



Correlation between selected anthropometry parameters among female adolescent nursing students -Indicators of health

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ABSTRACT

Anthropometric measures are important indicators of health status. The present research was conducted among selected female nursing college students to analyse the correlation between body mass index and body fat percentage. This Quantitative Descriptive cross-sectional study was conducted among 203 female nursing students at SRM College of Nursing, Kattankulathur, Chennai, using a non-probability convenient sampling technique. Body mass index was analysed using the formula, and Omron body fat analyser (HBF-306) was used to observe body fat percentage. Body mass index (BMI) results showed that the majority of samples 115 were found to have healthy BMI, 62 students were underweight, 24 samples were overweight. Body fat percentage results showed that 126 samples had healthy body fat percentage, 29 samples had too high body fat percentage, 38 study samples had too low body fat %, and 10 students had obese body fat %. The correlation was observed to be positive and significant among body mass index and body fat percentage in total. Correlation among body mass index and per cent body fat based on BMI Classification also showed a significant positive correlation among underweight, normal and overweight individuals. Still, a negative correlation was found in obese samples. Since the number of obese samples was less, a similar correlation study among large samples was recommended.

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INTRODUCTION

Sustaining a healthy weight in different stages of life should be a prime concern for leading a healthy life. Overweight or obese adolescents would

feel inferior, be socially isolated, and lose self-confidence, which in turn affect their academic performance (Trang *et al.*, 2019). Exceeding the prescribed amount of body fat level will cause adverse health issues. Overweight or obesity act as a comorbid factor for developing critical health problems. Underweight malnourished individuals also develop many deficiency disorders. Excess body fat stimulates metabolic risk, so measuring body fat percentage level will be helpful to execute preventive and curative health process. Body composition keeps varying in different stages of life and is reflected in anthropometric measurements. Anthropometry is an economical, non-invasive technique which gives in-depth information on different parts of body structure and has a long tradition of assessing health and nutritional status (Bhattacharya *et al.*,

2019). The World health organisation also endorses that body mass index could be used as health assessment and for measuring body adiposity. A person is categorised as underweight if his Body mass index is between 15 to 19.9, normal if the BMI is 20 to 24.9, overweight if the BMI is 25 to 29.9, and is obese if BMI is 30 to 35 or more (Nuttall, 2015).

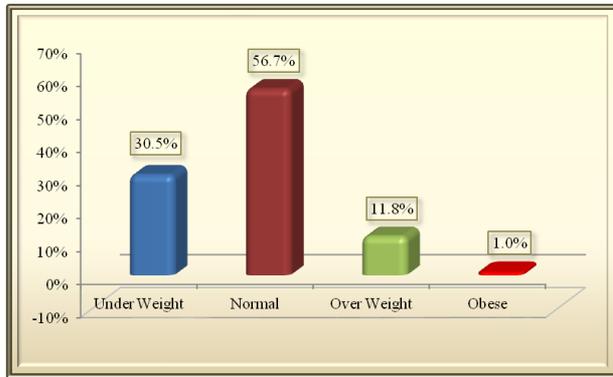


Figure 1: Graph showing percentage distribution of body mass index

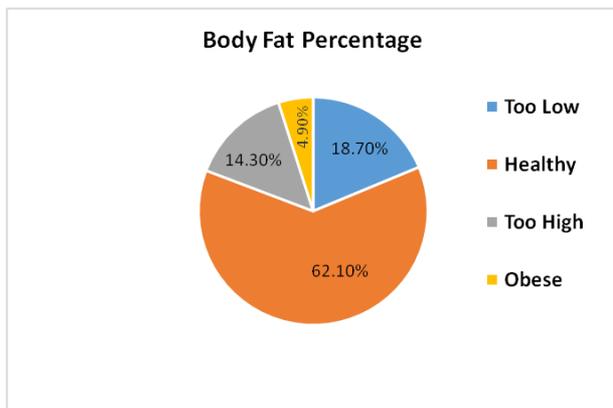


Figure 2: Graph showing percentage distribution of body fat percentage

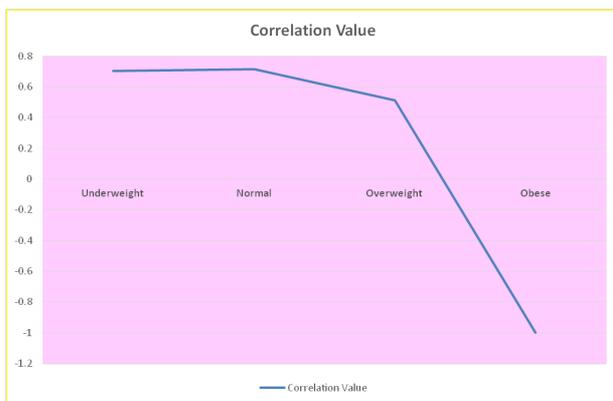


Figure 3: Graph showing correlation among body mass index and body fat percentage

ber of adolescents may be inaccurately recorded as obese based on body mass index (Etchison *et al.*, 2011). Body fat percentage measurement directly indicates the relative composition of the body and determine the fitness level, apart from height and weight (Jelena *et al.*, 2016). Body fat percentage index is also considered more precise to conclude an individual being obese or overweight because it measures body fat directly. Bioelectrical impedance analysis is a non-invasive process and instead gives a perfect measurement of body composition (Ranasinghe *et al.*, 2013). Obese individuals may have low body fat, whereas underweight individuals may have high body fat. Apart from Obese, even underweight and overweight, people may have fitness issues due to body fat percentage.

MATERIALS AND METHODS

The present Quantitative descriptive cross-sectional study was directed in SRM College of Nursing, Kattankulathur, Chennai. Non-probability convenient sampling method was followed to select 203 Female student samples who were studying nursing course during the academic year 2017–2018. The Institution committee gave the Ethical clearance, and the researcher obtained informed consent from all the subjects after explaining the necessity of this research work. Section, A part of the tool, contained Demographic variables and Section B comprised of Study variables Weight, Height, Body mass index, and body fat percentage. Female nursing students between 20 to 22 years of age, who were interested and willing to participate in the study were considered as inclusion criteria. Students taking medications, having prolonged illness and physically challenged were not included. The researcher personally carried out the anthropometric assessment of each sample in the examination room. Height of all the participants was measured by making them stand barefoot, head aligned and straight on the stadiometer. Weight was recorded to the nearest 0.5 kg using an electronic weighing scale while the students were barefoot and wearing uniform. Body mass index was noted using formula weight in kilogram divided by height in meters square. Omron body fat analyser (HBF-306) was used to evaluate body fat percentage. Personal data of the subjects such as height, weight, age, and sex were pre-entered, and bioelectrical impedance measurements were performed according to the manual instructions. BF% was measured using the pre-entered. As per the World health organisation BMI classification, weight was characterised as Normal, underweight, overweight and obese. Body fat percentage was also classified as too low, healthy, too

Table 1: Correlation among body mass index and body fat percentage of total subjects

S.No	Correlation Value	N	Table P-Value
1	0.87*	203	0.13

*Significant at .05 level

Table 2: Correlation among Body mass index and Body fat percentage based on BMI classification

S.No	Body Mass Index	Correlation Value	N	Table P-Value
1	Underweight	0.70*	62	0.25
2	Normal	0.71*	115	0.19
3	Overweight	0.51*	24	0.39
4	Obese	-1*	2	0.99

high and obese according to WHO and NHI guidelines. All obtained data were analysed statistically for results. Statistical analysis was conducted using the Percentage and Pearson correlation test.

RESULTS AND DISCUSSION

Among the majority of the selected samples of 115 samples (56.7%) were found to have normal BMI, 62 students (30.5%) were found to be underweight, 24 samples (11.8%) were overweight and only 2 (1%) of the samples were found to be obese. (Figure 1).

Figure 2 illustrates that among the study participants 126 (62.1%) samples had healthy body fat percentage, 29 samples (14.3%) had too high body fat percentage, 38 (18.7%) study samples had too low body fat %, and 10 (4.9%) students had obese body fat %.

The Table 1 shows that the correlation value 0.8787 was higher than the table p-value 0.138 and indicated that there is a significant positive correlation between body mass index and body fat percentage among total selected samples.

The Table 2 shows that among 62 underweight samples the correlation value 0.70 was higher than table p-value 0.25, hence it was significant. A positive correlation was observed in underweight samples with their body fat percentage. In 115 normal samples, the correlation value 0.71 was higher than table p-value 0.19. Hence it was also significant. Normal BMI subjects and their body fat percentage indicated a positive correlation. Among the 24 overweight samples, the correlation value 0.51 was higher than table p-value 0.39, and it was significant. A positive correlation was also observed among overweight subjects with their body fat percentage. While in 2 obese samples, the correlation value -1 was higher than table p-value 0.99, hence it was also significant. But the negative correlation was found between the

obese samples and their body fat percentage. These results are also depicted in Figure 3.

A research study confirms that Body mass index would be significantly correlated to body fat percentage (Rajkumari *et al.*, 2012). In this study, results on body mass index show that the majority of samples 115 were found to have healthy BMI, 62 students were found to be underweight, 24 samples were overweight. Body fat percentage results show that among the study participants majority of 126 samples had healthy body fat percentage, 29 samples had too high body fat percentage, 38 study samples had too low body fat %, and 10 students had obese body fat %. The selected subjects indicated a positive correlation between body mass index and body fat percentage and were also significant. Similar results were observed by (Akindede *et al.*, 2016) in adult Nigerians of different ethnic groups living in an urban region. Correlation between body mass index and body fat percentage based on BMI classification was positive and also significant in normal, underweight and overweight individuals but was negatively correlated with obese. Correlation value was higher in normal BMI samples, and there was a decreased correlation in underweight, overweight and obese individuals, but a negative correlation was observed in obese individuals. The findings of this study are concurrent with (Deurenberg *et al.*, 2002) research in which Asian populations body fat per cent was higher and Body mass index was lower compared to Caucasians. For a similar body mass, index Asians body fat per cent was 3-5% points higher, and for the same body fat %, their body mass index was 3-4 units lower compared using Caucasians. The increased percentage level of body fat at a low body mass index could be due to variations in trunk and leg length ratio and changes in slimness. The dissimilarity between muscle mass also contributes to the differences in body fat percentage and body mass index relationship. (Meeuwssen *et al.*,

2010) study used validated bio-impedance equipment to evaluate the body composition of 23,627 UK adults of 18-99 years of age with a mean body mass index of 26.3 ± 4.7 kg per m^2 , and 12,044 females, with average body mass index of 25.7 ± 5.1 kg per m^2 . The relationship among body mass index and per cent body fat was found not to be linear and had weaker association at lower body mass index.

CONCLUSIONS

The study concludes that body mass index and body fat percentage have significant correlation. Based on BMI classification, body mass index and body fat percentage indicated positive correlation among underweight, normal and overweight individuals but a negative correlation was observed in obese samples. Since the number of obese samples was less, a similar correlation study among large samples is recommended.

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Conflict of Interest

The authors declare that they have no conflict of interest for this study.

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