Assessment of Pulmonary Function Test in Patients with Major Respiratory Illness.

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Abstract

Introduction: Respiratory disorders are a class of major public health problems confronting the world for over many years. It is one of the important reasons for mortality in many countries every year. COPD (chronic pulmonary disease and Asthma, together with pneumonia are third most common cause of death. pulmonary function tests are used in clinics to assess the extent of the deterioration in lung functions, to predict the prognosis, to decide on treatment and to evaluate the response to treatment and evaluating lung function in the preoperative period and in health research.

Material and Methods: 60 individuals were enrolled in this observational study. They were categorized into three groups. a) Healthy subjects b) Asthma patients, c) COPD patients. FEV1, FVC, FEV1/FVC were measured by spirometer.

Results: Data were analyzed by student ANOVA and Bonferroni post hoc test- P value < 0.05 can be considered statistically significant

The mean ± SD levels of FVC in asthma is (2.21 ± 0.69), COPD (2.37 ± 0.81) and (2.71 ± 0.54) in normal healthy controls. The levels of FEV1 in respiratory diseases like Asthma, COPD are (1.93 ± 0.57), (1.93 ± 0.67) and (2.38 ± 0.41) in normal healthy controls. The ratio between the FEV1/FVC in Asthma, COPD and normal healthy individual are (88.01 ± 4.64, 81.11 ± 4.77, 90.71 ± 5.08) respectively. In Asthma, COPD the FVC values are increased with statistically insignificant of (p>0.05) when compared with normal healthy individuals however the FEV1 levels of Asthma, In COPD FEV1/FVC ratio is decreased with highly statistical significant with (p<0.001) in comparison to normal healthy controls. However in asthma the FEV1/FVC values are decreased with non significant when compared with normal healthy individual.

Discussion: Pulmonary function test (PFT) are used in clinics to assess the extent of the deterioration in lung functions, to predict the prognosis, to decide on treatment and to evaluate the response to treatment and in evaluating lung function in the preoperative period and in health research. There are various factors that influence the PFT, the most important ones being sex, age, race and height causes change in PFT values. From the present study, it states that there is an inverse relation between FVC and FEV1 in Asthma and COPD when compared with normal healthy controls. If the levels of FVC are increased then there is a decreased level of...
FEV1. in Asthma and COPD there is no variation in FVC but decreased levels in FEV1 is observed when compared to the normal healthy individuals.

**Conclusion:** Finally the above hypothesis conclude the importance of FVC and FEV1 levels plays an important role in identification of several various pulmonary disorders, however further studies should be adopted for the detailed aspects of the study.

**Keyword:** FVC, COPD, PFT

**Introduction**

In recent era Respiratory disorders are found to be disastrous for mankind as it is being shown by ongoing COVI-19 pandemic. But never the less history of respiratory diseases can never be forgotten which was ruling the world of illnesses over many years.

COPD, asthma in hands with pneumonia are now the world leaders of mortality ranked at the third position.

Pulmonary function tests are used in clinics to assess the extent of the deterioration in lung functions, to predict the prognosis, to decide on treatment and to evaluate the response to treatment and evaluating lung function in the preoperative period and in health research.

There are various factors that influence the PFT, the most important ones being sex, age, race, and height causes a change in PFT values.

Chronic Obstructive Pulmonary Disease (COPD) by definition is an irreversible inflammation of the lung airways leading to loss of elasticity of the alveoli and causing air trapping with its liability has increased, due to unceasing risk of respiratory diseases and modifications in lifestyle.

Hence to detect the disease and make its earliest treatment is the final goal of a physician, for detection of the disease in this era of modern technology Spirometry is the gold standard. Thus we have undertaken this study to see effect of the disease on the PFT values of patients coming to our institution.

**Material and Methods:**

60 individuals were enrolled in this observational study. They were categorized into three groups. The study groups consists of 20 patients suffering from Asthma, 20 patients with COPD attending to the department of pulmonary medicine at medical college and hospital. The control group consists of healthy subjects (n=20). Cardiovascular disease, hypertension is excluded in the present study. Standard ATS/ERS guidelines were followed while doing the Spirometry procedure.

Procedure for estimation of pulmonary function tests by spirometer:

The subject was asked to sit comfortable and relax. Place a sterile mouth piece in the subjects mouth in such way that the mouth piece remains fitted between the teeth and lips. Connect the mouth piece to spirometer. Close the nostrils with the help of nose clip.

Tidal volume- subject was made to breath in and out normally through the mouth to measure tidal volume

FEV1- subjects was made to take maximum inspiration and asked to exhale as rapidly and as forcefully. The amount of air exhale may be measured at 1 second (FEV1), 2 seconds (FEV2), and 3 seconds (FEV3).
Forced vital capacity (FVC) - subject was made to inhale as deep as possible and exhale forcefully, thus the forced vital capacity is measured. Mean and standard deviation of each of the measured parameters will be calculated in the study group and compared with controls. For statistically significant results Analysis of variance (ANOVA) with Bonferroni post hoc test will be applied using Graph pad 9 software. The significance of difference in the levels of pulmonary function tests between the study group and control group. P value < 0.05 will be considered statistically significant

**Table 1: Mean and SD of spirometry values in patients:**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Asthma (20) (Mean ± SD)</th>
<th>COPD (20) (Mean ± SD)</th>
<th>Normal Control (20) (Mean ± SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FVC</td>
<td>2.21 ± 0.69</td>
<td>2.37 ± 0.81</td>
<td>2.71 ± 0.54</td>
</tr>
<tr>
<td>FEV1</td>
<td>1.93 ± 0.57</td>
<td>1.93 ± 0.67</td>
<td>2.38 ± 0.41</td>
</tr>
<tr>
<td>FEV1/FVC</td>
<td>88.01 ± 4.64</td>
<td>81.11 ± 4.77</td>
<td>90.71 ± 5.08</td>
</tr>
</tbody>
</table>

The mean ± SD levels of FVC in asthma is (2.21 ± 0.69), COPD (2.37 ± 0.81) and (2.71 ± 0.54) in normal healthy controls. The levels of FEV1 in respiratory diseases like Asthma, COPD are (1.93 ± 0.57), (1.93 ± 0.67) and (2.38 ± 0.41) in normal healthy controls. The ratio between the FEV1/FVC in Asthma, COPD and normal healthy individual are (88.01 ± 4.64, 81.11 ± 4.77, 90.71 ± 5.08) respectively. In Asthma, COPD the FVC values are indifferent with no statistically significant of (p>0.05) when compared with normal healthy individuals however the FEV1 levels of asthma and COPD were changed with statistically no significant of (p>0.05) when compared with normal healthy individuals as post hoc results are depicted in table 2.

**Table 2: Bonferroni’s post hoc test results**

<table>
<thead>
<tr>
<th>Spirometry</th>
<th>FEV1</th>
<th>FVC</th>
<th>FEV1/FVC</th>
</tr>
</thead>
<tbody>
<tr>
<td>CN-COPD</td>
<td>N</td>
<td>N</td>
<td>++</td>
</tr>
<tr>
<td>CN-Asthma</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>COPD -Asthma</td>
<td>N</td>
<td>N</td>
<td>++</td>
</tr>
</tbody>
</table>

N- p > 0.05 not significant
+ - p< 0.05 Significant
++ - p < 0.005 highly significant

In COPD FEV1/FVC ratio is decreased with highly statistical significant with (p<0.001) in comparison to normal healthy controls. However in asthma the FEV1/FVC values are decreased with non-significant when compared with normal healthy individual.

**Discussion**

There are various factors that influence the PFT, the most important ones being sex, age, race and height causes change in PFT values. Hence in present study age-sex matched individuals were considered for the procedure.

For uncovering changes in pulmonary functions; spirometry is generally use which is supposed to be the gold standard for detecting COPD and asthma as it is also elaborated by Global
initiative against obstructive lung diseases (GOLD). Global initiative for chronic obstructive lung diseases (GOLD).  

Pulmonary function test (PFT) are used in clinics to assess the extent of the deterioration in lung functions, to decide on treatment and to predict the prognosis, of the patient as it is very easy to perform even at bed side of the patient. 

Spirometry also can be used to evaluate the response to treatment and in evaluating lung function in the preoperative period and in health research.

In present study no significant results were observed in FEV1 and FVC in asthmatics, COPD and normal individuals was observed to be non-significant similar results were observed by Gupta YS. This could be attributed to the fact that minor changes in the airways could be due to allergens or asthma aggravating factors which at initial phase of the disease doesn’t cause pathological changes at alveolar level which could be identified by Spirometry.

Considering FEV1/FVC ratio significantly reduced values were observed in normal individuals and COPD patients making this parameter to be the specific parameter in diagnosing COPD. Furthermore this parameter could be used to assess the prognosis of the disease which may prevent further deterioration of the disease. Similar results were observed by Enright PL and Gupta Y.

From the present study, it states that there is an inverse relation between FVC and FEV1 in Asthma and COPD when compared with normal healthy controls. If the levels of FVC are increased then there is a decreased level of FEV1 in Asthma and COPD there is no variation in FVC but decreased levels in FEV1 is observed when compared to the normal healthy individuals.

Cessation of smoking is supposed to be most important factor for preventing progression of the disease if it is possible to perceive these changes at an earlier stage of the disease then mortality and morbidity can be reduced to a greater extent. More emphasis on studies need to be given to confirm whether this has a role in halting further progression into COPD and potentially which could have a momentous profit in falling morbidity and mortality due to COPD.

**Conclusion**

Finally the above hypothesis conclude the importance of FVC and FEV1 levels plays an important role in identification of several various pulmonary disorders, however further studies should be adopted for the detailed aspects of the study.

**Bibliography:**


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