Naveen S Kotur et al /J. Pharm. Sci. & Res. Vol.4(1), 2012, 1681-1683

ISSN:0975-1459
Journal of Pharmaceutical Sciences and Research
www.jpsr.pharmainfo.in

Dynamic Lung Function Tests in Obese.

Naveen S Kotur[1*], S. C. Hiremath[2], Nanda B Sappandi[3], Gurupadappa K[4].

[1] Department of Physiology, Shimoga Institute of Medical Sciences, Shimoga, Karnataka.
[2]Department of physiology Karnataka institute of medical sciences Hubli
[3]Department of Anaesthesiology, Shree Dharmasthal Manjunatheshwara Medical College, Dharwad, Karnataka.
[4]Department of Biochemistry, Shimoga Institute of Medical Sciences, Shimoga, Karnataka.

Abstract
Obesity is a far-reaching problem worldwide today. It is more prevalent than ever and millions of people are at risk for number of diseases like type II diabetes, dyslipidaemia, derangement of pulmonary functions and cardiovascular diseases. The negative association between obesity and pulmonary functions is still not very clear. In this study we have assessed dynamic lung function tests in obese and controls. The parameters assessed between control and obese were statistically analyzed using SPSS software. The Forced Vital Capacity, maximum voluntary ventilation and mid expiratory flow were not statistically significant ($p > 0.05$), however expiratory time was statistically significant ($p < 0.001$).
Key words: Obesity, Body Mass Index, Forced vital capacity, maximum voluntary ventilation.

INTRODUCTION:

Obesity is one of the major deviation of body weight regulation, it is also called corpulence or fatness, is by far the most common effect of continued over consumption of calories more than the amount required to meet the energy expenditure. Obesity is a chronic disease, which is related to serious medical illness. Many of the metabolic consequences of obesity like coronary artery diseases, hypertension, diabetes mellitus and dyslipidaemia have been studied in detail[1,2]. Prevalence of obesity has increased besides to genetic predisposition, from adoption of sedentary life styles, disproportionate intake of calories, ease of availability of junk foods and use of automated working profiles[3]. Apart from calculations of Body mass index, alterations in some of the parameters of pulmonary function tests have been considered as an
early and a significant marker of obesity[4]. On the other hand, the studies on pulmonary consequences of mild to moderate obesity have been controversial to say the least, regarding the nature of pulmonary defect and whether there is any defect at all, that is attributable to obesity. There is a need to establish clearly the pattern of respiratory defect, if any, due to obesity which can aid in providing an impetus towards weight reduction programs in order to ward off future respiratory impairment. Hence the study was taken up.

METHODOLOGY:

In this study the screening was carried out in 150 individuals, and of them 35 individuals who fulfilled inclusion criteria were selected and an equal number of controls were also selected after appropriate matching. The study was carried out after obtaining institutional ethical committee clearance. The written informed consent was also obtained from all the subjects and the study was in adherence to Indian Council of Medical Research guidelines 2006[5].

Exclusion criteria:

- Individuals <18yrs and > 45 years.
- Individuals with history of chronic diseases like hypertension, cardiac diseases and tuberculosis or any disease known to affect respiration were excluded.

Inclusion criteria:

- Individuals aged between 18-45 years and whose body mass index was above 27.5 (Obese) were included as case subjects.
- Individuals aged between 18-45 years and whose body mass index ranging from 18.5 to 23 were included as control subjects.

Sample size:

- 35 individuals fulfilled the criteria's under the heading of case subjects and hence an equal number of controls of 35 were included in the study.
- Classification of obesity proposed by World health organization and National Institute of Health recommended for Indians was used while grouping individuals into different classes of obesity based on BMI [1, 6 & 7] and the same is depicted in table no.2.
- After collecting the preliminary data and calculating BMI using anthropometric instruments and Quetelet's index (Weight in kg divided by height in m^2)[8], Computerised spirolyser (with RS-232 connectivity), was used to measure pulmonary parameters. Statistical

analysis was done and its significance was determined by using student't' test.

RESULTS:

The vital data for obese and control is shown in Table 1.Table 2 shows the classification of overweight and obesity based on body mass index.

The dynamic lung function parameters were shown in the table 3. The results are expressed in mean ± SD. Vital capacity, FVC, FEV_1, were 2.68 ± 0.61, 2.46 ±0.67, 2.13± 0.53 in obese compared to 2.67 ±0.71, 2.53 ± 0.66, 2.31± 0.65 in controls respectively, the P value was > 0.05, which was not statistically significant. However, the expiratory time was 2.75± 1.08 in obese compared to 1.76 ±0.83 in controls respectively, the P value is < 0.001, which was highly significant.

DISCUSSION:

Obesity usually produces decrease in vital capacity, FVC & MVV. In our study, though observed decrease of the above mentioned parameters in obese individuals, however, it was not statistically significant (>0.05). MVV is considered as an index for respiratory muscle strength and hence is usually reduced in morbidly obese subjects with obesity hypoventilation syndrome[4].

The mean expiratory time at rest in obese was significantly high compared to the controls, the prolongation of expatriate time in obese subjects during forced expiratory maneuvers may indicate some form of respiratory flow limitation. Similar results were reported by Pankow[9] and in contrast, no such significant changes seen T_E (expiratory time) was reported by Chlif et al[10].

It has been proposed that each Kg of weight gain causes a steady reduction in VC[4], but a decrease in vital capacity is expected only in higher rates of obesity, the decrease in the vital capacities requires not only a decrease in compliance, but also increase in breathing. However, further studies are required in a larger group and higher grade obesity to ascertain the decrease of pulmonary function tests compared to the controls.

Table.No.1: Vital data between obese and controls.

Parameter	*Obese (Value as Mean ± SD)*	*Controls (Value as Mean ± SD)*
Age in years	34.1 ± 7.30	29.87 ± 7.36
Height in cm	165.77 ± 6.93	157.00 ± 6.61
Weight in kg	86.40 ± 7.72	60.87 ± 9.19
Body surface area in Sqm	1.97 ± 0.14	1.68 ± 1.5
Body Mass Index	31.43 ± 1.84	21.46 ± 2.64
Pulse in beats/min	82.3 ± 6.09	77.93 ± 7.55
Blood pressure in mm Hg (Systolic/ Diastolic)	126.9 ± 8.26 / 82.07 ± 4.94	127 ± 5.82 / 81.33 ± 3.29

Table No.2 Classification of overweight and obesity based on BMI in kg/m^2

Category	WHO Criteria	Recommendation for Indians
Normal	<18.5 - <25	< 23
Overweight	>25 - <30	>23 - <27.5
Obese (Mild – Class I)	>30 - <35	>27.5 - <32.5
Severe obesity (Class II)	>35 - <40	>32.5 - <37.5
Morbid obesity (Class III)	>40	> 37.5

Table.No.3: Forced Vital Capacity parameters & MVV between Obese and controls.

Parameter	*Obese (Value as Mean ± SD)*	*Controls (Value as Mean ± SD)*	*'p' value*
Vital Capacity (L)	2.68 ± 0.61	2.67 ± 0.71	> 0.05
Forced Vital Capacity (L)	2.46 ± 0.67	2.53 ± 0.66	> 0.05
FEV_1 (L)	2.13 ± 0.53	2.31 ± 0.65	> 0.05
Expiratory time (sec)	2.75 ± 1.08	1.76 ± 0.83	< 0.001
MVV (L/min)	87.61 ± 24.67	90.47 ± 19.13	> 0.05

Abbreviations used: PFT: Pulmonary Function Tests. BMI: Body Mass Index, FEV_1: Forced Expiratory Volume in one second, MVV: maximum voluntary ventilation, FVC: Forced Vital Capacity

REFERENCES:

1. Allison DB, Saunders SE, Jensen MD; Obesity in North America – An overview in obesity; Medical clinics of North America; 2000; 84 (2); 305-332.
2. Klein S, Ramijin JA, Larsen, Kronenberg, Polonsky; Williams Text book of Endocrinology; Obesity; 10th ed.; 2003; Saunders, Philadelphia; 1619-641.
3. Vague J; The degree of masculine differentiation of obesities: A factor determining predictions to Diabetes, Atherosclerosis, Gout, and Uric calculus disease; Am J Clin Nutr; 1954; 4; 20-35.
4. Biring AS, Lewi SMI, Liu JT, Mohsenifar AB; Pulmonary Physiological changes of morbid obesity; Am J. Med. Sciences; 1999; 318 (5); 293-97.
5. Ethical Guidelines for Biomedical Research on Human participants; Indian Council of Medical Research publication; 2006; 8-34. URL: http://www.icmr.nic.in/ethical_guidelines.pdf accessed on 10/02/2011.
6. Tierney Jr LM, Mc Phee SJ, Papadakis MA, Baron RB; Current Medical Diagnosis and Treatment; Nutrition; 39th ed.; Mc-Graw Hill Publisher; 2000; 1222.
7. Imprimis Knowledge series III; Fact sheet - Obesity in India; URL: http://www.imprimispr.com/whitepaper/White%20paper-obesity.pdf accessed on 10/02/2011.
8. Park K: Nutrition and Health; Park's textbook of preventive and social Medicine, McGraw Hill India, 2007; 19th: 432.
9. Pankow W, Podszus T, Gutheil T, Penzel T, Peter JH, Von Wichert P.; Expiratory flow limitation and intrinsic positive end-expiratory pressure in obesity. *J Appl Physiol*; 1998; 85: 1236–1243.
10. Chlif M, Keochkerian D, Mourlhon C, Choquet D and Ahmaidi S; Noninvasive assessment of the tension–time index of inspiratory muscles at rest in obese male subjects; *International Journal of Obesity;* 2005; 29**,** 1478–1483.