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Original Research Article

To Correlate Prevalence of Metabolic Syndrome with Pulmonary Function and Hematological Status

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Abstract:

Background & Methods: The aim of the study is to correlate prevalence of metabolic syndrome with pulmonary function and hematological status. The study was designed to obtain a cross sectional population-based data on anthropometric and cardio metabolic parameters of young adult (18-25 years).

Results: All the haematological parameters were found to be within normal limits for men and women from all the three groups. Significant difference in both RBC count and haemoglobin content was observed between male and female subjects. There was no significant difference in any of the parameters.

Conclusion: The anthropometric characters (Age, Height, BMI, Weight) of the male subjects were found to be better than the female subjects. Among cardio-metabolic parameters HDL-C, LDL-C, TG and BP were found to have higher values in female subjects then the male subjects. Overall prevalence of metabolic syndrome among the study subject was found with male more than subjects having slightly higher prevalence than female subjects.

Keywords: prevalence, metabolic, syndrome, pulmonary and hematological.

Study Design: Observational Study.

1. Introduction

The concept of “metabolic syndrome (MetS)” with central pathogenesis of insulin resistance emerged during the last century to identify individuals with risk of future development of diabetes mellitus and cardiovascular diseases[1]. The term “metabolic syndrome”, for association of obesity, diabetes mellitus, hyper-lipoproteinemia, hyperuricaemia and steatosis hepatitis when relating the additive effect of risk factors on atherosclerosis, was used by Haller in 1977[2]. Reavan in 1988, proposed insulin resistance as fundamental factor and named the constellation of abnormalities as “Syndrome X”. In 1989, Kaplan coined the term ‘insulin resistance, syndrome’ for clustering of different risk factors in individual. So far ‘Metabolic syndrome’ remains the most accepted and globally acknowledged terminology for the cluster of metabolically related cardiovascular risk factors[3].

Metabolic syndrome is currently defined as a constellation of an interconnected physiological, biochemical, clinical and metabolic factors that directly increase the risk of atherosclerotic cardiovascular diseases and type 2 diabetes mellitus (T2DM) [4]. The combination of risk factors in individual with metabolic syndrome include atherogenic dyslipidaemia, hypertension, glucose intolerance, pro-inflammatory and thrombotic state. A number of expert groups have attempted to develop unifying varieties to define "metabolic syndrome." The most widely accepted definition have been proposed by World Health Organisation (WHO), European Group of Study of Insulin Resistance (EGIR), National

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Cholesterol Education Program - Third Adult Treatment Panel (NCEP ATP- III), and International Diabetes Foundation (IDF) [5].
WHO developed its definition in 1998 to tie together the key components of insulin resistance, obesity, dyslipidaemia and hypertension with insulin resistance to be central to the patho-physiology of metabolic syndrome[6]. In 1999, EGIR proposed a modification to WHO definition with simplification of criteria for insulin resistance and central obesity. In 2001, NCEP, ATP-III derived a definition for metabolic syndrome, which was later updated by American Heart Association and the National Heart Lung and Blood institute in 2005. The NCEP, ATP-III definition is one of the most widely used criteria for metabolic syndrome that incorporates the key feature of hyperglycaemia, insulin resistance (IR), visceral obesity, atherogenic dyslipidaemia, and hypertension. In this, there is no requirement for any specific criteria to be met; only any three of five criteria is required[7].

2. Material and Methods

Present Study was conducted at Gandhi Medical College, Secunderabad, Telangana for 01 Year. The study was designed to obtain a cross sectional population-based data on anthropometric and cardio metabolic parameters of young adult (18-25 years). The calculated sample size following World Health Organization (WHO) guideline on population-based study was 300. 300 subjects completed all the procedures and had not come under any of the exclusion criteria.

Inclusion Criteria:

1. Only healthy Indian adolescent subjects (18-25 years) were included in the study irrespective of their sex and ethnicity.

Exclusion Criteria:

History of any disease and past or present medication was recorded to exclude the subjects having any cardio metabolic disorder from the study. Subjects having diabetes mellitus, hypertension, PCOS (polycystic ovary syndrome) and any other cardiovascular disorders were excluded from the study. A questionnaire was formulated for the purpose.
Following subjects were excluded from the study-
1. Subjects with known cardiovascular disorders were excluded from the study.
2. Subjects with other endocrine disorders (thyroid, adrenal) were excluded from the study.
3. Subjects with any type of chronic diseases (COPD, cancer, psychiatric disorders) were excluded from the study.

3. Result

Table No. 1: Comparison of the anthropometric parameters in male and female subjects

Parameters	Male	Female
Age (years)	22.13±2.22	21.83± 2.46
Height(cm)	165.45±6.46	156.36± 5.20
BMI(kg/m2)	21.69±2.30	22.78±2.24***
Weight (kg)	59.3±6.62	55.57±4.89***

Table No. 2: Analysis on components of metabolic syndrome

Parameters	Present	Absent	P Value
Triglyceride			

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(mmol/L)			0.0001
< 1.7	(03)01%	(189)63%	
≥ 1.7	(69)23%	(39)13%	
HDL – Cholesterol (mmol/L)			
F> 1.29, M> 1.03	(09)03%	(183)61%	0.037
F< 1.29, M< 1.03	(63)21%	(45)15%	
Fasting blood sugar (mmol/L)			
< 5.6	(48)16%	(204)68%	0.046
≥ 5.6	(27)09%	(21)07%	

Table No. 3: Systolic blood pressure & Diastolic blood pressure (mmHg)

Parameters	**Present**	**Absent**	**P Value**
Systolic blood pressure			
< 130	(45)15%	(195)65%	0.028
≥ 130	(30)10%	(30)10%	
Diastolic blood pressure			
< 85	(42)14%	(198)66%	0.033
≥ 85	(33)11%	(27)09%	

Table No. 4: Comparison between Atherogenic Components

Parameters	**Male**	**Female**
TG/HDL-C ratio	4.71±0.54	4.49± 0.95
HDL-C/TC ratio	0.20±0.03	0.20±0.03
HDL-C/LDL-C ratio	0.34±0.10	0.31±0.06

4. Discussion

This study aimed to find relevance between components that serve as the criteria for diagnosing metabolic syndrome and poor performing pulmonary function. Among males, every diagnostic component of metabolic syndrome had significant correlation with poor pulmonary function. On the other hand, among females, FVC had a tendency of poor pulmonary function but with no significant relevance[8].

Many studies conclude that pulmonary function drops among obese people. Previously, studies have used BMI, waist circumference, waist/hip circumference ratio, abdominal thickness (height) and skin thickness test as the markers that show obesity. However, as of recent, studies focus on abdominal obesity as indicative of overall level of obesity[9]. As such, this study tried to examine the waist circumference that demonstrates abdominal obesity as well as the relationship between metabolic syndrome components that are easily found among obese people and effects these factors have on pulmonary function.

According to the study, reverse-correlation was found between diagnostic components of metabolic syndrome and pulmonary function. Among males, while there were significant differences in FVC according to whether or not there were any diagnostics components for

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metabolic syndrome, there were no FVC differences found among females[10]. However, for both males and females, pulmonary function differed significantly according to waist circumference. For males, there was a significant statistical difference in FVC and FEV1/FVC. In the case of females, for waist circumference of 85 cm, both FEV1 and FEV1/FVC had a significant statistical difference, while waist circumference of 80 cm only showed a significant statistical difference in FEV1. In particular, among males, the partial correlation coefficient of waist circumference was FVC -0.189, FEV1/FVC 0.173.
According to a study conducted by Leone et al., both males and females showed reverse-correlation between all diagnostic components of metabolic syndrome and pulmonary function. As in this study, abdominal obesity was reported as the most powerful predictor of poor pulmonary function. In addition, Chen et al.18) found out that both males and females showed negative correlation between FEV1/FVC and waist circumference even after age, height, weight, workload, energy consumption, and smoking were factored in[11]. Thus, the bigger the waist circumference becomes, the greater its impact on pulmonary function, eventually having partial impact on the movements of diaphragm and chest. Canoy et al. took the waist/hip circumference ratio as the indicator of abdominal obesity to verify that both FEV1 and FVC show reverse correlation both among males and females.

5. Conclusion

The anthropometric characters (Age, Height, BMI, Weight) of the male subjects were found to be better than the female subjects. Among cardio-metabolic parameters HDL-C, LDL-C, TG and BP were found to have higher values in female subjects then the male subjects. Overall prevalence of metabolic syndrome among the study subject was found with male more than subjects having slightly higher prevalence than female subjects.

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