Original Article

Prevalence of metabolic syndrome and its risk factors among the government bank's employees of district Bijnor, Uttar Pradesh: A cross-sectional study

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Abstract

Background: Metabolic syndrome (MetS) involves having at least 3 out of 5 health conditions that increase the risk of cardiovascular disease, stroke, and type 2 diabetes mellitus. These conditions include increased blood pressure (BP), high blood sugar, excess body fat around the waist, and abnormal cholesterol or triglyceride levels. Each of these conditions is treatable with lifestyle changes and/or medication. **Objective:** 1). To find out the prevalence of MetS and various risk factors associated with it through MetS's screening criteria. 2) To find out the health risk status and stress level among bank's employees in the government sector. **Material and Methods:** A medical health camp was organised for all bank's employees to rule out the various health-related disorders. Thus, 64 beneficiaries were participated. A detailed history was taken regarding their socio-demographic profile, risk factors affecting the MetS, and stress levels among each individual through the direct personal interview method. **Results:** As per MetS's screening criteria (NCEP-ATP III), the prevalence of MetS was 7.81% among the bank's employees. The various risk factors affecting the MetS are elevated serum triglyceride level, elevated fasting blood glucose (FBG), raised BP, enlarged WC, etc., The majority of individuals had a high risk of health status 27 (42.1%) and a moderate level of stress, i.e., 38 (59.4%), respectively. Most of the participants were hypertensive 49 (76.6%), diabetic 16 (28.6%), and obese 37 (57.8%). **Conclusion:** Common concerns of male gender, increasing age and BMI, sedentary lifestyle, stress and positive family history should be considered for early identification and appropriate intervention to fight against the growing MetS epidemic.

Keywords: Insulin resistance, metabolic syndrome, MetS, obesity, prevalence, screening

Introduction

Metabolic syndrome (MetS) refers to a group of diseases that increase the chance of developing coronary heart disease, diabetes, stroke, and other significant health issues. The MetS is also known as insulin resistance (IR) syndrome.[1]

MetS is defined as having three or more of the following conditions[2]:

- **A large waist circumference:** It is also characterised as abdominal obesity or "having an apple shape" appearance. Extra fat in your stomach has a higher risk of heart disease than excess fat elsewhere in your body.
- **High blood pressure:** If your BP rises and remains elevated for an extended period of time, it might harm your heart and blood vessels. High BP can also lead to the build-up of plaque (a waxy substance) in your arteries. Plaque can cause heart and blood vessel problems, such as heart attacks and strokes.
- **High blood sugar level:** This can also damage your blood vessels and increase the chance of developing blood clots.
- **High blood triglyceride level:** Triglycerides are a form of fat found in the bloodstream. High triglyceride levels may

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raise LDL cholesterol, sometimes known as bad cholesterol. Heart disease risk rises as a result of this.

- **Low HDL cholesterol level, sometimes called good cholesterol:** Blood cholesterol levels play a crucial role in heart health. "**Good**" HDL cholesterol can assist in eliminating "Bad" LDL cholesterol from your blood vessels. "**Bad**" LDL cholesterol might induce plaque formation in your blood vessels.

MetS is prevalent in the United States. It affects around one-third of all individuals.[3] The good news is that most of it can be avoided. Knowing the risk factors and adopting a healthier lifestyle can help us to reduce the chances of getting MetS and the associated health issues.

The symptoms of MetS are determined by the five disorders listed above. Some signs are noticeable, while others are very subtle. For example, the healthcare provider may note that you have an enlarged WC, high BP, high blood triglycerides, and low HDL cholesterol, or "Good" cholesterol, which typically do not create any symptoms.[4] High blood sugar may induce the following symptoms: impaired vision, increased thirst, increased urine, particularly at night, fatigue, and weakness.

To diagnose MetS, the healthcare provider may ask if you or anybody in your family has any symptoms or risk factors. They may also inquire about your nutritional status and whether you exercise regularly or not. MetS can be ruled out using a variety of screening tests and procedures, including BMI, measurement of waist-hip circumference, acanthosis nigricans, pedal oedema, BP, and blood investigations, such as fasting plasma glucose and fasting lipid profile testing.[5]

MetS can also be caused by a variety of factors, many of which interact. Some of these factors, such as diet pattern and physical activity level (PAL) are under our control. Other factors, such as age, gender, and genetics, cannot be controlled.[6] MetS is primarily caused by an individual's body weight mass. Fat cells, particularly in the belly, can increase the quantities of substances known as free fatty acids (FFA).[7] These FFA can elevate levels of other chemicals and hormones, including insulin in our body. The body may not respond well to insulin, resulting in IR.[8] It is a pathological condition in which cells either do not respond properly to the hormone insulin or downregulate insulin receptors in response to hyperinsulinemia.[9]

MetS can be avoided by keeping a healthy weight. Changes in your lifestyle can be more beneficial to the heart, such as eating a good diet, exercising regularly, and giving up smoking and alcohol. Schedule regular visits to your healthcare professional to monitor your cholesterol, triglyceride, BP, and blood sugar levels.[10]

Material and Methods

A medical health camp was organized for all the bank's employees working in the government sector of district Bijnor, Uttar Pradesh. There are six government bank such as Allahabad Bank, Bank of Baroda, Bank of India, Central Bank of India, Punjab National Bank and State Bank of India. The information of all the study participants who attended the medical health camp and availed of the services was collected. The non-random purposive sampling technique was used for the data collection. The bank's employees, who were permanent employees and working for at least more than a year in the government sector and who had given informed written consent, were included in the study.

Thus, 64 study participants attended the health camp irrespective of disease status for the MetS screening, with the inclusion of diabetics, hypertensives, and dyslipidaemia patients and the exclusion of severely ill and pregnant females. However, the prevalence of these disorders was ascertained based on the physician's self-reported diagnosis and/or use of prescription medications along with therapeutics in the medical records. A detailed history was taken regarding their socio-demographic profile, health risk status, perceived stress level, and various risk factors affecting the MetS. A predesigned, pre-tested, pre-validated, semi-structured questionnaire was used for data collection by the direct personal interview method during health camps.

Study tool

The prevalence of MetS was assessed according to the National Cholesterol Education Program Adult Treatment Panel III (NCEP-ATP III) criteria, wherein the presence of any three following traits in the same individual would meet the criteria[11]:

1. **Abdominal obesity:** Waist circumference (WC) ≥102 cm (>40 inch) in men or ≥88 cm (>35 inch) in women.
2. **Serum triglycerides (TGs):** ≥150 mg/dL (≥1.7 mmol/L).
3. **High-density lipoprotein-cholesterol (HDL-C):** <40 mg/dL (<1.03 mmol/L) in men or <50 mg/dL (<1.29 mmol/L) in women.
4. **Fasting blood glucose (FBG) level:** ≥100 mg/dL (≥5.6 mmol/L).
5. **Blood pressure (BP):** ≥130/85 mmHg.

The Perceived Stress Scale (PSS) is a psychological instrument used for measuring the perception of stress by an individual.[12]

Height was determined using a wall-mounted, non-extendable measuring tape with the study participant standing in an erect barefoot position, arms by side, and feet together. Weight measurements were taken of each participant by standing at the centre of the weighing scale (WS-101) in light clothing without shoes. BMI was calculated as per Asian-Pacific criteria and divided into underweight (<18.5 kg/m^2), normal range (18.5–22.9 kg/m^2), overweight (23.0–29.9 kg/m^2), and obese (≥30.0 kg/m^2). Blood pressure (BP) was measured in the right arm with the subject seated and rested for 5 minutes using a standard mercury sphygmomanometer (diamond) and a suitable calibrated cuff. A blood sample was taken from all individuals after 8–10 h of fasting to measure fasting plasma blood glucose level, lipid profile (for cholesterol level and triglycerides level) and

a general physical examination was done to rule out acanthosis nigricans and pedal oedema.

Data analysis

The collected data was entered into MS Excel spreadsheet and was analysed using IBM SPSS software (version 26). Descriptive data was expressed using percentages, mean and standard deviation (SD). Pearson's Chi-Square test (χ^2) was used for statistical analysis, with a *P*-value < 0.05 as statistically significant. Institutional ethical committee approval was obtained prior to the start of study and informed written consent was obtained from all the study participants. The confidentiality of each participant was maintained regarding their names, investigation reports, and health risk status, respectively.

Results

A total of 64 bank's employees participated in the health camp. The mean age ± SD of study participants was 42.4 ± 10.8 years. Most of the study participants 20 (31.3%) were in the age group of 40–49 years. The majority of them were males 56 (87.5%) belonged to nuclear family 37 (57.8%) and were Hindu by religion 64 (100%). The majority of the participants were semi-skilled workers 31 (48.4%) with a graduate or higher level of education 35 (54.7%). Many of them, 26 (40.6%) belong to the upper socioeconomic class [Table 1].

Table 2 illustrates the various risk factors for study participants. It was observed that the majority of the study participants fall under the obese category of 37 (56.1%), followed by overweight 10 (15.2%) and normal range 15 (22.7%). The mean ± SD of BMI as per Asia-Pacific classification[14] were 24.97 ± 4.52, which falls under the overweight category. The PAL of the study participants was as follows: sedentary active 23 (35.9%), moderate active 25 (39.1%), and very active 6 (9.4%). There were an almost equal number of vegetarians 30 (46.9%) and non-vegetarians 34 (53.1%) study participants. The majority of them had an adequate sleep pattern (≥7 hours of sleep), i.e., 50 (78.1%). Among the 64 study participants, 15 (23.4%) were alcoholics, 10 (15.6%) were smokers, and 48 (75.0%) were hypertensive. Out of 64 study participants, only 56 gave their samples for FBS testing, of which 16 (28.6%) were diagnosed with diabetes. On physical examination, acanthosis nigricans is seen only in 5 (07.8%) individuals, and none of them had any pedal oedema found.

The PSS is a psychological instrument used for measuring the perception of stress by an individual. In the present study, it was found that out of 64 study participants 25 (39.1%) had a high level of stress, followed by 38 (59.4%) with a moderate level of stress, and only a few individuals had a low level of stress 1 (1.6%) [Figure 1]. Table 3 illustrates a significant association between stress level and dietary habits, with a *P*-value 0.003 (<0.05) and Chi-Square = 8.621, respectively. Table 4 illustrates the gender-wise distribution of study participants according to health risk status. Among the 64 study participants, 27 (42.2%) have a high health risk status, followed by 15 (23.4%) with a moderate health risk status, and 22 (34.4%) with a low health risk status.

Table 1: Distribution of study participants according to socio-demographic characteristics

Socio-demographic characteristics		Frequency (N=64)	
Variables	**Subgroups**	**Number (n)**	**Percentage (%)**
Age Group	<30 years	09	14.0%
	30-39 years	16	25.0%
	40-49 years	20	31.3%
	50-59 years	16	25.0%
	>60 years	03	04.7%
	Mean±SD	42.4±10.8	
Gender	Male	56	87.5%
	Female	08	12.5%
Religion	Hindu	64	100.0%
	Muslim	00	00.0%
Caste	General	22	34.4%
	OBC	18	28.1%
	ST/SC	24	37.5%
Type of Family	Nuclear	37	57.8%
	Joint	14	21.9%
	Three generation	13	20.3%
Level of Education	Illiterate	01	01.6%
	Primary	04	06.3%
	Junior high school	07	10.9%
	High school	08	12.5%
	Intermediate	09	14.1%
	Graduate & Above	35	54.7%
Occupation	Un-skilled worker	11	17.2%
	Semi-skilled worker	31	48.4%
	Skilled worker	22	34.4%
Type of Work	Sedentary worker	20	31.3%
	Moderate worker	35	54.7%
	Heavy worker	09	14.1%
Socioeconomic status (Modified BG Prasad's classification as per AICPI Jan 2024)[13]	Upper class-I (≥9130)*	26	40.6%
	Upper middle class-II (4565 to 9129)	06	09.4%
	Middle class-III (2739 to 4564)	06	09.4%
	Lower middle class-IV (1130-2259)	14	21.9%
	Lower class-V (≤1129 and below)	12	18.8%

*per capita monthly income of the family

Out of 64 study participants, only 49 individuals gave consent for a fasting lipid profile test, and the reports of LDL cholesterol for 34 participants were reported, respectively. It was observed that the abnormal range of serum cholesterol was 26 (53.1%), followed by serum triglycerides was 14 (28.6%), HDL cholesterol was 32 (65.3%), and LDL cholesterol was 6 (17.6%), respectively [Table 5]. In the diagnosis of MetS as per NCEP-ATP III criteria, it was observed that the prevalence of MetS was only 5 (7.81%) among the study participants [Table 6]. There was a significant association (*P*-value < 0.05) between health risk status with

Table 2: Distribution of study participants according to their risk factors

Risk Factors		Frequency (N=64)	
Variables	**Subgroups**	**Number (n)**	**Percentage (%)**
BMI classification (As per Asia-pacific classification)[14]	Under Weight (<18.5)	02	03.1%
	Normal Range (18.5-22.9)	15	22.7%
	Over-Weight (23-24.9)	10	15.2%
	Obese (≥25)	37	56.1%
	Mean±SD	24.97±4.52	
Physical Activity Level	Sedentary	23	35.9%
	Light Active	10	15.6%
	Moderate Active	25	39.1%
	Very Active	06	09.4%
Dietary habits	Vegetarian	30	46.9%
	Non-vegetarian	34	53.1%
Sleep pattern	Adequate (if ≥7 hrs. sleep)	50	78.1%
	Inadequate (if <7 hrs. sleep)	14	21.9%
Alcohol	Alcoholic	15	23.4%
	Non-Alcoholic	49	76.6%
Smoking	Smoker	10	15.6%
	Non-Smoker	54	85.4%
Hypertension status	Normotensive	16	25.0%
	Hypertensive	48	75.0%
Diabetic status (N=56)*	Non-Diabetic	40	71.4%
	Diabetic	16	28.6%
Acanthosis nigricans	Present	05	07.8%
	Absent	59	92.2%
Pedal oedema	Present	00	00.0%
	Absent	64	100.0%

Table 3: Association between stress level and dietary habit

Dietary Habit	Stress Level		Total N (%)
	Moderate Stress Level	High Stress Level	
Vegetarian	24 (37.5%)	06 (9.4%)	30 (46.9%)
Non-vegetarian	15 (23.4%)	19 (29.7%)	34 (53.1%)
Total	39 (60.9%)	25 (39.1%)	64 (100.0%)

Chi-Sq=8.621 d.f. = 1 *P*-value=0.003* *Statistically Significant

Table 4: Gender-wise distribution of study participants according to health risk status

Health Risk Status	Frequency (N=64)		
	Male n (%)	Female n (%)	Total n (%)
Low Health Risk (WHR ≤0.95 in male; ≤0.80 in female)	22 (34.4%)	0 (0%)	22 (34.4%)
Moderate Health Risk (WHR 0.96 to 1.0 in male; 0.81 to 0.84 in female;	14 (21.9)	1 (1.1%)	15 (23.4%)
High Health Risk (WHR >1.0 in male; ≥0.85 in female)	20 (31.3%)	7 (10.9%)	27 (42.2%)
Total	56 (87.5%)	8 (12.5%)	64 (100%)

gender ($P = 0.002$), occupation ($P = 0.003$) and type of work ($P = 0.004$). Although an insignificant association was seen

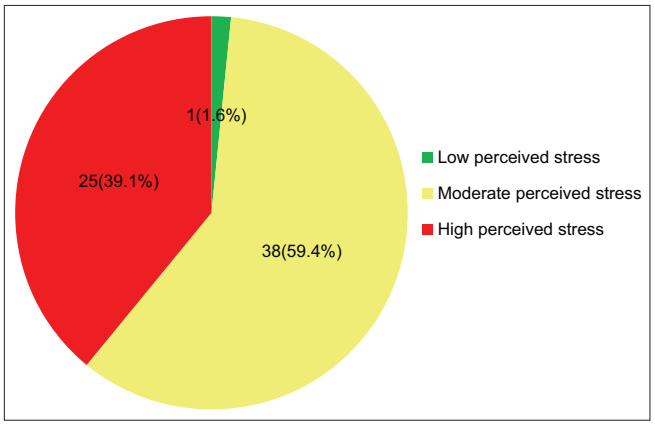

Figure 1: Perceived Stress Scale (PSS)

with PAL, dietary habits, sleep pattern, alcohol intake, smoking history, diabetes status, hypertension status, past history of COVID-19, and stress level, respectively [Table 7].

Discussion

MetS is a collection of interconnected physiological, biochemical, clinical, and metabolic risk factors such as diabetes, hypertension, dyslipidaemia, central obesity, glucose intolerance, pro-inflammatory, and pro-thrombotic states, all of which indicate underlying IR.[11] The World Health Organization (WHO), the European Group for the Study of Insulin Resistance (EGIR), the National Cholesterol Education Program-Adult Treatment

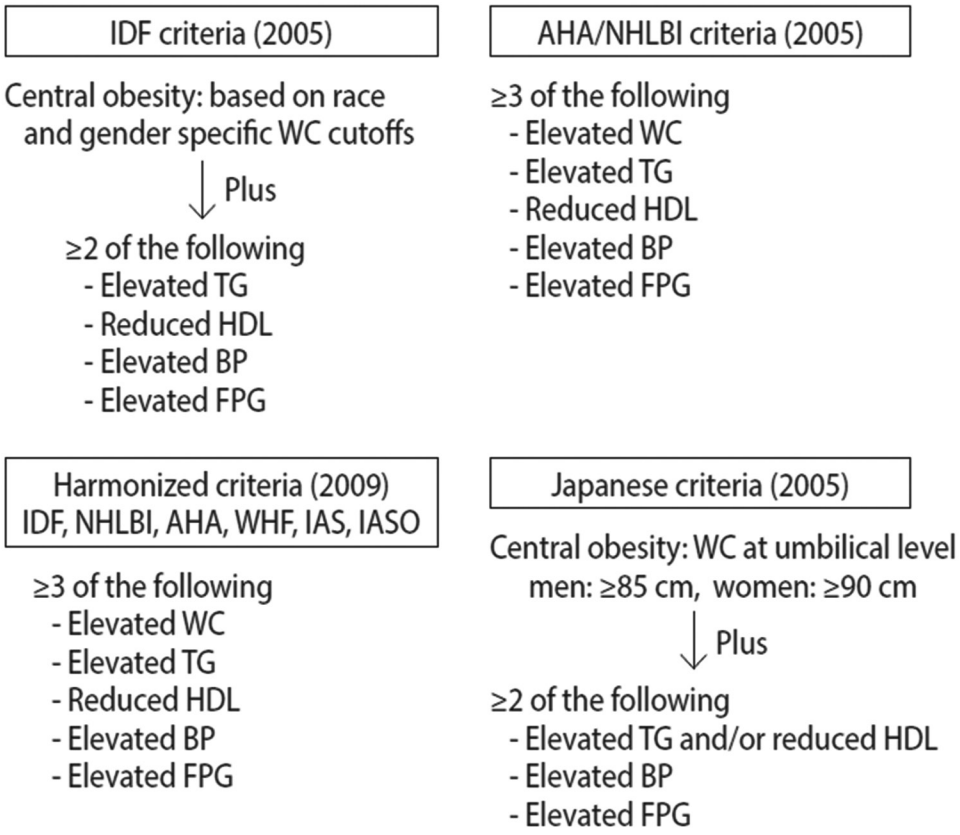

Figure 2: Selected criteria of metabolic syndrome. IDF, International Diabetes Federation; WC, waist circumference; TG, triglyceride; HDL, high-density lipoprotein cholesterol; BP, blood pressure; FPG, fasting plasma glucose; AHA, American Heart Association; NHLBI, National Heart Lung and Blood Institute; WHF, World Heart Federation; IAS, International Atherosclerosis Society; IASO, International Association for the Study of Obesity; BMI, body mass index; SBP, systolic blood pressure; DBP, diastolic blood pressure

Table 5: Distribution of study participants on the basis of fasting lipid profile test

Fasting Lipid Profile		Number (n)	Percentage (%)
Variables	**Subgroups**		
Serum Cholesterol level (N=49)	Normal range (130-200)	23	46.9%
	Abnormal range	26	53.1%
Serum Triglycerides level (N=49)	Normal range (30-200)	35	71.4%
	Abnormal range	14	28.6%
HDL Cholesterol level (N=49)	Normal range (40-60)	17	34.7%
	Abnormal range	32	65.3%
LDL Cholesterol level (N=34)	Normal range (up to 150)	28	82.4%
	Abnormal range	06	17.6%

Table 6: Metabolic syndrome (As per NCEP ATP III criteria)

Criteria	Frequency (N=64)
Elevated waist circumference (≥88 cm for women; ≥102 cm for men)	3+14=17
Elevated triglycerides (≥150 mg/dL) or drug treatment for elevated triglycerides	24
Low HDL cholesterol (<40 mg/dL for men; <50 mg/dL for women) or drug treatment for low HDL	0
Elevated blood pressure (systolic ≥130 mmHg or diastolic 85 mmHg) or hypertensive drug treatment	34
Elevated fasting glucose (≥100 mg/dL) or drug treatment for elevated glucose	16
Diagnosis (≥3 Criteria)	5 (7.81%)

Panel III (NCEP-ATP III), and the International Diabetes Federation (IDF) all agree on the definition of MetS, which includes disorders of glucose metabolism, hypertension, dyslipidaemia, and obesity[15,16] [Figure 2].

The current study was aimed to examine and screen the bank's employees with MetS in order to initiate efforts to effectively administer therapies to lower the risk of future problems. The modified NCEP-ATP III recommendations assessed the frequency of MetS in the current study was 7.81%, which is lower than the prevalence rates reported by Johnson KM *et al.*, (18.30%),[17] Sawant *et al.*, (19.52%),[18] and Kaur J *et al.*, (17.38%).[19] In India, IR and MetS are common. According to studies, the age-adjusted prevalence of MetS in urban Indian populations is over 25% (roughly 31% in women and 18.5% in males).[6]

Table 7: Association between risk factors and health risk status

Risk Factors		Health Risk Status				Chi-Sq.	*P*
Variables	**Subgroups**	**Low Health Risk (n=22)**	**Moderate Health Risk (n=15)**	**High Health Risk (n=27)**	**Total (N=64)**		
Gender	Male	22 (34.4%)	14 (21.9%)	20 (31.3%)	56 (87.5%)	8.059	0.02*
	Female	00 (0.0%)	01 (1.6%)	07 (10.9%)	08 (12.5%)		
Occupation	Un-skilled worker	01 (1.6%)	01 (1.6%)	09 (14.1%)	11 (17.2%)	10.644	0.03*
	Semi-skilled worker	14 (21.9%)	09 (14.1%)	08 (12.5%)	31 (48.4%)		
	Skilled worker	07 (10.9%)	05 (7.8%)	10 (15.6%)	22 (34.4%)		
Type of Work	Sedentary worker	02 (3.1%)	07 (10.9%)	11 (17.2%)	20 (31.3%)	10.078	0.04*
	Moderate worker	14 (21.9%)	07 (10.9%)	14 (21.9%)	35 (54.7%)		
	Heavy worker	06 (9.4%)	01 (1.6%)	02 (3.1%)	09 (14.1%)		
Physical Activity Level	Sedentary	05 (7.8%)	05 (7.8%)	13 (20.3%)	23 (35.9%)	12.044	0.06
	Light Active	03 (4.7%)	01 (1.6%)	06 (9.4%)	10 (15.6%)		
	Moderate Active	09 (14.1%)	08 (12.5%)	08 (12.5%)	25 (39.1%)		
	Very Active	05 (7.8%)	01 (1.6%)	00 (0.0%)	06 (9.45)		
Dietary Habits	Vegetarian	09 (14.1%)	06 (9.4%)	15 (23.4%)	30 (46.9%)	1.416	0.49
	Non-vegetarian	13 (20.3%)	09 (14.1%)	12 (18.8%)	34 (53.1%)		
Sleep pattern	Adequate (if ≥7 hrs. sleep)	20 (31.3%)	09 (14.1%)	21 (32.8%)	50 (78.1%)	4.989	0.08
	Inadequate (if <7 hrs. sleep)	02 (3.1%)	06 (9.4%)	06 (9.4%)	14 (21.9%)		
Alcohol	Alcoholic	08 (12.5%)	03 (4.7%)	04 (6.3%)	15 (23.4%)	3.266	0.20
	Non-Alcoholic	14 (21.9%)	12 (18.8%)	23 (35.9%)	49 (76.6%)		
Smoking	Smoker	06 (9.4%)	02 (3.1%)	02 (3.1%)	10 (15.6%)	3.707	0.16
	Non-Smoker	16 (25.0%)	13 (20.3%)	25 (39.1%)	54 (84.4%)		
Hypertension status	Normotensive	14 (21.9%)	12 (18.8%)	22 (34.4%)	48 (75.0%)	2.320	0.31
	Hypertensive	08 (12.5%)	03 (4.7%)	05 (7.8%)	16 (25.0%)		
Diabetic status (N=56)#	Non-Diabetic	03 (4.7%)	05 (7.8%)	08 (12.5%)	16 (25.0%)	4.121	0.39
	Diabetic	17 (26.6%)	07 (10.9%)	16 (25.0%)	40 (62.5%)		
Past history of COVID-19	Yes	06 (9.4%)	07 (10.9%)	06 (9.4%)	19 (29.7%)	2.854	0.24
	No	16 (25.0%)	08 (12.5%)	21 (32.8%)	45 (70.3%)		
Stress Level	Moderate Stress	14 (21.9%)	09 (14.1%)	16 (25.0%)	39 (60.9%)	0.105	0.95
	High Stress	08 (12.5%)	06 (9.4%)	11 (17.2%)	25 (39.1%)		

*Statistically Significant

According to Noubiap JJ *et al.*,[20] the global prevalence of MetS ranged from 12.5% (95% CI: 10.2–15.0) to 31.4% (29.8–33.0). The prevalence was substantially higher in the Eastern Mediterranean Region and the Americas, and it increased with each country's income level. The prevalence of ethnic-specific central obesity was 45.1% (95% CI: 42.1–48.2) worldwide; systolic BP ≥ 130 mmHg and/or diastolic BP ≥ 85 mmHg was 42.6% (40.3–44.9); HDL cholesterol < 1.03 mmol/L for men and < 1.29 mmol/L for women was 40.2% (37.8–42.5); serum triglycerides ≥ 1.7 mmol/L was 28.9% (27.4–30.5); and fasting plasma glucose was 24.5% (22.5–26.6). In the present study, out of 64 study participants, only 49 gave consent for a fasting lipid profile sample, of which 26 (53.1%) had a deranged cholesterol level, followed by 14 (28.6%) for triglyceride level, and 32 (65.3%) for HDL cholesterol level. Only 56 participants had given their FBG, of which 16 (28.6%) had elevated blood glucose. It was observed that 48 (75.0%) of the participants were hypertensive, with the majority being obese (56.1%), both of which are dangerous risk factors. Physical examination of the study participants revealed that only 5 (7.8%) had acanthosis nigricans.

The majority of the study participants 20 (31.3%) are between the ages of 40 to 49 years with a mean + SD of 42.4 + 10.79 years. Most of the participants were male 56 (87.5%), with a higher level of education (graduate and above) 35 (54.7%), and belonged to the upper socioeconomic class. In a similar study conducted by Rus M *et al.*,[21] it was observed that the most affected age groups were those aged 60 to 69 years old and 70 to 79 years old, with women being more likely to develop the condition. In the current study, the prevalence of MetS is only found in men as compared with women.

In the present study, a statistically significant association was occurred between gender, types of occupation, and type of worker with health risk status. In addition, there was a significant relationship (*P*-value = 0.003) between perceived stress level and dietary habits was found in the current study. In a study conducted by Chiolero A *et al.*,[22] it was found that smoking and poor eating habits were two key factors influencing the emergence of MetS. MetS was more common in smokers than in non-smokers. An imbalanced diet with fewer than three meals each day was found to be a significant risk factor. A high intake of saturated fats from red meat and trans fats, which are typically present in junk food, raised the likelihood of developing the syndrome while eating only white meat proved to be a protective factor against the illness.

In a study conducted by Rus M *et al.*,[21] there was no apparent association between consumption of alcohol and MetS; hence, it wasn't considered as a risk factor. MetS was more frequent in individuals who did not consume alcohol at all, compared to those who drank moderate quantities. The incidence of MetS in both males and females was associated with alcohol consumption ($P < 0.0001$). Alcohol use (0.1-5.0 g/day) was substantially related to a reduced frequency of MetS in both genders compared to non-drinkers.[23] The amount of alcohol consumed (>30.0 g/day) had no significant association with the prevalence of MetS. However, alcohol consumption (>30.0 g/day) demonstrated an association with hyperglycaemia and HDL cholesterol among the components of MetS.[24]

Other dietary patterns that may raise the risk of MetS include a high salt intake and excessive use of carbonated beverages. Patients who drank more salt per day had a significantly higher risk of developing MetS. Furthermore, people who drank soft drinks on a regular basis were more likely to develop MetS. Thus, nutrition plays an important role in the pathogenesis of the MetS.[25]

Other preventative interventions, such as the Dietary Approach to Stop Hypertension (DASH) or country-specific dietary guidelines, such as the Healthy Eating Indices (HEI), provide alternatives to the MedDiet and have consistently been related to a decreased incidence of MetS.[26]

Recommendations

The primary goals of treating MetS are to reduce the risk of heart disease and to avoid type 2 diabetes mellitus, if it has not already developed. If you have type 2 diabetes mellitus, medication can reduce your risk of heart disease by addressing all of your risk factors. The first line of treatment for MetS is lifestyle adjustments that promote a healthy heart. You may need to consult a dietician and a physical therapist to develop a food and exercise plan that works for you. If healthy lifestyle modifications do not produce results, you may require medications or weight loss surgery. Weight loss surgery is rarely used to treat MetS in children and teenagers.

Conclusion

The study confirmed that age, gender, and genetics are important factors in the prevalence of MetS. Men exhibited a larger risk than women, but both genders showed a rise in risk with age. Healthcare practitioners should keep these aspects in mind while developing preventative strategies and interventions. Unhealthy lifestyle habits such as smoking, unhealthy eating habits, and a sedentary lifestyle are key risk factors for MetS and require specific therapies. Encouraging people to adopt and maintain healthy eating habits, such as the MedDiet, DASH diet, or country-specific dietary guidelines, can help prevent and manage the illness. Regular physical activity is still an essential preventive factor against MetS. Sedentary lifestyle was significantly associated with an elevated risk. Additionally, public health programmes should emphasise raising awareness about MetS, its implications, and the benefits of living a healthy lifestyle to avoid its emergence.

Declaration of patient consent

The authors confirm that they have obtained all appropriate patient permission documents. In this form, the patient (s) has provided consent and other clinical information to be published in the journal. The patients understand that their names and initials will not be published and that every attempt will be taken to conceal their identity; however, anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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