Research Article

Comparison of anthropometric parameters between obese and non obese young individuals

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Abstract

Introduction: Obesity is a public health and policy problem because of its prevalence, costs and health effects. **Aims and Objective:** The present study was conducted to compare anthropometric measurements between obese and non-obese young individuals. **Material and Method:** The present study (cross sectional study) was conducted on 60 young medical student's age ranging from 18 to 23 years. Participants were classified into two groups obese and non-obese based on BMI (WHO). Body height, body weight, BMI, chest circumference, Waist circumference, Hip circumference, waist hip ratio and skin fold thickness (biceps, triceps, sub scapular and Suprailiac) were measured. Arithmetic mean, standard deviation, p-value and t-value were calculated for all the parameters studied. **Results:** Observation of this study shows that all anthropometric parameters of obese individuals were highly significant as compared to non-obese individuals, except body height.

Keywords: Height, Weight, Body mass index (BMI), Chest circumference, Hip circumference, Waist circumference, Waist hip ratio, Skin folds.

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INTRODUCTION

Obesity has been prevalent in the human history for over 20,000 years and affected numerous aspects of life and society. Obesity is characterized by excessive accumulation of fat in almost all the adipose tissues in the body. The cause of excess subcutaneous and visceral fat deposition in an individual is the cumulative effect of an imbalance between the energy of ingested food and that of expended in the course of daily activities. Easy way to access things by motor vehicles, prolonged physical inactivity sitting in front of the computers, consumption of junk foods, all these factors contribute to less energy expenditure[1]. According to World Health Organization reports, obesity has reached epidemic state worldwide[2]. Obesity is becoming a global epidemic in both children and adults and is associated with numerous co-morbidities such as cardiovascular diseases (CVD), hypertension, type 2 diabetes mellitus and sleep apnoea[3]. In fact, obesity is an independent risk factor for cardiovascular diseases and is associated with reduced life expectancy. In India, the prevalence of overweight state and obesity is increasing in children and young adults which is reflected by various studies[4]. Usually BMI has been used as a measure to diagnose obesity. Other types of anthropometric measures like WC, HC, skin folds and waist to hip ratio (W/H) have all been associated with increased body fat and have predicted the distribution of body fat. International criteria for body mass index (BMI) suggest the following: Underweight (<18.5 kg/m^2), normal weight (18.5-24.9 kg/m^2), overweight (25-29.9 kg/m^2) and obesity (>30 kg/m^2)[5]. But the revised guidelines for diagnosis of obesity in

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Asian Indian populations are: A normal BMI of 18.0-22.9 kg/m^2, an overweight BMI of 23.0-24.9 kg/m^2, and obesity of BMI greater than or equal to 25 kg/m^2. The present study was undertaken to compare anthropometric measurements between obese and non-obese young individuals by measuring body weight, body height, chest circumference, mid arm circumference, waist circumference, hip circumference and calculation of body mass index and waist/hip ratio.

METHODOLOGY

The study was carried out on sixty young medical students within age group of 18-23 years. **Instruments** used in present study:

Measuring tape, Weighing machine, Skin fold measuring calipers.

Anthropometric Parameters

Following anthropometric measurements were taken on the all subjects:

Height: Height was measured in the standing position, without shoes by using a measuring tape while the shoulders were in a normal state.

Weight: The body weight was measured of the subjects wearing light clothing and without shoes using a calibrated weighing machine.

Body mass index was calculated for each subject using Quetelets formula:

$$\text{Body mass index} = \frac{\text{Weight in kilograms}}{\text{Square of Height in meters}} \quad \textit{(Quetelets forml)}$$

Proposed classification of BMI for Asians [WHO]

Underweight	<18.5
Normal	18.5-23
Overweight	23-25
Obese	>25

Chest circumference (CC): CC was measured by using a measuring tape. The tape was held horizontally at the level of nipple passing over the lower sub scapular angle.

Mid arm circumference (MAC): Using measuring tape, mid arm circumference was taken at maximum girth of arm.

Waist circumference (WC): WC was measured at most lateral contour of the abdomen by a measuring tape.

Hip circumference (HC): HC was measured at the widest portion of the hips by a measuring tape.

Waist to hip ratio (W/H): W/H was calculated by dividing Waist circumference by Hip circumference.

Skin fold thickness: Skin fold measurements were also taken at the following sites by using skin fold measuring calipers:

- Biceps (BI) - front of arm.
- Triceps (TRI) - On the back of arm.
- Suprailica (SI)-Above iliac crest, at the level of umbilicus.
- Sub scapular (SS) - below inferior angle of scapula.

Statistical analysis

Arithmetic mean, Standard deviation was calculated for the statistical analysis of all the Anthropometric parameters. Unpaired t-test was used to test the significance of difference between mean values of all parameters of obese and non obese subjects.

RESULTS

There was no significant variation in age between obese and non-obese participants. Though body height did not show any significant inter-group variation but body weight was significantly higher (P<0.001) in obese group, and BMI score was also significantly higher (P<0.001) among obese. There was significant variation in mid arm circumference, Chest circumference, Hip circumference, Waist circumference, Waist hip ratio, Skin fold thickness between obese and non obese groups (P<0.001). All results are tabulated in Table I.

Table 1: Anthropometric parameters of obese and non-obese groups

Parameters	Obese (n=30)	Non obese (n=30)	P value
Age	23.5	23.3	0.054
Height (meter)	1.59 ± 0.04	1.58 ± 0.04	0.724
Weight (kg)	81.16 ± 8.21	55.34 ± 6.16	0.001*
BMI	28.02 ± 2.72	20.18 ± 1.18	0.001*
Mid arm circumference (cm)	29.12 ± 2.22	24.25 ± 4.52	0.001*
Chest circumference (cm)	98.45 ± 4.68	79.34 ± 6.26	0.001*
Waist circumference (cm)	95.82 ± 8.93	80.28 ± 8.26	0.001*
Hip circumference (cm)	102.14 ± 8.16	91.28 ± 6.73	0.001*
Waist to hip ratio	0.92 ± 0.04	0.82 ± 0.61	0.001*
Biceps Skin fold thickness (mm)	27.17 ± 5.24	22.31 ± 5.37	0.001*
Triceps Skin fold thickness (mm)	31.89 ± 6.33	24.65 ± 7.52	0.001*
Subscapular Skin fold thickness (mm)	30.14 ± 6.13	21.34 ± 6.39	0.001*
Suprailiac Skin fold thickness (mm)	32.11 ± 5.06	18.94 ± 7.24	0.001*

Data presented as Mean±SD.

DISCUSSION

Obesity is an epidemic disease. Body weight depends on balance between calorie intake and utilization of calories. Easy way to access things by motor vehicles, prolonged physical inactivity sitting in front of the computers, consumption of junk foods, all these factors contribute to less energy expenditure. Asian populations develop negative health consequences at a lower BMI than

Caucasians. Therefore in India a person with a BMI of 23 kg/m^2 will now be considered overweight and below that as one with normal BMI—unlike the cut-off limit of 25 kg/m^2 earlier. Those with BMI of 25 kg/m^2 will be clinically termed obese (as opposed to 30 kg/m^2 at the international level) and those with BMI of 32.5 kg/m^2 will require bariatric surgery to eliminate excess flab. According to guidelines, cut-offs for waist circumstances will now be 90 cm for Indian men (as opposed to 102 cm globally) and 80 cm for Indian women (as opposed to 88 cm at the international level).This is the first time India has officially compiled its weight and flab statistics to step up the fight against obesity and its direct fallout—diabetes. Studies say that India will become the global diabetes capital by 2050 if the abdominal and lower limb obesity and metabolic syndrome are not arrested[6]. The present study showed significant difference in all anthropometric measurements (body weight, body mass index, waist circumference, hip circumference, mid arm circumference, waist hip ratio and skin fold thickness) between obese and non-obese subjects, with obese subjects having higher values than the non-obese subjects. These findings might be explained by the direct effect of obesity and the positive correlation of the anthropometric measurements with each other. Our results were consistent with that of Dhuria S and Jia *et al*.[7,8] WHO has reported that, the body mass index (BMI), waist circumference (WC) and waist hip ratio (WHR) can be used in the prediction of abdominal visceral obesity, which positively correlates with each anthropometric variable. Waist circumference, hip circumference and waist hip ratio were greater in obese individuals compared to non-obese individuals. These findings might be explained by the facts that obese individuals trend to accumulate fat in the visceral region[9]. Thus, increasing WC and WHR, making obese individuals more predisposible to metabolic syndrome and its related complications. These findings were also similar to that obtained by Ascaso *et al*. (2003)[10].

CONCLUSION

Observations of this study shows that all anthropometric parameters of obese individuals were highly significant as compared to non-obese individuals, except body height. Obese individuals can use these anthropometric parameters as tool for monitoring their body fat indirectly. In view of current obesity trend and increasing cardiovascular diseases, it's advisable to decrease the daily calorie intake and also to improve fitness among young individuals by methodical and scientifically validated exercise regimen.

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