

Prevalence of obesity among under graduate medical students, a risk factor for Metabolic Syndrome

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Abstract: Background: Obesity is an epidemic of the 21st century. In Asia, Indians have a genetic susceptibility to develop obesity and Metabolic syndrome which is associated with cardio-metabolic risk factors. Aim and objective: To study the prevalence of overweight and obesity among under-graduate students of a medical college at Agaram village, Puducherry. Materials and method: About 384 students (212 boys & 172 girls) of average age 19.8 years participated in this study. Anthropometric measurements included height, weight, body mass index (BMI) and waist circumference. Clinical screening included blood pressure estimation. Statistics: The values were expressed as frequencies and mean \pm SD. Student 't' test and Chi-square tests were done to analyse the prevalence of obesity. Result: Based on Asia Pacific BMI guidelines 16.8% girls & 16.3% boys were in the overweight range. 41.2% girls & 34.43% boys were in the obese range. Conclusion: The prevalence of obesity is high in this study population. Hence screening for obesity (abdominal) a component of metabolic syndrome among young adults, effective education programme and life style modifications are urgently needed.

Keywords: Body mass index, Metabolic syndrome, Obesity, Waist circumference.

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I. Introduction

In recent years, occurrence of over-weight and obesity is very high affecting both developed and developing countries like India.^[1,2] The prolonged working hours in schools, lack of physical activity, pressure of examination and psychological stress^[3] leads to irregular and unhealthy eating habits among students. In India there is a nutritional transition from typical carbohydrate diet to fast food dietary habits, particularly among students.

According to the Western Pacific Regional Office of the World Health Organization (WHO) the revised BMI cut off levels for Asian people is 23.0 for overweight and 25.0 for obesity.^[4] Elevated body fat percentage and cardiovascular risks at low body mass index levels among Asian people, including Indians were well documented^[5]. Over-weight and obesity leads to metabolic syndrome which is a cluster of inter-related cardio-metabolic risk factors like Insulin Resistance, Dysglycemia, Dyslipidemia, and Hypertension.^[5] Waist circumference has been recognised as the best indirect clinical index of visceral fat accumulation.^[6] In a study conducted in Delhi, the prevalence of obesity was 33.4% in urban women and 21.3% in men.^[7] In India the incidence of obesity continues to increase and its prevalence among young adults vary between 10-30% according to a study conducted in Karnataka.^[8] In yet another study conducted among students in Navi, Mumbai about 75% of the subjects were in the over-weight range.^[9] In another study conducted in North India about 1/3rd of the subjects were over-weight and obese.^[10] South Indians are classified as metabolically obese due to larger adipocytes that are more resistant to the action of Insulin at lower BMI compared to Caucasians.^[11]

In India Diabetes Mellitus (DM) and Coronary Artery Disease (CAD) occurs at a very young age and hence the Union Health Ministry of India along with 20 other organizations like Regional Office for Western Pacific Region of WHO, International Obesity Task Force, Diabetes foundation of India, National Institute of Nutrition etc. have proposed a separate classification and BMI cut-off to define obesity in Asians in the year 2000.^[12] As per Modified National Cholesterol Education Programme-Expert Panel-Adult treatment panel III (NCEP-EP-ATP III) criteria,^[13] Waist circumference should be < 90cm in male and < 80 cm in female.^[14] Systolic Blood pressure (SBP) should be \leq 130 mmHg and Diastolic blood pressure (DBP) should be \leq 85mm Hg.^[15] So far only few studies have been done, especially in college population in spite of the high incidence of obesity and over-weight in them, with substantial risk for metabolic dysfunction. Hence in the current study we tried to assess the prevalence of obesity among undergraduate medical students of a tertiary care teaching hospital, (SLIMS) at Agaram village, Puducherry.

II. Materials And Methods

Sampling was universe and about 384 under-graduate students, aged 18-24years, who volunteered to participate in the study were enrolled. The study was carried out at a medical college (SLIMS) at Agaram village, Puduchery over a period of four months (October 2017 to January 2018). The study design and protocol was approved by SLIMS Research and Ethics Committee. The students were addressed in their class room regarding the features of the study programme and invited to participate voluntarily. Among the subjects who participated, 212 were male and 172 were female respectively.

Inclusion criteria: All students who gave informed consent.

Exclusion criteria: Known diabetic.

Anthropometric screening included measurement of height, weight, BMI and waist circumference (WC). All the instruments were standardized to reduce instrument error. Body weight was measured (to the nearest 0.5 kg) with the subject standing motionless on the weighing scale with feet 15 cm apart, and weight equally distributed on each leg. Height was measured (to the nearest 0.5 cm) with the subject standing in an erect position against a vertical scale of portable stadiometer and with the head positioned so that the top of the external auditory meatus was in level with the inferior margin of the bony orbit. Overweight/obesity was assessed on the basis of body mass index (BMI) for age using gender specific Centre for Disease Control (CDC) charts. WC was measured at the mid-point between the lowest rib and the iliac crest^[14] according to WHO guidelines using a stretch resistant tape after normal expiration.

Clinical screening included determination of blood pressure using digital blood pressure monitor (CH-432, CITIZEN Microhuman Tech) in sitting position after 5 minutes rest.

III. Statistical Analysis

The values were expressed as frequency and Mean \pm SD. Unpaired 't' test and Chi-square test was applied for comparison of mean difference of continuous variables among normal and obese group. All statistical analysis was performed by SPSS version 17. A p value ≤ 0.05 is considered significant.

Table:1 Classification of obesity based on revised BMI cut off

Classification	BMI cut off in kg/m ²	Male No. (%)	Female No. (%)
Under-weight	< 18.5	23 (10.8%)	20 (11.6%)
Normal	18.5-22.9	82 (38.6%)	52 (30%)
Over-weight	23-24.9	34 (16.03%)	29 (16.8%)
Obese-Grade-I	25-29.9	52 (24.52%)	51 (29.6%)
Obese-Grade-II	>30	21 (9.9%)	20 (11.6%)

Table: 2 Mean systolic and diastolic blood pressure of the study population.

Clinical parameters	Mean \pm SD
Systolic BP in mm of Hg	113.66 \pm 10.77
Diastolic BP in mm of Hg	73.58 \pm 7.07

Table: 3 Comparison of the mean systolic and diastolic blood pressure in male subjects with and without abdominal obesity.

Clinical Parameters in male subjects	Waist circumference ≤ 90 cm (n=149)	Waist circumference ≥ 90 cm (n=63)	P value
Systolic BP in mm of Hg	110.45 \pm 8.80	120.03 \pm 12.76	0.001*
Diastolic BP in mm of Hg	73.30 \pm 6.22	76.56 \pm 6.81	0.001*

Table:4 Comparison of the mean systolic and diastolic blood pressure infemale subjects with and without abdominal obesity.

Clinical parameters in female subjects	Waist circumference ≤ 80cm (n=99)	Waist circumference ≥ 80cm (n=73)	P value
Systolic BP in mm of Hg	107.59 ± 8.85	116.79 ± 10.69	0.001*
Diastolic BP in mm of Hg	70.74 ± 7.11	75.42 ± 7.44	0.001*

Table: 4 shows a significant p value of 0.001 on comparison of systolic and diastolic blood pressure among female with and without abdominal obesity. (A ‘p’ value ≤ 0.05 is considered significant).

IV. Result

The prevalence of obesity among medical students in the present study is 29.7% among male and 42.4% among female students. Table:1 shows the mean systolic and diastolic blood pressure in the study population. Table:2 shows that 16.03% of male and 16.8% of female students were in the over-weight range. About 24.52 % of male and 29.65 of female were in the obese Grade-I range and 9.9 % male and 11.6 % female were in the obese Grade-II range respectively. In table:3 the male students (n=212) were grouped into two based on their Waist circumference ≤ 90cm, 70.3% (n=149) and ≥ 90cm, 29.7% (n=63). The systolic BP and diastolic BP, were significantly higher in subjects with abdominal obesity compared to normal group.

In table: 4 the female students (n=172) were grouped based on waist circumference ≤ 80cm (n=99) corresponding to 57.6% and ≥ 80cm (n=73) corresponding to 42.4%. The systolic BP and diastolic BP, were significantly higher in subjects with abdominal obesity compared to normal group.

V. Discussion

In our study 16.03% male subjects and 29% female subjects were in the overweight range and 24.5% male and 29.6% female subjects were in the Grade I obesity range and 9.9% male and 11.6% female were in Grade II obesity range based on WHO global BMI standards. This is very high as compared to a study conducted among adolescents in Chennai city, in which only 6.2% were overweight and 5.2% were obese.^[16] In a study, conducted among medical students in Kerala^[17] the prevalence of obesity based on Asia-Pacific guideline was 25.71% and overweight was 24.57% which is similar to our study. In another study conducted among medical students in Malaysia, 5.2% were found to be obese (BMI > 30 kg/m²) and 14.8% were found to be overweight (BMI 23-24.9 kg/m²); 13.7% of males and 15.7% of females respectively^[18].

The prevalence of obesity among medical students in the present study was 29.7% among male and 42.4% among female students which is similar to a study conducted among medical students of Kanchipuram district published in National Journal of Research in community Medicine Vol.2. Issue 2 July. Sep. 2013 (079-148). In table:3 the male students (n=212) were grouped into non-obese (n=149) and obese group (n=63) based on BMI. Among male, about 29.7% (n=63) were in the obese range.

In table:4 the female students (n=172) were grouped into non-obese (n=99) and obese group (n=73) based on BMI. Among female students, about 42.4% (n=73) were in the obese range. This is very much high as compared to male students. The important findings on comparing the anthropometric, and clinical parameters between the obese and non-obese group is as follows: The systolic BP, diastolic BP and waist circumference were significantly higher in obese group compared to non-obese group. In our study the mean systolic and diastolic blood pressure was low in female subjects compared to male subjects. However compared to male students significantly more number of female students had abdominal obesity, the best indirect clinical index of visceral fat accumulation.^[14]

VI. Conclusion

The emergence of obesity in young adults can be contributed to nutritional shift, life style transitions like lack of proper sleep and addiction to sedentary activities like television viewing, smart phones and computer usage. So this study is aimed to create an awareness among students regarding maintenance of healthy habits, normal weight and regular physical activity. The draw back of this study is the sample size. From the present study it has been concluded that obesity is an aggravating and contributing factor for development of metabolic syndrome, diabetes and cardiovascular disease at an early age. We would like to stress the importance of early screening for obesity and metabolic abnormalities in young adults.

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