ASIAN JOURNAL OF PHARMACEUTICAL AND CLINICAL RESEARCH

INNOVARE ACADEMIC SCIENCES
Knowledge to Innovation

Vol 17, Issue 7, 2024

Online - 2455-3891
Print - 0974-2441

Research Article

TO COMPARE THE METABOLIC SYNDROME AND ITS ASSOCIATED FACTORS WITH THE NORMAL HEALTHY POPULATION

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Received: 06 March 2024, Revised and Accepted: 23 April 2024

ABSTRACT

Objective: Metabolic syndrome (MetS) is an associated conditions that together rise the risk of cardiovascular disease (CVD) and type 2 diabetes mellitus (T2DM). The study's hypothesis was to assess the prevalence of the Mets and its associated factors among the North Indian population.

Methods: The prevalence of the MetS was estimated to be two hundred patients who visited the hospital of Guru Nanak Dev, Sri Amritsar. Following variables such as body mass index, waist circumference, high-density lipoprotein-cholesterol, triglycerides, and fasting blood glucose were done.

Results: The prospective observational study revealed that the prevalence of the MetS was higher in women than men, based on the International Diabetes Federation definition (female-55% and male-45%). MetS was more prevalent in the study of patients with age >60 years. A strong association was found between the above parameters ($p<0.05$) with the Mets.

Conclusion: Amid the Mets driving the twin global pandemic of CVD and T2DM. There is a medical and economic imperative to identify those individuals with the Mets, so that interventions and treatment may prevent T2DM with CVD.

Keywords: Metabolic syndrome, Type 2 diabetes, Body mass index, Cardiovascular disease.

 DOI: http://dx.doi.org/10.22159/ajpcr.2024v17i7.50807. Journal homepage: https://innovareacademics.in/journals/index.php/ajpcr

INTRODUCTION

Mets is a condition characterized by ongoing mild inflammation that is by genetic predisposition and environmental factors [1]. The prevalence of metabolic syndrome (MetS) varies widely worldwide, ranging from 10% to 84%. Factors such as geographic distribution, ethnicity, age, and gender play a role in these variations among different populations [2]. In India, a meta-analysis revealed that the prevalence of MetS is around 30%. This condition most commonly occurs in elderly individuals over 60, women, and those living in urban areas [3]. Genetic predisposition, obesity, physical inactivity, smoking, and alcohol intake are all components of the syndrome [4]. Obesity has been linked with excessive sympathetic activity, which in turn is related to insulin resistance, diabetes, high blood pressure, abnormal lipid levels, and various other metabolic, cardiovascular, and kidney disorders. Our understanding of the relationship between overweight and obesity and MetS has increased with many products secreted from adipocytes, such as inflammatory cytokines, leptin, non-esterified fatty acids, adiponectin, and resistin [5]. Mets is a high-risk state because the complicated multimorbid condition requires optimal medication and lifestyle adherence to maintain desired health outcomes and prevent the onset and development of impacts such as cardiovascular disease (CVD) [6]. India has a high prevalence of diabetes, hypertension, and abdominal obesity compared to other countries, around 1.4 billion. The majority of the elderly population in the country are at risk of developing MetS [7,8]. Hence, this study aims to discover MetS and its factors in the north Indian population.

METHODS

A research study was conducted at the Biochemistry Department of the Government Medical College in Sri Amritsar. The study was done with approval from the institution's ethics committee. Among the 200 patients in the study, 106 were identified as not having Mets and were categorized as the control group, while 94 patients with Mets were classified into the case group. Data on patient demographics, socioeconomic status, and physical symptoms were carefully documented. Blood samples were collected to analyze for biochemical parameters such as fasting blood glucose (FBS) value and lipid profile. Mets is identified based on the guidelines set by the International Diabetes Federation (IDF). A diagnosis of Mets is made when an individual exhibits an enlarged waist circumference along with a minimum of two additional risk factors, which may include elevated FBS levels, dyslipidemia, and hypertension. Before the study, all participants provided written consent. The analysis was done by the Statistical Package for the Social Sciences software – discrepancies in baseline and review characteristics, as well as the prevalence of MetS and its components. Patients were analyzed for clinical significance ($p<0.05$) among the study population.

RESULTS AND DISCUSSION

The research was done at the Biochemistry Department of the Government Medical College in Amritsar. Patients were divided into two groups: Group I (100) as the case group and Group II (100) as the control group. The distribution of males and females is shown in Table 1. The findings revealed that females (55%) have a higher susceptibility to Mets compared to males (45%).

Using the IDF criteria, our study established a significant association between age and the Mets ($p<0.05$). The prevalence of Mets was highest in the age group of 61–80 years (Table 2). Our study observed a progressive development of the MetS under a sequential increase in age.

Our study participants were put into four categories based on their lifestyle: smokers, alcoholics, and both smokers and alcoholics. 20%

Table 1: Distribution of gender in MetS

Gender	(Mean+SE)
Male	90 (45%)
Female	110 (55%)

MetS: Metabolic syndrome, SE: Standard error

Table 2: Age-wise distribution with and without MetS

Age (years)	With MetS	Without MetS
20–40	6	16
41–60	22	98
61–80	42	16

MetS: Metabolic syndrome

Table 3: Distribution of the study participants according to associated factors

Variables	Subjects (n=200)	Percentage
Alcoholic	20	10
Smokers	10	5
Both alcoholics and smokers	40	20
None	130	65

Table 4: Prevalence of MetS according to BMI

BMI	With MetS (n=94)	Without MetS (n=106)
18.5–24.9	9 (9.5%)	28 (26.4%)
25–29.9	29 (30.8%)	33 (31.1%)
>30	56 (59.5%)	45 (42.4%)

BMI: Body mass index, MetS: Metabolic syndrome

Table 5: Laboratory variables of study participants

Variables	With MetS (n=94)	Without MetS (n=106)	Odd ratio	p-value
FBS				
<110 mg/dL	40	96	2.57	0.001
>110mg/dL	54	10		
HDL-c				
<40 mg/dL	42	22	2.15	0.001
TG				
≥150 mg/dL	60	26	2.6	0.0001
<150 mg/dL	34	80		

FBS: Fasting blood glucose, MetS: Metabolic syndrome, TG: Triglycerides, HDL-c: High-density lipoprotein cholesterol

were both smokers and alcoholics, with 5% being smokers and 10% being alcoholics exclusively (Table 3).

According to body mass index (BMI), study participants were categorized as weight (18.5–24.9 kg/m^2), overweight (25–29.9 kg/m^2), or obese (≥30 kg/m^2). According to the IDF classification, about 9 (9.5%), 29 (30.8%), and 56 (59.5%) of the study's Mets patients were classified as average weight, overweight, or obese, respectively. Most Mets patients were classified as "overweight" (59.5%) or "obese" (30.8%) in this study (Table 4). The rise in BMI plays a vital role in MetS, which is pertinent to our study. An important relationship ($p<0.05$) was identified between BMI and Mets according to the IDF criteria.

Based on IDF criteria, all the investigations were compared. FBS, triglycerides, and high-density lipoprotein (HDL) had a statistically significant association with the Mets in the laboratory variables (Table 5). It depicted a higher prevalence of females with Mets.

DISCUSSION

Having both MetS and type 2 diabetes mellitus (T2DM) substantially heightens the risk of cardiovascular complications and other health concerns. Treatment typically encompasses lifestyle modifications like dietary adjustments and physical activity, coupled with medications aimed at regulating blood sugar, blood pressure, and cholesterol levels. It was observed that females have a higher risk of MetS due to estrogen deficiency post-menopause, leading to insulin resistance, abdominal obesity, elevated triglyceride levels, and decreased HDL cholesterol (HDL-c) levels [9]. According to the IDF criteria, a noteworthy correlation between age and MetS ($p<0.05$) was seen. The prevalence of Mets peaked in the 61–80 age (Table 2). Our study noted a gradual rise in the incidence of MetS with advancing age with findings from a comparable study [7,8]. A higher proportion of the study population was identified as both smokers and alcoholics. Previous studies show that smoking and alcohol consumption are triggering factors for various health hazards, particularly cardiovascular and metabolic complications, suggesting that these lifestyle variables can be a precipitating factor leading to Mets and, in turn, cardiovascular complications [10]. In addition, obesity is linked with insulin resistance and MetS and also contributes to hypertension, high total cholesterol, low HDL-c, and hyperglycemia and is independently related to higher CVD risk [11].

CONCLUSION

The MetS increased with age, with a female preponderance. Mets is a group of metabolic abnormalities with a risk of T2DM with CVD. In addition, a larger proportion of the study population was both smokers and alcoholics. Prevention, earlier identification, and treatment are urgently needed to counteract the increased prevalence and reduce the burden of MetS among the north Indian population.

AUTHORS' CONTRIBUTIONS

The writing was completed by Dr. Jaswant Kaur, while data collection and analysis were carried out by Dr. Inderpreet Kaur and Dr. Purnima Jindal. Dr. Rajinderjit Singh Ahi reviewed and edited the research, and the final manuscript was prepared by him. Dr. Jaswant Kaur then submitted the manuscript for publication.

CONFLICTS OF INTEREST

There are no conflicts of interest.

AUTHORS' FUNDING

None.

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