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COMMUNITY BASED PROSPECTIVE STUDY ON METABOLIC SYNDROME IN RELATION TO ASSOCIATED LIFESTYLE PRACTICES

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ABSTRACT

Background: The metabolic syndrome is characterized by clustering of risk factors, which predisposes subjects to increased risk of diabetes and cardiovascular disease. Objectives of our study were to estimate prevalence of the metabolic syndrome and determine the relation and association of risk factors with the metabolic syndrome, to understand the influence of unhealthy life style pattern with existing co-morbidities. **Methodology:** Prospective study, community-based study conducted from April 2021-june 2021. A total of 234 subjects were included in the study. A total of 132 samples are exhibiting positive results from calculating risk meters including BMI, WC, Family history, Past/Present illness, Diet, Physical activity, behavioural factors and socioeconomic status excluding biochemical tests. **Results:** The total numbers of male subjects included in the study were 73 whereas female subjects are 56. The prevalence of the metabolic syndrome was 31.4% and 24.6% using WHO and AHA/NHLBI criteria respectively. Risk factors were age above 35 years, family history of diabetes, CVS and body mass index (BMI) above 23.9 kg/m2. Both Healthy diet and physical activity was not practiced by 21.3% which plays a major role to prevent Metabolic syndrome. **Conclusion:** The prevalence of the metabolic syndrome was high in selected population in Hyderabad, Telangana India. Higher BMI and low intake of fruits and vegetables are modifiable by life style modification. Following sedentary life style which in future plays a role to develop metabolic syndrome. Subjects are considered at risk to have Metabolic syndrome when they have comorbid conditions, family history, unhealthy life style practice, then the prevalence of Metabolic syndrome in selected population is 56.4%.

KEYWORDS: Metabolic syndrome (MetS), healthy lifestyle practice, prevalence, unhealthy lifestyle practice, sedentary pattern, South India.

INTRODUCTION

A major global public health concern, the metabolic syndrome is a group of interconnected risk factors characterized by the co-occurrence of hyperglycemia, hypertension, high triglyceride levels, and low levels of high-density lipoprotein (HDL) cholesterol. It is generally known that the metabolic syndrome raised the risk of type 2 diabetes mellitus by two times, cardiovascular disease by four times and mortality by five times during the course of five to ten years.[1]

The "metabolic syndrome" is a clustering of components that reflect over nutrition, sedentary lifestyles, and resultant excess adiposity and includes the clustering of abdominal obesity, insulin resistance, dyslipidaemia, and elevated blood pressure and is associated with other comorbidities including the prothrombotic state, proinflammatory state, non-alcoholic fatty liver disease, and reproductive disorders. Because it is a cluster of different conditions, and not a single disease, with the development of multiple concurrent definitions has resulted.[2] Lifestyle modification and weight loss should, therefore, be at the core of treating or preventing the Metabolic syndrome and its components. In addition, there is a general consensus that other cardiac risk factors should be aggressively managed in individuals with the Metabolic syndrome.[3]

Criteria involved in measurements of metabolic syndrome

- WHO – world health organization
- ADA- American Diabetes Association [for predicting risk for cardiovascular diseases & diabetics]
- NECP – National Cholesterol Education Program [for detection, evaluation and treatment of high blood cholesterol

- ATP III – National Cholesterol Education Program expert panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (ATP III)
- IDF – International Diabetics Federation
- AHA – American Heart Association
- NHLBI – The National Heart, Lung, And Blood Institute.[4]

The American Heart Association (AHA) in conjunction with the NHLBI also released a scientific statement regarding metabolic syndrome that includes a set of criteria that defines the condition. In order to provide more consistency in both patient care and research, the International Diabetes Federation, NHLBI, AHA, World Heart Federation, and the International Association for the Study of Obesity and describes a "harmonized" definition of metabolic syndrome. Waist circumference, with population and – a measure of body status.[5]

Table 1: Diagnosis Criteria for Metabolic syndrome.

WHO	EGRI	NCEP: ATPIII	AACE	IDF
High insulin levels, IFG or IGT, and two of the following	Top 25% of the fasting insulin values among nondiabetic individuals and two of the following:	Three or more of the following	IGT and two or more of the following	Central obesity as defined by ethnic/racial, specific WC, and two of the following
Abdominal obesity: WHR >0.9, BMI ≥ 30 kg/m2, WC> 37 inches	WC: ≥ 94 cm for men, ≥ 80 cm for women	WC: >40 inches for men, >35 inches for women	Triglycerides ≥ 150 mg/dl	Triglycerides ≥ 150 mg/dl
Lipid panel with triglycerides> 150 mg/dl, HDL-C <35 mg/dl	Triglycerides ≥ 2.0 mmol/litre and HDLC <1.0 mg/d	Tri glycerides ≥ 150 mg/dl	HDL-C: <40 mg/ dl for men, <50 mg/dl for women	HDL-C: <40 mg/dl for men, <50 mg/dl for women
BP >140/90 mm Hg BP	BP ≥ 140/90 mm Hg or antihypertensive medication	HDL-C: <40 mg/dl for men, <50 mg/dl for women	BP ≥ 130/85 mm Hg	BP ≥ 130/85 mm Hg
	Fasting glucose ≥ 6.1 mmol/litre	BP ≥ 130/85 mm Hg		FPG ≥ 100 mg/dl
		FPG ≥ 110 mg/dl		

WHR-Waist-to-hip ratio; BP-blood pressure; FPG-fasting plasma glucose.

The causes of MetS, which include smoking, a sedentary lifestyle, an unhealthy diet, and a lack of physical activity, have been the subject of numerous scientific research. Chronic diseases are prevented in some nations with developed healthcare systems through early detection and encouragement of healthy lifestyles. Databases on population health, behaviour, lifestyle, and nutrition are established by population-based health surveys and comprehensive health care services for the targeted age range. Many evidence-based policy decisions for health promotion and disease prevention are made as a result of analysing and extrapolating such existing meta-data.[6,7,8,9]

Across the globe, the prevalence of MetS in people of different ethnic backgrounds ranges from 20% to 60% Smoking cessation, diabetes control, obesity prevention, and maintaining normal blood pressure are still difficult for primary care services even in wealthy countries.[10] MetS is associated with many diseases, many prospective studies have used MetS as a risk factor to explore the occurrence, development and outcome of related diseases, but few studies have conducted prospective investigations on the development and outcome of MetS.[11]

Pharmacotherapy targeting a number of the components of the Metabolic syndrome, in addition to aggressive management of LDL-C and therapy for the prothrombotic state, has also been generally accepted as appropriate management of these high-risk patients. There is more controversy over pharmacotherapy targeting insulin resistance and hyperglycaemia. Finally, a number of unanswered questions regarding the Metabolic syndrome remain, including questions regarding the definition, pathogenesis, and treatment of the Metabolic syndrome.

There is a substantial increase in the prevalence of the metabolic syndrome in healthy young adults between ages 24 and 39 driven mostly by the increase in obesity and sedentary habits. The purpose of our study is to observe and determine the Metabolic Syndrome in relation to associated lifestyle practices in young ages of both the genders along with comorbid, illness of past and present, diet, family histories, stress in the community population of Hyderabad, Telangana, India.

Aim
To understand the relationship between the Metabolic Syndrome and associated lifestyle practices.

Objectives
To understand the influence of unhealthy lifestyle pattern with existing comorbidities.
To appraise the importance of healthy lifestyle practices in young adolescents.

METHODOLOGY

Study area: The study was conducted for a period at community level in and around Hyderabad, Telangana, India.

Study period: Approx. for 3 months
Study population: Students and employees with sedentary lifestyle

Study design: A Community based prospective study was conducted in and around Hyderabad, Telangana. The study was aimed to understand the relationship between the Metabolic Syndrome and associated lifestyle practices and their influences on the unhealthy lifestyle pattern with existing comorbidities so that the study could appraise the importance of healthy lifestyle practices, sedentary lifestyle, diet, stress with behavioural habits, in young adolescents in and around the areas of Hyderabad, Telangana. The survey questionnaire forms were circulated and the responses were recorded where observation and evaluation were performed between April 2021 to June 2021.

Selection criteria
Inclusion criteria: Eighteen-to-forty-five-year subjects, subjects with comorbid conditions were included in study.

Exclusion criteria: Paediatrics, < eighteen years, elderly (>fifty years), pregnant and lactating women were excluded from the study.

Data entry format or proforma
A questionnaire forms were designed and was circulated to the subjects which consists of anthropometric details, family history, present and past illness, social history, comorbid conditions along with diet, behavioral factors and physical activity.

Data collection
A total of 234 responses have been recorded through the questionnaire forms which was circulated by different social media form and the detailed observation have been done to evaluate the risks of Metabolic syndrome. The risk factors are estimated from WHO, ADA, NECP, ATP III guidelines and reference for risk scores are previous articles.

RESULTS

Prevalence of metabolic syndrome (Metabolic syndrome)
Questionnaire was prepared including risk factors of metabolic syndrome accordingly to collect data in community. A total of 234 samples are collected, which were future processed to find subjects prone to metabolic syndrome. A total of 132 samples are exhibiting positive results from calculating risk meters including BMI, WC, Family history, Past/Present illness, Diet, Physical activity and socioeconomic status excluding biochemical tests. The prevalence rate of Metabolic syndrome in given population was found to be 56.4%.

Distribution of subjects into gender
Table 1: Gender prevalence estimation of Metabolic syndrome.

GENDER	RISK PERCENTAGE
MALE	31.4%
FEMALE	24.6%
TOTAL	56.4%

The prevalence of metabolic syndrome found is differentiated into male/female gender, where 31.4% reported by males and 24.6% were reported by females, in which the highest risk percentage are found by males in the given population.

Distribution of subjects among different age groups
Table 2: Age prevalence estimation of metabolic syndrome.

AGE GROUP	RISK PERCENTAGE
18-23YEARS (A)	24.44%
24-29YEARS (B)	28.95%
30-36YEARS (C)	31.22%
37-42YEARS (D)	19.48%
43 AND ABOVE YEARS (E)	23.13%

The prevalence of Metabolic syndrome found is distributed among five different age groups. In which group-A scored 24.44%, group-B scored 28.95%, group-C scored 31.22%, group-D scored 19.48%, group-E scored 23.13%. The highest risk of all were found by group-C which is 30-36years age group followed by group-B which is 24-29 years age group.

Distribution of subjects in different categories

Table 3: Distribution of subjects according to family history and comorbid condition.

Category-I	X (no. of subjects with healthy lifestyle practice)	Y (no. of subjects with unhealthy lifestyle practice)
Family history	21	61
Comorbid condition	15	15
Both	30	27
None	36	29

From the above data, subjects recorded in the category of family history, comorbid condition and both of Y group is having more risk of Metabolic syndrome than X. X group subjects are following healthy diet and physical activity when compared to Y. In Y group, family history recorded a greater number of subjects who are at high risk.

Distribution of subjects according to diet and physical activity

Table 4: Distribution of subjects according to diet and physical activity.

CATEGORY- II	No Of Subjects/ complete population	Percentage
Diet control but lacks physical activity	72/230	31.2%
No Diet control but involving in physical activity	63/230	27%
Both diet control/physical activity	96/230	42%
Neither diet control/ physical activity	49/230	21.3%

From the above data the highest percentage were recorded by the subjects following both healthy diet and physical activity (42%) followed by the subjects who are following healthy diet but lacking physical activity (31.2%). The least percentage were recorded by the subjects who neither practice healthy diet nor physical activity (21.3%).

Distribution of subjects according to life style

Table 5: Distribution of subjects according to life style.

CATEGORY- III	No Of Subjects/complete population	Percentage
Unhealthy lifestyle with social history (smoking/alcohol)	86/230	37%
Healthy lifestyle with social history (smoking/alcohol)	27/230	12%

From the survey conducted, subjects who practice unhealthy lifestyle and also having social history (smoking/alcohol) recorded highest percentage (37%) and followed by subjects who practice Healthy lifestyle with social history (smoking/alcohol) recorded percentage (12%).

Estimation of water intake

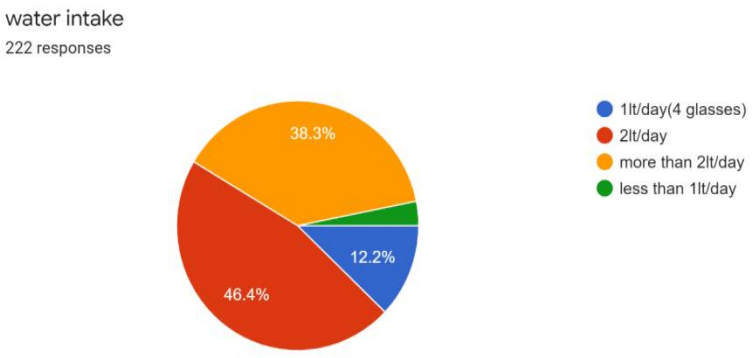

Figure 1: Responses for Estimation of water intake.

Drinking Water Helps Maintain the Balance of Body Fluids. The functions of these bodily fluids include digestion, absorption, circulation, creation of saliva, transportation of nutrients, and maintenance of body temperature. Thus, drinking water flushes out toxins from body and helps in maintain healthy lifestyle

Estimation of past/present illness

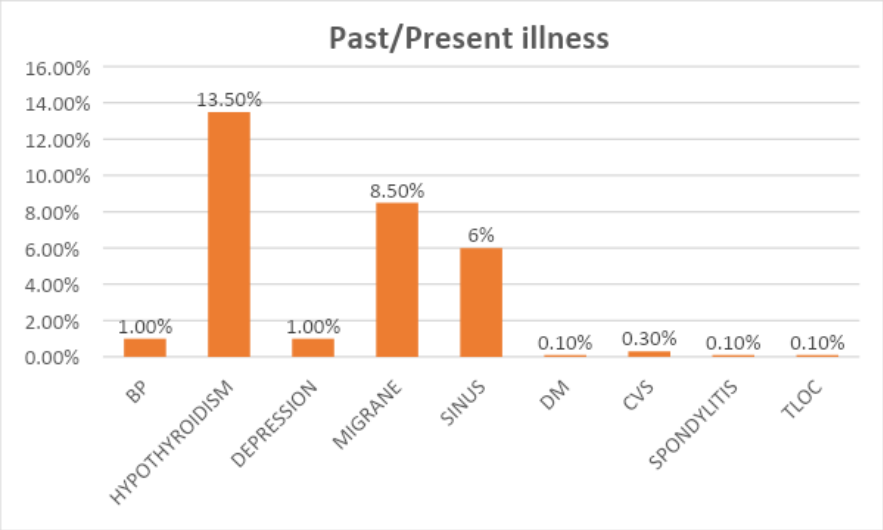

Figure 2: Responses for Estimation of present and past illness.

From the data subjects reported hypothyroidism (13.5%), migraine (8.5%), sinus (6%). Thyroid is a endocrine disorder involved in Metabolic syndrome which future develops cardiovascular disease. Sinusitis and migraine don't have any major role in Metabolic syndrome whereas Thyroid for a long time can develop Metabolic syndrome. Subjects reported sleeplessness as present health concern which also plays a role in Metabolic syndrome.

Estimation of family history

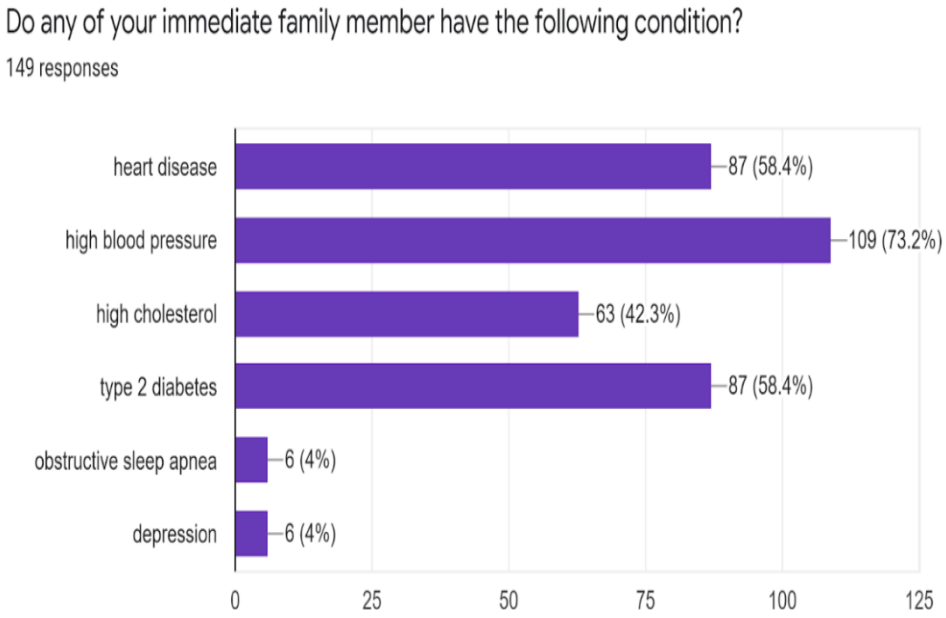

Figure 3: Responses for Estimation of family history.

According to the survey conducted 82 out of 110 subjects are reported medical conditions of immediate family members who are considered to be prone of having metabolic syndrome in future. Where high number of subjects reported high BP, heart disease, type2 DM of their immediate family members.

Estimation of stress conditions

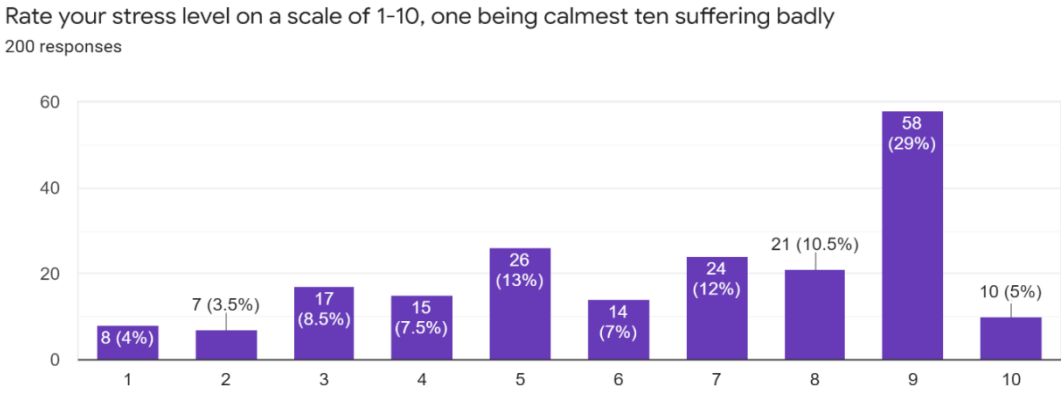

Figure 4: Responses for Estimation of Stress conditions.

The severity of stressful life conditions or events pertaining to finance, work, social relationships, health, and housing was self-rated. The study results found that the subjects reporting any stressful life events, those reporting work- or finance-related events had an increased risks for having the metabolic syndrome.

DISCUSSION

We observed a high prevalence of the metabolic syndrome in selected population using WHO, IDF and AHA/NHLBI criteria. But the prevalence of Metabolic syndrome found are differentiated into male/female - gender, where 31.4% reported by males and 24.6% were reported by females. The prevalence of Metabolic syndrome found are distributed among five different age groups. In which group-A scored 24.44%, group-B scored 28.95%, group-C scored 31.22%, group-D scored 19.48%, group-E scored 23.13%. The prevalence of Metabolic syndrome were recorded in all the age groups. The highest risk of all were found by group-C which is 30-36years age group followed by group-B which is 24-29 years age group. The least percentage were recorded by the group-D 37-42 years age group.

The prevalence of the metabolic syndrome from the survey conducted, subjects who practice unhealthy lifestyle and also having social history (smoking/alcohol) recorded highest percentage (37%) and followed by subjects who practice Healthy lifestyle with social history (smoking/alcohol) recorded percentage (12%).

It would be important to identify a more "suitable definition" for Asian Indians which would enable cardiovascular risk prediction maximally. In our population, the AHA/NHLBI criteria identified large sub-group of subjects without central obesity in addition to the subjects identified using both criteria. In the survey the family history recorded as heart disease-58.4%, High-BP-73.2%, High-Cholesterol-42.3%, Type II DM-58.4%, Obstructive sleep apnea-4%, Depression-4%. In criteria like WHO, AHA/NHLBI possibility of hereditary was CVS-23.8%, DM- >44%, BP-30-50%, High-cholesterol-50%, obstructive sleep apnea-40%, Depression-40%.

Risk factors associated with increased prevalence of the metabolic syndrome were similar even when different criteria were used. Age was an important risk factor. There was sharp rise in the prevalence of the metabolic syndrome in the 30–40-year age group as compared to less than 30 years age group. The high prevalence of the metabolic syndrome in younger age group is of concern because early onset will expose these subjects to the risk factors for prolonged duration and increase the risk of diabetes and cardiovascular disease. It is consistent with the study from Singapore where higher prevalence of the metabolic syndrome was observed at younger age in Asian Indians and Malays.

Counselling is conducted to the subjects involved by providing leaflet which includes the importance of balanced healthy diet, physical activity, water intake, proper sleep, reducing screen timing. The major points covered in counselling are, how family history shows impact on Metabolic syndrome and how present/past illness are inter linked to Metabolic syndrome. The importance of physical activity, healthy diet in order to reduce the risk of Metabolic syndrome are explained. Drinking Water Helps Maintain the Balance of Body Fluids. The functions of these bodily fluids include digestion, absorption, circulation, creation of saliva, transportation of nutrients, and maintenance of body temperature. Thus, drinking water flushes out toxins from body and helps in maintain healthy lifestyle.

The severity of stressful life conditions or events pertaining to finance, work, social relationships, health, and housing was self-rated. The study results found that the subjects reporting any stressful life events, those reporting work- or finance-related events had an increased risks for having the metabolic syndrome. The

risk was further increased according to accumulation of stressful finance-related events and to having at least three stressful life events in any of the life domains assessed. Accumulation of stressful life events was associated with insulin resistance, obesity, and triglycerides. The associations were not confounded by sex, age, lifestyle, or family history of diabetes. Therefore, study concluded that the life events perceived as stressful, particularly those related to finance and work, may be a signal for poor metabolic health.

In summary, there is need for cross-sectional studies with larger representative samples to get more reliable estimates of prevalence of the metabolic syndrome among Asian Indians. The subjects with the metabolic syndrome should be advised regarding lifestyle modification and weight reduction. Prospective studies among Asian Indians will help identify the appropriate criteria that will predict cardiovascular disease risk in this population.

CONCLUSION

The prevalence of the metabolic syndrome was high in selected population in Hyderabad, Telangana India. Subjects are considered at risk to have Metabolic syndrome when they have comorbid conditions, family history, unhealthy life style practice, then the prevalence of Metabolic syndrome in selected population is 56.4%.

Metabolic syndrome represents a constellation of cardiovascular risk factors which increase the risk of arteriosclerotic cardiovascular disease and the development of type 2 diabetes. In the present study 30-36 years of age group were reported unhealthy lifestyle patterns when compared to all populations. Unhealthy lifestyle practice includes unhealthy diet or intake of unhealthy fats and carbohydrates, not involving any kind of physical activity which is considered as sedentary lifestyle, no proper intake of water to flush of toxins, having improper sleep. Males are more prone than compared to females following unhealthy lifestyles and also socioeconomic habits.

The overall study states that practicing an unhealthy lifestyle who have both family history and comorbid conditions are more prone to metabolic syndrome than compared to unhealthy lifestyle with family history and comorbid conditions. Practicing a healthy lifestyle includes a healthy diet with involving in any kind of physical activity, avoiding socioeconomic habits are use full tools for preventing metabolic syndrome. The severity of stressful life conditions or events about of on to finance, work, social relationships, health, and housing was self-rated. The study results found that the subjects reporting any stressful life events, those reporting work- or finance-related events had an increased risk of having the metabolic syndrome.

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