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ABSTRACT

**Aim:** to obtain the prevalence of MetS in Jakarta, as a capital city of Indonesia.

**Methods:** data were obtained from surveillance of primary non-communicable disease in five regions in Jakarta, Indonesia, conducted in 2006. Targeting for 1,800 samples, we performed a purposive and simple random sampling of subjects within the age range of 25 – 64 years old in selected sampling areas, and stratified random sampling by adjusting to age and sex within those selected sampling areas. We use The WHO Step Wise in collecting data. We also collected blood sample for total cholesterol, LDL cholesterol, HDL cholesterol and triglyceride level. The ATP III modified Asian criteria require the presence of 3 or more of the following: 1. Abdominal obesity (waist circumference > 90 cm in men and > 80 cm in women; 2. A high triglyceride level (> 150 mg/dL); 3. A low HDL-cholesterol level < 40 mg/dL for men and <50 mg/dL for women); 4. High blood pressure (systolic > 130 mmHg or diastolic ≥80 mmHg; and 5. A high fasting plasma glucose concentration (≥110 mg/dL).

**Results:** among 1,591 subjects, there are 641 men (40.3%) and 950 women (59.7%). The crude prevalence of MetS using the ATP III modified Asian criteria is 28.4% with prevalences in men and women are 25.4 and 30.4% respectively. The prevalences of MetS in NGT, prediabetes, and diabetes group are 16.4, 35.1, and 73.4% respectively. The prevalences of MetS and central obesity in prediabetes and diabetes group are higher significantly than those in normal glucose tolerance group (p<0.01). The most common component of MetS in men is hypertension (84.7%), followed by hypertriglyceridemia (83.4%), central obesity (75.5%), hyperglycemia (50.9%) and low HDL-cholesterol (43.6%). In women, the most common component is central obesity (84.1%), followed by hypertension (84.1%), hypertriglyceridemia (66.1%), low HDL-cholesterol (57.8%), and hyperglycemia (50.2%).

**Conclusion:** the prevalence of MetS in this study is 28.4%. The most component found in men is hypertension while in women is central obesity.

**Key words:** metabolic syndrome, ATP III modified Asian criteria, prevalence.

INTRODUCTION

Based on the Household Health Survey in 2001, cardiovascular disease (CVD) is the leading cause of mortality in Indonesia. The survey also reported that CVD mortality due to non-communicable disease (NCD) has increased twice as much within the last 10 years which attributed to the increase of obesity, dyslipidemia, hypertension and diabetes mellitus. As a developing country, Indonesia has transformed its economy from agricultural-based to industrial-based. One of the prominent characteristics of industrial-based economy is the widespread use of technology as opposed to human factor often used in agricultural-based economy. This transition has inevitably changed the society life style whereby people tend to do less physical activities and eat fast-served food (often called junk food). This phenomena transformed the cause of mortal diseases from infection-type diseases to metabolic-type diseases, mostly caused by physical inactivity and obesity.

To identify persons at greater risk of cardiovascular disease due to metabolic abnormalities, the World Health Organization (WHO), the European Group for Study of Insulin Resistance (EGIR), International Diabetes Foundation (IDF) and National Cholesterol Education Program Adult Treatment Panel III (NCEP ATP III) created a diagnostic criteria called metabolic
syndrome (MetS). Metabolic syndrome is a cluster of metabolic abnormalities closely related to the risk of coronary heart disease (CHD), stroke and cardiovascular mortality. Each component of metabolic syndrome has been known as the major cardiovascular risk factor. Once they occur simultaneously, the adverse outcome should be more likely. In some cases, those metabolic disorders were found unpredictable when those people got routine general medical check up. Soebardi found that among newly diagnosed diabetes mellitus, the prevalence of dyslipidemia was higher than those without glucose intolerance.

Based on some recent studies, ATP III criteria are more simple and reliable in daily practice than those of WHO, EGIIR and IDF. In 1994, National Health and Nutrition Examination Survey (NHANES) in the US reported that the prevalence of MetS using NCEP/ATP III criteria in men and women were 22.8% and 22.6%, respectively. Among other Asia regions, the prevalence of MetS is also highly enough. In 1996, the prevalence of MetS in Malaysia among subjects whose age > 20 years old was 49.4% (the 2nd Malaysian National Health and Morbidity Survey). A National survey of MetS in the Thai population in the year 2000 reported the prevalence of MetS according to NCEP/ATP III criteria was 21.9%. In Indonesia, NCD study in Depok (2001) reported that the prevalence of MetS using ATP III modified Asian Criteria was 25.3%. Depok is one of the suburbs in West Java which is relatively near to Jakarta. Like other suburb regions surrounding Jakarta, the development of industrial area in Depok increases rapidly. Since Depok Study reported high prevalence of MetS, we assumed that the prevalence of MetS in Jakarta may be higher than or similar to that of Depok. The purpose of this study is to obtain the prevalence of MetS in Jakarta, as a capital city of Indonesia.

METHODS

The Jakarta NCD-S is a cooperation study by Research and Health Development, Ministry of Health and Department of Medicine, Faculty of Medicine, University of Indonesia. Area sampling is determined by purposive random sampling and simple random sampling. In those sampling areas, subjects are selected by stratified random sampling based on age and sex.

We use The WHO Step Wise in collecting data which consist of three steps. The first step is collecting demographic factor by interviewing subjects of the study. The second step is conducting physical examination such as anthropometric measurement (weight, height and waist circumference) and blood pressure. The third step is performing laboratory examination such as an oral glucose tolerance test (OGTT) and lipid profile. Height (to the nearest millimeters) is recorded in all subjects without wearing shoes. Weight (in kilograms) is measured in light clothing using a microtoise. Body Mass Index (BMI) is calculated using weight divided by the square of the height (kilograms per meter squares).

Waist circumference is measured in the middle between the last arcus costae and spina iliaca anterior superior (SIAS). There are three readings of blood pressure taken from each respondent who had rest adequately before being measured using standard mercury sphygmomanometer in sitting position. The mean value of the three readings is then calculated.

All subjects, except those with diagnosed diabetes, are then given an OGTT. OGTT is collected after subjects did overnight (about 12 hours) fasting and two hour after taking 75 gram of glucose in 200 ml water. We also collected blood sample for total cholesterol, LDL cholesterol, HDL cholesterol, and triglyceride level.

Initially, this study recruited 1,800 subjects from five regions in Jakarta. Among 1,800 subjects, 155 subjects withdrew from the study and 54 subjects did not perform blood sample collection, so there were 1,591 subjects eligible for the study.

Definition

The ATP III modified Asian criteria require the presence of 3 or more of the following: 1. Abdominal obesity (waist circumference >90 cm in men and >80 cm in women; 2. A high triglyceride level (>150 mg/dL); 3. A low HDL-cholesterol level <40 mg/dL for men and <50 mg/dL for women); 4. High blood pressure (systolic >130 mmHg or diastolic >80 mmHg; and 5. A high fasting plasma glucose concentration (>110 mg/dL).

Statistical Analysis

Data were analyzed using SPSS v13 software. We calculated estimates of mean or percentage of risk factors level in the overall population. Comparison of risk factors between population subgroup were performed using chi square test for categorical variables.

RESULTS

Among 1,591 subjects, there are 641 men (40.3%) and 950 women (59.7%). The crude prevalence of MetS using the ATP III modified Asian criteria is 28.4% with prevalences in men and women are 25.4 and 30.4%, respectively.
In men, the prevalence of MetS increases more than twice in the age group of thirties compared to the age group of twenties. The prevalence in the age group of fifties is relatively flat until the age group of sixties. While the prevalence of MetS in the age group of sixties to the above increases less than one half. While in women, the prevalence of MetS increases three fold in the age group of thirties compared to that of the twenties. While in the age group of fourties the prevalence increases twice as many as the previous age group. In the age group of fourties to the above the prevalence is relatively flat (less than one half fold). The prevalences of central obesity increase with age and have similar pattern to the increase prevalences of MetS. (Figure 1A and 1B)

The prevalences of MetS in NGT, prediabetes and diabetes group are 16.4, 35.1, and 73.4%, respectively. The prevalences of MetS and central obesity in prediabetes group and diabetes group are higher significantly than those in normal glucose tolerance group (p<0.01).

The most common component of MetS in men is hypertension (84.7%), followed by hypertriglyceridemia (83.4%), central obesity (75.5%), hyperglycemia (50.9%) and low HDL-cholesterol (43.6%). While in women, the most common component is central obesity (84.1%), followed by hypertension (84.1%), hypertriglyceridemia (66.1%), low HDL-cholesterol (57.8%) and hyperglycemia (50.2%). Besides central obesity, the profile of dyslipidemia among men and women is different. The proportion of low HDL cholesterol is higher among women than that among men, while the proportion of high triglyceride is higher among men than that among women. These differences are statistically significant (p<0.05).

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**DISCUSSION**

The prevalence of MetS in Asian region increases as modernization is underway. Indonesia is one of the Southeast Asia developing countries which has rapid economic and social growth. It causes two opposite effects, better economical condition and the increase of non-communicable disease such as obesity, hypertension, coronary artery disease, and diabetes mellitus. Other Asia regions such as Malaysia, Thailand, Philippines and Singapore also reported the high prevalence of MetS (>20%).

Several studies in terms of the prevalence of MetS in some regions in Indonesia (Depok, Surabaya, Bali, Bandung, Semarang, North Sumatera, and Maskassar) have been performed. Almost all of the studies reported the prevalence of MetS using Asian modification ATP III criteria. They reported the prevalence of MetS was in the range of 16.6% (Semarang, 2005) to 34.0% (Surabaya, 2005). Budhiarta (2004) in Bali reported the difference between the prevalence of MetS in urban and in rural area whereby the prevalence of MetS

**Table 1. The proportion of components of MetS in women and men with MetS**

<table>
<thead>
<tr>
<th>MetS components</th>
<th>Men (%)</th>
<th>Women (%)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td>84.7</td>
<td>84.1</td>
<td>0.871</td>
</tr>
<tr>
<td>Hyperglycemia</td>
<td>50.9</td>
<td>50.2</td>
<td>0.879</td>
</tr>
<tr>
<td>Central obesity</td>
<td>75.5</td>
<td>91.3</td>
<td>0.000</td>
</tr>
<tr>
<td>Low HDL-C</td>
<td>43.6</td>
<td>57.8</td>
<td>0.004</td>
</tr>
<tr>
<td>High Triglyceride</td>
<td>83.4</td>
<td>66.1</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Figure 1. Prevalence of MetS and central obesity in men (A), women (B), and subgroup according to glucose tolerance classifications (C)
in urban is higher than that in rural, as many as 24.8% and 7.8%, respectively. Jakarta as the capital city of Indonesia consist of various cultural and socio-economical background. The crude prevalence of MetS in this study is 28.4% with similar prevalences between men and women. Theoretically, the prevalence of MetS among men is higher than that among women especially in the age below 50. But, in recent years, the prevalences of MetS among women are increasing parallel with that in obesity. The prevalence of MetS in this study is similar to that in Depok (suburban area near to Jakarta in 2002 where the prevalence of MetS was 25.3%).

In men, the prevalence rises with age and reaches the peak at the age group of sixties. The increase of prevalence is relatively flat within age group. The prevalence of central obesity also rises, follows the prevalence of MetS. It shows the influence of central obesity in the pathogenesis of cardiovascular diseases. Several studies have shown the relationship between abdominal obesity and unfavorable cardiovascular risks and markers of inflammation. By this finding, it is reasonable to use waist circumference as a simple tool in routine screening besides body mass index. Among MetS components, hypertension is the most common components of MetS found in men. It is difficult to explain this finding because this study didn’t recall the family history of hypertension. Study in Semarang Central Java (Suhartono et al, 2005) also reported that hypertension was the most common component of MetS found in their study. This study recruited subjects who visited the clinic and more than half of those subjects were older than 50 years old.

In women, the prevalence also rises with age but the trend is sharper and reaches the peak level at the age group of fifties. The sharp increase of prevalences happens before the age group of fifties but remains flat thereafter. The proportion of low HDL cholesterol among women is also higher than that in men. This figure is different from that of men and it may show that in women, hormonal changes during pregnancy and menopause could play an important role in metabolic changes. Another explanation is about the different proportion between age groups. The proportion of women in the range of 30 - <40 and 40 - <50 years old were higher than that in the other age group. Many of these women work as housewives and spent all of their time in their home. It is better to evaluate the physical activity among this group. Unfortunately, this study did not recall the daily activity in detail. This study also did not recall the history of pregnancy and menopause as we know that pregnancy and menopause could be important factors that influence the increase of waist circumference in women. In menopause, there is loss of estrogen and causes an increase in central fat (android fat deposition) which has higher risk of diabetes and cardiovascular disease. In these ranges of age, the prevalence of central obesity in women is higher than those in other age group. It may influence the pattern of the rising prevalence and the crude prevalence of central obesity and MetS in this study. In women, central obesity is the most common components found in almost all age groups as well.

The prevalences of MetS increase along with the disturbance of glucose tolerance level as reported by Alexander from NHANES III Study. It shows that insulin resistance persists and will be heavier as glucose intolerance and diabetes develop. Since MetS can predict the risks of cardiovascular events, it can be assumed that subjects with glucose intolerance and DM will have higer risk for developing CVD event compared with normal glucose tolerance one.

CONCLUSION

The prevalence of MetS in five areas in Jakarta is 28.4% and there are no significant differences of prevalences between men and women. The prevalence of MetS increases along with age, central obesity and the level of glucose intolerance. The most component found in men is hypertension while in women is central obesity.

REFERENCES


