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Prevalence and Risk Factors of Metabolic Syndrome in General Medicine Clinic Attendees: A Cross-Sectional Analysis

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Abstract
Metabolic syndrome (MetS) represents a cluster of conditions including hypertension, hyperglycemia, abnormal cholesterol levels and excess body fat around the waist. It significantly increases the risk of developing cardiovascular diseases and diabetes. This study aims to determine the prevalence and identify the risk factors of MetS among general medicine clinic attendees. A cross-sectional analysis was conducted among 150 attendees of a general medicine clinic. We collected data through clinical examinations, blood tests and structured interviews to assess the presence of MetS as defined by the International Diabetes Federation criteria. The prevalence of MetS among the clinic attendees was found to be significant. Key risk factors identified included age, sedentary lifestyle, and dietary habits. The study underscores the high prevalence and distinct risk profiles of MetS among general clinic attendees, highlighting the need for targeted interventions to manage and prevent this syndrome.

INTRODUCTION

Metabolic syndrome (MetS) is increasingly recognized as a major public health challenge worldwide. It encompasses a constellation of interrelated risk factors of metabolic origin that appear to directly promote the development of atherosclerotic cardiovascular disease (CVD) and type 2 diabetes mellitus (T2DM). These risk factors include increased blood pressure, high blood sugar level, excess body fat around the waist and abnormal cholesterol levels. The significance of MetS lies not only in its high prevalence but also in its profound impact on global health systems, due to the chronic nature of its associated diseases[1].

The global prevalence of MetS varies, largely influenced by geographical, ethnic and socioeconomic factors, as well as by the criteria used for its definition. In general, the prevalence of MetS has been increasing, paralleling the rise in obesity and sedentary lifestyles. This trend is alarming as MetS predisposes individuals to a higher risk of developing cardiovascular diseases, which are leading causes of mortality globally[2].

In light of this, understanding the epidemiology of MetS, particularly among populations frequenting general medicine clinics, can provide critical insights into its risk factors and aid in the early identification of individuals at high risk. This understanding is essential for developing effective preventive and management strategies[2].

Several risk factors for MetS have been identified, including age, genetics, obesity, physical inactivity and poor dietary habits. However, the interaction between these factors and their collective impact on the syndrome's development within clinic-based populations requires further exploration. Thus, studies focusing on clinic attendees are crucial as they can reveal specific patterns of MetS prevalence and associated risk factors in a controlled, clinical environment[3].

Given the high stakes associated with MetS, many health systems and policies are increasingly focused on intervention strategies aimed at modifiable risk factors. These include promoting physical activity, dietary modifications and regular monitoring of at-risk individuals. Thus, a detailed understanding of MetS within the context of general medicine clinics could significantly enhance the effectiveness of these interventions[4].

Aims and Objectives: To determine the prevalence and identify the risk factors of Metabolic Syndrome among attendees of a general medicine clinic.

- To assess the prevalence of Metabolic Syndrome among general medicine clinic attendees.
- To identify the demographic and lifestyle risk factors associated with Metabolic Syndrome in this population.
- To evaluate the correlation between Metabolic Syndrome and its individual components in clinic attendees.

MATERIALS AND METHODS

Source of Data: Data was sourced from attendees of a general medicine clinic who consented to participate in the study.

Study Design: This was a cross-sectional analytical study designed to assess the prevalence and identify risk factors of Metabolic Syndrome.

Study Location: The study was conducted at a general medicine clinic located in an urban area.

Study Duration: Data collection occurred over a six-month period from January to June 2023.

Sample Size: A total of 150 attendees of the clinic were included in the study.

Inclusion Criteria: Attendees aged 18 years and above, both males and females, who consented to participate were included.

Exclusion Criteria: Attendees with existing diagnoses of cardiovascular diseases or diabetes, pregnant women and those unwilling to provide consent were excluded.

Procedure and Methodology: Participants underwent a detailed clinical examination, including measurements of waist circumference, blood pressure, and fasting blood lipid and glucose levels. A structured questionnaire was used to gather information on lifestyle factors such as diet and physical activity.

Sample Processing: Blood samples were processed in a central laboratory to assess glucose and lipid profiles.

Statistical Methods: Data were analyzed using SPSS software. Descriptive statistics, chi-square tests and logistic regression were used to identify the prevalence and risk factors of Metabolic Syndrome.

Data Collection: Data collection involved both direct measurements and self-reported information through structured interviews with the participants.

RESULTS AND DISCUSSIONS

Table 1 details the demographic and lifestyle risk factors associated with Metabolic Syndrome (MetS) among attendees of a general medicine clinic. Notably,

Table 1: Demographic and Lifestyle Risk Factors for Metabolic Syndrome

Demographic/Lifestyle Factor	n (%) with MetS	Odds Ratio (OR)	95% CI	p-value
Age > 50 years	30 (20%)	2.5	1.3 - 4.7	0.006
Male Gender	25 (16.7%)	1.8	0.9 - 3.6	0.09
Regular Alcohol Use	20 (13.3%)	1.6	0.7 - 3.7	0.25
Low Socioeconomic Status	25 (16.7%)	2.1	1.1 - 4.0	0.02
High Stress Levels	30 (20%)	2.8	1.5 - 5.2	0.001

Table 2: Correlation of MetS with Its Components

MetS Component	n (%) with MetS	Odds Ratio (OR)	95% CI	p-value
High waist circumference	40 (26.7%)	3.3	1.8 - 6.1	<0.001
High triglycerides	35 (23.3%)	2.9	1.5 - 5.6	0.002
Low HDL cholesterol	30 (20%)	2.2	1.2 - 4.0	0.01
High blood pressure	45 (30%)	3.6	2.0 - 6.4	<0.001
High fasting glucose	25 (16.7%)	2.0	1.1 - 3.7	0.02

individuals aged over 50 years showed a significant association with MetS, having an odds ratio (OR) of 2.5 and a statistically significant p-value of 0.006. This suggests a higher risk of MetS in this age group compared to younger attendees. Male gender and regular alcohol use were also examined., males had an OR of 1.8, but the association was not statistically significant (p-value of 0.09) and regular alcohol use had an OR of 1.6 with a p-value of 0.25, indicating a weak association. Low socioeconomic status and high stress levels were significantly associated with MetS, with ORs of 2.1 and 2.8 respectively, and p-values indicating statistical significance (0.02 and 0.001 respectively). This highlights the impact of socioeconomic factors and stress on the risk of developing MetS.

Table 2 explores the correlation between MetS and its individual components. A high waist circumference had a strong association with MetS, showing an OR of 3.3 and a p<0.001, which underscores the importance of abdominal obesity as a core component of MetS. Similarly, high triglyceride levels and high blood pressure were strongly correlated with MetS, with ORs of 2.9 and 3.6, respectively, both with statistically significant p-values. Low HDL cholesterol and high fasting glucose levels also demonstrated significant associations with MetS, with ORs of 2.2 and 2.0 respectively and p-values indicating significance. These findings underscore the multifactorial nature of MetS and the critical roles played by various metabolic components in its prevalence among clinic attendees.

Table 1 underscores the multifaceted nature of this condition. The study reveals that individuals aged over 50 years exhibit an increased risk, likely due to reduced physical activity, hormonal changes and altered metabolic profiles typical of older adults Bowo-Ngandji[5] Although the association between MetS and male gender was not statistically significant in this study (p=0.09), it is consistent with other research suggesting that men might initially be at a higher risk due to less subcutaneous and more visceral fat, though this risk tends to equalize after women reach menopause Vajdi[6] The study also observed a weak association with regular alcohol use (p=0.25), which aligns with studies indicating a J-shaped relationship where moderate consumption might be protective, but high consumption escalates the risk Indriyati[7]

Additionally, a significant link between low socioeconomic status and MetS was noted, attributed to poor nutritional choices, higher stress levels and reduced access to healthcare, all factors that contribute to the prevalence of MetS Ramírez-Manent[8] High stress levels were strongly correlated with MetS (p = 0.001), supported by studies showing that both psychological and physiological stress can lead to hormonal imbalances, promoting MetS through mechanisms such as increased cortisol levels affecting fat distribution and insulin resistance Mahadevan[9]

Table 2 highlights the correlations between MetS and its physiological components. A strong correlation with high waist circumference reflects its role as a central obesity marker and a primary risk factor due to its impact on insulin resistance Asghar[10] High triglycerides are well recognized as a marker of MetS, contributing to the cardiovascular risk profiles associated with metabolic dysregulation Jayant[11] Similarly, low HDL cholesterol is closely correlated with MetS, as it plays acrucial role in lipid transport and removal, with lower levels indicating a disturbed metabolic state Bernal-Reyes[12] The strong association between high blood pressure and MetS aligns with literature linking hypertension to insulin resistance and endothelial dysfunction, both key elements in MetS pathology Adil SO[13] Lastly, the correlation with high fasting glucose levels highlights the impaired glucose metabolism integral to MetS, leading to a higher risk of developing type 2 diabetes, a frequent consequence of unmanaged MetS Otsuka[14]

CONCLUSION

This cross-sectional analysis of 150 general medicine clinic attendees provided insightful data on the prevalence and risk factors of Metabolic Syndrome (MetS). The study found a notable prevalence of MetS, emphasizing its significance as a public health issue that warrants attention. Among the key findings, age

over 50 years, low socioeconomic status, and high stress levels were significantly associated with MetS, highlighting the influence of both biological and socio-environmental factors in the development of this syndrome.

The correlation of MetS with traditional components like high waist circumference, high triglycerides, low HDL cholesterol, high blood pressure, and high fasting glucose reaffirms the complex interplay of these factors in defining the risk and presence of MetS. Particularly, the strong associations of high waist circumference and high blood pressure with MetS underscore the critical roles of obesity and hypertension as central components in the pathophysiology of MetS.

These findings suggest the need for targeted interventions aimed at these risk factors. Strategies focusing on lifestyle modifications, such as improved diet, increased physical activity and stress management, could be beneficial. Additionally, specific attention should be given to vulnerable populations, particularly older adults and those from lower socioeconomic backgrounds, to mitigate the risk factors prevalent in these groups.

Ultimately, this study reinforces the necessity for routine screening for MetS components in general medicine clinics. Early identification and proactive management of MetS can significantly reduce the risk of cardiovascular diseases and diabetes, which are major health burdens globally. Further research is encouraged to explore longitudinal outcomes and the efficacy of specific interventions in reducing the prevalence and impact of MetS among clinic attendees.

Limitations of Study

Cross-Sectional Design: The inherent limitation of the cross-sectional study design is its inability to establish causality. Although this study identified associations between various demographic, lifestyle factors and Metabolic Syndrome (MetS), it cannot determine if these factors cause MetS or if the relationship is bidirectional.

Sample Size and Generalizability: The study was conducted with a relatively small sample size of 150 clinic attendees, which may not adequately represent the broader population. This limits the generalizability of the findings to other settings or larger populations with diverse demographic backgrounds.

Selection Bias: Participants were only recruited from a single general medicine clinic, which might have introduced selection bias. Attendees of a clinic may have different health behaviors or baseline characteristics compared to the general population, potentially skewing the prevalence and risk factor analysis.

Self-Reported Data: The study relied in part on self-reported data for lifestyle factors, such as physical activity and diet. Self-reported information can be subject to recall bias and may not accurately reflect true behaviors or exposures.

Lack of Longitudinal Follow-up: Without longitudinal data, it's challenging to observe the progression of MetS or to understand the long-term impacts of the identified risk factors on the development of MetS.

Limited Socioeconomic and Psychological Measures: Although socioeconomic status and stress levels were considered, the study may not have captured all relevant social and psychological variables that could influence the risk of developing MetS, such as education level, employment status, or coping mechanisms.

Confounding Factors: While the analysis adjusted for some confounders, there could be additional unmeasured confounding factors that affect the relationship between the identified risk factors and MetS. This includes genetic predispositions, medication use and other underlying health conditions.

Diagnostic Criteria: The study used specific criteria to define MetS, which might differ from other studies, potentially affecting comparisons and interpretations of prevalence rates across different studies.

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