# Burden of combined obesity among students of a medical college in Guntur city of Andhra Pradesh

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**Background:** Obesity is a major public health problem especially in adolescent age group. Obesity is now recognized as a chronic or non-communicable disease. Medical students are not an exception to this fast spreading epidemic, despite their medical knowledge. Few studies in fact have reported higher prevalence among medical fraternity than general population. Also, based on scientific evidence of higher proportion body fat than muscle mass among Asian Indians, the actual prevalence may be higher than what is assessed by WHO cut off for BMI. In some cases central obesity is very high in individuals whom the BMI is normal. Both BMI and WC in combination would be better predictors of obesity related diseases than sole using of BMI or WC alone. Very limited knowledge is available on combined obesity. So, we planned this study to know its burden especially among medical students. **Methodology:** It was a cross-sectional study at a medical college in Andhra Pradesh. A total of 207 medical students were selected from first and third semesters by simple random selection. Data was collected on sociodemographic data and the data of height and weight (BMI, General obesity), waist circumference (Central obesity). Finally, we estimated the burden of combined obesity (BMI+C.O). **Results:** It was observed that 35 (16.91%) medical students were having combined obesity (obesity according to BMI and waist circumference G.O + C.O). Among them 15 (20%) are male, and 20 (15.15%) are female students. **Conclusions:** The present study gives an idea about the high prevalence of combined obesity in the medical students. This should be an alert signal because medical students are the future doctors, health leaders and role models to the community. So, we need to identify specific barriers among medical students and come up with workable solutions.

**Keywords:** BMI, Central Obesity, Combined Obesity, General Obesity, Medical Students

# Introduction

**Background:** Obesity is a major public health problem especially in adolescent age group. Obesity is now recognized as chronic non-communicable disease [1]. Medical students are also not an exception to come under this over weight and obesity category in spite of their medical knowledge. Stress is the major factor which contributes to obesity [2].

Medical education is highly stressful so majority of the students are having irregular unhealthy lifestyle. Due to the pressure of examinations and lack of coping skills medical students have irregular dietary habits. Medical students need to be extra conscious about overweight and obesity because its prevalence was found as high among them.

This obesity and overweight is a major risk factor for non-communicable diseases and co morbidities [3-4]. In Asian Indians evidence show that body fat is more than muscle mass. According to WHO cut off for BMI in non obese are actually obese when body fat taken into consideration [5]. In some cases central obesity is very high in individuals whom the BMI is normal which has been termed "metabolically obese" [6].

Studies shows that in The Asian Indians body fat composition is high compared to muscle mass which is the main cause for metabolic obesity. Some Indians considered non-obese by the WHO criteria of BMI cut-offs are actually obese when body fat is used to define obesity. Secondly there is a high prevalence of abdominal adiposity even in people who are otherwise considered as non-obese [7-8-9].

Central obesity is important risk factor for cardiac risk than compared to general obesity. Waist circumference is simple and easily obtainable measurement for central obesity [10-11].

In many studies BMI has taken as important parameter for obesity, but in few studies waist circumference has taken into consideration. In our study we have taken both BMI and WC combined obesity which is a potential risk factor for many diseases especially non-communicable diseases.

So this study was done with the aim to estimate the prevalence of central obesity combined with high Body Mass Index among the undergraduate medical students.

**Objectives of the study:** The primary objective Was to assess the burden of central obesity combined with high Body Mass Index among medical students.

# Methodology

**Study setting:** The current study was conducted in a tertiary care teaching hospital in Andhra Pradesh

**Study duration:** Study was conducted for a period of twelve months in the year 2018 including study design, approval and data acquisition and analysis

**Study type**: Cross-sectional study

**Sampling methods**: We have selected 207 medical students from first and third semesters by simple random selection.

**Inclusion criteria:** First and third semester students of MBBS were included in the study.

**Exclusion criteria:** if the student was suffering from any psychiatric illness or under any antidepressant medications they were excluded from the study.

**Data collection procedure:** Data was collected using a structured data collection tool, comprising of self-administered close ended questionnaire on key demographic variables. The tool also had details regarding the anthropometric parameters like weight, height, waist circumference.

Initially data on self-administered questionnaire was collected in the class room, after making them seated at sufficient distance to avoid discussion and exchange of information. Later anthropometric measurements were done at the end of practical or clinical posting sessions.

Height was recorded with stature meter, while individuals stood straight with their heels, buttocks and scapula rest against a wall. Waist circumference (WC) was measured using a flexible non-elastic measuring tape. Individuals stood with their feet together, arms resting by their side.

Waist circumference was measured at the approximate midpoint between the lower margin of the last palpable rib and the top of the iliac crest according to WHO STEPS protocol [12].

The BMI was calculated using the Quetelet's equation (ratio of weight in kg and square of height in m). BMI cut off values for Indians to define overweight and obesity taken from WHO. Participants with waist circumference value higher

Than gender specific waist circumference cut off values (90 cm for males and 80 cm for females) were considered to central obesity. People with both higher BMI and higher than gender specific cut off value of waist circumference were considered as central obesity [5].

**Data analysis:** Data was compiled in Excel sheet and later analysed with SPSS Statistics version 21. Quantitative variables were summarized as mean and standard deviation; categorical variables were summarized as frequencies and percentages.

Association between quantitative variables was assessed by Pearson correlation coefficient. P Value < 0.05 will be considered as statistically significant.

**Ethical consideration and permission**: Study was commenced after Institutional ethical committee approval. Written informed consent was obtained from the participants before initiation of the study.

# Results

A total of 207 students were included in the final analysis. Among 207 students, males were 75 (36.23%), females 132 (63.77%), hostellers 73 (35.3%), day scholars 134 (64.7%).

Family history nil for NCD's in 60 (29%), in 61 (29.5%) one lifestyle diseases was present, in 86 students (41.5%) more than one problem present for e.g. either hypertension, or diabetes or CAD.

Among 207 students 62 (29.9%) are not involved in any sort of exercise, 54 (26.1%) students were doing 30 minutes per day, 85(41.1%) students were involved in sports for more than 30 minutes per day.

Time spending with TV music up to one hour seen in maximum number of students 117 (56.5%), 17 students (8.2%) watching for 3 hours and more than 3 hours per day. Mobile usage of up to 1hour seen in 125 (60.4%) students, maximum of 3 hours and more seen in 33 (15.9%) students (Table 1).

**Table-1: Characteristics of the study population (N=207).**

| Parameter | N (%) |
|---|---|
| **Gender** | |
| Male | 75 (36.23 %) |
| Female | 132 (63.77 %), |
| **Place of residence** | |
| Hostel | 73 (35.3%), |

| Parameter | N (%) |
|---|---|
| Day scholar | 134 (64.7%) |
| **Socio economic status** | |
| below Rs.40,000 | 52 (25.11%) |
| Rs.40,000 to Rs.1 lakh | 120 (58.0%) |
| more than 1lakh | 35 (16.9%) |
| **Family history of NCD** | |
| Nil | 60 (29%) |
| One | 61 (29.5%) |
| More than 1 NCD | 86 (41.5%) |
| **Physical activity** | |
| Nil | 62 (29.9%) |
| 10 to 20 mints per day | 6 (2.9%) |
| 30 mints per day | 54 (26.1%) |
| More than 30 minutes per day | 85 (41.1) |
| **Spending with TV** | |
| Nil | 11 (5.3%) |
| Up to 1 hour | 117 (56.5%) |
| More than 1 hour | 79 (38.2%) |
| **Mobile phone usage** | |
| 1hour seen in | 125 (60.4%) |
| >1 hour to <3 hours | 49 (23.7) |
| 3hours and more | 33 (15.9%) |

**Table-2: Prevalence of Obesity as per different criteria.**

| Obesity | Male (N=75) | Female (N=132) | Overall (N=207) |
|---|---|---|---|
| **Obesity (As per BMI)** | | | |
| Yes | 22 (29.33%) | 27 (20.45%) | 49 (23.67%) |
| No | 53 (70.67%) | 105 (79.54%) | 158 (76.33%) |
| **Obesity as per WC** | | | |
| Yes | 20 (26.67%) | 34 (25.76%) | 54 (26.09%) |
| No | 55 (73.33%) | 98 (74.24%) | 153 ( 73.91%) |
| **Obesity Combined** | | | |
| Yes | 15 (20%) | 20 (15.15%) | 35 (16.91%) |
| No | 60 (80%) | 112 (84.85%) | 172 (83.09%) |

According to waist circumference 20 males (26.67%) have central obesity (WC > 90cm), female students 34 (25.76%) have central obesity (WC > 80cm), 55 (73.33%) male students and 98 (74.24%) female students have waist circumference within normal limits (Table 2).

It was observed that 35 (16.91%) medical students were having combined obesity (obesity according to BMI and waist circumference G.O + C.O). Among them 15 (20%) are male, and 20 (15.15%) are females (Table 2).

**Table-3: Correlation among different variables.**

| Correlations | | Waist Circumference | Exercise | Reading | Mobile | Physical Activity | TV and Music |
|---|---|---|---|---|---|---|---|
| Waist Circumference | Pearson Correlation | 1 | -0.292** | 0.083 | -0.023 | -0.320** | 0.081 |
| | Sig. (2-tailed) | - | 0.000 | 0.236 | 0.741 | 0.000 | 0.245 |
| Exercise | Pearson Correlation | -.292** | 1.0 | 0.077 | -0.008 | 0.723** | 0.032 |
| | Sig. (2-tailed) | <0.001 | - | 0.269 | 0.910 | 0.000 | 0.642 |
| Reading | Pearson Correlation | 0.083 | 0.077 | 1.0 | -0.219** | 0.263** | -0.168* |
| | Sig. (2-tailed) | 0.236 | 0.269 | - | 0.001 | 0.000 | 0.016 |
| Mobile | Pearson Correlation | -0.023 | -0.008 | -0.219** | 1 | 0.015 | 0.054 |
| | Sig. (2-tailed) | 0.741 | 0.910 | 0.001 | - | 0.826 | 0.436 |
| Physical Activity | Pearson Correlation | -0.320** | 0.723** | 0.263** | 0.015 | 1 | 0.001 |
| | Sig. (2-tailed) | <0.001 | <0.001 | <0.001 | 0.826 | - | 0.993 |
| TV & Music | Pearson Correlation | 0.081 | 0.032 | -0.168* | 0.054 | 0.001 | 1 |
| | Sig. (2-tailed) | 0.245 | 0.642 | 0.016 | 0.436 | 0.993 | - |
| **. Correlation is significant at the 0.01 level (2-tailed). | | | | | | | |
| *. Correlation is significant at the 0.05 level (2-tailed). | | | | | | | |

It was found significant (P<0.001) positive correlation between BMI and Waist Circumference. There is significant (P<0.001) negative correlation between Waist Circumference and exercise.

There is significant negative correlation between reading and mobile usage. TV viewing & listening music also has significant negative correlation with reading (Table 3).



**Figure 1: Prevalence of overweight and obesity according to BMI**

According to BMI (WHO'S South East Asian guidelines) [13], 115 (55.56%) students comes under normal weight (BMI 18.5 to 22.9), 43 (20.77%) students comes under over weight (BMI= 23 to 24.9), 49 (23.67%) students belongs to the category of general obesity (BMI > 25) (Figure 1).

# Discussion

In this study among 207 students 43 (20.77%) students are overweight and 49 (23.67%) were obese according to BMI. Central obesity according to

Waist circumference observed in 54 (26.09%) medicos. Combined obesity (BMI + C.O) is seen among 35 (16.91%) medical students.

BMI and Waist circumference was positively correlated, means when BMI increasing waist circumference also increasing. Waist circumference is significantly correlated negatively with exercise or physical activity.

Similar study was conducted at Meenakshi Medical College hospital and research institute, Enathur, Kanchipuram district, Tamil Nadu, Out of 500 students, 458 (92%) participated in the study [14]. 54% among them were males and 46% were females.

The prevalence of overweight was 24.3% and the prevalence of obesity according to BMI was 8.6% according to WHO guidelines [15]. Similar study conducted at BMCRI, Bengaluru, from July-September 2014, in this study only BMI and waist circumference taken for estimating prevalence of obesity [16].

Out of the total 424 students studied, 62 (14.6%) were overweight and 48 (11.3%) were obese according to BMI. Risk factors like junk food, long hours of mobile and computer usages were taken. Out of 424 students studied, 47 males and 110 females making a sum of 157 (37%) who was considered to have central obesity according to their waist circumference [16].

Another study done at Haryana among 130 MBBS students, normal BMI was observed in 73.1%
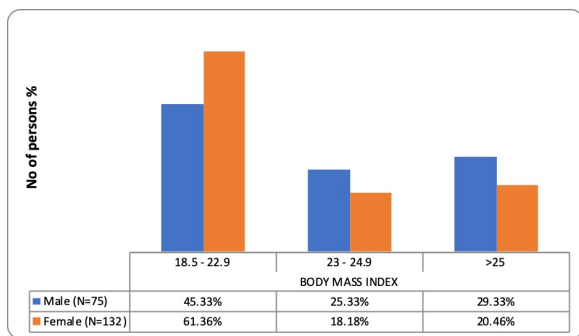
Students, while 22.3% students were overweight, 3.1% obese [17]. A study was done at G.R medical college Gwalior among 131 second semester medical students.

In that study also BMI taken for overweight and obesity assessment and found the prevalence of overweight was 13(9.93%) and the prevalence of obesity was 2 (1.53%). The prevalence of underweight was 25 (19.08%) [18].

In this study we mainly concentrated on combined obesity which includes both BMI and waist circumference, which predicts more metabolic obesity. 20% of male students, 15.15% female students have combined obesity which is alarming.

Evidence suggests that the body composition abnormalities of Asian Indians may have an important bearing on the pathogenesis of metabolic derangements. First, their body fat is more and muscle mass less than compared with other Asian ethnic groups. Present day dietary habits, stressful routine lead to decreased physical activity is a primary drive of overweight and obesity.

Obesity leads to many medical consequences like hypertension, diabetes, coronary artery disease, stroke, and cancers. Psychological consequences are anxiety, depression, isolation, rejection, poor self-image, and poor performance and the mechanical disturbances include osteoarthritis, abdominal hernia, diaphragmatic hernia, varicose veins.

Chronic obesity ultimately leads to increased insulin resistance, because of visceral fat which is a passive source of several hormones, cytokines and chemical signals to other tissues which can develop into type 2 diabetes. Central obesity is an important predictor of metabolic disorders than BMI [19].

Obesity is not only aetiology of many diseases it also affects the quality of life and finally leads to premature death [20]. Both BMI and WC in combination would be better predictors of obesity related diseases than sole using of BMI or WC alone [21].

Medical students in this study were in prepathogenesis phase or in latent period of non-communicable diseases. The obesity problem can be reversible if we tackle them as early as possible through proper balanced diet, preventing sedentary lifestyle such as reducing TV watching time, promoting more physical activity and sports according to their interest and also coping skills for stress management.

# Conclusion

The present study gives an idea about the high prevalence of overweight and obesity in the medical students. Obesity due to BMI and Waist circumference (Combined Obesity) in this study shows alarming situation in medical students. This study highlights that medicos though they are having knowledge about nutrition and physical activity could not be able to implement practically.

Students should focus on improving time management skill also they need to be encouraged to participate in physical exercise, especially sports, athletics, and other outdoor activities. Improvement in dietary habits, if made in early years of medical schooling, would produce physicians practicing and promoting healthy dietary habits. Awareness through health education was created to the medical students while measuring anthropometric measure-ments.

This should be an alert signal because medical students are the future doctors, health leaders and role models to the community. Further studies should be undertaken to identify specific barriers among medical students in practicing healthy dietary habits and come up with workable solutions. Therefore, it is of utmost importance to have early intervention programmes to prevent non-communicable diseases among these future doctors.

# What this study adds to existing knowledge

The study had highlighted the prevalence of different types of overweight and obesity among medical students. The key addition of the study was it's documentation of overall and central obesity and their overlap among the study population. The study highlights the importance assessing waist circumference, along with BMI, to avoid underestimation of the true burden of overweight and obesity.

# Author contribution

Dr. SS had conceptualized the study, prepared the study protocol, and conducted the data collection, analysis and manuscript writing. She has verified all the drafts and approved the final draft. Dr. SD had provided key inputs on methodology during protocol preparation, supported data compilation and analysis. She has also edited all the drafts and

Approved the final draft of the manuscript.

# Limitations

First, the sample used in this study was a convenient sample and thus findings need to be interpreted with caution. Further qualitative studies are needed for better understanding to plan for interventions.

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