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A Study Of Prevalence Of Metabolic Syndrome In Subjects With Central Obesity

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Abstract

Background

The metabolic syndrome is a group of metabolic origin's risk factors accompanied by increased risk for cardiovascular disease and type 2 diabetes. The major underlying risk factors for metabolic syndrome are insulin resistance and obesity; exacerbating factors are advancing age, physical inactivity, endocrine and genetic factors. The condition is progressive, begins with borderline risk factors that eventually progress to categorical risk factors.

Indians have a characteristic obese phenotype; they have relatively low BMI with abdominal obesity. Fat in the abdominal region is more metabolically significant than fat depots elsewhere in the body. Various studies show that increased abdominal (visceral) fat accumulation is an independent risk factor for CAD, hypertension, stroke and type 2 diabetes there by leading to metabolic syndrome. However, there is a paucity of data and studies regarding the relationship between abdominal obesity and metabolic syndrome in our part of the country.

This study aims to study the relationship between abdominal obesity and metabolic syndrome.

Materials and Methods

A total of 100 patients with abdominal obesity (waist circumference >90cm in males >80.0cm in females) will be enrolled in this study. Patients will be examined for metabolic syndrome features and complications of obesity in the hospital attached to KATURI MEDICAL COLLEGE, November 2018 to October - 2020, are included in the

study. Every patient will be evaluated by history, clinical examination, and relevant investigations.

Results

Of the total 100 subjects, 57 males and 43 females, 71% had MS. 68%

had systolic BP > 135mmhg, 52 % had diastolic BP > 85 mmHg, 68 % were on antihypertensive drugs, 20% were on insulin treatment, 20% were on oral hypoglycemics. 91% had FBS more than 100mg/dl. The mean level of total cholesterol, LDL cholesterol, triglyceride is increased, whereas the mean level ofanti-atherogenic HDL cholesterol is low in subjects with MS

Prevalence of MS significantly high in older age groups, age is positively associated, alcohol use is negatively associated, HDL(decreasing) and triglycerides are positively associated with the incidence of metabolic syndrome, patients of diabetic treatment are more likely to develop metabolic syndrome, Waist circumference is the better predictor of MS when compared to BMI independently.

Conclusions

This study supports the growing evidence that waist circumference can serve as a practical screening method for the metabolic risks that often accompany overweight and obesity.

Considering the present health risks of metabolic syndrome, additional follow-up studies are required for components other than the present components of

the MS. This study is consistent with the saying, " Thinking about heart then look at your waist. "

Keywords

Coronary artery disease, Body mass index, High-density lipoprotein, Low-density lipoprotein.

Introduction

Metabolic syndrome has been one of the major public- health challenges worldwide·[1] There has been growing interest in the constellation of closely related cardiovascular risk factors. Although the association of several these risk factors has been known for more than 80 years, the clustering received least attention until 1988 when Reaven described syndrome X: insulin resistance, hyperglycemia, hypertension, low HDL-cholesterol, and raised VLDL-triglycerides.[2] Surprisingly, he omitted obesity, now seen by many as an essential component, especially visceral obesity.[1] Various names were proposed subsequently, the most popular being metabolic syndrome.

Metabolic syndrome diagnosis can be made if a person has three of the five following features[3]:

- Increased waist circumference (102cm in men and 88 cm in women)
- Elevated triglycerides (150mg/dl)
- Reduced HDL cholesterol (50 mg/dl in women and 40 mg/dl in men)
- Elevated blood pressure (_130/85 mmHg o r ontreatment for hypertension)
- Elevated fasting glucose (_100mg/dl)

When the waist circumference is 88cm or more in women or 102 cm or more in men, the term abdominal obesity can be applied.

Various definitions and diagnostic criteria are available, but Asian Indians have an increased predisposition not only to diabetes [4] but also to premature coronary artery disease.[5] This has been attributed to the so-called 'Asian Indian Phenotype'[6,7] characterized by less of generalized obesity measured by body mass index (BMI) but greater central body obesity as shown by greater waist circumference (WC) and waist- to -hip ratios (WHR).[6,7] Thus, many Asian Indians fit into the category of metabolically obese, normal-weight individuals.

The advantage of measuring waist circumference is that excess abdominal fat is correlated more closely with the presence of metabolic risk factors than total body fat. The cut points for defining abdominal obesity are arbitrary. For susceptible individuals, lesser accumulations of abdominal fat can precipitate or aggravate metabolic risk factors. This is particularly so in certain populations. For example, in Asian populations, lower waist circumference cut-points have been identified to define abdominal obesity.

Aims and Objectives

The aim is to study the prevalence of metabolic syndrome in people with central obesity.

Materials and Methods

Source of Data (Sample)

A prospective study of 100 cases (outpatients and inpatients) with abdominal obesity in the hospital attached to KATURI MEDICAL COLLEGE, between November-2018- October-2020 are included in the study.

Method of Collection of Data

Every patient will be evaluated by detailed history, clinical examination, weight, height, abdominal circumference, and these patients would undergo investigations like lipid profile, FBS, PPBS, ECG.

Inclusion Criteria

Patients with Waist circumference > 90 cm in men and >80 cm in women

NCEP Adult treatment Panel III (ATP III)

Waist circumference >102 cm in men and >88 cm in women FOR INDIANS, Waist circumference >90cm in men and >80 cm in women

Serum triglycerides>150 mg/dL

HDL cholesterol <40 mg/dL in men and <35 mg/dL in women Blood pressure >130/85 mm Hg

Serum glucose >100mg / dL changed in 2004 from110 mg / dl

Exclusion Criteria

Causes of abdominal distention / obesity due to other conditions like hypothyroidism, paralytic ileus, as cites. Patients with already established heart disease.

Protocol

At the time of admission to the hospital, or in the outpatient department, the abdominal circum ference is measured; if the patient satisfies the inclusion criteria, a detailed case history was taken, and a meticulous physical examination was done and recorded in the performa with particular reference to height, weight, BMI, and past history of Ischemic heart disease, hypertension, diabetes.

Following the history and examination treatment for hypertension, diabetes treatment was noted, then investigations in the form of FBS, PPBS fasting lipid profile, ECG, urea, creatinine was done.

Statistical Methods

Descriptive statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean ± SD (Min-Max) and results on categorical measurements are presented in number (%). Significance is assessed at 5 % level of significance. Z-test for proportion has been used to find the significant incidence of metabolic syndrome with study characteristics. Multivariate logistic regression analysis has been used to find the significant association of risk factors to the metabolic syndrome. Student t-test (Two-tailed, independent) has been used to find the significance of study parameters.

1. Z-test for a proportion (Binomial distribution)

Objective: To investigate the significance of the difference between the assumed proportion and the P**0** and the observed proportion P, the following formula is used.

$$z = \frac{\hat{p} - p_o}{\sqrt{\frac{p_o(1-p_o)}{n}}}$$

Where –

- z = Test statistics
- n = Sample size
- p_o = Null hypothesized value
- $\hat{p}$ = Observed proportion

1. Significant figures

+ Suggestive significance 0.05<P<0.10

* Moderately significant 0.01<P□ 0.05

** Strongly significant P□ 0.01

Statistical software

The Statistical software namely

SPSS 24 .0, Stata 8.0, MedCalc 9.0.1 and Systat11 .0 were used for the analysis of the data, and Microsoft Word and Excel have been used to generate graphs, tables, etc

Results

Study Design

A Cross-sectional study consisting of 57 males and 43 females

is undertaken to study the prevalence of metabolic syndrome and to find the significant risk factors associated with the presence of the metabolic syndrome

Table 1. Age distribution of patient studied

Age in years		No	%	No	%	No	%
20-30		6	10.5	7	16.3	13	13.0
31-40		8	14.0	2	4.7	10	10.0
41-50		13	22.8	11	25.6	24	24.0
51-60		18	31.6	11	25.6	29	29.0
61-70		10	17.5	10	23.3	20	20.0
71-80		2	3.5	2	4.7	4	4.0
Total		57	100.0	43	100.0	100	100.0
Mean SD		50.911	2.96	52.12	14.99	51.43	13.81

Table 2: Characteristics of diabetes in male and female study group

Criteria	Male (n=57)		Female (n=43)		Total (n=100)	
	No	%	No	%	No	%
FBS>100 mg/dl	54	94.7	37	86.1	91	91.0
On insulin	11	19.3	9	20.9	20	20.0
On OHA	12	21.1	8	18.6	20	20.0
Freshly detected	4	7.1	2	4.7	6	6.0

Table 3: Characteristics of Hypertensives in male and female study group

Criteria	Male (n=57)		Female (n=43)		Total (n=100)	
	No	%	No	%	No	%
SBP>130 mm Hg	41	71.9	27	62.8	68	68.0
DBP >85 mm Hg	31	54.4	21	48.8	52	52.0
On Hypertensive treatment	21	36.8	15	34.9	88	68.0

Table 4: Levels of Lipid profile in patients of MS

Lipid parameters	MS		P value
	Absent	Present	
Total cholesterol (mg/dl)	205.66±40.79	218.18±59.31	0.301
LDL (mg/dl) HDL	120.17±24.55	134.39±54.49	0.181
(mg/dl)	43.83±27.69	38.31±5.92	0.112
Triglycerides (mg/dl)	144.24±36.59	186.62±83.26	0.010*

Table 5: Lipid Abnormalities in Males and Females

Criteria	Males (57)		Females (43)		Total	
	No	%	No	%	No	%
Total cholesterol (>200mg/dl)	30	52.6	28	65.1	58	58.0
LDL (>100 mg/dl)	42	73.7	36	83.7	78	78.0
HDL (< 40 mg/dl for men &<35 mg/dl for women)	31	54.4	6	13.9	37	37.0
Triglycerides (>150 mg/dl)	33	57.9	26	60.5	59	59.0
On lipid lowering drugs	26	45.6	9	20.9	37	37.0

Table 6: Prevalence of METABOLIC SYNDROME in males and females

MS	Male (n=57)		Female (n=43)		Total (n=100)	
	No	%	No	%	No	%
Present	42	73.7	29	67.4	71	71.0
Absent	15	26.3	14	32.6	29	29.0

Discussion

Metabolic syndrome is estimated to affect more than one in five adults, and its prevalence in women might be related to their higher rates of obesity. Both general and upper body adiposity were higher in women than in men,

MS and related disorders will be pertinent to the practice of the general physician as well as the endocrinologist, the cardiologist, the diabetologist, and other specialists. MS always lacked a structure and has different facets seen by various specialists. Diabetologists see it as insulin resistance; cardiologists see it as dyslipidemia and syndrome X, it is a polycystic ovarian syndrome for the adolescent physicians and obstetrics-gynecology specialists.

Each cluster component has variations based on several factors, including migration, socioeconomic class, rural-urban subclass, etc. The body fat pattern and lipids are particularly making the Asian Indians coronary prone. Unfortunately, the Asian Indian studies outside India outnumber the studies from India.

The high prevalence of obesity and insulin resistance in the urban Indian population is well known. In a study from Chennai, Mohan et al report an 18.7% prevalence of Insulin resistance Syndrome in upper socioeconomic strata in South India, while it was 6.5% in the lower socio economic strata.

This study differs from other studies as this study included all the subjects had one metabolic component, i.e., abdominal obesity

The percentage of subjects with impaired fasting sugars is high both in males and females compared to other studies because the subjects were inpatients, comparing other community-based studies. Also, the total study population had one component of MS, i.e., abdominal obesity. These observations are not similar to the Compared studies characteristic dyslipidemia described the elevation of blood.

LDL levels with a decrease in HDL levels. However, at least one lipid abnormality is present in > 95% of the present study subjects. When our observation is compared with the various studies of GP Paraleetaland Rajeev Gupta et al**.,** the total cholesterol and triglycerides level is significantly higher in the female subjects. The observations in male subjects were comparable to the studies mentioned above.

When our observation was compared with the various studies, PROSPER Prospective Study of Pravastatin in the Elderly at Risk. BRHS[107]British Regional Heart Study the percentage of subjects having MS is 71%, but the compared studies show a very less prevalence. Subjects with LDL cholesterol and triglycerides level are higher in the current study.

The observations of the HDL level is comparable to PROSPER but not to BRHS. Fasting glucose level > 100 is seen in 90% of our study but very less percentage in the mentioned studies.

When assessed independently, waist circumference is more Predictive of metabolic syndrome comparing other anthropometric measurements like BMI. Although neither BMI nor waist circumference provides a complete picture of overall risk, the waist circumference of the Subjects from the present study revealed stronger associations with multiple risk factors. This finding suggests that waist circumference can be used to screen the general population. Our observations are co-relating with Ingrid Lofgren et al. Wei Shen et al. and Mohan et al. Waist circumference measurement appears to provide more comprehensive information on the potential occurrence of other risk factors for CHD, including diastolic blood pressure, the presence of the MS, and high plasma TG.

Summary

Background

The metabolic syndrome is a constellation of metabolic origin's risk factors accompanied by increased risk for cardiovascular disease and type 2 diabetes. The condition is progressive, beginning with borderline risk factors that eventually progress to categorical risk factors. Indians have a characteristic obesity phenotype; they have relatively low BMI with abdominal obesity. However, there is a lack of data and studies regarding the relationship between abdominal obesity and MS in our country.

Methods

The present study was carried out in 100 patients with abdominal obesity (waist circumference >90cm in males >80.0cm in females). Patients were examined for features of MS and complications of obesity and other associated conditions. Every patient was be evaluated by history, clinical examination, and relevant investigations.

Results

Total of 100 subjects, 57 males and 43 females. The mean age in males and females is 50.91±12.96yrs and 52.12±14.99 yrs, respectively.

1. The mean waist circumference in males and females is 97.18±10.54 cmand 87.99±6.84 cm, respectively.
2. The mean BMI in the male group was 27.91±3.97 kg/m^2, and that of the Female group was 25.97±8.14kg/m^2.
3. The mean systolic BP in the male group was139.54±23.62, and that of the female group was 138.28±21.59.mm Hg.
4. The mean diastolic BP in the male group was 86.91±13.15, and that of the female group was85.12±12.88.mmHg 68 % had systolic BP>135mmhg.
   - **A.** 52 % had diastolic BP > 85 mmhg.
   - **B.** 68 % were on antihypertensive drugs.
5. The mean FBS in the male group was 152.49±46.54mg/dl, and that of the female group was 150.51±61.84mg/dl irrespective of the treatment status 7.The mean PPBS in the male group was 205.96±74.66mg/dl, and that of the female group was 188.21±73.40mg/dl regardless of the treatment status 20% were on insulin treatment.
   - **A.** 20% were on oral hypo glycemics.
   - **B.** 91% had FBS more than 100mg/dl.
6. The mean total cholesterol in the male group was 206. 96 ± 47.25 mg/dl. and that of the female group was 224. 60±62.37mg / dl
7. The mean LDL in the male group was 124.79±40.80 mg / dl and that Of the female group was 137.53±55.99 mg / dl
8. The mean HDL in the male group was 38.11±5.30 mg/dl and that of female group was 42.30±23.17 mg/dl.
9. The mean total cholesterol in the male group was 206.96±47.25 mg/dl and that of the female group was 224.60±62.37mg/dl.
10. The mean level of total cholesterol, LDL cholesterol, and triglyceride is increased where as the mean level of anti atherogenic HDL cholesterol is low in subjects with MS.
11. Prevalence of MS significantly less in lower age groups (particularly in 20-30 years)
12. Age is positively associated; alcohol use is negatively associated, HDL (decreasing) and TGL are positively associated with the incidence of metabolic syndrome.
13. Waist circumference is the better predictor of MS when compared to BMI independently.

Conclusions

This study supports the growing evidence that waist circumference can serve as a practical screening method for the metabolic risks that often accompany overweight and obesity. Among the widely used anthropometric measures, waist circumference had the highest cross-sectional correlation with MS. This observation is consistent with the substantial literature on the health risks now well associated with fat distribution patterns. Central obesity, notably the relatively small visceral adipose tissue compartment, is considered a more important marker of the physiological disturbances that accompany excess weight gain than total body adipose tissue.

The message emerging from this study is how best to define and screen for obesity, considering energy stores on the one hand and health risks on the other. Considering the present health risks of metabolic syndrome, additional follow-up studies are required for components other than the present components of the MS. This study is consistent with the saying, “Thinking about heart then looks at your waist."

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