total	89	52	141	
Sex	**Triglycerides Level**		**Triglycerides Level**	**P value**
	Hyper triglyceride	**Normal**		

Male	18	17	35	0,406
Female	63	43	106	
Total	81	60	141	
Sex	**Blood Pressure**		**Total**	**P value**
	Hypertension	**Normal**		
Male	6	29	35	0,009
Female	44	62	106	
Total	50	91	141	

Table 3 Correlative Test between Waist Circumference and Triglyceride Level

Variable	Correlative Coefficient	P value
Triglyceride Level	0,4212	0,000

This research provided factors contributing in metabolic syndrome such as waist circumference, triglyceride level, sex and blood pressure. The result shows that the greater of abdominal circumference, the higher the level of blood triglycerides is. This result supports the results of previous studies which also show that abdominal circumference is associated with lipid profiles, and one of the them is triglycerides[13]. Abnormal blood lipid values are associated with significant abdominal circumference, which also correlates with coronary artery disease[14]. Furthermore, the combination of abdominal circumference and triglycerides (abdominal circumference index with triglycerides) is an indicator of risk in patients with cardiovascular disease[14]. Increased abdominal circumference is an independent risk factor for increased self-triglycerides and a phenotypic decrease in HDL cholesterol that makes the condition of dyslipidemia[15]. The relationship between abdominal circumference and triglyceride levels can be through several mechanisms. First, accumulation of visceral fat deposits can be assessed by measurement of abdominal circumference. Second, triglyceride levels can be an indicator of low density cholesterol (VLDL) lipoprotein levels. The increase in both indicators of abdominal circumference and triglycerides is a manifestation of the body's failure to metabolize energy and store fat, a process known as protective metabolic deposition. Normally, the body will clean triglycerides in the blood after eating and store them in subcutaneous fat reserves. This disruption of function will also result in successive metabolic disorders such as diabetes mellitus, atherosclerosis, pro-coagulation, pro-inflammation, and other metabolic effects. Triglyceride-waist circumference is strongly associated with the prevalence of prediabetes and diabetes. This predictor was a novel and clinically effective marker for early identifying the risks of prediabetes and diabetes[16].

Our finding show the significant relationship of waist circumference among gender. Waist circumference is a better predictor of changes in lipid profile, especially HDL colesterol than significant change of body mass index[17]. Women were at greater risk of centralized obesity then men[18]. Women have more body fat than men. In contrast, many studies prove there are consequences of metabolic disorder of the central obesity typical of men. Women have the pear-shaped body fat distribution that associated with lower cardiometabolic risk[19]. Our data should be corrected with the age factor. The longitudinal study found the inverse relationship among age and term of waist circumference change. The prevalence was increased more markedly among the younger subjects. However, men and women had the same of significant increase of waist circumference [20].

The triglyceride level has the significant difference among women and men. Women in obese stage have the higher total-cholesterol and LDL cholesterol compared to men[21]. Sex hormones played important role for metabolic health in men and women. Before menopause, women have lower risk of atherosclerotic cardiovascular disease relative to men. Estrogens have been a factor for lowering glucose and lipid abnormalities[22].

4. CONCLUSION

The prevalence of Metabolic Syndrome in Yogyakarta Special Region is 26,24 % with central obesity and hyper triglycerides as the most common components. The greater of waist circumference, the higher the level of blood triglycerides is.

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