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A Study on the Implications of Body Mass Index Analysis Amongst College Students from Chennai, India

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A B S T R A C T

The youth of today has the power to help a country develop and move towards progress. 'Overweight and Obesity' is a serious concern among the youth today. This increases the chances of dying from hypertension, type 2 diabetes, coronary heart disease, stroke, gallbladder disease, osteoarthritis, sleep apnea, respiratory problems, dyslipidaemia and endometrial, breast, prostate, and colon cancers. The body mass index (BMI) is currently in use for defining anthropometric height/weight characteristics in adults and for categorizing them into groups. The common interpretation is that it represents an index of an individual's fatness, BMI is a person's weight in kilograms (kg) divided by his or her height in meters squared. The National Institutes of Health (NIH) now defines normal weight, overweight, and obesity according to BMI. A BMI of less than 18.5 kg/m² indicates -underweight. The WHO also regards a BMI of less than 18.5 as underweight and may indicate malnutrition, an eating disorder, or other health problems if the BMI is 19 to 24.9 kg/m², it is considered a healthy weight. A BMI of 25 to 29 kg/m² is defined as overweight. A BMI of over 30 kg/m² is defined as obese. The present work was carried out to study the BMI of college students and the influence of age, gender family income and feeding habits on BMI. The normal weight category had the highest percentage of students, followed by underweight, overweight and obese. The trend of BMI categorized with their percentages was similar in both male and female. Age wise analysis showed that the normal weight BMI in the age group 20 and the age group 19 showed maximum underweight BMI. Food habits involving consumption of milk and egg, and timely consumption of meals did not show any correlation with BMI besides family income and food habits did not show any correlation with BMI in the present study.

Key words: BMI, Obesity, Health, Diet, Fitness

The youth of today has the power to help a country develop and move towards progress, the youth play a great role in nation-building. – According to Kailash Satyarthi [1], no segment in the society can match with the power, idealism, enthusiasm and courage of the young people." Hence the issues concerning the health and wellbeing of the youth needs to be addressed with due importance. Besides of the top 10 most common health issues concerning the youth being 'Overweight and Obesity' comes second next to Physical Activity and Nutrition (URMC information 2021). Hence it was appropriate to analyze this common health issue by studying the BMI amongst the college students. As being overweight or obese increases the chances of dying from many diseases.

The body mass index (BMI) is currently in use for defining anthropometric height/weight characteristics in adults and for categorizing them into groups. The common

interpretation is that it represents an index of an individual's fatness. It also is widely used as a risk factor for the development of or the prevalence of several health issues. BMI is a person's weight in kilograms (kg) divided by his or her height in meters squared. The National Institutes of Health (NIH) now defines normal weight, overweight, and obesity according to BMI rather than the traditional height weight charts. The formula in metric units for BMI= weight (in kilograms) height (in meters) 2. In English units, the formula for BMI- weight in pounds Vs Height (in inches). BMI is a person's weight in kilograms (kg) divided by his or her height in meters squared. The National Institutes of Health (NIH) now defines normal weight, overweight, and obesity according to BMI rather than the traditional height weight charts. The formula in metric units for BMI= weight (in kilograms) height (in meters) 2. In general, a BMI over 25 is now the standard to indicate a person is overweight. BMI is classified in the following ways. A BMI of less than 18.5 kg/m² indicates -underweight. The WHO also regards a BMI of less than 18.5 as underweight and may indicate malnutrition, an eating disorder, or other health problems If the BMI is 19 to 24.9 kg/m², it is considered a healthy weight. A BMI of 25 to 29 kg/m² is defined

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as overweight. A BMI of over 30 kg/m² is defined as obese and means the health is at risk.

The basis of the BMI was devised by Adolphe Quetelet, a Belgian astronomer, mathematician, statistician and sociologist, from 1830 to 1850 during which time he developed what he called "social physics" The modem term "body mass index (BMI) for the ratio of human body weight to squared height was coined in a paper published in the July 1972 edition of the Journal of Chronic Diseases by Ancel Keys. The BMI is universally expressed in kg/m², resulting from mass in kilograms and height in metres. The effect of men working in industries had influence on the glucose tolerance and cardio vascular risk factors, from this we come to known that the obesity was higher among shift workers compared to day workers, whereas body fat distribution was different between the two groups, shift may be directly responsible for increased body fatness [2]. According to WHO 2021, worldwide obesity has nearly tripled since 1975. It is likewise stated that in 2016, more than 1.9 billion adults, 18 years and older, were overweight. Of these over 650 million were obese, 39% of adults aged 18 years and over were overweight in 2016, and 13% were obese, most of the world's population live in countries where overweight and obesity kills more people than underweight, 39 million children under the age of 5 were overweight or obese in 2020. The present work was carried out to study the BMI of Chennai college students and the influence of age, gender family income and feeding habits on BMI.

MATERIALS AND METHODS

The students from various Chennai city colleges were randomly chosen for the study. The students' height in centimeters and weight in kilograms were recorded. They were questioned individually regarding their food habits, their meal timings, their routine schedule and about the family income. The details collected were classified and tabulated. The collected data were analyzed and discussed:

BMI was calculated using the formula:

Weight (kg) / Height (m)²

RESULTS AND DISCUSSION

The BMI analysis is an attempt to categorize a person as underweight, normal weight, overweight, or obese based on the calculated value. Commonly accepted BMI ranges are underweight; UW-18.5 kg/m², normal weight; NW- 18.5 to 25, overweight; OW- 25 to 30, obese; OB- over 30.

Among 350 students randomly selected without any bias, 92 were males and 258 were female students. The supporting information such as food habits and annual income of each and every individual was gathered from them independently. The entire information was tabulated and the results were inferred. The BMI of the 350 students were categorized as 1. Underweight-106 students, 2. Normal weight- 202 students 3. Over weight- 36 students and 4. Obese-6 students. The percentage of students falling under the normal weight category was the highest with 57.7% slightly higher than half the percentage of the population. Then normal weight category was 30.3%, overweight category was 10.3% and the obese category with 1.7%.

The BMI is also influenced by gender factor. Among 92 male students the percentages were highest in the NW category with 61.7% next in the underweight category with 27.7% the least percentage was in the overweight with 10.6% No male has recorded an obese BMI. Of 129 female students the NW category recorded 56.3%, the - 31.3% and Overweight- 10.1% of the female population. Obesity is of the major issue among today's population. Obesity leads to various disorders and complications in the organ system. Amongst the student female population 23% were obese. The obesity was noticed only in females and not in male students. It was understood that the male students engage themselves in sports and games which may have imputed a NW BMI. Besides the percentages of NW category was higher in males - 67.3% than in females- 55%. In the UW category the females super ceded the males. This difference may be due to less intake of food by females.

Table 1 BMI analysis amongst college students with gender specification

BMI	Males	Percent Males	Females	Percent Females	Total
UW	26	27.7	80	31.3	106
NW	58	61.7	144	56.3	202
OW	10	10.6	26	10.1	36
OB	0	0	6	2.3	6
Total	94		256		350

Table 2 BMI analysis amongst college students with age specification

Age	UW	Percent	NW	Percent	OW	Percent	OB	Percent	Total
17	16	40	20	50	2	5	2	5	40
18	36	40.9	42	47.7	10	11.4	0	0	88
19	28	29.8	52	55.3	10	10.6	4	4.3	94
20	10	11.9	64	76.2	10	11.9	0	0	84
21	12	35.3	18	52.9	4	11.8		0	34
22	2	100	-	-	-	-	0	-	2
23	2	100	-	-	-	-	-	-	2
24	-	-	2	100	-	-	-	-	2
25	-	-	2	100	-	-	-	-	2
26	-	-	2	100	-	-	-	-	2
Total	106		202		36		6		350

The influence of gender on BMI is in accordance with the findings of Julie [3]. When we consider age as one of the factors, the students fall the age of 17 and 21, very few were in the ages of 22 to 27. Only 10 among the 350 were in the age group of 22 to 27. Among 340 under the ages 17 to 22, there

were significant differences in the underweight category the highest percentage was recorded in the age group 18 followed by ages 17, 21, 19, and 20. It was evidenced that these students were not taking regular meals at the age of 17. In the normal weight category, the highest was noted in the age 20. It was

realized that this age group students were more aware of diet and health.

The overweight category had equal percentage of students at ages 18, 19 and 20. At the age of 17, the students noted with overweight have been in risk for coronary heart disease [4]. At the age of 17, the students are highly active and the intake of food is exhausted in their activities. Association of age with BMI is always studied, BP was higher among subjects with elevated BMI among older persons [5]. At the age of 19, only 4 students were obese. The food intake and calories spent may be taken into consideration. Normal weight individuals had higher GPA scores than their overweight counterparts. Here the hereditary factors may be cited. Obesity is a serious disease that is associated with an increased risk of diabetes hypertension heart disease, stroke and cancer, among other diseases [6]. The influence of age and gender may be slightly correlated as teenagers ignore their health and take only 2 to 3 meals. Lower levels of eating awareness are caused by higher levels of perceived stress [7]. Among 350 students 132 students took meals 2 times a day 206 students 3 times a day. 4 students ate only once a day and 4 students had 4 times a day and 4 students ate 5 times a day. The students who ate 5 times a day fall were overweight. Among 350 students 336 consumed egg and only 14 did not. Milk was consumed by only 184 students regularly. Nutrition mainly depends on consumption of egg and milk and it was evidenced that students from low-income families were underweight. It was confirmed that in this study the income of the family did not play a significant role in deciding the food consumption of the students and hence their weight and BMI. The socio-economic status also influences BMI [8]. The various factors such as lack of exercise, playing, walking and genetic factors may lead to categorization of students under various BMI.

CONCLUSION

Body mass index is a measure of someone's weight in relation to height. The present work was carried out to study the BMI of college students and the influence of age, gender family income and feeding habits on BMI. The normal weight category had the highest percentage of students, followed by underweight, overweight and obese. The trend of BMI categorized with their percentages was similar in both male and female. Age wise analysis showed that the normal weight BMI in the age group 20 and age group 19 showcased maximum underweight BMI. Food habits involving consumption of milk and egg, and timely consumption of meals did not show any correlation with BMI besides family income and food habits did not show any correlation with BMI in the present study. A high BMI can be an indicator of health problems. A body mass index (BMI) above the healthy weight range or too much of fat around the waist can increase the risk of heart disease, type 2 diabetes, stroke and certain cancers. One can have a healthy BMI and still have excess tummy fat meaning you're still at risk of developing these diseases. Regardless of our height or BMI, we should try to lose weight if our waist is 94cm or more (men) and 80cm or more (women). According to WHO (2021) overweight and obesity and related non communicable diseases are largely preventable. Supportive environments and communities are considered fundamental in shaping people's choices, by making the choice of healthier foods and regular physical activity the easiest choice (the choice that is the most accessible, available and affordable), and therefore is vital in preventing overweight and obesity. At the individual level, people can: limit energy intake from total fats and sugars; increase consumption of fruit and vegetables, as well as legumes, whole grains and nuts; and engage in regular physical activity. Likewise from the present study recommendations can be given the Universities and other decision making authorities to reemphasize the significance of healthy food choices and regular compulsory physical activity for raising a healthy generation.

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