

Anthropometric Parameters and Their Relationship with Obesity in Adolescent Boys (Aged 13-17) in Delhi, India

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Abstract

In today's world limited data are available on adolescent obesity regarding the better predictor among various parameters of anthropometric parameters. The aim of this 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, India in the year 2013-2014. In this study, the prevalence of obesity and overweight was found between 3.70% and 19.75% respectively. According to waist to height ratio analysis 36.42% and waist circumference 22.83% male adolescents were found obese. Body Mass index, Waist to height ratio and Waist circumference 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.

Keywords: Body mass index, Waist height ratio, Obesity, Adolescents.

1. Introduction

Obesity is a highly complex multi factorial chronic (Al-Quaiz AJ 2001; Vaughan 2002) and non – communicable disease (Bharti, Deshmukh & Garg 2008) where excessive fat in adipose tissues gets accumulated to an extent that health starts getting adversely affected (WHO 1998) and if not taken care seriously turns most children into adult obese in future. (Parsons et al 1999; Sharma & Sharma 2006) 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. (WHO fact sheet 2003) 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. (WHO fact sheet 2003) 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 (Commission on Ending Childhood Obesity: 2014) 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. (Huxley et al 2010; Report of WHO Expert Consultation. Geneva, 2008) In the INTER HEART case-control study of myocardial infarction in diverse populations (27,000) in 52 countries (Yusuf et al 2005), BMI, Waist circumference and waist hip ratio were all strongly and linearly associated with risk of myocardial infarction. (Yusuf et al 2005) Europeans have less body fat as compared to Chinese's and South Asians as per the BMI classifications. (Deurenberg 2000; 1998)

2. Material and Methods

All the Measurements were taken by the experienced and trained physical education teachers for the dependent as well as independent variables after the informed consent by the participants. 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 (Colditz 1995; WHO expert consultation 2001)

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 %

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%

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%

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.

Fig. 1

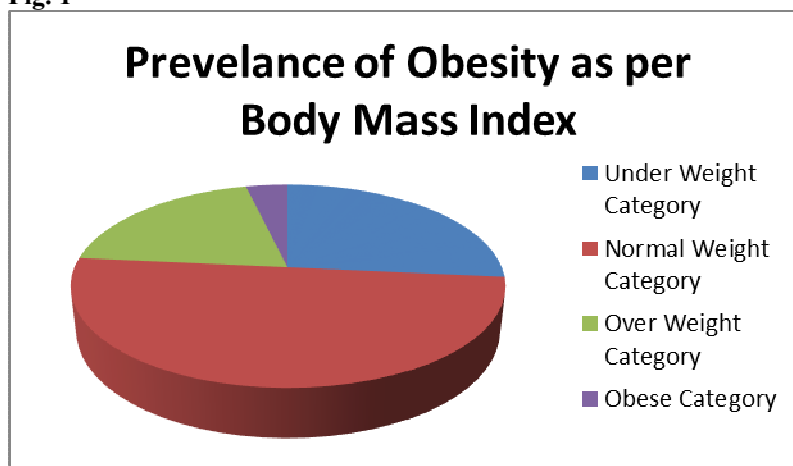


Fig. 2

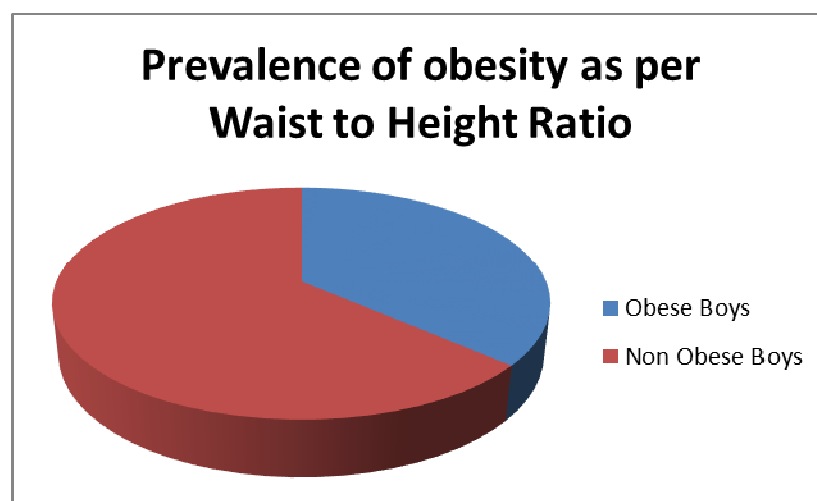


Fig. 3

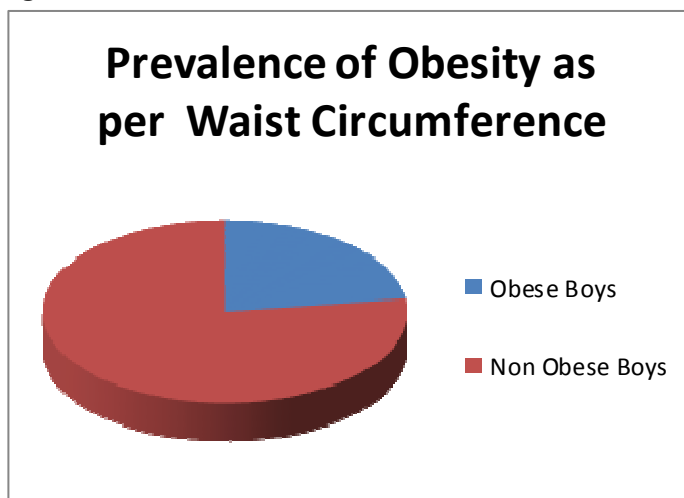


Table 1 & Fig 1 shows the Body Mass Index standard cut off values, out of 162 boys, 43 (26.54%) were in Under Weight Category, 81 (50%) in Normal Weight Category, 32 (19.75%) in Over Weight Category and 06 (3.70%) in obese Category which, as compared to Irish adolescents is high in overweight category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

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. (McCarthy et al 2003; Ashwell& Hsieh 2005; Patricia FP et al 2011; Bacopoulou F. 2015)

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.(Report of WHO Expert Consultation.Geneva, 2008.)

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)

3. Findings

This study sought to ascertain the correlation between obesity and anthropometric parameters such as Body mass index, waist circumference, and waist to height ratio and also examined which one is the better predictor of obesity among these parameters of Delhi, India based public schools adolescents. According to results, 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%), (Marwahaet al 2006)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. (Midha T et al 2007)

Results showed 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. (McCarthy et al 2003; Ashwell& Hsieh 2005; Patricia FP et al 2011; Bacopoulou F. 2015)

As results showed 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%. (Peter S. &Gerda M. H. 2012)

The correlation between body mass index, Waist circumference and Waist to height ratio was significant.(Gupta et al., 2007)

4. 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.(Edel Rafael et al 2013; Kubaet al 2013; Moksha et al. 2010;Claudio Maffeis et al 2008)

5. Conflict of Interest

There is no conflict of interest in this research work.

6. Source of Funding

There was no funding received for this research work.

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