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Evaluation of Association of Anthropometric Indices Related to Obesity with Pulmonary Function Tests in Female Medical Students: An Institutional Based Study

Sonam Bansal[1], Manish Agarwal[2*], Piyush Gupta[3], Kavita Yadav[4], Yogesh Yadav[5]

[1]MSc Medicine (Physiology) Student, Department of Physiology, Dr. S.N. Medical College, Jodhpur, Rajasthan, India. [2]Resident, Department of Paediatrics, SMS Medical College, Jaipur, Rajasthan, India. [3]Resident, Department of Preventive & Social Medicine, Maulana Azad Medical College, New Delhi, India. [4]PhD Scholar, Department of Physiology, SMS Medical College, Jaipur, Rajasthan, India. [5]Assistant Professor, Department of Paediatrics, SMS Medical College, Jaipur, Rajasthan, India.

ABSTRACT

Background: Obesity and body fat distribution are important predictors of coronary heart disease. Pulmonary function tests are usually carried out for assessing the functional impairments and to make diagnosis. Hence; we planned the present study to evaluation of association of anthropometric indices related to obesity with pulmonary function tests in female medical students. Methods: The present investigation included assessment of association of Anthropometric Indices Related to Obesity with Pulmonary Function Tests in Female Medical Students. Total of 150 female medical students were included in the present study. Measurement of the height, hip circumference, and weight of all the subjects was done. Waist circumference was measured and value of equal to or less than 80 cm was considered as normal, while subjects with value of more than 80 cm were considered at high risk. In the sitting position by using the nose clips, spirometry was performed in all the subjects. The pulmonary parameters recorded included Peak Expiratory Flow Rate (PEFR), Forced Expiratory Flow {FEF (25-75%)}, Forced Expiratory Volume in One Second (FEV1), Forced Vital Capacity (FVC), FEV1: FVC. Respiratory Rate (RR) was also noted. Results: Mean FVC and FEV$_1$ in the present study was found to be 2.5 and 2.3 respectively. Mean respiratory rate was found to be 15 per minute. We obtained significant correlation between difference anthropometric variables related to obesity and lung function tests in female medical studies. Conclusions: Significant correlation exists between difference anthropometric variables related to obesity and lung function tests in female medical students.

Keywords: Female medical students, Obesity, Pulmonary function test

*Corresponding Author

Dr. Manish Agarwal,
Resident, Department of Paediatrics, SMS Medical College, Jaipur, Rajasthan, India.

INTRODUCTION

Obesity and body fat distribution are important predictors of coronary heart disease. Moreover, they are associated with several chronic diseases including hyperlipidemia, hyperinsulinemia and hypertension.[1,2] From a clinical view, estimation of adipose tissue distribution must therefore be considered as important in the evaluation of the patient's cardiovascular risk profile. There are numerous methods of assessing overweight, obesity and fat distribution such as measurements of weight, height, waist, hip, midarm, thigh and calf circumferences and calculations of waist-to-hip ratio, and BMI.[3,4] Pulmonary function tests are usually carried out for assessing the functional impairments and to make diagnosis. It is due to the fact that the lungs are generally affected in case of multisystemic diseases. However, the pulmonary functions may also differ in normal people because of ethnic origin, physical activities, environmental conditions, altitude, age, height, gender, socioeconomic status and based on the level of tobacco consumption.[5-7] Hence; we planned the present study to evaluation of association of anthropometric indices related to obesity with pulmonary function tests in female medical students.

METHODS

The present investigation was commenced in the department of Physiology, Dr. S.N. Medical College, Jodhpur, Rajasthan,

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India. It included assessment of association of Anthropometric Indices Related to Obesity with Pulmonary Function Tests in Female Medical Students. Before the starting of the study, written consent was obtained from all the students after explaining in detail the entire research protocol. Total of 150 female medical students were included in the present study. While making the calculations and measurements, four readings of all the parameters was obtained and mean value was calculated for each subject. For measurement of the weight, a weighing scale was used. Flexible measuring tape was used for assessment of other anthropometric measurements. For recording of the lung functional tests, computerized spirometer (India) was used. Measurement of the height, hip circumference, and weight of all the subjects was done. Waist circumference was measured and value of equal to or less than 80 cm was considered as normal, while subjects with value of more than 80 cm were considered at high risk. In the sitting position by using the nose clips, spirometry was performed in all the subjects. The parameters recorded included Peak Expiratory Flow Rate (PEFR), Forced Expiratory Flow {FEF (25-75%)}, Forced Expiratory Volume in One Second (FEV1), Forced Vital Capacity (FVC), FEV1: FVC. Respiratory Rate (RR) was also noted. All the results were summarized in Microsoft excel sheet and were analyzed by SPSS software. Chi-square test and univariate regression curve was used for determination of level of significance.

RESULTS

For the present study, we enrolled a total of 150 female medical students. Mean height of the subjects was 1.6 m, while mean weight and mean BMI was 59.1 Kg and 23.08 Kg/m^2 respectively. Mean waist and hip circumference were found to be 76.2 cm and 97.5 cm respectively. Mean value of PEFR and FEF of female medical students was found to be 5.84 and 4.16 respectively. Mean FVC and FEV$_1$ in the present study was found to be 2.5 and 2.3 respectively. Mean respiratory rate was found to be 15 per minute. We obtained significant correlation between difference anthropometric variables related to obesity and lung function tests in female medical students as shown in Table 1.

Table 1: Association of anthropometric indices in relation to obesity with difference lung functional tests in female students

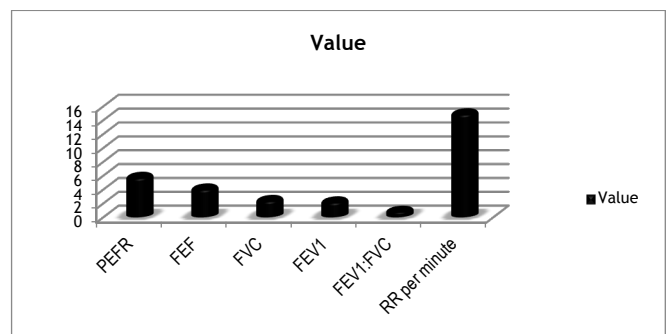| Parameter	Lung functional tests				
	PEFR	FEV	FVC	FEV$_1$	FEV$_1$: FVC
BMI	-0.06	-0.17*	0.25	0.07	-0.88*
Waist- Hip ratio	-0.00	-0.05	0.09	0.09	-0.02
Waist- height ratio	-0.06	-0.16*	0.08	-0.03	-0.18*

*: Association is Significant at 0.05 levels

DISCUSSION

For the present study, mean value of PEFR and FEF of female medical students was found to be 5.84 and 4.16 respectively. Mean FVC and FEV$_1$ in the present study was found to be 2.5 and 2.3 respectively. Mean respiratory rate was found to be 15 per minute. We obtained significant correlation between difference anthropometric variables related to obesity and lung function tests in female medical students.
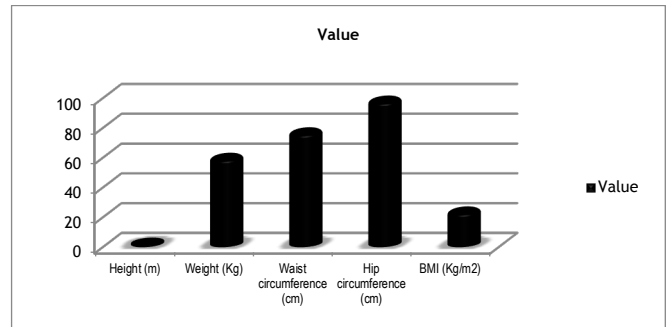
Graph 1: Mean anthropometric parameters and indices

Graph 2: Mean lung functional test

In one of the previous studies conducted by Bertsias G et al, authors assessed a total of 989 third-year medical students, aged 22 +/- 2 years. Anthropometric measures and blood chemistries were obtained. The relationships between obesity indices (body mass index [BMI], waist circumference [WC], waist-to-hip ratio [WHpR], waist-to-height ratio [WHtR]) and CVD risk factor variables (blood pressure, glucose, serum lipoproteins) were investigated. A substantial proportion of Greek medical students were overweight or obese, obesity status being related to the presence of hypertension and dyslipidaemia.[8]

Karakaş P et al presented the reference anthropometric data associated with obesity for cardiovascular risk and metabolic diseases for healthy young adults in a Turkish population. The study group consisted of 1163 second-year medical students (650 women, 513 men) aged 20-25 years and the measurements were made using a flexible standard measuring tape. From 1163 medical students, the mean values of body mass index, circumferences of waist, hip, neck, mid-arm, thigh and calf were 20.89 ±1.6 kg/m2, 73.15 ±5.1 cm, 95.35 ±4.8 cm, 30.32 ±1.37 cm, 24.12 ±1.75 cm, 47.23 ±3.26 cm and 34.36 ±2.19 cm respectively in women, while the same measurements were 21.98 ±1.67 kg/m2, 77.73 ±5.81 cm, 95.64 ±4.81 cm, 35.61 ±1.43 cm, 25.60 ±1.84 cm, 44.10 ±3.26 cm and 34.92 ±2.08 cm respectively in men. The precise knowledge of anthropometric data could be used as reference values for evaluating the body composition and fat distribution of Turkish young people.[9]

Akın O *et al* investigated the correlation between anthropometric indices and pulmonary function test results in children without asthma. Children without any respiratory disorders were enrolled in this study. Anthropometric measurements, such as height, weight, neck circumference (NC), and waist circumference, were obtained from the enrollees and body mass index was calculated. Afterward, pulmonary function tests were performed using spirometry. A total of 178 children (106 boys, 59.5%) with a mean age of 9.7 years were included the study. NC was above the 90th

percentile in 65 children. Importantly, pulmonary parameters, such as forced expiratory volume during the first second (FEV1) and the ratio of FEV1 to forced vital capacity (FVC), were lower in subjects with a large NC. Similarly, waist circumference was above the 90th percentile in 67 children, and FEV1/FVC was significantly lower in children with a large waist circumference. They identified NC as a novel anthropometric index that is strongly correlated with respiratory functions in children.[10] Alipour B et al assessed 85 asthmatics (37 male and 48 female). Pulmonary function tests (PFTs) and anthropometric parameters were measured for each patient. Mean age and median duration were 43.9 ± 10.61 and 6 (3–14) years, respectively. Among anthropometric parameters, only waist-to-hip ratio (WHR) indicated significant correlation with PFTs in both sex (P < 0.05). There were negative associations between waist circumference, hip circumference and WHR with PFTs only in overweight and obese women (P < 0.05). Some anthropometric parameters affected lung function, and it seems that gender differentially contributes to this effect.[11] Bekkers MB et al examined the association of body mass index (BMI) and waist circumference (WC) at age 12, and of persistently (at ages 8 and 12 years) high BMI and large WC, with forced vital capacity (FVC) and forced expiratory volume in 1 second (FEV1) at age 12. Height, weight, WC and FVC and FEV1 were measured during a medical examination in 1288 12-year-olds participating in the PIAMA birth cohort study. 1090 children also had BMI and WC measured at age 8. The associations between BMI and WC and FVC, FEV1, and FEV1/FVC ratio were studied using local and linear regression analyses, separately for girls and boys. The regression models were adjusted for age, height, and pubertal development and maternal educational level. High BMI and large WC were associated with higher FVC; in girls these associations were statistically significant and 3.6% respectively in adjusted models. Similar associations were observed for persistently high BMI or large WC: girls with a high BMI or large WC at both 8 and 12 years had statistically significantly higher FVC at age 12 years, than girls with normal BMI or WC at both ages.[12]

CONCLUSION

From the above obtained data, the authors conclude that significant correlation exists between difference anthropometric variables related to obesity and lung function tests in female medical students. Therefore, adequate student awareness programs should be propagated for increasing the awareness of bad effects of obesity on health among students and general population.

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