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Original Research

Evaluation of cardiovascular profile among patients with metabolic syndrome: An observational study

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Abstract
Background: Metabolic syndrome encompasses a collection of interrelated disorders that elevate the risk of atherosclerotic cardiovascular diseases, such as myocardial infarction, cerebrovascular accidents, peripheral vascular diseases, insulin resistance, and type II diabetes mellitus.Hence; the present study was conducted for evaluating cardiovascular profile among patients with metabolic syndrome.
Materials & methods: The present study included analysis of 100 patients with metabolic syndrome. Inclusion criteria for the present study included subjects of any gender above 30 years and below 60 years of age, who gave informed consent, and who fulfilled the metabolic syndrome criteria. Detailed history and thorough clinical examination were carried out in each patient. Blood samples were obtained and complete hematological along with biochemical profile was assessed. All the results were compiled in Microsoft excel sheet and were analyzed by SPSS software.
Results: Mean age of the patients with metabolic syndrome was 48.1 years.57 percent of the patients of the metabolic syndrome group were males. Mean FBS among the patients of the metabolic syndrome was 138.4 mg/dL respectively. Mean SBP and DBP of the patients of the metabolic syndrome was 142.7 and 91.9 respectively. Hypertension and diabetes was seen in 62 percent and 33 percent of the patients respectively. Dyslipidemia was seen in 66 percent of the patients.
Conclusion: The identification, mitigation, and management of the fundamental risk factors associated with metabolic syndrome, along with the promotion of a healthy lifestyle, should be prioritized as a significant strategy for alleviating the burden of cardiovascular disease within the broader population.
Key words: Cardiovascular, Metabolic

Introduction

Metabolic syndrome encompasses a collection of interrelated disorders that elevate the risk of atherosclerotic cardiovascular diseases, such as myocardial infarction, cerebrovascular accidents, peripheral vascular diseases, insulin resistance, and type II diabetes mellitus.[1] The defining characteristics of metabolic syndrome include central obesity, insulin resistance, hypertension, and atherogenic dyslipidemia. Research indicates that individuals with metabolic syndrome face a twofold increase in the risk of developing atherosclerotic cardiovascular diseases and a fivefold increase in the likelihood of diabetes mellitus compared to the general population. Furthermore, metabolic syndrome is linked to accelerated atherosclerosis, the early onset of atherosclerotic cardiovascular diseases, and the premature development of type II diabetes mellitus.[2, 3]

The prevalence of MetS vary greatly depending on criteria used to define MetS, the age, gender, ethnicity and environment of the population being studied and obesity prevalence of the background population studied. Regardless of which criteria are used, however, the prevalence of MetS is high and is on the rise in many Western societies.[4, 5]

The pathogenic mechanisms underlying Metabolic Syndrome (MetS) are intricate and not yet completely understood. There is ongoing debate regarding whether the individual components of MetS should be viewed as separate pathologies or as manifestations of a unified pathogenic process. The significant geographic variability in the prevalence of MetS, along with its recent increase in developing regions, highlights the critical role of environmental and lifestyle factors, particularly excessive caloric intake and insufficient physical activity, as key contributors. Visceral fat accumulation has been identified as a primary instigator of many pathways associated with MetS, underscoring the significance of high caloric consumption as a fundamental causative element. Among the various proposed mechanisms, insulin resistance, neurohormonal activation, and chronic inflammation are

recognized as the principal factors in the onset, progression, and eventual transition of MetS to cardiovascular disease (CVD).[6- 8] Hence; the present study was conducted for evaluating cardiovascular profile among patients with metabolic syndrome.

Materials & methods

The present study included analysis of 100 patients with metabolic syndrome. Inclusion criteria for the present study included subjects of any gender above 30 years and below 60 years of age, who gave informed consent, and who fulfilled the following metabolic syndrome criteria:

1.Central obesity(waist circumference >90cm in males and >80cm infemales

2.With any two of the following

- serum triglycerides >150mg/dl.
- serum HDL cholesterol <40mg /dl in males and <50mg/dl in females
- Supine systolic BP >130mmhg Or diastolic BP >85mmhg.
- Fasting plasma glucose >100mg/dl

Detailed history and thorough clinical examination were carried out in each patient. Blood samples were obtained and complete hematological along with biochemical profile was assessed. All the results were compiled in Microsoft excel sheet and were analyzed by SPSS software. Chi- square test, Mann-Whitney U test and student t test were used for assessment of level of significance.

Results

Mean age of the patients with metabolic syndrome was 48.1 years.57 percent of the patients of the metabolic syndrome group were males. Mean FBS among the patients of the metabolic syndrome was 138.4 mg/dL respectively. Mean SBP and DBP of the patients of the metabolic syndrome was 142.7 and 91.9 respectively. Hypertension and diabetes was seen in 62 percent and 33 percent of the patients respectively. Dyslipidemia was seen in 66 percent of the patients.

Table 1: Biochemical and hemodynamic profile

Variable	Mean	SD
FBS (mg/dL)	138.4	35.5
SBP (mm of Hg)	142.7	30.7
DBP (mm of Hg)	91.9	20.9
TG (mg/dL)	190.8	33.8

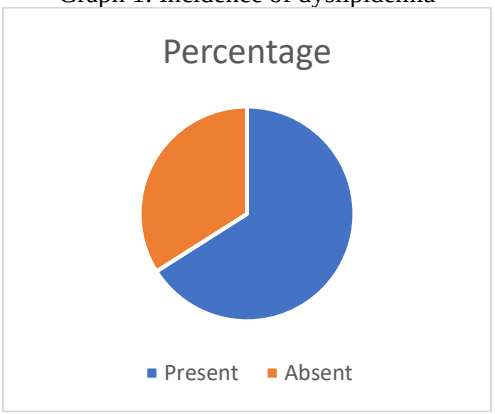
Table 2: Incidence of hypertension

Hypertension	Number	Percentage
Present	62	62
Absent	38	38
Total	100	100

Table 3: Incidence of diabetes

Diabetes	Number	Percentage
Present	33	33
Absent	67	67
Total	100	100

Graph 1: Incidence of dyslipidemia



Discussion

Metabolic syndrome (MetS) represents a constellation of metabolic abnormalities, which include insulin resistance, atherogenic dyslipidemia, central obesity, and hypertension. The underlying mechanisms of MetS involve a complex interplay of genetic predispositions and acquired factors, primarily associated with insulin resistance and chronic low-grade inflammation. If not addressed, MetS is closely linked to a heightened risk of developing diabetes and cardiovascular diseases (CVDs). Given that CVDs are the predominant cause of morbidity and mortality globally, it is crucial to explore the implications of MetS in this regard to alleviate the substantial burden of these conditions. Although MetS is a relatively recent clinical classification, research into this syndrome has surged significantly over the past few decades.[9]The goals of therapy are to reduce both a short-term and lifetime risk. The presence of the MetS per se indicates a higher lifetime risk. A practical approach to estimate absolute, short-term CHD/CVD risk in patients with the MetS without ASCVD or diabetes is to use the standard Framingham algorithm to estimate a 10-year risk of the coronary heart disease (CHD).[10]

Mean age of the patients with metabolic syndrome was 48.1 years.57 percent of the patients of the metabolic syndrome group were males. Mean FBS among the patients of the metabolic syndrome was 138.4 mg/dL respectively. Mean SBP and DBP of the patients of the metabolic syndrome was 142.7 and 91.9 respectively. Hypertension and diabetes was seen in 62 percent and 33 percent of the patients respectively. Dyslipidemia was seen in 66 percent of the patients. Didangelos TP et al conducted a study to evaluate the impact of orlistat in conjunction with a hypocaloric diet (HCD) compared to HCD alone on the cardiovascular risk profile in individuals diagnosed with both Metabolic Syndrome (MetSyn) as defined by the National Cholesterol Educational Program—Adult Treatment Panel III and type 2 diabetes mellitus (DM). The final analysis included 126 patients who were free from cardiovascular disease at the outset. Among these, 94 patients (73%) received orlistat (360 mg/day) alongside HCD for a duration of six months, while 34 patients (27%) adhered to HCD exclusively. The study assessed various components of the MetSyn criteria, including waist circumference, systolic and diastolic blood pressure, fasting glucose levels, triglycerides, high-density lipoprotein cholesterol (HDL-C), body mass index, glycosylated hemoglobin (HbA1C), the homeostasis model assessment of insulin resistance (HOMA) index, as well as total and low-density lipoprotein cholesterol (LDL-C). All participants met the MetSyn criteria at baseline. Following the six-month intervention, significant differences were observed between the groups receiving orlistat plus HCD and those on HCD alone in terms of body weight ($p = 0.0001$), waist circumference ($p < 0.0001$), fasting glucose ($p < 0.0001$), HbA1C ($p < 0.0001$), systolic blood pressure ($p = 0.024$), total cholesterol ($p < 0.0001$), LDL-C ($p = 0.034$), and HOMA index ($p = 0.022$). However, no significant differences were noted in triglycerides and HDL-C levels. The administration of orlistat was well tolerated among participants. At the conclusion of the study, 65% of patients receiving orlistat plus HCD continued to meet the MetSyn criteria, with 41% exhibiting four to five components of MetSyn, in contrast to 91% ($p < 0.0001$) and 53% ($p = 0.017$), respectively, in the HCD-only group.[11]Mottillo S et al searched the Cochrane Library, EMBASE, and Medline databases through June 2009 for prospective observational studies investigating the cardiovascular effects of the metabolic syndrome. Two reviewers conducted data extraction, which was subsequently synthesized using random-effects models. They identified a total of 87 studies encompassing 951,083 patients (NCEP: 63 studies with 497,651 patients; rNCEP: 33 studies with 453,432 patients). The analysis revealed minimal variation in cardiovascular risk between the NCEP and rNCEP definitions. When the data from both definitions were combined, the metabolic syndrome was linked to an elevated risk of cardiovascular

disease (CVD), CVD-related mortality, overall mortality, myocardial infarction, and stroke. Notably, patients diagnosed with metabolic syndrome but without diabetes exhibited a persistently high cardiovascular risk. The presence of metabolic syndrome was associated with a twofold increase in cardiovascular events and a 1.5-fold increase in overall mortality.[12]Numerous extensive population and prospective studies have indicated a markedly elevated risk of all-cause mortality, as well as cardiovascular disease (CVD) mortality and morbidity, linked to the presence of metabolic syndrome. Analysis of data from participants aged 50 years and older in the United States NHANES III revealed a mean odds ratio of 2.07 for CVD, with 14% of individuals exhibiting metabolic syndrome compared to 9% without it. Notably, around 85% of individuals with diabetes also present with metabolic syndrome, while the remaining 15% who do not have metabolic syndrome show a reduced prevalence of coronary artery disease (CAD). This observation may be explained by the lower incidence of hypertriglyceridemia, reduced HDL cholesterol levels, and diminished rates of hypertension in this atypical subset of diabetic patients. The West of Scotland Coronary Prevention Study (WOSCOPS) corroborated these findings, demonstrating that the CVD hazard ratio increased with the number of metabolic syndrome components, reaching 2.75 when both metabolic syndrome and high CRP concentration were present. Furthermore, in the Framingham cohort, metabolic syndrome was found to account for approximately 25% of all newly diagnosed CVD cases. The 10-year risk of CAD in men with metabolic syndrome was classified as moderate, ranging from 10% to 20%.[13- 15]

Conclusion

The identification, mitigation, and management of the fundamental risk factors associated with metabolic syndrome, along with the promotion of a healthy lifestyle, should be prioritized as a significant strategy for alleviating the burden of cardiovascular disease within the broader population.

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