CORRELATION OF LUNG FUNCTION PARAMETERS IN OBESE AND NORMAL MALES WITH THEIR BODY MASS INDEX

DHARMENDRA DODIYA, ANUP PATEL***

*Assistant Professor, GMERS Medical College, Sola, Ahmedabad
**Associate Professor, , GMERS Medical College, Gandhinagar

Abstract: Back ground and Objectives Obesity is now a day's major worldwide problem and major cause of morbidity and mortality also obesity can cause respiratory symptoms, many obese people are referred for pulmonary function tests (PFTs). Our objective is to see whether lung function parameters shows any association with Body mass Index. **Materials and Method:** 198 healthy male subjects were studied and divided in obese (50) and non-obese (148) groups. Their body mass index is compared with their spirometric parameters. **Results**: In obese subjects FEV1/FVC has significant positive correlation with BMI and FEV1 has negative correlation with BMI. But in case of non obese individuals above mentioned parameters has no significant relationship with BMI. **Conclusion**: From the study it is concluded that Obesity has correlation with lung function parameters. Further large scale studies are required to establish these relationship.

Author of Correspondence: Dr Anup Patel, Department of Physiology, GMERS Medical college, Sola,Ahmedabad, Gujarat EMAIL: anup2185@gmail.com

Introduction:

Obesity is now a day's major worldwide problem and major cause of morbidity and mortality also[1]. India witnessed a more significant rise in obesity from its 19th position for both men and women in 1975 to rankings 5th and 3rd respectively in 2014, reflecting increasing obesity rates[2]. Since obesity can cause respiratory symptoms, many obese people are referred for pulmonary function tests (PFTs). It is well known that obesity causes decreases in lung volumes[3]. The magnitude of increase in obesity is found to increase with asthma[4]. A meta-analytical study of the effect of elevated BMI on asthma incidence[5] determined that the likelihood of asthma was 1.51 times higher in subjects with a BMI ≥ 25 kg/m^2 compared to those of a normal weight (18.5-24.9 kg/m^2). Many studies are also suggestive of an increased prevalence of obesity amongst adults with asthma[6], but do not adequately describe cause and effect relationship between obesity and asthma. Furthermore, surgical and diet-induced weight-loss have been reported to improve in lung function and symptoms in patients with asthamatic patients.

Methods: After taking local ethical committee permission Healthy male subjects, aged from 20 to 45 years were recruited randomly from the surroundings. In this study, 198 subjects were recruited for the study. They are arranged in two groups of obese (50 males with BMI 25 to 29.99 kg/m^2) and non-obese (148 males with BMI 18 to 24.99kg/m^2). Depending on their BMI values, the subjects were classified into obese and non-obese groups accordingly as per WHO classification system[1]. Obesity is classified as per BMI>= 25 Kg/m^2. The subjects with respiratory or any major systemic disease and smokers were excluded from study. Written informed consent from every patient was taken.

Anthropometry: Weight was measured nearest to 100 gms using a standardized electronic weighing machine, with the subjects standing. The height of the subjects were measured using a standard 1000-mm tape measure to the nearest centimetre. BMI was calculated body weight in kg/height in m^2 [7]. Range of BMI for selection of subjects is 25+/-7 Kg/m^2 .

The study was done with use of electronic PFT machine helios 702 attached with computer. The standard procedure is followed in the subjects in

the resting condition with adequate ventilation and standard room temperature. Datas of pulmonary function test were imported to excel sheet. And comparison is done between Body mass index and FEV1/FVC

Standard spirometric measures included, forced vital capacity (FVC), forced expiratory volume in one second FEV1, the ratio of forced expiratory volume in one second to forced vital capacity (FEV1/FVC),. Pulmonary function variables were recorded as a percentage of the normal value predicted on reported height and age[8].

Statistical Analysis

The data were expressed in mean±SD and they were analyzed by SPSS (Statistical Package for Social Sciences) statistical software. Differences were considered statistically significant when $p < 0.05$.

Parameters	Obese Mean+/- SD	Normal Mean+/- SD
BMI (Kg/m^2)	27.22+/- 1.21	21.64+/- 1.43
FEV1 (Ltrs)	2.23+/-0.51	2.75+/-0.62
FEV1/FVC	87.84+/-3.96	85.04+/-3.06

Table :1

Table 1 shows the values of BMI , FEV1 and FEV1/FVC comparison between obese and normal individuals

Parameters	**Obese**		**Normal**	
	Pearson correlation coefficient	**P value**	**Pearson correlation coefficient**	**P value**
FEV1	**-0.510**	**0.010**	**-0.021**	**0.723**
FVC	**-0.208**	**0.310**	**-0.023**	**0.812**
FEV1/FVC	**0.595**	**0.002**	**0.042**	**0.568**

Table :2

Table 2 shows correlation of BMI with spirometric values in obese and non-obese subjects.

Result:

On analysis of collected data when compared, it is found that in obese subjects FEV1/FVC has significant positive correlation with BMI and FEV1 has negative correlation with BMI which is quite significant. But in case of non-obese individuals above mentioned parameters has no significant relationship with BMI.

Discussion

Obesity is the most common metabolic disease in the world. However, the relationship between obesity and lung function is not fully understood. Some studies showing no effects[9] and some other studies showing significant effects on comparing obesity and spirometric data[10-11]. This discrepancy between studies could be explained by the wide variations may be because of difference in methods in these studies. In our study we found that there is a significant positive correlation of BMI with FEV1/FVC in obese male adults. In one study by Fukahori s et al BMI was found to be positively correlated with forced expiratory volume in 1 second (FEV(1))/forced vital capacity (FVC) in men and with maximum mid-expiratory flow (MMF) in all subjects[12]. In a study done by Andrew et al suggestion of the predominance of a restrictive pulmonary function profile is offered by the lack of any significant effect of BMI on FEV1[13]. But in our study BMI showed significant negative correlation with FEV1in obese subjects. This finding

corroborates with the findings of few previous researchers[14-15]. Gender and age are unchangeable risk factors for every chronic disease and COPD as well. These data, showing that BMI strongly positively correlates with both lung function parameters in men as per Ivana F et al[16]. There was a significant difference in the FVC, FEV1 and the FEF25-75 values between the underweight, normal weight and the overweight subjects in study done by Umesh et al[17]

The compromised FVC, FEV1/FVC, and uncompromised expiratory flow rates together suggestive of the dominant effects of increasing BMI on chest wall restriction and /or diaphragmatic limitation. We have also allowed for the isolation of this effect by excluding the subjects with obstructive diseaese.

Conclusion:

From the study it is concluded that Obesity has correlation with lung function parameters. In obese individuals lung function are found to be reduced. Further large scale studies are required to establish these relationship.

No Conflict of Interest.

References

1. World Health Organization. Obesity and Overweight. < http:// www.who.int/dietphysicalactivity/publications/facts/obesity/en/>(Version current at April 10, 2008)
2. The Wall Street Journal 2015
3. Chest. 2006 Sep;130(3):827-33
4. Global Initiative for Asthma. Global Strategy for Asthma Management and Prevention. < http://www.ginasthma.com/ReportItem.asp?l1=2&l2=2&intId=94> (Version current at April 10, 2008)
5. Beuther DA, Sutherland ER. Overweight, obesity, and incident asthma: A meta-analysis of prospective epidemiologic studies. Am J Respir Crit Care Med. 2007;(175):661–66.
6. Chen Y, Dales R, Tang M, Krewski D. Obesity may increase the incidence of asthma in women but not in men: longitudinal observations from the Canadian national population health surveys. Am J Epidemiol.2002;155:191–7
7. Garrow JS, Webster J. Quetelet's index as a measure of fatness. Int J Obes. 1985;9(2):147–53
8. Knudson RJ, Lebowitz M, Holberg CJ, Burrows B. Changes in the normal maximal expiratory flow-volume curve with aging. Am Rev Resp Dis. 1983;127:725–34. 1983
9. Jenkin SC, Moxha J. The effects of mild obesity on lung function. Respir Med. 1991;85:309–311
10. Salome Cheryl M, King Gregory G, Berend Norbert. Physiology of obesity and effects on lung function. J Appl Physiol. 2010;108:206–11
11. Biring M, Lewis M, Liu JT, Mohsenifar Z. Pulmonary physiologic changes of morbid obesity. Am J Med Sci. 1999;318:293–97
12. Chin Med J (Engl). 2010 Oct;123(20):2792-6
13. Andrew J, Debbie B, Ali B. The association of body mass index with airway obstruction in non-asthmatics: Implications for the inaccurate differential diagnosis of asthma in obesity. Canadian Journal of Respiratory Therapy. 2011;47(2):11–22
14. Rubinstein I, Zamel N, DuBarry L, Hoffstein V. Airflow limitation in morbidly obese, nonsmoking men. Ann Intern Med. 1990;112:828–32
15. Biring MS, Manmohan S, Michael I, Liu JT, Mohsenifar Z. Pulmonary physiologic changes of morbid obesity. Am J Med Sci. 1999;318(5):293–7
16. European Respiratory Journal 2012 40: P985;
17. Umesh Pralhadrao Lad, Vilas G. Jaltade, Shital Shisode-Lad, P. Satyanarayana Journal of Clinical and Diagnostic Research 2012; May, Vol 6, Issue : 3 :350 – 353

Disclosure: No conflicts of interest, financial, or otherwise are declared by authors