

Metabolic Syndrome Components and Nutritional Status among Hypertensive Outpatients at Dr. Hasan Sadikin General Hospital Bandung

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Abstract

Background: Metabolic syndrome and overnutritional status (overweight and obesity) are examples of determinants that can give rise to hypertension, so the three diseases are correlated with each other. This study aimed to reveal metabolic syndrome components and nutritional status among hypertensive outpatients.

Methods: This study involved 44 hypertensive outpatients who visited the Nephrology and Hypertension Clinic of Dr. Hasan Sadikin Hospital, Bandung in September to October 2013. Anthropometric and blood pressure measurements, anamnesis, and medical record data collection were carried out to describe the patient's metabolic syndrome components by using International Diabetes Federation criteria on South Asian people and nutritional status by WHO classification in Asian people.

Results: Among respondents, 25 (57%) had abdominal obesity, 14 (32%) had hypertrygliceridemias, 14 (32%) had low HDL cholesterol, 19 (43%) were taking lipid-lowering medications, 20 (45 %) had high level of fasting blood glucose, 21 (48%) had been diagnosed as mellitus type 2, 15 (34%) had high blood pressure, 40 (91%) were taking antihypertensive medications, 19 (43%) had metabolic syndrome, and 31 (70%) were overweight or obese.

Conclusions: Less than a half of the respondents meet the metabolic syndrome criteria and over two third of them are at overnutrition state (overweight or obesity). [AMJ.2016;3(3):477-81]

Keywords: Hypertension, metabolic syndrome, nutritional status

Introduction

In recent years, the prevalence of noncommunicable diseases (NCDs) in world population has grown rapidly. The NCDs and all of its negative impacts were responsible for almost two third of the world's 57 million death in 2008, yet more than a half of those occurred in low and middle income countries, including Indonesia.¹

Hypertension, metabolic syndrome, overnutritional status (overweight and obesity) are NCDs.² Hypertension is a condition where arterial blood pressure rises abnormally.⁵ Metabolic syndrome is a cluster of some metabolic abnormalities that consists of diabetes mellitus or increased fasting plasma glucose, abdominal obesity, high LDL cholesterol, low HDL cholesterol and high

blood pressure.⁶ According to the International Diabetes Federation (IDF), for a person to be defined with metabolic syndrome they must have central obesity plus any criteria of four following factors: raised tryglicerides (≥ 150 mg/dl), reduced HDL cholesterol (< 40 mg/dl in males and < 50 mg/dl in females), raised blood pressures (systolic BP ≥ 130 mmHg or diastolic BP ≥ 85 mmHg or with treatment of previously diagnosed hypertension), and high fasting plasma glucose (≥ 100 mg/dl or previously diagnosed diabetes mellitus).⁶ Nutritional status is a stratification reflecting whether physiologic needs of nutrients are being met. It can be assessed by some ways, one of them is body mass index (BMI) that furtherly divided into four categories, which two of them, overweight and obesity, reflects overnutritional status.⁷ Metabolic syndrome can give rise to hypertension, as the presence

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of insulin resistance activate renin angiotensin aldosterone system and sympathetic nervous system.⁵ Through insulin resistance and proliferation of glomerular capillary endothelium, overnutritional status can also cause hypertension.⁵ Those facts make the relationship of the three diseases very clear, yet there is no study that describes how metabolic syndrome components and overnutrition exist in hypertensive people, at least in West Java, Indonesia's most populous province. The aim of this study was to describe the metabolic syndrome components and nutritional status among hypertensive patients.

Methods

This cross-sectional study was carried out at the Nephrology and Hypertension Clinic, Dr. Hasan Sadikin General Hospital Bandung, in September–October 2013. It involved previously-diagnosed hypertensive outpatients who visited the clinic, regardless whether they were new or follow up patients. The aim and the way this study would be conducted had been approved by Dr. Hasan Sadikin General Hospital's Ethical Committee. This study used non probability consecutive sampling as its data collection method. The amount of minimal samples was determined by using the minimal sample formula on categorical descriptive variables with deviation standard alpha of 1.96 of 95% confidence interval, 10% precision (d), and presumed proportion of 0.5 that was calculated as 43 samples.

Hypertensive outpatients were evaluated to define whether they fulfilled IDF metabolic syndrome criteria on South Asian people, and then the measurement of body height and weight were performed to define nutritional status based on their BMI for Asian people.⁸ The IDF defines metabolic syndrome as the presence of abdominal obesity (waist circumference ≥ 90 cm for South Asian men and ≥ 80 cm for South Asian women), plus at least two of these following factors: raised triglycerides (≥ 150 mg/dl), reduced HDL cholesterol (< 40 mg/dl in males and < 50 mg/dl in females), raised blood pressures (systolic BP ≥ 130 mmHg or diastolic BP ≥ 85 mmHg or with treatment of previously diagnosed hypertension), and high fasting plasma glucose (≥ 100 mg/dl or previously diagnosed diabetes mellitus).⁶ The nutritional status was classified into four categories according to World Health Organization (WHO) classification of body mass index in Asian people thus underweight

for BMI < 18.5 kg/m², normal for BMI 18.5–22.9 kg/m², overweight for BMI 23–24.9 kg/m², and obese for BMI ≥ 25 kg/m².⁸

The patients were included in this study if they brought laboratory results paper of HDL cholesterol, triglycerides, and fasting plasma glucose for follow up purpose, or intended to perform such tests by instruction of the clinic's doctor in charge. Exclusion criteria of this study were the patients who refused to get involved, the patients with non-complete laboratory medical records, and the patients with vertebral abnormalities so the measurement of body height could not be performed. It was decided that laboratory data had been performed over two months before patient's admission to the clinic, were also excluded.

Furthermore, blood pressure, waist circumference, body weight and height measurements were carried out directly to the patients. Anamnesis was performed to collect the patient's name, age, previous history of type 2 diabetes melitus, medications, and medical record numbers. For the patients who brought the laboratory test results paper, the data of HDL cholesterol, triglycerides, and fasting plasma glucose could also be performed at the clinic; for the patients who did not have them, those data were taken at the Hospital's Clinical Pathology Department several weeks following the primary data collection. The previous history of type 2 diabetes melitus and medications were rechecked by data from the Outpatient Medical Record Department. However, 3 diabetes melitus history data were not successfully rechecked by medical record data because those were not available.

Results

There were 69 hypertensive outpatients visiting the clinic included in this study, however only 44 of them who were free from the exclusive criteria and whose data would be analyzed. The number of both male and female subjects were 22 respectively, or with male:female ratio of 1:1 (Table 1). The 60–66 age group was the largest group in total subjects and both sexes. Male patients were relatively older than female patients, which was reflected by their means and median of age.

Moreover, abdominal obesity was present in the majority of subjects. There were almost a third of the whole subjects who had hypertriglyceridemia and low HDL

Table 1 General Characteristics of Subjects

Features	Total (n=44)	Male (n=22)	Female (n=22)
Age (years old)			
39–45	1 (2%)	1 (5%)	0 (0%)
46–52	4 (9%)	2 (9%)	2 (9%)
53–59	11 (25%)	4 (18%)	7 (32%)
60–66	19 (43%)	11 (50%)	8 (36%)
67–73	6 (14%)	2 (9%)	4 (18%)
74–80	2 (5%)	1 (5%)	1 (5%)
81–87	1 (2%)	1 (5%)	0 (0%)
Patient's Status			
New	1 (2%)	1 (5%)	0 (0%)
Follow up	43 (98%)	21 (95%)	22 (100%)

cholesterol level. High fasting plasma glucose level existed in slightly less than a half of the whole subjects, as well as the amount of subjects who were previously diagnosed as type 2 diabetes mellitus. There were around a third of the whole subjects classified as having uncontrolled high blood pressure. Nine out of ten hypertensive subjects were receiving antihypertensive medications, compared to only four of ten who were receiving lipid-lowering medications. The prevalence of metabolic syndrome according to IDF criteria was 43% of the total subjects, with the majority of female subjects categorized as metabolic

syndrome compared to less than a third of male subjects.

Seventy per cent of the subject was classified as overnutrition (overweight and obese) according to the WHO BMI Criteria for Asian people.⁸ Overnutritional status was also present in majority of both male and female subjects, both 86% and 54% respectively (Table 3).

Discussion

More than half of the hypertensive patients included in this study were aged above 60

Table 2 IDF Metabolic Syndrome Components among Hypertensive Outpatients

Features	Total (n=44)	Male (n=22)	Female (n=22)
Waist Circumference ≥ 90 cm for male and ≥ 80 cm for female	25 (57%)	8 (36%)	17 (77%)
Triglycerides ≥ 150 mg/dl	14 (32%)	9 (41%)	5 (23%)
HDL Cholesterol < 40 mg/dl for male and < 50 mg/dl for female	14 (32%)	6 (27%)	8 (36%)
With Lipid-Lowering Medications	19 (43%)	10 (53%)	9 (47%)
Fasting plasma glucose > 100 mg/dl	20 (45%)	14 (64%)	6 (27%)
With Previous Diagnosis of Type 2 Diabetes Mellitus	21 (48%)	14 (64%)	7 (32%)
Blood Pressure $\geq 130/85$ mmHg	15 (34%)	9 (41%)	6 (27%)
With Antihypertensive medications	40 (91%)	18 (82%)	22 (100%)
Fulfill IDF Criteria on Metabolic Syndrome	19 (43%)	7 (32%)	12 (55%)

Note : IDF=International Diabetes Federation, HDL=High Density Lipoprotein

Table 3 Nutritional Status among Hypertensive Outpatients

BMI Classification	Results in Total (n=44)	Results in Male (n=22)	Results in Female (n=22)
Underweight	1 (2%)	0 (0%)	1 (5%)
Normal	12 (27%)	3 (14%)	9 (41%)
Overweight	16 (36%)	10 (45%)	6 (27%)
Obese	15 (34%)	9 (41%)	6 (27%)

Note : BMI=Body Mass Index

years, both in male and female sex groups. That characteristic was considered relatively to be same with two previous studies conducted in Taiwan.^{9,10} The predominance of follow-up patients group over new patients might be due to the function of the hospital as a referral destination from the primary health care which made the first diagnosis and initial management before referring.

This study revealed that abdominal obesity was present in the majority of hypertensive outpatients. In spite of its different amount of prevalence (62.2%), a study published by Hsu et al.⁹ in 2005 has also shown that phenomenon. Both prevalences revealed in this study and in the study of Hsu et al.⁹ were higher than the general population according to Indonesia's National Basic Health Research 2007 which reported only 18.8%.¹¹

There were almost similar prevalence of hypertriglyceridemia according to this study and the different studies established by Su et al.¹⁰ and Hsu et al.⁹ as they reported that high plasma triglyceride level is present in 34.74% and 40.50% of hypertensive patients. Nonetheless, Su et al.¹⁰ and Hsu et al.⁹ both have shown that low HDL cholesterol exist in 69.7% and 78.2% of the same subjects, which was quite different with this study. Those variations could possibly be caused by differences in the amount of subjects who were receiving lipid-lowering drug administrations, and how data were collected. Su et al.¹⁰ and Hsu et al.⁹ carried out simultaneous blood sample collection to their subjects and used standardized laboratory examination method instead of taking secondary data from the subjects' medical record with varying time. In this study, 43% of the subjects were receiving lipid-lowering medications. That results could possibly be influenced by a limitation such as 3 unrechecked medication history of anamnesis data because of the medical record incompleteness.

Furthermore, Su et al.¹⁰ reported that high fasting plasma glucose (above 100 mg/dl) is

present in almost two third of hypertensive patients, which was quite varied from less than a half according to this study. However, that study only involved hypertensive outpatients from the Cardiology and Neurology Department without those from the Endocrinology Department, as opposed to this study which included patients from the two departments, which could influence the results, since the Endocrinology Department had significant numbers of diabetic patients with uncontrolled fasting plasma glucose.

Moreover, Hsu et al.⁹ stated that 30.11% of hypertensive outpatients were previously diagnosed as having type 2 diabetes mellitus, lower than what this study showed. Having explained before, that the study have not involved patients in the Department of Endocrinology, hence it could lower the number of hypertensive subjects.

There were about one third of hypertensive outpatients who remained having high blood pressure, although the fact was 91% of them were receiving antihypertensive medications. The effectivity of such medication in reducing blood pressure depends on the patient's obedience, the patient's condition, and medication completeness, while the subjects' blood pressure were measured.

According to this study, there was 43% of hypertensive outpatients who fulfilled the IDF criteria on metabolic syndrome. A previous study revealed that metabolic syndrome (using IDF criteria) is present in 54.67% of hypertensive outpatients, which was slightly different with this study.¹⁰ Both two studies established higher prevalences than a study that used the same criteria and was conducted by Zainuddin et al.¹³ in the Malaysian general population which was 33.33%. A research established by Kelishadi et al.¹⁴ from Isfahan, Iran, concluded that the prevalence of metabolic syndrome is rather higher in hypertensive than in normotensive population. It strongly reflects that metabolic syndrome tends to be more prevalent in

hypertensive population than in the general one. Rahajeng and Tuminah³ reported that there are about 11.2% and 14.7% classified as overweight or obese among hypertensive population, which is much lower than this study revealed. Their study involved over a hundred thousand rural and urban subjects taken from 33 provinces across Indonesia which were very different from this study's mostly urban and local subjects. The same study also revealed that overnutrition is more prevalent in hypertensive than in general population.

As a conclusion, the metabolic syndrome components according to IDF among hypertensive outpatients are more than a half have abdominal obesity, almost a third have hypertriglyceridemia and low plasma HDL cholesterol level, almost a half have high fasting blood glucose level, almost two third have uncontrolled high blood pressure. Whereas, patients with antihypertensive medications are much higher than who are not with 9:1 ratio, and lipid-lowering medicated patients and patients with previous history of type 2 diabetes mellitus are less than a half. The prevalence of metabolic syndrome among hypertensive outpatients is 43%. There are more than 70% of hypertensive outpatients classified as overweight or obese.

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