

Comparison and Construction of Body Fat Standards for Different Age Groups among University Male Students

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Abstract

Objectives: This study examined the differences in body fat percent and its variables comparing it with different age groups in university male students. The present study also aimed at constructing body fat standards for university male students. **Methods/Statistical Analysis:** Five thousand male participants were chosen randomly for the purpose of research. The participant's age was from 18-25 years. Eight age groups were formed according to the age of participating students. Group one had participants with 18 years of age, group two - 19 years, group three - 20 years, group four - 21 years, group five - 22 years, group six - 23 years, group seven - 24 years and group eight had participants with 25 years of age. All participants had undergone testing on selected variables at different times. Technical support was taken from physical education expert to collect the data on body fat percent and other variables. Collected data was analyzed with one-wayanova and .05 were set as the level of significance. **Findings:** Analysis of collected data from present study revealed a highly significant difference in body fat percent between various age groups ($F_{7,4992} = 93.6$), fat mass ($F_{7,4992} = 56.80$), lean body mass ($F_{7,4992} = 15.23$) and body density ($F_{7,4992} = 94.81$). The range for body fat standards was <2 % for group one (18 years) to >27% for group eight (25 years). **Application/Improvement:** There was as ignificant change in body fat percent, lean mass, fat mass and body density among different age groups. Body fat increased with the advancement of age in university youths. The significant difference found can be attributed to various factors. Body fat percent was least in the first year of university i.e. 18 years age group. The student seems to be more active in early years of their college. While it was observed that body fat percent was highest in group eight (25 years) i.e. during the later stages of the university. Generally, students are less inclined towards physical activities in the later stage of their university years due to more concentration towards studies and career building. This may lead to accumulation of more fat in this age group.

Keywords: Age, Body Fat Percent, University Students

1. Introduction

When health is absent, wisdom cannot reveal itself, art cannot become manifest, strength fight, wealth becomes useless and intelligence cannot be applied¹. Body composition is an important component of exercise prescription and health management program². With body mass index measurements it is very difficult to assess the composition of the body of a person, whether or not a person is overweight or muscular inbuilt. And hence, it is more appropriate to use body fat percentage as a measure of assessing body composition of a person³⁻⁶.

Body fat percent is also predictor health status of a

person. In pursuit of that, we have to assess both body fat and mass of the body. It is not easy for general public to accurately measure their body fat percent while on the other hand body mass can be easily assessed. But the only problem with body mass is that it cannot reveal if the weight is lean or fat.

And therefore, we might reach to a scenario where two persons may have different fat and lean mass with similar age, weight and height⁷. Decline in the level of physical activity was observed in college students in recent decade⁸⁻¹⁰. In such circumstances, it becomes important to asses body composition and the need for accurate measurement of body fat percent to assess the

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health of an individual. Therefore, this study examined the differences in body fat percent and its variables comparing it with different age groups in university male students. The present study also aimed at constructing body fat standards for university male students.

2. Materials and Methods

2.1 Participants

Participants in this study were enrolled as male students in different colleges of Delhi University. Five thousand participants were chosen randomly for the study. The participant's age was from 18-25 years. Eight age groups were formed as per the age of participating students. Group one had participants with 18 years of age, group two - 19 years, group three - 20 years, group four - 21 years, group five - 22 years, group six - 23 years, group seven - 24 years and group eight had participants with 25 years of age. All participants had undergone testing on selected variables at different times. Technical support was taken from physical education expert to collect the data on body fat percent and other variables.

2.2 Study Protocol

All participants were tested for following variables; Body

density, body fat percent, lean mass. Body density was measured by using the equation from¹¹. Body fat percent was measured by using Siri's formula¹². Measurement of skin fold thickness was carried out at three different sites namely: Chest, triceps and subscapular. Harpenden skinfold caliper was used to measure the thickness of skin fold and was recorded in millimeters.

2.3 Statistical Analysis

The scores for each variable were gathered as per age. One way anova was employed to examine the differences in body fat percent and its variables comparing it with different age groups in university male students. To construct body fat standards percentile scale was used. The significance level was set at .05.

3. Results and Discussion

3.1 Results

Analysis of collected data from present study revealed a highly significant difference in body fat percent, fat mass, lean mass and body density between various age groups. Results were presented in Table 1. Body fat percent for different age groups were presented in Table 2.

Table 1. Comparison of Body Fat Percent (One Way Anova)

Variable	Source of Variance	Df	Sum of Squares	Mean Square	F Ratio
Body Fat Percentage	Among Groups	7	8729.67	1247.09	93.6*
	Within Groups	4992	66492.96	13.32	
Fat Mass	Among Groups	7	3971.80	567.4	56.80*
	Within Groups	4992	49861.27	9.98	
Lean Body Mass	Among Groups	7	2669.394	381.342	15.23*
	Within Groups	4992	124954.5	25.031	
Body Density	Among Groups	7	.046	.007	94.81*
	Within Groups	4992	.349	.000	

$F_{.05} (7, 4992) = 2.01$

Table 2. Standards for body fat

Body Fat %	Body Fat Standards							
	Grp. 1 – 18 years (n 640)	Grp. 2 – 19 yrs (n 960)	Grp. 3 – 20 yrs (n 760)	Grp. 4 – 21 yrs (n 560)	Grp. 5 – 22 yrs (n 540)	Grp. 6 – 23 yrs (n 520)	Grp. 7 – 24 yrs (n 509)	Grp. 8 – 25 yrs (n 511)
Very Low	< 2	< 6	< 5	< 7	< 7	< 7	< 8	< 9
Low	2 – 10	7 – 10	6 – 11	8 – 12	8 – 12	8 – 13	9 – 13	10 – 14
Optimal	11 – 14	11 – 15	12 – 16	13 – 16	13 – 17	14 – 17	14 – 18	15 – 19
High	15 – 23	16 – 30	17 – 26	17 – 26	18 – 26	18 – 27	19 – 26	20 – 26
Very High	> 23	> 30	> 26	> 26	> 26	> 27	> 27	> 27

3.1.1 Standards for Evaluating Body Fat Percent

3.2 Very high

A person is seriously overweight in this category. This level can be dangerous with serious implications on health; High: In this category a person really above the normal range. A person has to be extremely careful not gain further weight; optimal range: This is the most accepted and desired body fat percent; low: low can be good, but the loss of additional body fat should be avoided: very low: This is only acceptable for competitive endurance athletes.

3.3 Discussion

Highly significant change was seen in body fat percent, lean mass, fat mass and body density between different age groups. Body fat increased with the advancement of age in university youth. The significant difference found can be attributed to various factors. Body percent was least in the first year of the university i.e. 18 years age group. The student seems to be more active in early years of their college. While it was observed that body fat percent was highest in group eight (25 years) i.e. during the later stages of the university. Generally, students are less inclined towards physical activities in the later stage of their university years due to more concentration towards studies and career building. This may lead to accumulation of more fat in this age group. Improved economic condition towards the later stage of the university could be another reason for increased body fat percent in group eight (with 25 years).

With the advancement of age weight gain is obvious along with the accumulation of body fat, as also suggested by Vaccaro et.al. in their study¹³. Another study also reported a significant linear trend between the body fat and years ($r = 0.264$, $p < 0.001$) for males¹⁴. Moreover, students find less time for activity in the later stages of their university study as also suggested in similar study¹⁵. This could be further due to more pressure on academics on the students with the advancement of years in university.

The ability of participants was reduced on some of the fitness components namely; abdominal strength and flexibility as they advanced through age and their university years. Again the possible reason could be an increase in body fat with the advancement of age. Garrett & Kirkendall also suggested that body fat can affect physical performance in a negative way¹⁶. Less physical activity may lead to a higher fat percentage as indicated

in a similar study¹⁷. And that's why non-sports persons and less active people tend to have more fat "Higher amount of fat can be seen in non-sportspersons than in sportspersons"¹⁸. Also according to Abraham, body fat does not contribute to force production and so it causes a decrease in relative strength¹⁹.

4. Conclusion

There was as significant change in body fat percent, lean mass, fat mass and body density among different age groups. Body fat increased with the advancement of age in university youths.

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