



Original Research Article

A Study on Metabolic Syndrome among Diabetic Patients in a Tertiary Care Hospital

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ABSTRACT

Introduction: Metabolic syndrome is a widely prevalent and multi-factorial disorder. Metabolic syndrome describes a cluster of metabolic alterations associated with excess fat weight.

Objectives: To describe the proportion of Metabolic syndrome among diabetics and to evaluate the components of metabolic syndrome

Methodology: 205 Diabetic patients admitted in Medical wards of a teaching hospital were interviewed for data collection.

Results: A total of 205 subjects were interviewed, as per NCEP-111 criteria 143(69.75%) study subjects had metabolic syndrome, 85 (59.44%) were men and 58 (40.55%) were women. 41(28.67%) of them were positive for 3 criteria, 86(60.13%) cases had 4 criteria and 16(11.18%) were positive for all the 5 criteria. Among men waist circumference was high in 10(11.76%) subjects, high systolic blood pressure was seen among 43(50.58%) cases, diastolic blood pressure was more in 41(48.23%) patients, hypertriglyceridemia was found in 63(74.11%) subjects, values of high density lipoprotein was low among 40(47.05%) cases, high levels of fasting blood sugar level was seen among 74(87.05%) cases. Among women waist circumference was high in 28(48.27%) subjects, high systolic blood pressure was seen among 22(37.93%) cases, diastolic blood pressure was more in 22(37.93%) patients, hypertriglyceridemia was found in 36(62.06%) subjects, values of high density lipoprotein was low among 48(82.75%) cases, high levels of fasting blood sugar level was seen among 50(86.20%) cases. Waist circumference was significantly high ($p < 0.0001$) among females. Low levels of high density lipoprotein were significantly more ($p < 0.0001$) in females.

Conclusion: Preventive lifestyle interventions are essential

Key words: Metabolic syndrome, Hypertension, Diabetes

INTRODUCTION

The Metabolic syndrome is a widely prevalent and multi-factorial disorder. The syndrome has been given several names, including- metabolic syndrome, insulin resistance syndrome, syndrome X and plurimetabolic syndrome. ⁽¹⁾ Metabolic

syndrome describes a cluster of metabolic alterations associated with excess fat weight. The typical abnormalities include impaired glucose tolerance, dyslipidemia, insulin resistance (hyperinsulinemia), hypertension, upper body obesity, coagulation abnormalities, hyperuricemia and polycystic

ovary syndrome in women. To have a “metabolic syndrome,” an individual must have excess fat weight and at least 2 co-morbidities such as dyslipidemia and hypertension or dyslipidemia and impaired fasting glucose. The excess fat must be truncal rather than gynaecoid. ⁽²⁾

The prevalence of the metabolic syndrome depends on age, ethnic background, and gender. It rises linearly from 20 to 50 years and plateaus thereafter. Even within the same ethnic population group it appears that there can be significant differences in the prevalence of both the individual factors that constitute the metabolic syndrome and the metabolic syndrome itself.

The mechanisms underlying the metabolic syndrome are not fully known; however resistance to insulin stimulated glucose uptake seems to modify biochemical responses in a way that predisposes to metabolic risk factors. A central role has been attributed to the pro-inflammatory cytokines, tumor necrosis factor a (TNF- a) and interleukin (IL)-6, supported by the fact that both are produced in substantial amounts by human adipose tissue.

Risk factors occur in isolation only 30% of the time, and clustering of three or more factors occurs 17% of the time in both genders. The incidence of coronary disease along with carotid atherosclerosis is higher in patients with metabolic syndrome along with higher mortality from all such causes. Although for many obese patients the risk of developing metabolic syndrome is quiet evident, but studies also show that the risk of having the metabolic syndrome increases steeply even within the overweight or the "preobese" range.

Based on clinical trials, aggressive management of the individual components of the syndrome should make it possible to prevent or delay the onset of diabetes mellitus, hypertension and cardiovascular

disease. Management of the metabolic syndrome involves education and intervention at various levels. ⁽¹⁾

Lifestyle modifications include weight loss, regular exercise, stopping smoking, and reducing dietary fat intake. Losing just 10% of excess body weight lowers blood pressure and improves insulin resistance. Some persons may be able to treat high blood pressure and hyperglycemia by altering their lifestyle alone. In many individuals, lifestyle modification is not adequate, and medications must be used to decrease blood pressure, lower triglycerides, and increase the level of HDL.

Because these problems are often linked, treating one aspect of the metabolic syndrome may help the other issues. For example, regular exercise can help you lose weight, reduce blood pressure, and manage hyperglycemia and insulin resistance. Combining healthful eating with a regular exercise program is the cornerstone of treating the metabolic syndrome and reducing risk for heart disease, stroke, diabetes, and other medical problems. ⁽³⁾

Aim and Objectives:

1. To describe the proportion of Metabolic syndrome among diabetics.
2. To assess the components of metabolic syndrome among the study group.

MATERIAL AND METHODS

Study area: This study was conducted in M.V.J medical college and research hospital, at Hoskote, Bangalore (Rural), located at Karnataka in South India. Study area constituted Medical wards of the above hospital.

Study design: Cross sectional study

Source of data: Diabetic patients admitted in Medical wards of the above Hospital

Inclusion criteria: Diabetic cases whose lipid profile, fasting blood sugar values were available and willing to participate in the study

Method of data collection:

The instrument used for the purpose of the study is a predesigned structured questionnaire. The Questionnaire contains the general information of the person, duration of diabetes, components of metabolic syndrome such as waist circumference, blood pressure measurements and data on lipid profile. Over a period of one year 205 diabetic patients were interviewed for data collection. Blood pressure was measured on the right arm after a 20-minute rest in the sitting position using a mercury sphygmomanometer by the auscultatory method. Waist circumference was measured on bare skin at the narrowest indentation between the tenth rib and the iliac crest using a plastic anthropometric tape. According to National cholesterol education programme Adult Treatment Panel III criteria (NCEP-ATP III) the diagnosis of metabolic syndrome was made when three or more of the following was present: waist circumference >102 cm in men and >88 cm in women, fasting glucose >110 mg/dl, systolic blood pressure >130 mmHg or diastolic blood pressure >85 mmHg, fasting triglycerides >150 mg/dl, and HDL cholesterol <40 mg/dl in men and <50mg/dl in women. Patients with normal blood pressure, normal serum triglycerides and normal serum HDL were considered as having these risk factors if they were taking medications for the same. All patients were receiving anti-diabetic medications and were considered to have diabetes even if they had normal blood glucose.

Data entry and analysis: Using Micro soft excel and Statistical package for social sciences

Statistical tests used:

- 1) Descriptive statistics
- 2) Binomial proportions test

OBSERVATIONS AND RESULTS

A total of 205 subjects were interviewed over a period of one year, of which there were 77(37.56%) females and 128(62.43%) males. As per NCEP-111 criteria 143(69.75%) study subjects had metabolic syndrome. Of which 85 (59.44%) were men and 58 (40.55%) were women. Proportion of positive criteria of metabolic syndrome is as follows, 41(28.67%) of them were positive for 3 criteria, 86(60.13%) cases had 4 criteria and 16(11.18%) were positive for all the 5 criteria.

Mean age of study subjects is 59.2 ± 13.4 years, majority of the cases were in the age group 61-70 years. Age distribution of diabetic cases is as shown in table-1. Mean duration of diabetes is 5.03 ± 6.07 years, duration of diabetes amongst most of them was between 1-5 yrs (33.65%) and < 1 yr (29.75%). Details are as shown in table- 2.

Among 85 men who had metabolic syndrome, waist circumference was high in 10(11.76%) subjects, high systolic blood pressure was seen among 43(50.58%) cases, diastolic blood pressure was more in 41(48.23%) patients, hypertriglyceridemia was found in 63(74.11%) subjects, values of high density lipoprotein was low among 40(47.05%) cases, high levels of fasting blood sugar level was seen among 74(87.05%) cases. Among 58 women with metabolic syndrome, waist circumference was high in 28(48.27%) subjects, high systolic blood pressure was seen among 22(37.93%) cases, diastolic blood pressure was more in 22(37.93%) patients, hypertriglyceridemia was found in 36(62.06%) subjects, values of high density lipoprotein was low among 48(82.75%) cases, high levels of fasting blood sugar level was seen among 50(86.20%) cases. Waist circumference was significantly high

($p < 0.0001$) among females compared to men. Low levels of high density lipoprotein

were significantly more ($p < 0.0001$) in females than men.

TABLES: Figures in brackets denote percentages.

Table no 1- Age distribution of Diabetic cases (N=205).

Age in years	Cases
31-40	32(15.60)
41-50	32(15.60)
51-60	50(24.39)
61-70	52(25.36)
>70	39(19.02)

Table no 2- Duration of Diabetes among study subjects (N=205)

Duration of diabetes	No of cases
< 1yr	61(29.75)
1-5 yr	69(33.65)
6-10 yr	49(23.90)
11-15 yr	16(7.80)
16-20 yr	8(3.90)
> 21 yr	2(0.97)

Table no 3 - Proportion of components of metabolic syndrome (N=143)

Components	Men (N=85)		Women (N=58)	
	Frequency	Mean	Frequency	Mean
Waist circumference >102 cm in men and >88 cm in women	10(11.76) $p < 0.0001$	91.1±9.3	28(48.27)	88.7±12.6
Systolic Blood Pressure >130 mmHg	43(50.58) $p=0.136$	136.3±20.9	22(37.93)	138±19.4
Diastolic Blood Pressure >85 mmHg	41(48.23) $p=0.223$	85.4±12.6	22(37.93)	83.6±9.6
Triglycerides >150 mg/dl	63(74.11) $p=0.125$	212.3±98.6	36(62.06)	198.3±133.7
High density lipoprotein <40 mg/dl in men and <50mg/dl in women	40(47.05) $p < 0.0001$	40.4±15.5	48(82.75)	39.9±12.2
Fasting blood sugar >110 mg/dl	74(87.05) $p=0.883$	180±57.3	50(86.20)	168.3±68.6

DISCUSSION

A total of 205 subjects were interviewed over a period of one year, of which there were 77(37.56%) females and 128(62.43%) males. As per NCEP-111 criteria 143(69.75%) study subjects had metabolic syndrome, of which 85 (59.44%) were men and 58 (40.55%) were women. Many such studies conducted in different parts of the world give varied findings, a study done in Chandigarh by Ethiraj Dhanaraj et-al reported 56.83% of diabetic patients had metabolic syndrome, among which 41.7% of men and 70.4% of women had metabolic syndrome. (4) There are many criteria for diagnosis of Metabolic syndrome, on the basis of International Diabetes Federation criteria (IDF), in a study done at Pakistan 66.5% was the prevalence of Metabolic syndrome, among men and women it is 44.3% and 84.7% respectively. (5) A United States of America

study showed the prevalence of Metabolic syndrome as 21.8 %. (6) In a Mumbai based study percentage of Metabolic syndrome is 19.52%, among men and women it is 25.16% and 12.6% respectively. Reasons for varied findings may be due to geographical and racial differences among the study subjects at different places. (7)

Proportion of positive criteria of metabolic syndrome is as follows, 41(28.67%) of them were positive for 3 criteria, 86(60.13%) cases had 4 criteria and 16(11.18%) were positive for all the 5 criteria. Majority of the subjects were positive for 4 criteria and relatively less number of cases were positive for all the 5 criteria. In a Mumbai based study majority of the study subjects were positive for 3 criteria (44.6%) followed by 4 criteria (36.35%) and 5 criteria (19.04%) respectively. (8)

Mean age of study subjects is 59.2 ± 13.4 yrs, majority of the cases were in the age group 61-70 years followed by 51-60 years. Age distribution of diabetic cases is as shown in table-1. As per the observations made in a study done at Salem mean age of patients diagnosed as having metabolic syndrome is 49 years which is not consistent with our findings. ⁽⁹⁾ Findings of a study from Pakistan also reported 49.7 years as mean age. ⁽¹⁰⁾

Mean duration of diabetes is 5.03 ± 6.07 yrs, duration of diabetes amongst most of them was between 1-5 yrs (33.65%) and < 1 yr (29.75%). Details are as shown in table- 2. In Pakistan similar study revealed mean duration of diabetes as 6.5 years, so the mean duration of diabetes was more among people in Pakistan as compared to our study subjects in Bangalore. Around 50% of them were suffering from diabetes of less than 5 years duration in Pakistan, our study reported 63.4% of the cases were diagnosed with diabetes of less than 5 years duration. ⁽¹⁰⁾

Among 85 men who had metabolic syndrome, waist circumference was high in 10(11.76%) subjects, high systolic blood pressure was seen among 43(50.58%) cases, diastolic blood pressure was more in 41(48.23%) patients, hypertriglyceridemia was found in 63(74.11%) subjects, values of high density lipoprotein was low among 40(47.05%) cases, high levels of fasting blood sugar level was seen among 74(87.05%) cases. Findings of a similar study done in Mumbai reported 88.49% of men having hypertension, 74.4% of cases had hypertriglyceridemia which is exactly the same as our findings, low levels of high density lipoproteins was seen among 58.53% which is higher as compared to our study, high waist circumference was seen among 34.92% where in our study the percentage of cases having this risk factor was much less comparatively. ⁽⁸⁾ Among 58

women with metabolic syndrome, waist circumference was high in 28(48.27%) subjects, high systolic blood pressure was seen among 22(37.93%) cases, diastolic blood pressure was more in 22(37.93%) patients, hypertriglyceridemia was found in 36(62.06%) subjects, values of high density lipoprotein was low among 48(82.75%) cases, high levels of fasting blood sugar level was seen among 50(86.20%) cases. In a study done at Mumbai the risk factors among women is as follows, hypertension was seen among 77.62% which is almost the same as our findings when both systolic and diastolic blood pressures are combined. Hypertriglyceridemia was seen among 64.64% which is consistent with our study findings. Low levels of high density lipoprotein were seen among 71.13% of women in Mumbai study. High waist circumference was seen among 80.13% which is almost double as compared to our study findings. ⁽⁸⁾ Waist circumference was significantly high ($p < 0.0001$) among females compared to men. Low levels of high density lipoprotein were significantly more ($p < 0.0001$) in females than men. Similar findings were reported in a study at Mumbai where in women had statistically significant high prevalence of central obesity and low levels of high density lipoprotein.

CONCLUSION

Implementing preventive lifestyle interventions such as diet education, physical activity, weight control, smoking cessation, and related behavior modification is essential. Incorporate more activity into the day, aim for at least 30 min of activity at least 5 days per week.

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