Original Research Article

Association of Metabolic Syndrome and Blood Pressure in Patients with Essential Hypertension

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ABSTRACT

Objective: In Indian hypertensive patients, to investigate the prevalence and characteristics of the MS was the main objective of the present study.

Material and Method: Current study was conducted in a tertiary care OPD among 130 patients who were diagnosed with essential hypertension. Any patients who were more that 18 years of age and diagnosed with essential hypertension and willing to participate in the study were included. By routine laboratory techniques which is generally used at NABL accredited private or government testing laboratories for analysis of lipid profile total cholesterol, total triglycerides, low-density lipoprotein cholesterol and high density lipoprotein cholesterol were assayed.

Result: Average MS score were high in both the male and female group. Both male and female groups patients receives adequate blood pressure lowering treatment. In both the groups maximum patients were in ARB therapy. All parameters which are related to occurrence of metabolic syndrome like, abdominal obesity, Total Cholesterol (TC), Triglycerides (TG), Low Density Lipoprotein (LDL), fasting blood glucose (FBG) and uric acids were significantly higher in both male and female patients than the control one.

Conclusion: Current study concludes that, in Indian hypertensive patients, especially in females, metabolic syndrome was highly prevalent.

INTRODUCTION

In the 20th century, cardiovascular disease (CVD) was identified as the major cause of morbidity and mortality in the developed world. In the Indian population high prevalence of diabetes and hypertension is alarming and has been attributed to metabolic syndrome. During this period there was considerable effort to understand the under lying biology of the disease and to identify the contributing risk factors. As risk factors were identified, it became apparent that more than one was often present in the same individual. Toward the end of the century, the clustering of CVD risk factors was first described, most notably the simultaneous presence of obesity, type 2 diabetes, hyperlipidemia and hypertension [1-3]. Although insulin resistance (i.e., resistance to insulin stimulated glucose uptake) as a future of type 2 diabetes was first described many years earlier [4], hyperinsulinemia was also found to be a key feature of type 2 diabetes [5,6], as well as hyperlipidemia [7-9], obesity [10-13] and hypertension [12-14].

Despite its high prevalence, associated morbidity and increased mortality, hypertension still remains inadequately treated in the majority of

patients. This is largely because of certain inherent problems associated with management of hypertension. The problems include on one hand, the lack of necessary concern, application and at times knowledge, on the part of the physician in question. On the other hand, the problem may be related to the lack of patient compliance.

It is important to recognize that many people exhibit a cluster of metabolic risk factors and life style factors that constitute a condition called metabolic syndrome. Characteristics features are abdominal obesity, atherogenic dyslipidemia (elevated triglycerides, small LDL particles, low HDL cholesterol), elevated blood pressure, insulin resistance (with or with our glucose intolerance) and prothrombotic and pro inflammatory states. The presence of three or more of these CV risk factors is necessary for the diagnosis of the metabolic syndrome, according to current NCEP ATP III guidelines. Nutrition and lifestyle approaches (weight reduction, increased physical activity) are the first line therapy.

Recognition of metabolic syndrome helps the clinicians to focus his attention on the need for life style therapies to reduce all metabolic risk factors currently. The growing awareness of metabolic syndrome changes the prospective from a single risk factor paradigm to multiple risk factors. This refines the evaluation of risk for both diabetes and cardio-vascular disease. Therefore, to determine the relationships between other features of the MS and hypertension is clinically important. In Indian hypertensive patients, to investigate the prevalence and characteristics of the MS was the main objective of the present study.

MATERIAL AND METHOD

Current study was conducted in a tertiary care OPD among 130 patients who were diagnosed with essential hypertension. All patients before enrolment to the study were briefed properly regarding the purpose and objective of the study and a written consent were obtained before the enrolment. Any patients who were more that 18 years of age and diagnosed with essential hypertension and willing to participate in the study were included. Any patients presented with any macro or micro vascular complication including established cardiovascular disease, any grade of heart failure, with retinal and nephrological abnormality, Obstructive sleep apnea, Hypothyroidism, hyperthyroidism, hypercalcemia, acromegaly, cognitive impairment and pregnant or lactating women were excluded from this study.

Metabolic syndrome was examined in each patient listed as per the modified ATP III version other than elevated blood pressure generally by four diagnostic criteria as mentioned bellow. Patients were considered or diagnosed as having metabolic system if there were presence of any two or more of these factors.

- High-density lipoprotein cholesterol (HDL-C) < 40 mg/dl in male and < 50 mg/dl in female.
- Abdominal girth > 90 cm in male and > 80 cm in female.
- Fasting plasma glucose ≥ 110 mg/dl or use of hypoglycemic agents.
- Fasting triglycerides ≥ 150 mg/dl and

By routine laboratory techniques which is generally used at NABL accredited private or government testing laboratories for analysis of lipid profile total cholesterol, total triglycerides, low-density lipoprotein cholesterol and high density lipoprotein cholesterol were assayed. By using standard adult arm cuff of a mercury sphygmomanometer blood pressure was measured in each arm with the subject's arm supported and at least 10 minutes after rest in sitting position.

By using SPSS 20.0 (SPSS Corp., Chicago, USA) he collected data were statistically analyzed. To examine the data, Chi-squared test and descriptive statistics were used. Throughout the study, all continuous variables were reported as mean, Standard Deviation (SD) and range. For evaluating the statistical relations between

the sub groups an independent sample t- test was performed. P<0.05 indicated that the difference was statistically significant.

RESULT

Total 130 participants participated in this trial among whom 80 patients were male and 50 patients were female (Table 1). Among total participant 80 having

Metabolic syndrome and 50 didn't have (Table 2). Table 1 depicted the demographic and characteristic details of the participants. Average MS score were high in both the male and female group. Both male and female groups patients receives adequate blood pressure lowering treatment. In both the groups maximum patients were in ARB therapy.

Table 1 Demographics and characteristics of the study population:

Parameters	Male Participants (N=80)	Female Participants (N=50)	P-Value
Age(Years)	63.9 ± 10.8	65.7 ± 11.9	<0.001
MS (%)	47%	56%	0.08
MS(score)	3.2 ± 0.8	3.7 ± 0.6	
Abdominal Obesity(%)	58%	78%	<0.001
Abdominal Girth (cm)	93.4 ± 10.1	86.1 ± 9.4	<0.001
TC(mg/dl)	194.3 ± 39.7	192.8 ± 40.1	0.06
TG(mg/dl)	178.8 ± 42.9	121.2 ± 30.7	<0.001
LDL-c(mg/dl)	110.2 ± 31.3	109.4 ± 25.6	<0.001
HDL-c(mg/dl)	35.8 ± 5.2	47.1 ± 6.1	<0.001
Fasting glucose (mg/dl)	125.3 ± 29.7	101.6 ± 18.3	<0.001
Uric Acid (mg/dl)	6.9 ± 2.2	6.2 ± 1.6	0.07
Anti-hypertensive agent			
Alpha adrenergic blocker(%)	7%	8%	0.41
Beta adrenergic blocker(%)	19%	24%	0.52
Calcium channel blockers(%)	42%	31%	0.03
Diuretic (%)	34%	42%	0.04
ACEI(%)	21%	18%	0.02
ARB (%)	67%	72%	0.03
Lipid lowering agent (Statin)	38%	25%	0.005

Table 2 depicts comparison of male & female hypertensive patients with or without the metabolic syndrome. All parameters which are related to occurrence of metabolic syndrome like, abdominal obesity, Total Cholesterol (TC), Triglycerides (TG), Low Density Lipoprotein (LDL), fasting blood glucose (FBG) and uric acids were significantly higher in both male and female patients than the control one.

Table 2: Comparison of male & female hypertensive patients with or without the metabolic syndrome.

Parameters	Male Participants (N=80)		P-Value	Female Participants (N=50)		P-Value
	With MS (N=50)	Without MS (N=30)		With MS (N=30)	Without MS (N=20)	
Age(Years)	60.6 ± 11.3	65.2 ± 9.3	<0.001	64.5 ± 10.7	66.4 ± 12.5	<0.001
MS(score)	3.8 ± 0.9	1.2 ± 0.5	<0.001	3.9 ± 0.8	1.4 ± 0.4	<0.001
Abdominal Obesity(%)	77%	33%	<0.001	92%	48%	<0.001
Abdominal Girth (cm)	97.2 ± 11.4	84.8 ± 7.5	<0.001	91.4 ± 11.2	81.6 ± 6.8	<0.001
TC(mg/dl)	228.8 ± 42.6	154.1 ± 30.8	<0.001	209.6 ± 48.2	142.1 ± 29.7	<0.001
TG(mg/dl)	221.6 ± 54.7	148.2 ± 30.4	<0.001	161.2 ± 30.7	129.2 ± 30.7	<0.001
LDL-c(mg/dl)	130.5 ± 39.8	92.3 ± 20.7	<0.001	121.3 ± 27.3	91.8 ± 15.9	<0.001
HDL-c(mg/dl)	32.6 ± 5.8	37.9 ± 4.8	<0.001	40.3 ± 6.7	51.1 ± 4.8	<0.001
Fasting glucose (mg/dl)	132.6 ± 31.9	101.1 ± 11.4	<0.001	121.4 ± 16.3	92.6 ± 11.7	<0.001
Uric Acid (mg/dl)	7.7 ± 2.8	6.1 ± 1.7	<0.001	6.5 ± 1.8	5.1 ± 1.1	<0.001

DISCUSSION

Worldwide the prevalence of chronic diseases is increasing with a very rapid phase. The growing epidemic of chronic disease in many developing countries including India, disrupts health planning and overwhelms the already under resourced health care systems.

Out of 130 patients who had included in this study 80 patients were having metabolic syndrome, i.e., prevalence of metabolic syndrome is 61.5%. As shown by the National Health and Nutrition Examination Survey (NHANES) carried out by Ford et al, 28% for men and 30% for women was the prevalence of metabolic

syndrome, in US adults [15]. As compared to males (29.9%) in patients with essential hypertension, higher prevalence of metabolic syndrome was found in females 46.6% revealed in a study conducted by K. K. Chandra et al [16]. Ina different angle, hypertension was linked to metabolic syndrome in women and not in men as found in a Chinese population based study conducted by Chou et al [17]. The authors of this study suggested that as compare to men, in women, role of sympathetic activity in pathogenesis of hypertension in women may be more dependent on insulin resistance. Thus, in female with essential hypertension, metabolic syndrome is more common. Even in our study MS score and abdominal obesity was higher in female as compare to men. In current study, as compare to younger age groups and male, the older age group and females had a significantly higher frequency of metabolic syndrome.

Over and above the potential risk of each risk factor in isolation, metabolic syndrome may amplify hypertension-related cardiac and renal changes [18]. The Women's Ischemia Syndrome Evaluation (WISE) study of 780 women showed that, in the subsequent 3 years, metabolic syndrome was significantly associated with a higher risk of death or major cardiovascular event [19]. People aged 30–70 years a community-based national epidemiological health survey in Saudi Arabia also showed among females (42%) than males (37%) an overall adjusted frequency of metabolic syndrome (by ATP-III criteria) of 39.3%, with a higher rate [20]. With hypertension waist circumference correlates strongly in women already shown in a study [21-23].

CONCLUSION

Current study concludes that, in Indian hypertensive patients, especially in females, metabolic syndrome was highly prevalent. In line with the findings, authors strongly recumbent all clinicians who treat hypertension, routine screen to their patients to diagnose presence of metabolic syndrome and for other cardiovascular risk factors.

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