



## Body Mass Index ( BMI ) : Mirror of Health

### KEYWORDS

Body Mass Index, collegian students, anthropometric measurement, health risk

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**ABSTRACT** BMI is the product of height and weight. BMI has been used in Clinical practice by the WHO as the standard for recording obesity statistics since the early 1980s. We randomly selected 500 students from college campus. The anthropometric measurement of 249 male and 251 female students were recorded. For BMI status, findings were tabulated, calculated and represented graphically. We found maximum percentage of underweight students ( 49 % ), as compared to normal BMI ( 47.6 % ), overweight students observed ( 2.8 % ) and obese students ( 0.6 % ), due to many different factors such as stress, tension, restlessness, study, etc affecting their diet and health.

### Introduction:

The body mass index (BMI), or Quetelet index, is a measure for human body shape based on an individual's mass and height. BMI is a statistical measure of body weight based on a person's weight and height. BMI was invented between 1830 and 1850 by the Belgian polymath Adolphe Quetelet during his study on social physics. It is defined as the individual's body mass divided by the square of their height – with the value universally being given in units of kg/m<sup>2</sup> gives an indication of nutritional status. With the availability to refer to BMI charts, it is useful in comparing with others of the same age, gender and race.

BMI can be calculated with reference to their age according to different age groups as it has different ranges for being overweight, underweight or normal weight. BMI provides a reliable indicator of body fatness for most people and is used to screen for weight categories that may lead to health problems. However, when evaluating the BMI, several characteristics of an individual need to be known. An individual's age, gender, ethnicity, and level of fitness must be considered when using BMI to determine health risk. BMI of less than 18.5 is underweight, indicating a possible case of eating disorder or malnutrition.

### Review of proposed area:

According to the most recent National Health and Nutrition Examination Survey (NHANES III, 1988-1994), between one-third and one-half of US men and women 20 years and older are overweight, and nearly one-fourth are clinically obese. It is often a lifelong problem that preferentially affects women (Dickerson, 2001). Many studies have shown that, BMI range and classification has a possible link of developing obesity related diseases as well as premature death. Obesity is the nutritional disorder in the developed world. In the United States, BMI is also used as a measure of underweight, owing to advocacy on behalf of those suffering with eating disorders, such as anorexia nervosa and bulimia nervosa. A wide variety of social science outcomes are affected by health (Culyer and Newhouse, 2000). A study published by JAMA in 2005 showed that overweight people had a similar relative risk of mortality to normal weight people as defined by BMI, while underweight and obese people had a higher death rate. High BMI is associated with type 2 diabetes only in persons with high serum gamma-glutamyl transpeptidase.

### Research Methodology

For our data collection, we randomly selected 500 students from XI, XII and UG level of Pratibha Niketan College campus, Nanded ( M. S. ). The height and weight of 249 male and 251 female students were measured. The data was collected by taking anthropometric measurements of the students. To minimize inaccuracy in the measurements, we measured height and weight of the students in the college time, because heavy lunches taken by students may affect the results. The data was collected in the year 2013-2014. We recorded the data in tabular form, calculated student's BMI by using given formula and tally it with internationally recommended BMI chart and table 1. After analysis graph has been made such as figure 1 and 2.

### Anthropometric Measurement

We recorded the BMI readings in the college campus at department of Zoology whereby the student mobility occurs. Students are asked to remove their shoes, belongings like jacket, coat, hair ornaments, etc. Student's height and weight measured successively until coincide readings.

**Height** is the distance between the lowest and highest points of a person standing upright. Height was measured by using wall mounted stadiometer with movable head piece. The stadiometer was fixed from the 200 cm mark up against the wall from the floor. Height was measured by using a stadiometer in cm. The height rule is taped vertically to the hard flat wall surface with the base at floor level. The wall may not have a base-board molding. The students were asked to stand with his/her back to the height rule. The back of the head, back, buttocks, calves and heels should be touching the upright, feet together. The top of the external auditory meatus (ear canal) should be level with the inferior margin of the bony orbit (cheek bone). The students were asked to look straight. The head piece of the stadiometer was lowered so that the hair pressed flat. Height was recorded to the resolution of the height rule (i.e. nearest millimetre/half a centimetre). If the student was taller than the measurer, the measurer should stand on a platform so that he/she can properly read the height rule. **Weight** is a body of determinate mass, as of metal, for using on a balance or scale in weighing objects, substances, etc. Weight of students measured by using weighing machine in kg. The student stands in the centre of the plat-

form, weight distributed evenly to both feet. Standing off-centre may affect measurement. Self-reported weights are not acceptable, even if the student is immobile or refuses to be weighed. The weighing machine was placed nearby to the stadiometer. The weighing machine should be placed on a hard-floor surface (not on a floor which is carpeted or otherwise covered with soft material). If there is no such floor available, a hard wooden platform should be placed under the weighing machine. A carpenter's level should be used to verify that the surface on which the weighing machine is placed in horizontal position.

### Result and discussion:

We have recorded BMI readings of 500 students from Pratibha Niketan Mahavidyalaya, Nanded. It includes 249 males and 251 females of 11<sup>th</sup>, 12<sup>th</sup> and UG class. From table 2 and figure 1 and 2, the total 249 males consist of 58 from XI<sup>th</sup> class, 97 from XII<sup>th</sup> and 94 from UG. Total 251 females consist of 92 from XI<sup>th</sup>, 88 from XII<sup>th</sup> and 71 from UG. Out of 500 students we got 49 % were underweight that is 245, Normal 238 (47.6 %), overweight 14 (2.8%), obese 3 (0.6 %). We calculated BMI of 58 male students from XI<sup>th</sup> class, in which underweight are maximum 41 (70.68 %), normal 15 (25.86 %), overweight 2 (3.44 %). No one recorded as obese. We measured BMI of 97 male students of XII<sup>th</sup> class in which normal are maximum 54 (55.67 %), underweight 40 (41.23 %), obese 2 (2.06 %), overweight 1 (1.03 %). We recorded BMI of 94 male students from UG level in which normal are maximum 49 (52.12), underweight 41 (43.61 %), overweight 4 (4.25 %). No one obese has been found. We examined 92 females for BMI from XI<sup>th</sup> class in which maximum 49 (53.26) are underweight, normal 40 (43.47), overweight 3 (3.26 %) and no one obese has been obtained. In XII<sup>th</sup> class we collected BMI of 88 females in which maximum 45 (51.13 %) are normal, 41 (46.59 %) underweight, 1 (1.13 %) overweight and 1(1.13 %) obese. We calculated BMI of 71 female students at UG level in which maximum are underweight 39 (54.92 %), normal 29 (40.84 %), overweight 3 (4.22 %), and no obese at all.

### Conclusion

Most of the college students does not aware of their health so we found maximum percentage of underweight students ( 49 % ), normal students ( 47.6 % ), overweight students ( 2.8 % ) and obese students ( 0.6 % ). Due to many different affecting factors on their health and diet, we obtained such type of result. Underweight BMI may be due to genetics, metabolism, lack of food or illness. Life style of collegian students is so busy. Their daily schedule has no relax time at all. They should concentrate on their study and ultimately it affects on their meal, sleeping time, thus student generally suffering from tension, depression, fear, parent's botheration, competition in educational fields, etc. This phase mostly commence from board examination (tenth standard) and till their whole student life. We have found concerning result that student from collegian campus showing maximum underweight BMI ( 49 % ), than normal BMI (47.6 %).

### BMI and Health Risk

#### Overweight and Obesity-Related Health Problems in Adults

Obesity hypoventilation syndrome (OHS) is a breathing disorder that affects some obese people. People who are overweight or obese are at increased risk of having gallstones. Most overweight people have type 2 diabetes. People who are overweight or obese often have health

problems that may increase the risk for heart disease. These health problems include high blood pressure, high cholesterol, and high blood sugar. Obesity also can lead to heart failure. Obesity is a concept that refers to excessive fatness (Bjorntorp, 2002; Bray, Bouchard, and James, 1998).

High BMI can lead to a buildup of plaque in your arteries. If the clot is close to your brain, it can block the flow of blood and oxygen to your brain and cause a stroke. Rise in BMI increases the risk for several cancers. Fat cells may release hormones that affect cell growth, leading to cancer. Being overweight or obese raises your risk for colon, breast, endometrial, and gallbladder cancers. Obesity is the most important risk factor for sleep apnea. Being overweight Osteoarthritis is a common joint problem of the knees, hips, and lower back. The fatty liver disease most often affects people who are middle-aged, overweight or obese, and/or diabetic. Recent studies suggest that obesity may promote chronic kidney disease. Overweight also increases the risks associated with surgery and anesthesia, and severe obesity increases surgery time and blood loss. Obesity can cause menstrual issues and infertility in women. Fatness is a risk factor for ischemic heart disease, congestive heart failure, stroke, cancer, respiratory disease, diabetes, hyper lipidemia, hypertension, asthma, sleep apnea, arthritis, degenerative joint disease, gastric reflux, and depression (Pi-Sunyer, 2002; U.S. D.H.H.S., 2001; NIH, 1998). Given the link between fatness and morbidity and mortality, excessive fatness is now recognized as one of the most serious public health challenges facing the U.S. (U.S. DHHS, 2001) and other industrialized countries (International Obesity Task Force, 2005).

#### Underweight-Related Health Problems in Adults

Women who are very thin may stop ovulating, experience irregular periods or face fertility issues. If a man is underweight, his sperm count is 33% lower than those who are not. The American Journal of Public Health showed that underweight men had a higher risk of dying in car accidents. Underweight person are most susceptible to Brittle Bones, arthritis, heart disease, Type 1 Diabetes, Breast Cancer, depression, weakened Immune System, osteoporosis, anemia, hair loss, Anorexia and Bulimia. Underweight students have poor physical stamina and weak immune system. Proper diet, exercise, appetite stimulants are some preventive measures on it.

$$\text{BMI} = \frac{\text{[Weight in kilograms]}}{\text{[Height in meters]}^2}$$

#### BMI calculation formula:

Table: 1

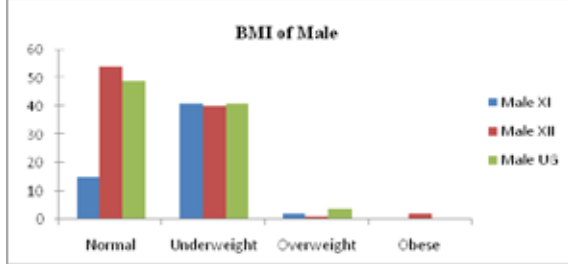
Recommended BMI Chart	
Underweight	BMI less than 18.5
Ideal/normal	BMI 18.5-25
Overweight	BMI 25-30
Obese - should lose weight	BMI 30-40
Very obese - lose weight now	BMI greater than 40

**Table: 2**  
**Number and BMI status of Pratibha Niketan College campus students in 2013-2014**

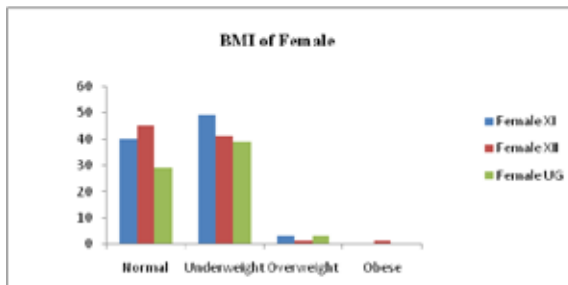
Sex/ BMI	Class	Normal	Under-weight	Over-weight	Obese	Total	Total
No. of Male	XI	15	41	2	00	58	249
	XII	54	40	1	2	97	
	UG	49	41	4	00	94	
No. of Fe-male	XI	40	49	3	00	92	251
	XII	45	41	1	1	88	
	UG	29	39	3	00	71	
Total		238 (47.6 %)	245 (49 %)	14 (2.8 %)	03 (0.6 %)		500

**Figure: Gender wise Number and BMI status of college campus students in 2013-2014**

**Figure 1**



**Figure 2**



X-Axis= Number of students; Y-Axis= BMI status

**REFERENCE**

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