



Anthropometric Parameters and their Relationship with Obesity in Adolescent boys (aged 13-17 years) in Delhi

KEYWORDS

Body mass index, Waist height ratio, Obesity, Adolescents

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ABSTRACT The purpose of the study was to investigate whether there is a correlation between the obesity and anthropometric parameters such as Body mass index, waist circumference, waist to height ratio and to find out which one is the better predictor of obesity among these parameters. A status study was designed under purposive sampling included 162 school going adolescents in urban areas of the Delhi. Prevalence of obesity and overweight was found between 3.70% and 19.75% respectively. Obesity as per waist to height ratio analysis (36.42%) and waist circumference (22.83%) among male adolescents was found. Body Mass index & Waist to height ratio ($r=0.617$) and Waist circumference ($r=0.592$) were significantly correlated with each other. It was concluded that waist to height ratio is a better predictor for the obesity than Body mass index and Waist circumference having a higher correlation with BMI.

INTRODUCTION

Obesity is a highly complex multi factorial chronic^[1-2] and non – communicable disease^[3] where excessive fat in adipose tissues gets accumulated to an extent that health starts getting adversely affected^[4] and if not taken care seriously turns most children into adult obese in future.^[5-6] In 2002 according to World Health Organisation's analysis report approximately 58% of diabetes, 21% of chronic heart disease and 8-42% of certain cancers globally were attributable to a BMI above 21 kg/m².^[7] If current trends continue, India and the Middle Eastern crescent will have taken over by 2025, followed by China, Latin America and the Caribbean, and the rest of Asia.^[7] There is an immediate need to control such globally threatening disease by spreading awareness about the fatal consequences of being obese and overweight, involving children and adolescents into 60 minutes of regular physical activity^[8] and healthy food habits by cutting high carbohydrate, sugary and fatty foods. The previous study examined the relationship between Body mass Index as general obesity measure and Waist circumference & Waist to Height Ratio as an abdominal obesity measures as strong predictors.^[9-10] In the INTER HEART case control study of myocardial infarction in diverse populations (27,000) in 52 countries^[11], BMI, Waist circumference and waist-hip ratio were all strongly and linearly associated with risk of myocardial infarction.^[11] Europeans have less body fat as compared to Chinese's and South Asians as per the BMI classifications.^[12-13]

Objective of Study: To find out the occurrence of obesity among adolescents and to find that waist to height ratio or waist circumference is a better predictor for the obesity among school children in Delhi region.

Methodology:

Selection of Subjects: 162 school going adolescents in urban areas of the Delhi consented for the study. The age group was 13-17 years.

Selection of Variables: The waist to height ration, waist circumference and body mass index were selected as the variables for the study which were measured as per standard procedures of measurement.

Administration of Test: The calibrated digital weighing machine (WS593, 2014), stadiometer (WS700, 2014), steel measuring tape (WS024, 2014) was used for weight (kg), height (cm) and waist circumference (cm) respectively with barefoot and lightest clothing on. BMI (weight (kg)/height (m²) standard classification values were taken as underweight, normal weight, overweight, or obese^[14-15]. The collected data was applied the descriptive statistics and correlation. The level of significance was set at .05 level to draw conclusions.

Results:

According to results, shown in Table 1 & Fig 1 the prevalence of overweight (19.75%) and obesity (3.70%) of 162 boys, (collectively 23.45%) is significantly higher than that found in the national survey of Delhi in 2006 (boys: 16.75%),^[22] and also reported to be higher when compared with the meta-analysis of nine studies including 92,862 subjects, the prevalence of overweight was 12.64% and obesity 3.39% of childhood obesity in India.^[23]

Results shown in Table 2 & Fig. 2 details 59 boys (36.42%) were of Overweight category in relation with Waist to Height Ratio as per the standard cut off (0.50) points accepted and used worldwide.^[17-20] In table 3 & fig 3 results show of 37 boys (22.83%) were obese as per waist circumference (0.90cm), which is recorded much higher as compared to 6829 adolescents from Germany, Iran and Brazil which was 10.5%.^[24]

The table 4 shows correlation between body mass index, Waist circumference and Waist to height ratio was significant.^[21]

Table 1: Prevalence of Obesity on the basis of BMI among adolescent's boys of Delhi, India (n= 162)

Category for obesity	Body Mass Index (boys)	Values in Percentage
Under Weight Category	43	26.54 %
Normal Weight Category	81	50 %
Over Weight Category	32	19.75 %
Obese Category	06	3.70 %

Fig. 1 Prevalence of Obesity as per Body Mass Index

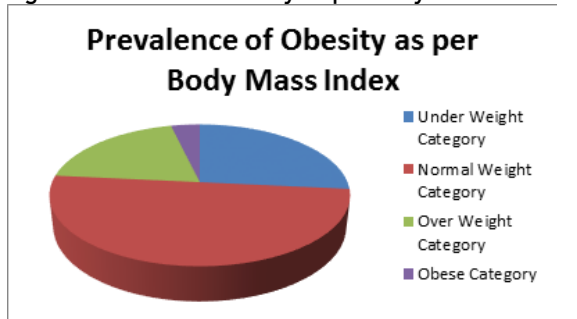


Table 1 & Fig 1 shows the Body Mass Index standard cut off values, out of 162 boys, 43 (26.54%) were in Under Weight Category, 81 (50%) in Normal Weight Category, 32 (19.75%) in Over Weight Category and 06 (3.70%) in obese Category which, as compared to Irish adolescents is high in overweight category (11%) and less in obese (8%) category.^[16]

Table 2: The prevalence of obesity as per Waist to Height Ratio standard cut off (n=162)

Gender	Waist to Height Ratio Standard cut off (0.50)	Values in Percentage
Obese Boys	59	36.42%
Non Obese Boys	103	63.58%

Fig. 2: Prevalence of Obesity as per Waist Height Ratio

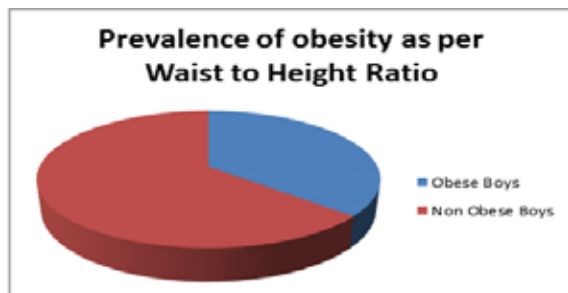


Table 2 & Fig 2 illustrates the relationship of obesity with Waist to Height Ratio, (N=162), 59 boys (36.42%) were in Overweight category. The standard cut off (0.50) was taken as reported worldwide.^[17-20]

Table 3: The prevalence of obesity as per Waist Circumference (n=162)

Gender	Waist Circumference Standard cut off (0.90)	Values in Percentage
Obese Boys	37	22.83%
Non Obese Boys	125	77.16%

Fig. 3 Prevalence of Obesity as per Waist Circumference

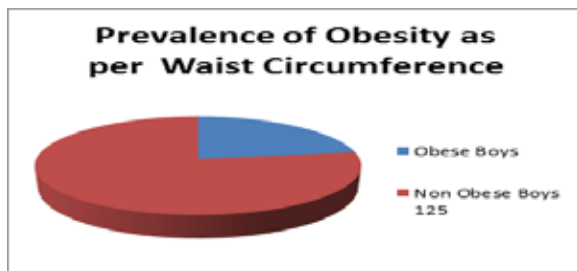


Table 3 & Fig 3 Explains the relationship between Obesity and Waist Circumference, (n=162), 37 boys (22.83%) were in Overweight category. The standard cut off (0.90) was taken as reported.^[10]

Table 4: The correlation among anthropometric variables

	Body Mass Index	Waist Circumference	Waist to Height Ratio
Body Mass Index	-- ---	0.592*	0.617*
Waist Circumference	0.592*	----	0.947*
Waist to Height Ratio	0.617*	0.947*	----

*Significant at (p<0.05) level of confidence.

According to results as shown in table 4, the Pearson's product-moment correlation among anthropometric variables was found to be significant (Gupta et al., 2007)

Conclusion

The results have shown that there is a significant correlation among anthropometric parameters such as Body Mass Index, Waist circumference, Waist to height ratio and Waist to height ratio should be preferred to be used over and above BMI and Waist circumference and as a strong predictor which can be interpreted for the adolescent boys as an indicator for adolescent Obesity.^[25-28]

Conflicts of interest: NIL

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