



## Prevalence of overweight and obesity in college going girls in Delhi

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### Abstract

**Background:** Overweight and obesity are escalating problems in developing countries and are related to cardiovascular risk factors.

**Objectives:** The study aimed to assess the prevalence of overweight and obesity in collegiate women.

**Methods:** A cross sectional study on 224 collegiate women aged 18 to 23 years was conducted in Delhi. Data was collected on anthropometric measurements and body composition parameters using standard techniques.

**Results:** Using the WHO cuts offs for BMI, the prevalence of overweight and obesity in girls above 19 years of age were at 19% and 1.1% respectively. The prevalence of overweight decreased marginally to 17.9% and obesity increased significantly to 19% while using Asian cut offs. Using WC cut offs ( $\geq 80$ cm), the prevalence of abdominal obesity was 8.9%. There was a statistically significant difference ( $p < 0.05$ ) in WC, body fat (%) across the various BMI categories.

**Conclusions:** Increased prevalence of cardiovascular risk factors requires immediate attention for adopting preventive plans.

**Keywords:** Overweight, obesity, body mass index, waist circumference

### Introduction

Urbanisation coupled with globalization has led to a change in lifestyle. The change in eating habits from whole grains to refined, calorie dense foods, along with increased sedentariness is raising the risk of becoming overweight or obese. The prevalence of obesity in Indian women was 1.2% in 1975, which increased to 5.4% in 2014 (NCD Risk Factor Collaboration, 2016). A high number of people being overweight or obese will impact the already constrained health resources in a developing country like India. Therefore, it is important to estimate the prevalence of overweight

and obesity in young adults so that they can be identified and effective measures can be taken before it increases the risk of other non communicable diseases such as diabetes. Therefore, the aim of the study was to estimate the prevalence of overweight and obesity in collegiate women in Delhi.

### Methods

A cross sectional study was undertaken to estimate the prevalence of overweight and obesity of 224 collegiate women aged 18 to 23 years. Anthropometric assessment included weight, height, waist and hip circumferences. Weight (to nearest 0.1kg) was measured using a digital weighing scale and height was measured using a stadiometer (with sensitivity of 0.1cm). The waist circumference (WC) was measured around the narrowest point between ribs and hip front after exhaling (WHO, 1995). The hip circumference (HC) was measured around the pelvis at the point of maximal protrusion of the buttocks when the subject is standing erect with the feet together (WHO, 1995). Measurements were taken in duplicate. Body mass index (BMI) was calculated as weight (in kg) divided by height (in metres) squared and both international BMI cut offs for overweight and obesity (25.0–29.9 overweight and  $\geq 30$  kg/m<sup>2</sup> for obesity) and Asian cut offs (23–24.9 Asian overweight and  $\geq 27.5$  kg/m<sup>2</sup> higher risk). Abdominal adiposity was defined as using both international and Asian cut offs as waist circumference  $\geq 88$  cm and  $\geq 80$  cm respectively. The TANITA Body Composition Analyser (BC-420MA, TANITA Corp., Tokyo, Japan), was used to determine body composition in the participants. Institutional ethical clearance was obtained before initiation of the study. Informed consent was taken from all the participants. The prevalence of overweight and obesity in college girls was estimated. The difference between the various BMI categories was compared using ANOVA. The level of significance was defined at  $p < 0.05$ .



Results

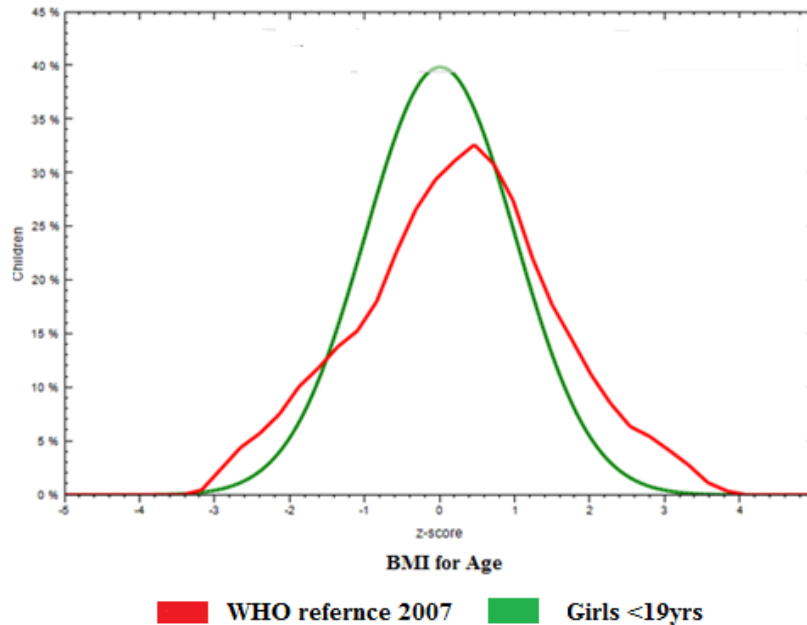
The mean age of the participants was 20±1.42 years. The anthropometric and body composition profile of collegiate women is given in Table 1.

Table 1: Anthropometric and body composition profile (n=224)

Parameter	Mean ± SD	Coefficient of Variation (%)	Maximum	Minimum
Age (yrs)	20.03 ± 1.42	7.0	23.0	18.0
Weight (kg)	54.72 ± 9.83	18.0	94.8	27.2
Height (cm)	156.6 ± 5.56	4.0	170.9	132.8
BMI (kg/m <sup>2</sup> )	22.25 ± 3.56	16.0	34.8	15.4
WC(cm)	68.36±8.8	12.8	106.7	53.0
HC (cm)	93.17 ± 8.2	9.0	127.0	61.0
Body fat %	22.85 ± 8.11	35.0	42.5	3.0
Fat Mass (kg)	13.25 ± 6.88	52.0	40.3	0.8
Total Body Water (kg)	28.96 ± 2.72	9.0	39.8	19.8

The body mass index (BMI) was calculated and prevalence of overweight and obesity was assessed by calculating the BMI for age (n=40) using WHO reference (2007) for girls below 19 years of age. In Figure 1, it can be seen that the distribution was slightly skewed to the right indicating that 65% of the girl were above the normal For girls aged below 19 years, the prevalence of overweight and obesity was recorded as 17.5% and 7.5% respectively using BMI-age z scores.

Figure 1: BMI for age in comparison to WHO (2007) (n=40)



Using the international cuts offs of BMI (WHO, 1998), 19% of the girls were overweight, while 1.1% were obese as given in Table 2.

Table 2: Classification of adults according to international definition of BMI cut offs



Classifications	BMI (kg/m <sup>2</sup> )	Sample representation (n=184)	(Percent)
Underweight	≤18.5	22	12
Normal weight	18.5-24.99	125	67.9
Preobese (overweight)	25.00-29.99	35	19
Obese class I	30.00-34.99	2	1.1
Obese class II	35.00-39.99	0	0
Obese class III	≥40.00	0	0

The prevalence of obesity increased from 1.1% to 20% when using the BMI classification proposed for Asians (WHO, 2004; WHO/IASO/IOTF, 2000) as given in Table 3.

Table 3: Classification of collegiate women based on BMI cut offs for Asians

Classification	BMI (kg/m <sup>2</sup> )	Sample representation	
		(Count)	(Percent)
Underweight	< 18.5	22	12%
Normal	18.5 - 22.99	92	50%
At risk of obesity	23 - 24.99	33	17.9%
Obese class I	25.0 - 29.9	35	19%
Obese class II	> 30.0	2	1%

Abdominal obesity in women was 3.6% using the international cut off for waist circumference, while it was 8.9% using cut offs proposed for Asians (WHO, 2008).

The participants were categorised according to their BMI as underweight, normal, at –risk of

developing obesity and obese as per the WHO/IASO/IOTF (2000) cut offs for Asians and it was seen that the anthropometric measurements, indices and body composition parameters show a gradual increasing trend from the lowest to the highest BMI categories. A statistically significant difference ( $p < 0.05$ ) was observed in waist circumference, hip circumference, body fat %, and fat mass across the various BMI categories. Post hoc analysis showed that the mean difference in WC and HC among different BMI groups was

found to be statistically significant ( $p < 0.05$ ) with WC and HC being higher in obese than in overweight or at risk participants. There were significant differences in weight, body fat % and fat mass across the BMI groups.

### Discussion

The study assessed the prevalence of overweight and obesity in 224 collegiate women of Delhi. According to the proposed classification of BMI for Asians by WHO/IASO/IOTF (2000), the prevalence of overweight and obesity was 17.9% and 20% respectively, thereby classifying more participants as obese vis-à-vis the accepted WHO (1998) classification. Similarly, proposed waist circumference cut offs for Asians identified a higher number of participants suffering from abdominal obesity. These reduced cut offs for



Asians will help in early identification of participants who are at a greater risk for developing health problems later in life.

A similar study on girls reported prevalence of obesity as 10.5% (Augustine and Poojara, 2003).

Waist circumference, hip circumference and body fat% increased across BMI categories. Therefore, the risk of having suffering from abdominal obesity increases at a higher BMI. It can be seen that overweight and obesity are escalating and have become problems that need urgent attention before they spiral into diabetes and other diseases.

### Conclusion

Prevalence of overweight and obesity in college going girls requires immediate attention for

adopting preventive plans with a focus on healthy lifestyle will help in curbing this menace.

### Acknowledgements

We are grateful to Dr GS Toteja for his continued guidance and inputs during the course of this study.

### Abstract Publication

The abstract of the paper entitled “Prevalence of overweight and obesity and status of blood pressure and lipid profile in college going girls in Delhi”, has been published in the 47<sup>th</sup> Annual National Conference of Indian Dietetic Association Scientific Proceedings (December’ 2014) in the category of Community Nutrition (Poster).

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