

Association between Body Mass Index (BMI) and Percent Body Fat (%BF), Estimated by Bioelectric Impedance, Among the Young Adult Males of Lalmati Area of Guwahati, Assam

SanjeebMallick¹

¹Research Scholar, Department of Anthropology, GU

ABSTRACT

The aim of the study was to determine the association between (BMI) body mass index and (%BF) percent body fat among the 200 young adult males of Lalmati area of Guwahati age ranging from 18 – 32 years during 2020. In this study, young adult males were classified into three groups which is 18 – 22, 23 – 27 and 28 – 32 years. BMI and %BF was calculated according to the classification given WHO Asian cut off and American Council on Exercise. The results show that there is a statistically significant correlation between BMI and %BF at 0.01 level. Weight is also statistically significant with BMI and %BF at 0.05 level.

Keywords:

BMI, %BF, Young-adult, Lalmati

Introduction

A young adult is generally a person in age ranging from the late teenagers or early twenties to their thirties. But opinions and definitions are vary from each other. For different reasons, timeframe on young adulthood cannot be defined exactly because of producing different results according to the different mix of overlapping indices like legal, maturational, occupational, sexual and emotional. Most of the young people are presumed to be healthy but as per WHO (1998) an estimated 2.6 million young aged from 10 to 24 years die each year. Different studies were on youth, young, adolescent, young adult and outcomes are namely obesity, undernutrition, overweight, common mental health problems like stress, depression, suicide, alcohol and tobacco use, substance use, violence and road traffic injury (WHO, 2013).

Although young adults are generally considered as a healthy and fit time of life. Available evidences indicate that young adult are prone to a number of health impacting conditions due to their personal choice, environmental influence and lifestyle changes including communicable and non-communicable disorders and injuries.

The United Nation defines youth as the people aged from 15 to 24 years. The United Nation also acknowledges that this is not unfair to other age groups such as 18 to 30 years which are listed by Member States. There is a useful distinction between adolescents that is 13 to 19 years and young adults within UN itself (those between the ages of 18 and 32 years).

Various studies on Body Mass Index (BMI) and Percent Body Fat (%BF) were done by various scholars from various parts of the world. Ranasinghe et al., (2013) studied Relationship between Body Mass Index (BMI) and body fat percentage, estimated by bioelectric impedance, in a group of Sri Lankan adults: a cross sectional study. Nasr Eldeen et al., (2017) studied Relationship between Body Mass Index (BMI) and Body Fat Percentage in a group of Saudi Arabian Adults. In 2019, Singh et al. studied Relationship between body mass index and percentage of body fat, estimated by bio-electrical impedance among adult females in a rural community of North India: A cross-sectional study.

Body mass index is a value derived from the mass (weight) and height of individual. The body mass index is an attempt to quantify the amount of tissue mass (muscle, fat and bone) in an

individual and then categorize that person as underweight, normal, overweight or obese based on that value.

The body fat percentage is a measure of fitness level, since it is the only body measurement that directly calculates a person's relative body composition without regard to height and weight. The body mass index provides a measure which allows the comparison of the adiposity of individuals of different heights and weights.

Objectives of the Study

The main objective of the present paper is to assess the association between body mass index and percent body fat of young adult males of Lalmati area of Guwahati city. With this prime objective the paper attempts:

- (i) To understand the nutritional status on the basis of body mass index (BMI).
- (ii) To find out the mean values of body fat percentage.
- (iii) To assess the correlation between body mass index and percent body fat.

Materials and Method

For the purpose of the study, a cross-sectional study was conducted among the 200 young adult males of age ranging from 18 to 32 years. The subjects were divided into three age groups i.e. 18 – 22, 23 – 27 and 28 – 32. Data were collected by using purposive sample method. The subjects were selected from the Lalmati area of Guwahati City in Kamrup (M) district of Assam. All experiments were performed in accordance with relevant guidelines and regulations.

For the assessment of Body Mass Index (BMI), height and weight measurements are taken using standard protocols given by Weiner and Lourie (Weiner & Lourie, 1981). Height was measured by using anthropometer and weight was measured by portable weighing machine in light clothing and without shoes. Body Mass Index (BMI) was calculated as the weight in kilograms divided by the square of the height in meters (kg/m^2).

Bioelectrical impedance analysis was done to assess the body fat percentage.

Statistical analyses were done by using SPSS 20.0. Descriptive statistics were used to calculate the frequency of the basic measurements of the subjects. T-test was done to see the mean differences of the different age group. To find out the correlation between body mass index and body fat percentage Pearson's Correlation test was done. The BMI value was calculated and summarized in age group wise and to assess the BMI-based nutritional status, recommended cut-off points for WHO Asians were used. To find out the fitness level of body fat percent, the recommended body fat cut off was used which was given by the American Council on Exercise (ACE), 2009.

Results and Discussion

From the table 1 we have seen that the mean height is the highest among the 28 – 32 age group young adult males which is 172.25 cm and the mean value is the lowest among the age group of 23 – 27 years which is 169.75 cm. The mean weight is the highest among the young adult males of 28 – 32 age group whereas the mean value is the lowest in the age group of 18 – 22 years which is 61.52 kg. The mean BMI is the highest among the 28 – 32 years of age group and the lowest in the age group of 18 – 22 years that is 18.12 kg/m^2 . In the age group of 23 – 27 years, the mean BMI is 22.14 kg/m^2 . In the body fat percentage (%BF), the mean value is found to be highest among the 28 – 32 age group of young adult males that is 26.89% and the lowest in the age group of 18 – 22 years that is 16.98%. The mean difference between the age group of each variable is not statistically significant at 5% level.

Table 1: Descriptive Statistics on Height, Weight, BMI and %BF of young adult males of Lalmati area of Guwahati.

Variables	Age group (in years)	N	Mean \pm S.E	S.D	t' value	p' value
Height	18 – 22	70	171.26 \pm 1.22	2.82		
	23 – 27	65	169.75 \pm 1.26	2.71	0.00	0.99
	28 – 32	65	172.25 \pm 1.45	3.12	-0.01	0.98
Weight	18 – 22	70	61.52 \pm 2.12	4.75		
	23 – 27	65	68.45 \pm 3.01	5.59	-0.08	0.95
	28 – 32	65	76.65 \pm 0.89	1.42	-0.08	0.94
BMI	18 – 22	70	18.12 \pm 0.64	1.39		
	23 – 27	65	22.14 \pm 1.02	2.11	-0.15	0.89
	28 – 32	65	26.41 \pm 1.00	1.92	-0.13	0.91
%BF	18 – 22	70	16.98 \pm 2.64	3.01		
	23 – 27	65	21.78 \pm 4.25	5.56	-0.18	0.87
	28 – 32	65	26.89 \pm 1.22	2.01	-0.15	0.89

$p < .05$ when compared to the mean values of age groups

Table 2: Nutritional Status as per Body Mass Index (BMI) among young adult males of Lalmati area of Guwahati.

Age group (in years)	BMI Range					Total
	<18.5 (Underweight)	18.5 – 22.9 (Normal)	23.00 – 24.9 (Overweight)	25.00 – 29.9 (Obese I)	>30 (Obese II)	
18 – 22	35 (50%)	27 (38.57%)	6 (8.57%)	2 (2.86%)	-	70
23 – 27	10 (15.38%)	45 (69.23%)	5 (7.69%)	4 (6.15%)	1 (1.54%)	65
28 – 32	8 (12.31%)	32 (49.23%)	15 (23.08%)	6 (9.23%)	4 (6.15%)	65
Total	53 (26.5%)	104 (52%)	26 (13%)	12 (6%)	5 (2.5%)	200

WHO Asian specific cut off

Table 3: Distribution of Body Fat Percentage (%BF) of young adult males of Lalmati area of Guwahati.

Age group (in years)	Body Fat Percentage Classification (%BF)					Total
	Essential Fat (2 – 5%)	Athletes (6 – 13%)	Fitness (14 – 17%)	Acceptable (18 – 25%)	Obese (25%+)	
18 – 22	9 (12.86%)	21 (30%)	35 (50%)	3 (4.29%)	2 (2.86%)	70
23 – 27	3 (4.61%)	15 (23.08%)	24 (36.92%)	18 (27.69%)	5 (7.69%)	65

28 – 32	1 (1.54%)	7 (10.77%)	12 (18.46%)	26 (40%)	19 (29.23%)	65
Total	13 (6.5%)	43 (21.5%)	71 (35.5%)	47 (23.5%)	26 (13%)	200

American Council on Exercise (ACE)

Table 4: Association of different variables through Pearson's Correlation

	<i>Age-group</i>	<i>HT</i>	<i>WT</i>	<i>BMI</i>	<i>BFP</i>
<i>Age-group</i>	1	.393	.999*	1.000*	1.000*
<i>HT</i>		1	.437	.409	.410
<i>WT</i>			1	1.000*	1.000*
<i>BMI</i>				1	1.000**
<i>BFP</i>					1

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Note: HT= Height, WT= Weight, BMI= Body Mass Index, BFP= Body Fat Percentage

In the above table 2. Nutritional status as per BMI range is depicted. The highest number of underweight (<18.5) young adult males are found which is 35(50%) in the age group of 18 – 22 years. And the lowest number of obese young adults are found in the age group of 18 – 22 years also. The highest number of overweight and obese young adult males are found in the age group of 28 – 32 years and the lowest number of underweight young adult males are found in the age group of 28 – 32 years also. Most of the young adult males are found to be normal in the age group of 23 – 27 years.

The table 3 shows us that body fat percentage is the highest that is 25%+ found in the age group of 28 – 32 years. 40% young adult males have acceptable range of body fat percentage which is 18 – 25% in the age group of 28 – 32 years. Only 1.54% young adult males need essential fat. 50% young adult males shows the fitness level which is 14 – 17% fat percentage in the age group of 18 – 22 years. Only 2.86% young adult males are found to be obese category which is 25%+ body fat percentage in the age group 18 – 22 years.

Table 4 shows that correlation of age is statistically significant with weight, body mass index and body fat percentage at the 0.05 level. Weight is statistically significant with body mass index and body fat percentage at the 0.05 level. Body mass index is statistically significant with body fat percentage at the 0.01 level.

Conclusion

From the above discussion it is cleared that association between body fat percentage and body mass index is statistically significant. And also we can see that body mass index and body fat percentage is correlated to each other. Highest number of young adult males of age group 28 – 32 years are found to be overweight and obese in the BMI range and BFP classification. And in the age group of 18 – 22 years, most of the young adults are found to be underweight according to BMI cut off. Due to excessive fat percentage of some young adult males fall under 28 – 32 years of age show the high blood pressure level and also different kinds of diseases like heart problem,

diabetes etc. They should take the curative measures like healthy diet, vigorous physical activity, etc. to continue a healthy life style.

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