Forced Vital Capacity in Obese Females

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Abstract

Obesity is increasing global problem. It is associated with various life threatening and metabolic problems. It’s effect on CVS, endocrine liver diseases have been studied many times. The present study was planned to assess Forced Vital Capacity (FVC) in obese females. A total 100 obese and 102 non obese females (21-65 years) were recruited in this study. Obesity was determined by BMI (Body Mass Index), Percentage of body fat, and WHR (Waist Hip Ratio). FVC was recorded on a computerized Medspiror. Obese females showed decrease in FVC (Forced Vital Capacity) as compared to non obese one. This indicates that obesity affects pulmonary functions with manifestation of restrictive ventilatory defect.

Keywords
BMI (body mass index), WHR (waist hip ratio), FVC (forced vital capacity)

Introduction

Obesity is increasing at an alarming rate throughout the world. Due to change in physical activity level and dietary practices there is more sedentary life style, so prevalence of obesity is increasing in the developed as well as developing countries. There are more than 250 million people are obese, equivalent to 7% of adult population. By 2015 around 700 million people will be obese. In India, in urban area 24% and in rural area 7% of females are obese and overweight.

The most common medical problem attributed to obesity include NIDDM, hypertension, hyperlipidemia, gall bladder and liver diseases. Less well known but not less important are the respiratory complications of obesity. Obesity affects normal function mechanism of respiratory system even if lungs are normal.

Most of studies on obesity and respiratory function are done in western countries and particularly in males. In view of this the present paper aims to study how the obesity alters respiratory function.

Materials and Methods

100 obese and 102 non obese females between the age of 21-65 years not suffering from any Respiratory and Cardiovascular diseases were selected. Obesity was determined with the help of BMI, WHR and Skinfold thickness. Skinfold thickness was measured by COSPEN caliper at four sites viz. Bicep, Tricep, Subscapular and suprailliac. Summation of all four sites determines percentage of body fat from the chart mentioned in the manual for females.

Selection criteria -
For Obese females : BMI >30 kg/m², WHR > 0.87, Summation of skinfold thickness at four sites >85mm.
For Non obese females : BMI <25 kg/m², WHR< 0.87, Summation of skinfold thickness at four sites <45mm.

FVC was determined by computerized MEDSPIROR®.

Subjects were asked to take deep breath then close the nose and exhale as forcefully and rapidly as possible into the mouthpiece of equipment.

Statistical Methods : Standard error of difference between two means (z test) was used for statistical analysis.

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Observation Table

<table>
<thead>
<tr>
<th>Groups</th>
<th>21-35 years (Group I)</th>
<th>36-50 years (Group II)</th>
<th>51-65 years (Group III)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Non obese females</td>
<td>Obese females</td>
<td>Non obese females</td>
</tr>
<tr>
<td>Number (n)</td>
<td>41</td>
<td>40</td>
<td>42</td>
</tr>
<tr>
<td>Mean (± S.D.)</td>
<td>2.35 (± 0.16)</td>
<td>1.55 (± 0.24)</td>
<td>2.14 (±0.14)</td>
</tr>
<tr>
<td>Z value</td>
<td>17.61</td>
<td>17.65</td>
<td>9.78</td>
</tr>
<tr>
<td>P value</td>
<td>p&lt; 0.01</td>
<td>p&lt; 0.01</td>
<td>p&lt; 0.01</td>
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<tr>
<td>Significance</td>
<td>H.S.</td>
<td>H.S.</td>
<td>H.S.</td>
</tr>
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H.S – Highly Significant.

Result

FVC showed highly significant decline in obese females in all three groups as compared to non obese females.

Discussion

FVC of obese females was significantly less than non obese females. These findings are consistent with the findings observed by Zied Rasslan et al. (2004)4 · Heather M. Ochs Balcom et al. (2006)10.

Decrease in FVC may be due to Mechanical factors and Systemic inflammatory factors.

Accumulation of fat mechanically affects expansion of diaphragm due to encroachment of fat into the chest wall and diaphragm. It also impedes decent of diaphragm during forceful inspiration as intra-abdominal adipose tissue pressing upward on it. Thick layer of subcutaneous fat over the chest wall compress the thoracic cage as a strapping around it and hence affects its expansion. There is decrease in chest wall, lung and total respiratory system compliance9.

Adipose tissue is metabolically active tissue and influences circulating level of IL-6, TNF-á, leptin and adiponectin, that may act via systemic circulation to negatively affect pulmonary function10.

Conclusion

Obesity affects FVC with manifestation of restrictive ventilatory defect.

Hence weight reduction is necessary to avoid restrictive ventilatory complications of obesity. Further detailed study is required to assess role of obesity on other respiratory function parameters.

Acknowledgement

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References


