Assessment of Pulmonary function tests in petrol pump workers: A cross sectional study

*Dr Santosh V Chidri, Dr Satish Patil

Department of Physiology, MNR Medical College, Sangareddy, Andhra Pradesh, India

*Corresponding author: Email- santosh.chidri@gmail.com

Abstract:

Introduction: Pulmonary function tests are one of the important tools in assessing efficacy of the respiratory system. Several studies have been carried to assess this issue. The present study was planned to assess and confirm the ill effects of air pollution in petrol pump workers.

Material and methods: The subjects who were continuously working in petrol pump industry since more than one year were included in the study. To assess the direct impact of the prevailing atmosphere, subjects those who are exposed directly to actual work area were selected rather than subjects working in the petrol pump office. The written consent was obtained after explaining the study background and implications in their own local language. The control group consisted of subjects from same town with working background in office area. The pulmonary function tests were done by using digital spirometry.

Results and conclusion: From present study significant difference in the statistical data (p < 0.005) between control group and petrol pump workers was noted. All the measured respiratory parameters showed significant results. FEV1, FEV2, VC and MVV were analyzed in this assessment study. From present study we may conclude that petrol pump workers are strongly affected by surrounding pollution. Hence some regulations should be formed for protecting them from health hazards.

Keywords: FEV1, Vital capacity, MVV

Introduction:

Pulmonary function tests are one of important tool in assessing efficacy of the respiratory system. Spirometry is one of cheapest and easier method available for assessment of lung functions. [1] The results are helpful in assessing and prognostic indicators than diagnostic one. Petrol pump workers due constant exposure to air pollution in the form of dust particles, pollution air vapors & gases are always seen with chronic lung diseases. Occupational exposure of petroleum products, air pollution, crowdly atmosphere, and its exhaust cause significant health problem in petrol pump workers. [2] The effects of this pollution on our respiratory system hampering health is well known fact. Several studies are carried out on this issue. [3,4,5,6,7,8] Our aim was to assess and confirm these findings from south Indian population.

Material and methods:

The present cross sectional study was carried out at MNR Medical College, Fasalwadi, Sangareddy, and Andhra Pradesh in Department of Physiology during last one year as part of research activity. The study protocol was approved by research ethical committee. The sample collection was done by purposive sampling technique. We selected 40 petrol pump workers from 12 petrol pumps across the town and nearby highways in a circle of 30 kilometers from our college. The sample size was determined by
The variables were defined and finalized with help from statistician. The subjects included were the one who were working continuously in same industry for more than one year. The subjects exposed directly to actual work of filling the fuel were selected. This was done to assess direct impact of air pollution. The subjects with history of smoking, alcoholism and any respiratory disorder were excluded from present study. The written consent was obtained after explaining the study background and implications in their own local language.

The control group was selected within same age range (20-45) years with working in office area only from same town. The pulmonary function tests were done by using digital spirometry at their place of work. The other demographic data was also collected by using data sheet. All the data were tabulated and filled in excel sheet of Microsoft World 2007. The data was shifted to SPSS Software version 17 for necessary statistical processing.

The descriptive statistics was applied followed by Z test for comparison between two groups.

**Observations and results:**

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Workers exposed for &lt; 2 years</th>
<th>Workers exposed for 2-5 years</th>
<th>Workers exposed for &gt; 5 years</th>
<th>Control Group (n = 40)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEV₁ (%)</td>
<td>85.66±0.7</td>
<td>85.02±1.2</td>
<td>84.76±3.11</td>
<td>86.33±2.54</td>
</tr>
<tr>
<td>FVC (L)</td>
<td>4.25±2.23</td>
<td>3.75±0.95</td>
<td>3.60±0.72</td>
<td>4.35±1.22</td>
</tr>
<tr>
<td>MVV</td>
<td>128.33±3.22</td>
<td>122.12±0.67</td>
<td>114.73±0.76</td>
<td>135.12±1.02</td>
</tr>
<tr>
<td>VC (L)</td>
<td>5.09±1.56</td>
<td>4.85±2.11</td>
<td>4.39±0.56</td>
<td>5.11±1.39</td>
</tr>
</tbody>
</table>
**Discussion:**

Present study showed statistical significant difference between the control group and petrol pump workers (p<0.005). All the measured respiratory parameters showed significant results. The present study was done as a pilot project from our department with short duration. So only FEV1, FEV, VC and MVV were assessed in the study, hence other parameters were not included in the results analysis.

The various dust particles &air vacuoles in the air are directly inhaled and hence directly show their toxic effects over respiratory system. However in study done by Hulke el al., FEV1 (%) showed non-significant change, thus suggesting restrictive type of lung disease .

Other studies have been performed in petrol pump workers and petrol filling workers. In these studies, lung function impairment was seen. In a study done in petrol pump workers, restrictive type of lung disease was seen, as in ours. In a study by Meo SA et al[10], in the subjects exposed to crude oil spill into sea water, significant reduction in forced vital capacity (FVC), forced expiratory volume in first second (FEV(1)), forced expiratory flow (FEF(25-75%)) and maximum voluntary ventilation (MVV) were noted, however this impairment was reversible and lung functions parameters improved when the subjects were withdrawn from the polluted air environment. Similar findings were observed in cats following long-term exposure to diesel exhaust.

A similar study done by Madhuri et al. , Thirty healthy non-smoker male working in petrol pump for more than three years formed the study group, while thirty healthy non-smoker males who are not exposed to air pollutants from hospital staff served as control group. The pulmonary function test was assessed using computerized spirometer. The pulmonary function test (FVC, FEV1, FEV1/FVC%, FEF25 – 75% and PEFR) were significantly decreased in petrol pump workers. The results suggest that there in a need to improve control measures and the health status of workers engaged in petrol fumes.

**Conclusion:**

From present study we may conclude that petrol pump workers are strongly affected by the surrounding pollution that is prevailing in their work area. Many of them are in the young and middle age group and are likely to suffer from respiratory diseases that may progress to chronicity. Hence adequate regulations should be formed for protecting them from health hazards. Moreover they need to be counselled, educated and advised to take some simple preventive measures so as to minimize exposure to the polluting environment.

**Keywords:**
FEV1: Forced expiratory volume  
MVV: Maximum ventilatory volume  
VC : Vital capacity  
FVC : Forced vital capacity

**References:**


