

Correlation Between Various Obesity Indices in Pakistani Adolescents Aged 13-15 Years

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Objects: Obesity during childhood and adolescence is a matter of growing concern and is related to adverse health outcomes. Studies across different countries found correlation between BMI and other obesity indices but extent of the problem has been given less importance in our country.

Subject and Methods: To find out the correlation between BMI and other obesity indices, percent body fat and waist hip ratio in adolescents of 13-15 years. This comparative study was carried out in urban district of Lahore and total of 270 adolescents 13-15 years of age were recruited. Obesity was assessed by BMI, percent body fat and waist hip ratio. BMI (wt in kg/ht in m²) for adolescents was calculated by standard international cut off points. Triceps skin fold thickness was measured by Harpenden's calipers and then this was used to calculate percent body fat. Waist and hip circumference was measured by using a measuring tape.

Results: OBMI and percent body fat was significantly correlated. (Pearson correlation coefficient =0.428 p<0.05). The correlation between BMI and waist hip ratio was also significant (Pearson correlation coefficient =0.384 p< 0.05).

Conclusion: When BMI increase in adolescents there is an increase in percent body fat and waist hip ratio.

Key words: Placenta praevia ,antepartum haemorrhage ,postpartum haemorrhage.

Introduction

Childhood and adolescent obesity is considered to be a dilemma of the new millennium. It is a major health problem in the developed countries, but only a matter of concern in the developing countries. Increased prevalence of obesity from preschool children to adolescence has been observed globally as an epidemic.¹ Long term complication and a major concern about childhood obesity is that it tracks into adulthood so that obese children become obese adults.² The epidemic of pediatric obesity is having a huge impact on the physical and social well being of today's children; as a number of diseases have exhibited links to it. Obesity promotes insulin resistance, which in turn is related to type II diabetes mellitus.³ Overweight children and adolescents are at increased risk of several cardiovascular risk factors like dyslipidemia, hyperinsulinemia and hypertension.⁴ Other co-morbidities associated with childhood obesity are ovarian hypergonadism, reduced bone density and raised C-reactive proteins.⁵ It is also associated with orthopedic problems, hepatic steatosis, pseudomotor cerebri, negative self esteem, depression and anxiety.⁶ Extensive research regarding this topic has been conducted in the developed countries.⁷ Pakistan is a developing country, and few studies regarding this topic have been carried out in Hafizabad,⁸ Karachi⁹⁻¹¹ and

Islamabad. A National Health Survey evaluating the prevalence of childhood obesity was conducted 1987 and 1997.¹² No study has evaluated the correlation between various obesity indices in Pakistan. When obesity occurs in adolescents it tends to persistent into adulthood¹³ causing different co-morbidities and premature mortalities. Measurement of obesity by various obesity indices can help in its detection and elimination resulting in decreased adult obesity and its consequences.

Aims and Objectives

To find correlation between BMI and other obesity indices like % body fat and waist hip ratio in adolescents of 13-15 years.

Subjects & Methods

This comparative study was carried out in the urban district of Lahore. A total of 270 adolescents 13-15 years of age were recruited. Out of these, 135 were male and 135 were female. Each of these were further grouped into normal, overweight and obese according to the international cut off points of BMI.¹⁴ After taking consent from each subject on a proforma, following measurements were taken.¹⁵

1. Weight and Height measurements were used to calculate BMI = weight/height² [kg/m²]
2. Waist and hip circumference was used to calculate

waist hip ratio.¹⁶

3. Triceps Skinfold Thickness was measured by Harpendens Caliper¹⁷ and this was used to find percent body fat by the following formula:
 Percentage Body Fat = $4.67 + [0.85(Wt/(Ht)^3)] + 0.73 (TSFT)$ (Wt in Kg; Ht in Mt.; TSFT in mm)¹⁸

Results

Mean SD values of various obesity indices are shown in **Table-1**

Correlation between various obesity indices is shown in **Table -2**

Table-1: Obesity Indices in Study Population

Obesity Indices	Mean ± S.D
BMI (Kg/m2)	26.33± 7.57
Male	
Female	25.39± 5.3
Waist Hip Ratio	
Male	0.86± .13
Female	0.78± .13
Percent Body Fat (%)	
Male	34.21± 10.24
Female	38.38± 9.14

Table-2: Correlation between various obesity indices in male adolescents (n = 135)

Correlation Between	Coefficient (r)	p-value
BMI and % body fat	+0.658	<0.001*
BMI and waist hip ratio	+0.510	<0.001*

*High significant

Table-3: Correlation between various obesity indices in female adolescents (n = 135)

Correlation Between	Coefficient (r)	p-value
BMI and % body fat	+0.240	<0.05*
BMI and waist hip ratio	+0.128	<0.02*

*Significant

There was positive correlation between various obesity indices. Pearson correlation coefficient showed that the correlation between BMI and Percent Body Fat was highly significant in males and significant in females while the correlation between

BMI and waist hip ratio was highly significant in male and significant in female adolescents.

Discussion

The present study showed a positive correlation between BMI and percent body fat. In boys, this correlation was highly significant and in girls it was significant. Many studies have reported similar correlation using anthropometry, x-ray absorptiometry, and hydrodensitometry for the estimation of percent body fat. Maynard et al. (2001) reported moderate to highly positive correlation between BMI and percent body fat in both in boys and girls by using hydrodensitometry for the estimation of percent body fat.¹⁹ Field et al. (2003) reported a positive and highly significant correlation between BMI and percent body fat (measured by DEXA-Dual Energy X-ray Absorptiometry) in both sexes.²⁰ A study on Chinese adolescents (2004) found that BMI was closely correlated with percent body fat in both male and female.²¹ A cohort study in Delhi, India (2005), showed that BMI was positively correlated with percent body fat in both sexes. Percent body fat was measured by sum of skinfold thicknesses.²² Although these studies were performed on people with different cultural, racial and geographical background and different methods for the estimation of percent body fat were used, their results were consistent with the present study which elucidates that these results prevail internationally.

Waist hip ratio is a measure of central adiposity, with a higher ratio associated with greater central obesity and possibly with greater visceral adiposity. In the present study, evaluation of Pearson Correlation Coefficient between BMI and waist hip ratio showed a positive correlation. In males, this correlation was highly significant and in females it was significant. A prospective study (1992) by Tieboon et al. showed that in adolescent boys and girls the correlation between BMI and waist hip ratio was positive and strong.²³ Analysis of Bogalusa Heart study (1999) showed similar results.²⁴ Sachdev et al. (2005) examined the correlation between BMI and waist hip ratio in a cohort study from birth to 21 years of age in males and females showing that higher BMI and greater BMI gain in late childhood and adolescents were associated with increased central obesity (measured by waist hip ratio)²² Although the above mentioned studies have been conducted in different geographical situation, using different sample sizes, in different racial communities and in people having a different life style (smoking, alcohol

consumption, physical activity and eating habits) but still their results were similar to the present results proving that such correlations can prevail globally.

Conclusion

In addition to BMI, percent body fat and waist hip

ratio can also be used as a measure of obesity as both are highly correlated to BMI.

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