Research Article

Comparison of the body composition parameters in the adolescent medical and paramedical students in South India

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Received August 6, 2015. Accepted August 21, 2015

Abstract

Background: Obesity is currently a global problem not only among the adults but also in the adolescents. The factors contributing to obesity may be metabolic, behavioral, psychological, and sociocultural. In addition, stress is, particularly, important, because it causes an irregular diet pattern and absence of physical activity. Medical curriculum is vast and stressful, with the pressure of examination and high expectations in performance.

Objective: To find out the prevalence of overweight and obesity among the undergraduate medical and paramedical students. An attempt was made to find out the significance of factors influencing body weight such as eating behavior and physical activity levels in a total of 348 students.

Materials and Methods: A cross-sectional study was conducted with 348 female medical and paramedical students in the age group of 18–20 years. Anthropometric measurements and body fat (BF) and total body water (TBW) percentages of all the participants were assessed. A predesigned questionnaire was given to each student to obtain information about their food habits and physical exercise.

Result: The statistics used were mean with SD; percentages were calculated, and the correlation coefficient (*r*) was determined. The BMI, BF%, waist circumference, and waist–hip ratio were all found to be significantly more in medical students when compared with paramedical students, whereas the TBW was found to be more in the paramedical students.

Conclusion: Obesity was more prevalent in medical students when compared with paramedical students.

KEY WORDS: Obesity, body mass index, waist–hip ratio

Introduction

Obesity occurs worldwide affecting all the socioeconomic groups, regardless of age, sex, or ethnicity. It has been reported by the WHO, in 2005, that there were about 1.6 billion overweight persons aged 15 years and older, and among them, a minimum of 400 million adults were obese.[1] Roughly, 2–3 billion adults will be overweight and more than 700 million adults obese, by 2015, according to the estimation by the WHO.[1] Various genetic, endocrinal, metabolic, psychological, environmental, behavioral, and sociocultural factors are attributed to the development of obesity.[2,3] The transformation of disease profiles is observed especially in developing countries. This has been attributed to shifts in the diet and lifestyle changes toward the west.[4] Data from the National Family Health Survey (NFHS) of India have shown that overweight was more prevalent among the urban and high socioeconomic status groups, especially among the women.[5] Obesity can lead to serious public health problems, as it is associated with

Access this article online	
Website: http://www.ijmsph.com	Quick Response Code:
DOI: 10.5455/ijmsph.2016.0608201598	

several comorbid conditions such as cardiovascular, psychological, orthopedic, neurological, and renal diseases.[4] Cardiovascular diseases can occur owing to obesity, which is a distinct risk factor. Recently, it is seen that obesity is a major risk factor for several common cancers as well.[3] It is associated with a reduced life expectancy. The problem of obesity is spreading rapidly among children and adolescents posing a huge economic burden.[6] Although obesogenic environment is causing the global problem of obesity, there is substantial evidence that obesity may be heritable, and there exists a subpopulation with a genetic predisposition to excess adiposity.[3,7] This study was undertaken to see the prevalence of obesity among the adolescent medical and paramedical students.

Materials and Methods

A cross-sectional study was conducted on 348 female students in the age group of 18–20 years in a medical college, Hyderabad. Of them, 201 were MBBS students and 147 paramedical students pursuing BPT, MLT, and BSc nursing courses. Anthropometric measurements such as height, weight, waist circumference (WC), and hip circumference (HC) were taken for all the participants. The body mass index (BMI) and waist–hip ratio (WHR) were calculated. The body fat (BF) and total body water (TBW) percentages were also assessed. A predesigned questionnaire was given to each student, which included questions about their food habits and physical exercise. An informed consent was taken from all the study participants and the Institutes Ethics Committee permission was obtained.

Height was measured using a standard meter scale with the subject standing erect without footwear. The body weight was measured in kg in light indoor clothing without shoes, using a digital scale and rounded to the nearest number. The BMI was calculated for all the participants by using the formula wt/ht^2 (kg/m^2). By taking the BMI into consideration, the subjects were classified into underweight (<18.5 kg/m^2), healthy (18.5–24.9 kg/m^2), overweight (25–29.9 kg/m^2), and obese (>30 kg/m^2), as per the WHO guidelines.

The WC was measured at the midpoint between the lower margin of the last palpable rib and the top of the iliac crest. Classification of WC was done according to the WHO guidelines into healthy (<80 cm), increased risk (80–87.9 cm), and substantially high risk (>88 cm).

The HC was measured around the widest portion of the buttocks, without compressing the skin. The WHR was calculated from the WC and HC measurements. The students were classified into healthy (< 0.8), increased risk (0.8–0.84), and substantially high risk (> 0.85) as per the WHO guidelines.

The percentages of BF and TBW were measured using a digital body fat scale (AVON Corporation Ltd.), which works on the principles of bioelectric impedance technique and was rounded off to the nearest 0.1%. On the basis of BF%, the students were classified into underfat (< 20), healthy (20–32), over fat (33–38), and obese (>38). The TBW was measured to the nearest 0.1%, and the students were classified again into underfat (>61.8), healthy (52.6–61.8), over fat (47.9–52.5), and obese (<47.9) according to the composition of their body water.

Information regarding their physical activity levels and food habits such as vegetarian or nonvegetarian diet, frequency of intake of junk food, and fruits taken per week were sought.

Result

The data were tabulated and analyzed statistically using mean, standard deviation (SD), and percentages. Graph pad software QuickCalcs version was used to perform the *t*-test to obtain the *p* value and confidence interval. Correlation coefficient (*r*) was also determined.

Table 1 depicts the mean (± SD) anthropometric parameters in the medical and paramedical students. The mean weight, BMI, BF%, WC, and WHR were all found to be higher in group I (medical) when compared with the group II (paramedical) students. The TBW was lower in group I than group II students.

The number of students who were underweight as per the WHO criteria were more in paramedical course in comparison with the MBBS course, whereas overweight and obese were more in MBBS as shown in Table 2, which was statistically significant ($p < 0.0001$), and 95% confidence interval (CI): 1.38–3.10.

The BF% of the students falling in the underfat category was more in paramedical than medical course as shown in Table 3. The percentages of overfat and obese together were more in group I when compared with the group II students. This was found to be statistically significant ($p < 0.0001$) and 95% CI: 2.64–5.76.

TBW% was more in paramedical students than the medical students. Low TBW indicated a higher BF% as shown in Table 4. The *p* value was < 0.0001 and 95% CI:4.31–1.99.

The WC measurements showed that the students coming under high risk and substantially high-risk categories were more in group I in comparison with the group II students, which is very less as shown in Table 5. The *p* value was calculated and found to be statistically significant ($p < 0.0001$) and 95% CI:7.25–10.71.

More number of students with > 0.8 WHR were found in the MBBS course in comparison with the paramedical courses. This was found to be significant statistically with $p = 0.0003$ and 95% CI: 0.0093–0.0307 as shown in Table 6.

Most of the students in both the groups were taking nonvegetarian diet. However, the number of students eating a nonvegetarian diet on a regular basis (6–7 days/week) was substantially high in group I than the group II students as shown in Table 7.

The overall intake of junk food in medical students was more than the paramedical students.

The intake of fruits did not follow a regular pattern in both the groups, but in general it was more in group I students.

About 58.2% of group I students were not involved in any kind of physical activity when compared with group II where it was only 38.77%.

Table 1: Anthropometric parameters, body fat%, and total body water among the study subjects

Parameters	Group I (medical students)	Group II (paramedical students)
No. of students (*N*)	201	147
Mean age (years)	18.61 (± 0.77)	19.06 (± 1.26)
Mean height (cm)	159.73 (± 5.76)	154.91 (± 5.71)
Mean weight (kg)	56.97 (± 9.86)	48.37 (± 10.72)
Mean BMI (kg/m^2)	22.36 (± 3.87)	20.12 (± 4.27)
Mean BF %	22.63 (±6.89)	18.43 (± 7.81)
Mean TBW%	56.52 (± 5.23)	59.67 (± 5.69)
Mean WC (cm)	78.57 (± 7.05)	69.59 (± 9.33)
Mean HC (cm)	98.16 (± 7.69)	89.02 (± 9.82)
Mean WHR	0.80 (± 0.05)	0.78 (± 0.05)

Table 2: Comparison of the BMI between the medical and paramedical students

BMI range	MBBS, (*N* = 201) (%)		Paramedical, (*N* = 147) (%)	
Underweight (<18.5)	42	20.89	60	40.81
Healthy (18.5–24.9)	99	49.25	75	51.02
Overweight (25–29)	51	25.37	6	4.08
Obese (>30)	9	4.48	6	4.08

Table 3: Comparison of the BF% between the groups I and II

Classification	MBBS, (*N* = 201) (%)		Paramedical, (*N* = 147) (%)	
Underfat (<20)	87	43.28	93	63.26
Healthy (20–32)	90	44.77	48	32.65
Overfat (33–38)	21	10.44	0	0
Obese (>38)	3	1.49	6	4.08

Table 4: TBW differences between the two groups

Classification	MBBS, (*N* = 201) (%)		Paramedical, (*N* = 147) (%)	
Underfat (>61.8)	36	17.91	60	40.81
Healthy (52.6–61.8)	129	62.31	81	55.10
Overfat (47.9–52.5)	24	11.94	0	0
Obese (<47.9)	12	5.97	6	4.08

Table 5: WC measurements in the study subjects

Waist circumference (cm)	Group I (MBBS), *N* (%)	Group II (paramedical), *N* (%)
<80 (healthy)	114 (56.71)	129 (87.75)
80–87.9 (high risk)	69 (34.32)	9 (6.1)
>88 (substantially high risk)	18 (8.9)	9 (6.1)

Table 6: WHR in the two groups

WHR	Group I (MBBS), %		Group II (Paramedical), %	
≤0.8	126	62.68	105	71.42
>0.8	75	37.31	42	28.57

Table 7: Food habits and exercise in the two groups

Course	Group I (MBBS)				Group II (paramedical)			
Food habits/exercise	0/wk	1–2/wk	3–5/wk	6–7/wk	0/wk	1–2/wk	3–5/wk	6–7/wk
NV	9	75	54	63	15	87	30	15
Junk food	18	87	78	18	42	60	21	24
Fruits	9	51	87	54	6	63	21	57
Exercise	117	39	27	18	57	42	12	36

Table 8: Correlation (*r*) between the different anthropometric variables

	MBBS (*r*)	Correlation status	Paramedical (*r*)	Correlation status
BMI vs. WC	0.65	Strong positive	0.85	Very strong positive
BMI vs. HC	0.81	Very strong positive	0.91	Very strong positive
BMI vs. WHR	–0.07	No correlation	0.17	No correlation
BMI vs. BF%	1.0	Very strong positive	0.99	Very strong positive
BF% vs. TBW	–0.98	Very strong negative	–0.98	Very strong negative

Table 8 depicts a strong positive correlation between BMI and WC, HC, and BF% in both the groups. A very strong negative correlation was seen between the BF% and TBW as well. But, no correlation was found between the BMI and WHR in both the groups.

Discussion

This study showed that the mean weight, BMI, BF%, WC, and WHR were found to be higher in medical students, as most of them belonged to the higher socioeconomic strata of the society and were likely to consume more energy rich foods in contrast to the paramedical students who came from middle or lower income groups where the affordability is low. This is in accordance with the previous studies done earlier.[2,8,9,10]

Around 50% of students in both the categories (MBBS and paramedical) were in the healthy range of BMI as per the WHO criteria. However, the percentage of overweight and obese among medical students was strikingly higher when compared with the paramedical students, as the mean weight was higher contributing to a higher BMI even though there was little difference in the mean height between the two groups. This correlates with study done by Subramanian and Smith.[9]

Medical students showed higher levels of BF% and lower percentage of TBW in comparison with paramedical students, which may be owing to certain lifestyle factors such as more intake of energy rich foods and sedentary habits owing to their busy medical curriculum leaving no time for outdoor activities. Owing to the higher levels of BF%, the TBW% was found to be low probably owing to an unequal distribution of fat stores and water in different body compartments leading to an imbalance in fat and water.

The WC and WHR were strikingly high in medical than paramedical students, which may be owing to irregular and unhealthy eating habits both during the daytime and during the nights, with frequent visits to the college canteen for refreshments such as tea, aerated drinks, and fried foods, which was similar to the previous studies done.[11] Most of them slept late in the night to prepare for the frequently conducted tests and complete the vast syllabus in a limited time.

Physical inactivity was found to be more in medical than paramedical students. Most of the medical students were found to travel either by cabs or their own vehicles than using the public transport system.[3] Moreover, as medical curriculum usually does not include a physical education training hour, students are less motivated to take up any outdoor activities. Added to that, a busy schedule during the MBBS course does not leave any time to indulge in any physical activity even after the college hours. As the body weight and BMI increase, their motivation and participation in outdoor physical activity reduces, which becomes a vicious cycle. Stress of the vast medical course and busy schedule with a stringent assessment pattern leads to an irregular lifestyle and unhealthy food habits, which makes them overweight and obese in comparison with the paramedical students where the stress levels were comparatively low. This correlates with study done by Bakr et al.[12]

The limitations of this study are that the study group is small and included only female students. Including male students would help in comparing the parameters between the two genders, so as to assess the outcome more accurately.

Conclusion

Assessing the anthropometric parameters along with BF%, TBW, physical activity levels, and eating habits in the adolescent age with different stress levels would be beneficial in predicting the risk of developing certain diseases, particularly, cardiovascular, metabolic, and orthopedic disorders.

Awareness can be created even among medical students to take timely precautions to prevent obesity-related disorders later in life.

Consumption of energy rich foods, lack of physical activity, and adopting certain lifestyle factors are known to contribute to the prevalence of obesity among the adolescents. However, very few studies are available to see the impact of stress on the body composition of the students pursuing different medical courses. The stress of the MBBS curriculum adds to the changes in eating habits and physical activity levels in medical students, which is not so evident in the paramedical students whose stress levels are comparatively lower.

Acknowledgment

We thank Mr. Sriram Taranikanti for helping with the statistical methods.

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How to cite this article: Taranikanti M, Panda S, Dash AK, Yasmeen N, Siddiqui ARO, Tiyyagura S. Comparison of the body composition parameters in the adolescent medical and paramedical students in South India. Int J Med Sci Public Health 2016;5:610-614

Source of Support: Nil, **Conflict of Interest:** None declared.