Original research article

International Journal of Medical Science and Education | pISSN- 2348 4438 | eISSN-2349- 3208

PREVALENCE OF METABOLIC SYNDROME AMONG NEWLY DIAGNOSED HYPERTENSIVE PATIENTS IN A TERTIARY CARE HOSPITAL AT UDAIPUR

B.L.Somani[1] ,A.P.Gupta[2*]

1.Assistant professor , Department of Medicine , Pacific Medical College and hospital, Udaipur
2.Professor and Head , Department of Pediatrics , Pacific Institute of Medical Sciences, Udaipur

***Email id of corresponding author-** agmhrc@gmail.com

Received: 25/07/2015 ***Revised: 10/12/2015*** ***Accepted: 12/12/2015***

ABSTRACT:

Objective: In developing countries like India, there is a very high prevalence of hypertension and diabetes mellitus in the population attributed to metabolic syndrome. This study is planned to study the prevalence of metabolic syndrome (MS) among newly diagnosed hypertensive patients. MS prevalence was estimated by modified National Cholesterol Education Program-Adult Treatment Panel III (NCEP-ATP III) criteria. **Material and Methods**: In our hospital-based cross-sectional study one hundred and seventy one newly diagnosed hypertensive patients above the age of 18 years in Pacific Institute of Medical Sciences and Hospital, Udaipur, Rajasthan were studied. Student's *t*-test and Chi-square test were used to compare the continuous variables and discrete variables respectively. All analyses were done using SPSS version 10.**Result**: Prevalence of metabolic syndrome was 43.86 % (n=75) in patients of hypertension. The prevalence of metabolic syndrome was higher in women 62.67 % (n=47) as compared to men 37.33% (n=28). The most common abnormality found was obesity (high waist circumference), seen in 90.67 % (n=68), followed by low HDL-C in 81.33 % (n=61) an abnormal triglyceride (TG) level in 77.33 % (n=58) and abnormal fasting blood sugar (FBS) 73.33 % (n=55). **Conclusion**: The prevalence of metabolic syndrome is high among newly diagnosed female hypertensive patients as compared to males. So there is requirement of routine screening of risk factors responsible for morbidity and mortality related to cardiovascular disease.

Key Words: Metabolic syndrome, hypertension, triglyceride, obesity, HDL, FBS

INTRODUCTION:

Individuals with metabolic syndrome have about twice the risk of developing coronary heart disease (CHD) over the next 5 to 10 years as compared to those without the syndrome. **(1)** Metabolic syndrome is also known as insulin resistance syndrome, syndrome X and dysmetabolic syndrome, as it is a point of interest by many researchers due to its growing prevalence worldwide.**(2)**

Alberti et al and Grundy et al indicated several risk factors associated with metabolic syndrome that related to CHD.**(1,2)** These are: a) central adiposity b) elevated blood pressure c) hyperglycemia and d) dyslipidemia. Each health factor plays an important role in the pathogenesis of CHD. Table 1 presents the criteria laid by the third report of the National Cholesterol Education Program / Adult Treatment Panel (NCEP ATP III) for clinical diagnosis of metabolic syndrome. As presented in Table 1 waist circumference (WC) measurement for Asians, as central adiposity is a common feature, are lower than non-Asians, therefore WC cut points are based on the International Diabetes Federation (IDF), ≥80 cm for women and ≥90 cm for men**.(3)**

The alarmingly high prevalence of diabetes and hypertension in developing countries like India is related to the presence of risk factors causing metabolic syndrome. Several studies have shown a high incidence of this syndrome in Indians compared to Western population. Obesity, a major factor responsible for high blood pressure, high serum cholesterol, low HDL, and high blood sugar level and it is otherwise associated with high cardiovascular disease risk and therefore metabolic syndrome.**(4, 5)**

When hypertension and other metabolic risk factors are found in an individual, they act synergistically and responsible for an increase incidence of the total cardiovascular disease (CVD) risk compared to those results from individual risk factors.**(6)** The aim of this study was to find the prevalence of metabolic syndrome (MS) among newly diagnosed hypertensive patients at a tertiary care hospital at Udaipur.

MATERIAL AND METHODS

Subjects

In our hospital-based cross-sectional study one hundred and seventy one newly diagnosed hypertensive patients above the age of 18 years in Pacific Institute of Medical Sciences and Hospital, Udaipur, Rajasthan were studied. The study subjects were examined for various parameters and their laboratory investigations as per table 1, carried out in fasting state for confirmation of risk factors in metabolic syndrome.

Inclusion criteria

Patient having essential hypertension i.e. BP >140/90, having age group between 18-70 years were included in the study.

Exclusion criteria

(1) Age >70 years.

(2) Age <18 years.

(3) Renal failure.

(4) Preeclampsia/eclampsia.

(5) Obstructive sleep apnea.

(6) Hypothyroidism, hyperthyroidism, hypercalcemia, acromegaly.

(7) Patients on medications having impact on parameters mentioned in Table 1 such as steroid, tricyclic antidepressants, cyclosporine, and non-steroidal anti-inflammatory agents etc.

Table 1: Criteria for Clinical Diagnosis of Metabolic Syndrome Based on NCEP ATP III [2]

Measure (any 3 of 5 constitute diagnosis of metabolic syndrome)	**Categorical Cut-points**
1. Elevated waist circumference	
a. Non-Asians	≥102 cm in men ≥88 cm in women
b. Asians	≥90 cm in men ≥88 cm in women
2. Elevated triglycerides	≥150 mg/dL (1.7 mmol/L) or On drug treatment for elevated triglycerides
3. Reduced HDL-C	<40 mg/dL (1.03 mmol/L) in men <50 mg/dL (1.3 mmol/L) in women or On drug treatment for reduced HDL-C
4. Elevated blood pressure	≥130 mm Hg systolic blood pressure or ≥85 mm Hg diastolic blood pressure or On antihypertensive drug treatment in a patient with a history of hypertension
5. Elevated fasting glucose	≥100 mg/dL or On drug treatment for elevated glucose

Blood pressure measurement

Blood pressure was measured in each arm using standard adult arm cuff of a mercury sphygmomanometer with the subject's arm supported and at least 10 minutes after rest in sitting position. The mean of three measurements of the systolic and diastolic blood pressure was used. Where there was a difference in the BP between the two arms, the higher value was adopted.

Anthropometric measurement

Measurement of height was done to the nearest 1 centimeter using a stadiometer in an erect posture.Waist Circumference (WC) was measured midway between inferior margin of ribs and the superior border of iliac crest in a horizontal plane in erect position on bare abdomen with arm away from trunk. The average of two measurements taken after inspiration and expiration were measured at least an interval of 0.5 cm.

Laboratory analysis

Lipid profile and blood glucose (glucose oxidase to peroxides method) were measured using an auto-analyzer. Lipoproteins were measured enzymatically.

Statistical Analysis

All continuous variables were reported as mean, Standard Deviation (SD) and range throughout the study. P value was considered significant at <0.05.

RESULT

Prevalence of metabolic syndrome was 43.86 % (n=75) in patients of hypertension as in Table 2. The prevalence of metabolic syndrome was higher in women 62.67 % (n=47) as compared to men 37.33% (n=28). The most common abnormality found was obesity (high waist circumference), seen in 90.67 % (n=68), followed by low HDL-C in 81.33 % (n=61) an abnormal triglyceride (TG) level in 77.33 % (n=58) and abnormal fasting blood sugar (FBS) 73.33 % (n=55) as in Table 3.

Table 2: Sex wise distribution of metabolic syndrome according to Adult Treatment Panel III criteria

Diagnosis by ATP III crieteria	Male (n = 81)		Female (n = 90)		Total (n = 171)	
	No.	Percentage	No.	Percentage	No.	Percentage
Metabolic syndrome	28	34.57 %	47	52.22 %	75	43.86 %
No metabolic syndrome	53	65.43 %	43	47.78 %	96	56.14 %

Amongst all females 91.1 % (n=82) had an abnormal HDL-C levels followed by an

abnormal waist circumference in 50% (n=45). Incidence of abnormal FBS and TG in females were 30 % (n=27) and 31.1 % (n=28) respectively

Table 3: Risk factors according to Adult Treatment Panel III criteria in patients with and without metabolic syndrome

ATP III criteria	Patients with metabolic syndrome (n = 75)		Patients with no metabolic syndrome (n = 96)		Total (n = 171)		Chi-test	Significance
	No.	Percentage	No.	Percentage	No.	Percentage		
Obesity (high waist circumference)	68	90.67 %	10	10.42 %	78	45.61 %		Significant
FBS > 110 mg %	55	73.33 %	3	3.13 %	58	33.92 %		Significant
High TG	58	77.33 %	8	8.33 %	66	38.6 %		Significant
Low HDL-C	61	81.33 %	23	23.96 %	84	49.12 %		Significant

Amongst all males 51.85 % (n=42) had abnormal HDL-C levels followed by an abnormal TG in 35.80 % (n=29). The FBS and waist circumference were abnormal in 33.33 % (n=27) and 34.57 % (n=28) respectively.

DISCUSSION

Metabolic syndrome was associated with the risk factor as described by Alberti et al was 43.86% **(2)**i.e. out of 171 patients enrolled for the study, only 75 patients had metabolic syndrome in our study. As shown by the National Health and Nutrition Examination Survey (NHANES) carried out by Ford et al , in US adults, it was found to be around 28% for men and 30% for women, higher percentage in females.**(7)**

Concordant to our finding, the association between the prevalence of metabolic syndrome and sex was reported in other studies from western countries (8, 9) also in the study conducted by K. K. Chandra et al **(10)** which showed a similar higher prevalence of metabolic

syndrome in females 52.22% as compared to males (34.57%) in newly diagnosed hypertensive patients.

Chou et al studied metabolic syndrome in Chinese population, showed that hypertension was linked to metabolic syndrome more commonly in females and not correlated well in males.**(11)** The role of sympathetic activity in females may be more dependent on insulin resistance was hypothecated than in males as suggested for the pathogenesis of hypertension. Thus metabolic syndrome is more common in female with hypertension either newly diagnosed patients or patients with essential hypertension. An abnormal waist circumference of 90 cm and low HDL-C of ≤50 mg% is easily achieved in females in developing countries like India because role of sedentary lifestyle, less physical activity, less exercise and diet.

The clinical importance of the metabolic syndrome is related to its putative impact on cardiovascular morbidity and mortality; the prevalence of CHD, MI, and stroke are approximately threefold higher in subjects with the metabolic syndrome than it is found in those without the syndrome.

Factors that may contribute to the development of metabolic syndrome could be age, marital status, diet (consumption of more fat and sugar compared to fruits and vegetables, also use of meat and poultry products), sedentary lifestyle, genetic influences. Low levels of adiponectin have been seen in individuals with obesity, central adiposity, insulin resistance, and type 2 diabtes and high levels of leptin have been linked to obesity. Studies related to the associations of adiponectin and leptin should be the focus of future research.

HDL-C was the most abnormal parameter among subjects with metabolic syndrome detected in 81.33% of patients, also it is found to be the most common abnormal parameter in both females as well as in males. KK Chandra et al [10] studied that abnormal HDL-C level in blood was the most common abnormality in men and abnormal waist circumference due to central obesity was the most common abnormality in women, in Asian population.

TG / HDL-C ratio, a good surrogate marker for metabolic syndrome as well as for hyper-insulinemia, as fasting blood sugar is monitored as a parameter for diagnosis of metabolic syndrome and it provides an important and independent risk factor estimate for the Coronary Artery Disease (CAD) as well as cardiovascular disease (CHD).

To combat metabolic syndrome and its complications, an effective strategy is to be planned, which keep a sight on the management of its complications causing loss of healthy

lifestyle and also have an impact on the financial status of the patient in developing countries like India. Strict measures are required for health promotion, which are - adoption of healthier eating habits, increased physical activity and maintenance of normal body weight should accompany vigorous management and control of blood pressure.

LIMITATIONS

The present study has some limitations that should be acknowledged. The sample size is small and the setting is limited.

CONCLUSION

Due to the rising prevalence of metabolic syndrome, developing countries are at increased risk of CHD and other cardiovascular-related diseases, therefore intensive lifestyle modification and treatment are recommended to prevent the incidence of metabolic syndrome and improve the overall health outcomes. Future research is warranted which will help in decreasing the incidence of metabolic syndrome and its complication.

REFERENCE

1. Grundy SM, Brewer HB, Cleeman JI, Smith SC, Lenfant C. Definition of metabolic syndrome: Report of the National, Heart, Lung, and Blood Institute/American Heart Association conference on scientific issues related to definition. J Ame Heart Assoc 2004; 109: 433–8.
2. Alberti KGMM, Eckel RH, Grundy SM, Zimmet PZ, Cleeman JI, Donato KA et al. Harmonizing the metabolic syndrome: A joint interim statement of the International Diabetes Federation Task Force on Epidemiology and Prevention; National Heart, Lung, and Blood Institute; American Heart Association; World Heart Federation; International Atherosclerosis Society; and International Association for the Study of Obesity. Circulation 2009; 120: 1640–5.
3. International Diabetes Federation. The IDF consensus worldwide definition of the metabolic syndrome 2006. Retrieved from. http://www.idf.org/webdata/docs/IDF_Meta_def_final.pdf.
4. Pouliot MC, Despres JP, Nadeau A, Moorjani S, Prud Homme D, Lupien PJ, et al. Visceral obesity in men.Association with glucose tolerance, plasma insulin and lipoprotein levels. Diabetes. 1992; 41:826-34.
5. Despres JP. Health consequences of visceral obesity. Ann Med. 2001; 33: 534-41.

6. Braunwald E. Hypertension. In: Douglas P. Zipes, Peter Libby, Robert O. Bonow, Eugene Braunwald, eds. Braunwald's Heart Disease: a Textbook of Cardiovascular Medicine. 7th ed. Philadelphia: Saunders; 2005: 1953.
7. Ford ES, Giles WH, Dietz WH. Prevalence of the metabolic syndrome among US adults. Findings from the Third National Health and Nutrition Examination Survey. JAMA. 2002; 287:356-9.
8. Hsu CN, Chen YC, Wang TD: Prevalence and characteristics of the metabolic syndrome in Chinese hypertensive patients: a hospital-based observation. Acta Cardiol Sin 2005; 21:89–97.
9. Shahbazian H, Latifi SM, Jalali MT, Shahbazian H, Amani R, Nikhoo A, Aleali AM: Metabolic syndrome and its correlated factors in an urban population in South West of Iran. J Diab Metab Disord 2013; 12:11.
10. Chandra KK, Mahotra S, Gupta M, Ubowega A, Jain S, Kumari S, et al. Prevalence of metabolic syndrome among patients with essential hypertension in the hypertension clinic of a North Indian tertiary care hospital. Indian J Cardiol. 2004; 7:27-31.
11. Chen CH, Len KC, Tsai ST, Chou P. Different association of hypertension and insulin related metabolic syndrome between men and women in 8437 non-diabetic Chinese men. Am J Hypertens. 2000; 61:29-37.