

## Frequency of metabolic syndrome and its components in 300 Pakistani obese patients

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**Objective:** To assess the frequency of metabolic syndrome (MS) and its constituents in a sample of Pakistani obese patients.

**Methodology:** In this descriptive and cross-sectional study, we used a sample of 300 patients from Khyber Teaching Hospital, Peshawar, Pakistan from April 2016 to November 2016. They were randomly selected and their mean age was between 15 and 25 years. The variables obtained included BMI, both systolic and diastolic blood pressure, cholesterol, fasting blood glucose, triglyceride levels, LDL-cholesterol, HDL-cholesterol, waist to hip ratio, waist circumference and insulin resistance.

**Results:** Of the 300 patients, the frequency of MS was 20%. There were no significant differences in the frequency of developing MS between the genders. The order of frequency of the components as observed was as follows; abdominal obesity was 88%, high triglyceride level was 85%, males were 40%, 40% of the

sampled population resided in the urban area. Meanwhile, 35% of the patients had hypertension while only 5% had hyperglycemia. The frequency of developing MS was 70 times higher in patients with high triglyceride levels in their when compared to those with normal levels.

**Conclusion:** The frequency of MS and its components in Pakistani adolescent patients is high. The high levels of triglyceride and a sedentary lifestyle profoundly contributed to MS. Moreover, the findings signify the importance of early treatment and prevention of obesity in working toward reducing the rate of diabetes mellitus type 2; as glucose intolerance had a strong relationship with the components of MS, and cardiovascular diseases such coronary artery disease. (Rawal Med J 201;42:295-298)

**Keywords;** Metabolic syndrome, central obesity, type II diabetes mellitus, high triglyceride, hypertension, dyslipidemia.

### INTRODUCTION

Metabolic syndrome is a collection of several metabolic abnormalities, which include high cholesterol levels, abdominal obesity, increased levels of fasting plasma glucose in the body, hypertension, and low high-density lipoprotein (HDL) levels. Obesity is ranked as the most significant risk factor causing the burden of disease worldwide. In Europe, for instance, the number of cases reported yearly for those with overweight and obesity is at 400,000, which estimates to one in every four children.<sup>1</sup> A diet rich in fats and carbohydrates is to be blamed for obesity. Obesity is a primary public health issue worldwide and it is the primary cause of MS. The definition of obesity is termed as a BMI more than 95%.<sup>2</sup>

The frequency of MS is rising substantially; obesity is considered one of the leading contributors to the incidence of different diseases due to its etiological

relationship to other cardiovascular risks such as hypertension and diabetes.<sup>3</sup> The frequent implicit risk factors for the MS are abdominal fatness, insulin resistance and otherwise related conditions that can be physical inactivity, aging, and hormonal imbalance. Adiposity is a burning indicator of the MS due to its relation to dyslipidemia, hyperinsulinemia, hypertension.<sup>4</sup>

According to WHO, the criteria used for diagnosis is hyperinsulinemia or impaired fasting glucose >6.1 mmol/L plus any of abdominal obesity, (which is a waist:hip >0.9, BMI more than 30, waist girth more than 94 cm; dyslipidemia (HDL cholesterol < 50mg/dL in females and less than 40mg/dL in males or triglyceride more than 150mg/dL). Most authorities rely on this definition as it is applicable, accurate and specific. However, with regards to a program by national cholesterol education and adult panel as per a recent study, MS requires three or more of the

following symptometabolic syndrome; waist girth more than 102 cm for the males and more than 88 cm for the women, fasting blood sugar more than 5.7 mmol/L (100mg per dL), a serum triglyceride of more than 150 mg per dL and HDL cholesterol less than 40 mg/ dL, an account of hypertension or a blood pressure reading more than 130 systolic and more than 85 diastolic.<sup>5</sup>

Pakistan is one of the countries that is being affected by the lifestyle diseases such as diabetes and cardiovascular diseases and is mainly connected to reduced physical activity and the food that consist of fat and carbohydrate diet.<sup>6</sup> The purpose of this study was to determine the frequency of MS and its constituents in obese adolescent patients and to establish a comparison of their clinical, biochemical characteristics and anthropometry in the patients without and those having MS by gender.

## METHODOLOGY

This descriptive cross-sectional study was conducted on obese patients were from Khyber Teaching Hospital, Peshawar Pakistan from April and November 2016. We studied 300 obese patients, mainly adolescents (120 males and 180 females) with BMI more than 95th percentile, according to the growth curve for prevalence of MS. The inclusion criteria used was those with obesity, which meant a BMI more than two standard deviation according to age and gender. The age of the participants ranged between 15 and 25 years. The exclusion criteria were obesity due to secondary causes such as chronic illness and use of medication. The outcome variable was MS (either absent or present) while the independent data variable included BMI, age, gender, lifestyle, triglyceride levels and high blood pressure. The study protocol had an approved by the Research and Ethics Committee.

Fasting blood samples were analysed. OGTT was carried out following a 9-hour fasting period. Serum glucose value was obtained using glucose colorimetric oxidase slides. Samples of blood were obtained every half hourly min for two hours for obtaining the values of insulin and plasma glucose level after the giving 1.75 g of oral glucose for every kilogram of body mass.<sup>7</sup> During the study, the health

officers and clinicians provided education information and materials for those found to have any medical conditions and were booked for specialized follow up and management.

Data were analysed using SPSS version 18 and frequency analysis used to approximate the frequency of metabolic syndrome and its constituents, and the relationship between gender and metabolic syndrome tested using the  $\chi^2$  test. Variables were compared with independent samples using t-test. A p-value of less than 0.05 was used as a significant value.

## RESULTS

The prevalence of MS was at 20% of the total obese patients who took part in the study. Those who had MS presented with more than two characteristics of MS and the components included hypertension, dyslipidaemia, obesity and glucose intolerance.<sup>7</sup> Females were more prone to develop the syndrome compared to males. For instance, 22.2% of the female population were found to have MS, which translates to 40 individuals. On the other hand, only 20 males had metabolic syndrome (16.6%) but were both statistically insignificant.

**Table 1. Prevalence of Metabolic Syndrome.**

Component	Prevalence
Abdominal obesity	88%
High triglyceride	85%
Hypertension	35%
Hyperglycaemia	5%

**Table 2. Factors related to Metabolic Syndrome.**

Variables	1 or 2 components of Metabolic Syndrome	More than 3 parameters
Systolic BP(mm Hg)	113.05 ±10.90	126.30±15.40
Diastolic BP (mm Hg)	73.90±8.60	80.75±12.15
Cholesterol (mg/dl)	185.10±45.40	192.45±46.90
Triglyceride (mg/dl)	90.25±37.12	147.70±80.65
LDL- C (mg/dl)	115.65±35.70	120.60±36.15
HDL-C (mg/dl)	56.65±17.55	40.45±17.80
Glucose (mg/dl)	92.00±13.20	105.10±40.70

The frequencies of the various constituents of MS are shown in a Table 1. In addition, the clinical,

anthropometric measurements and biochemical data of the obese patients with MS and those without were compared. Various components of MS are shown in Table 2.

## DISCUSSION

The study assessed the incidence of MS in the obese patient attending Khyber Teaching Hospital. Since our study was carried out mostly in hospital, our results do not generalize the whole population of Khyber-Pukhtunkhwa but gives valuable information of the situation in Peshawar. Since obesity is the leading metabolic disease a lot of research should be directed to it as it as an emerging issue and health menace.<sup>8</sup>

Obesity and overweight has a strong link in both adolescents and children to cardiac and diabetic conditions.<sup>9</sup> In our study, the frequency of MS was found to have a greater percentage in patients who had abdominal obesity and glucose intolerance. Other conditions, which links with MS were, reduced physical activity and hormonal imbalance. The ages of the individuals under study had no significant disparity, as they were mainly adolescent in the pubertal stage. However, the girls showed advanced tanner stages and attributed to their early start of puberty and the significant fat deposition in puberty.

As per the study, the frequency of MS was at 20%. When compared to previous studies, it lay in the same bracket as the reports showed that previous data was between 10 and 20%. When compared to countries such as the United States, the rate of MS in Pakistan is lower. The United States has a third of its population with the syndrome. The prevalence of MS in Malaysia is 24%, 19% in Mongolia, 28.8% in India, 12.2% in Singapore, 14.8 % in China and 12% in Japan.<sup>10</sup> Although the prevalence of MS varies with countries, it has shown a rising trend. The difference in the levels of the syndrome in the countries is because of the difference in diet and morphologic characteristics of the populations in the countries.

Due to a sedentary and toxic life, the degree of MS in patients residing in urban centres was high; this is attributed to the reduced physical inactivity and diet

rich in high calorie such as fat and carbohydrate. Moreover, unlike children in the rural setting who are active and eat balanced diet, most of the children in the urban setting watch television and have less physical activity compared to their counterpart. The high caloric intake will thus lead to fat accumulation in the body and increases the risks of developing metabolic syndrome and consequently diabetes mellitus type 2 and cardiovascular disorders.<sup>11</sup>

The most common component of MS according to our research was waist circumference as most of our participants were obese. Results showed that 15% of the patients under study had impaired blood glucose levels.<sup>12</sup> Many studies show that children who are born with higher birth weights or gain a lot of weight in the early post partum period have a high incidence of developing MS, while other studies showed no link with gestation time nor the weight at birth had any association with the development of syndrome.<sup>13</sup> However, more studies, specifically comparing individuals with low or high weights at birth are expected to give better conclusive outcomes on the links between metabolic syndrome and birth weight. The inheritance of MS is at 30% and thus the high rate can be blamed on genetics although studies have failed to support the associated abnormalities<sup>14</sup> and need further research.

The risk of developing diabetes mellitus type 2, cardiac disease, and cerebrovascular accidents is directly proportional to the risk of having the component of metabolic syndrome and it is evident from our data. The chance of developing metabolic syndrome is closely associated with overweight and increased BMI and physical inactivity.<sup>15</sup>

## CONCLUSION

The frequency of MS and its components in Pakistani adolescent patients is high. The high level of MS is mainly due to a decrease in awareness of the cardiac and metabolic effects of metabolic syndrome in the Pakistani population. Therefore, prevention and management of metabolic syndrome and its components will get a positive feedback from an increase in awareness.

**Author contributions:**

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