

**Original Research Article****Peak Expiratory Flow Rate (PEFR) in Smoker and Non-Smoker Petrol Pump Workers in Haldwani**

Authors

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Email: [vkdwivedi2003@yahoo.co.in](mailto:vkdwivedi2003@yahoo.co.in)**Abstract**

Long term exposure to petrol vapors has shown to affect the different physiological systems in the body, with the highest impact on the respiratory system. The actual purpose of this study is to assess the impact of petrol or diesel fumes/vapours coupled with environmental pattern on the lung functions of petrol pump workers who are non smokers and smokers. The pulmonary function test was analysed using Wright's Peak Flow Meter having range of 60-800 L/min. The value of PEFR was reduced in Petrol pump workers as compared to control groups and reduction in PEFR was far more severe in smoking workers. This reduction is due to proliferative and fibrotic changes in the lungs, occurring due to petrol/diesel fumes, in addition smoking habits of petrol pump workers may contribute further in deterioration of pulmonary functions. Strategies should be planned at various levels to protect petrol pump workers against the hazardous effects of petrol/diesel fumes.

**Keywords:** Petrol pump workers, automobile exhaust.**Introduction**

Petrol is a mixture of volatile hydrocarbons, while diesel fuel contains paraffin's, alkenes and aromatics. Petrol and diesel are the most commonly used automobile fuels in India. A long term exposure to the air pollutants may lead to ill health on the respiratory functions<sup>[10]</sup>. Air Pollution is increasing day by day and this increment is significantly contributed by vehicles<sup>[12]</sup>.

It is well known that industrial dust inhalation over a long period leads to proliferative and

fibrotic changes in the lungs<sup>[1]</sup> Reduction in Peak Expiratory Flow Rate (PEFR) is reported in stone quarry workers<sup>[4]</sup>, cement pipe factory workers<sup>[6]</sup>, cotton mill workers<sup>[2]</sup>, electroplaters<sup>[7]</sup> and hair dressers<sup>[5]</sup>.

The actual purpose of this study is to assess the impact of petrol or diesel fumes / vapors coupled with environmental pollution on the lung function of petrol pump workers who are non smokers<sup>[8, 12, 15]</sup>. Diesel exhaust, in addition to generating pollutants like hydrocarbons, oxides of nitrogen and carbon is a major contributor to particulate

matter in most places of the world. Symptoms like chronic cough, wheezing and breathlessness have been reported on exposure to these pollutants<sup>[2, 4]</sup>. At high ambient concentrations, well- defined and marked systemic pulmonary inflammatory response is also observed<sup>[5]</sup>.

Various occupational exposures to petrol/diesel products have been shown to affect different systems of body<sup>[5,9,11,14]</sup>. Several animal studies have also demonstrated a consistent association between the air pollution and the altered lung function<sup>[12,13,15]</sup>. Petrol pump workers (Filling attendants) are continuously exposed to the organic and inorganic substances present in the petrol.

Long term exposure to petrol vapors has shown to affect the different physiological systems in the body, with the highest impact on the respiratory system<sup>[9,14]</sup>. Exposure to volatile fuel compounds and roadway motor vehicle exhaust leads to increased risk of chronic lung disease and carcinogenesis. Tobacco smoking further accelerates this process. The average daily exposure to these chemicals in India generally exceeds about 10h/day. Some of them are working for more than ten years now. Hence, the present study aims to evaluate the respiratory functions in subjects continuously exposed to petrol/diesel vapor for more than five years.

### Material and Methods

The present study was carried out after obtaining clearance from the Ethical clearance committee of the college, on 75 asymptomatic, healthy male subjects of 30 – 35 years of age. The study was divided into 3 groups. In group 1 (n = 25), petrol pump workers who were smokers as well, were included whereas in group 2 (n = 25), non-smoker petrol pump workers were taken. Further, group 3 (control group, n = 25) comprised of non-smoker healthy subjects who were not exposed to Petrol /Diesel fumes. The subjects in all the groups were almost of same age group, height, weight and socio-economic status.

### Criteria for selection

1. Age group was 35-50 years.
2. Smokers (25) exposed to Petrol/diesel fumes for at least 5 years.
3. Non-smokers (25) exposed to Petrol/diesel fumes for at least 5 years.
4. Control (25)- Non-smokers not exposed to Petrol/diesel fumes.
5. All the subjects were free from respiratory or cardiovascular disease or any other systemic disease.
6. Anthropometric data of all the subjects were almost similar in relation to age, height and weight.

The subjects were asked to abstain from smoking for at least 2 hours before recording Peak Expiratory Flow Rate (PEFR). All the subjects were explained about the method to prevent fear and apprehension. PEFR was recorded between 9-11 am to prevent the effect of diurnal variation. PEFR was recorded by using Wright's Peak Flow Meter having a range of 60-800 L/min. All the subjects were explained the purpose of the test and method of testing was demonstrated after obtaining informed consent from them individually.

The subjects were asked to take a deep inspiration with maximum effort and then they were instructed to blow out forcefully through the mouth piece into the instrument. The test was performed in standing position with nose clip applied.

### Results

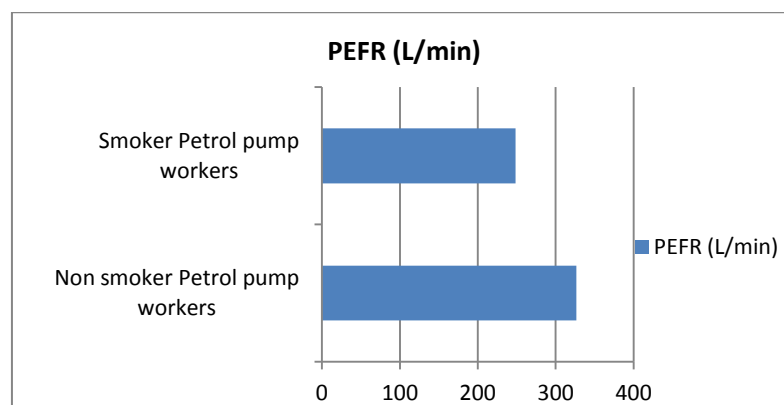
The PEFR values in case of Petrol pump workers who were smokers as well were significantly reduced in comparison to non-smoking Petrol pump workers (Table 1, Fig 1 (A);  $p < 0.05$  Student's t-test for unpaired observations). Further, the PEFR values of non-smoking Petrol pump workers were also decreased significantly from non-smoking healthy subjects who were not exposed to Petrol/ diesel fumes (Table 1, Fig 1 (B);  $p < 0.05$  Student's t-test for unpaired observations).

**Table 1** PEFR values of the subjects in various groups are given. The values represent the mean  $\pm$  SD of 25 subjects in each group.

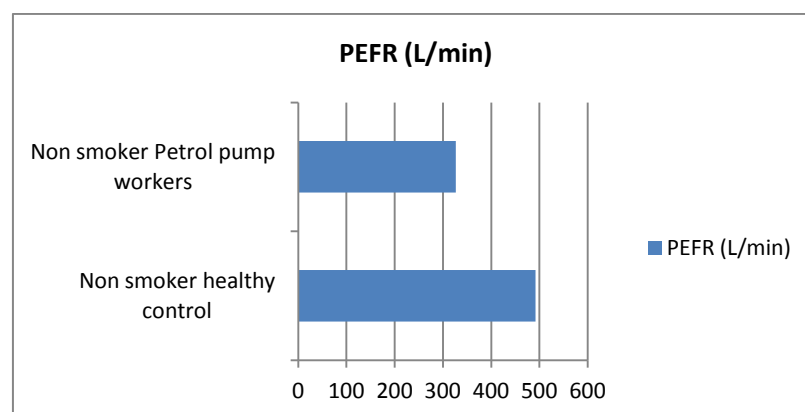
Groups	No. of Subjects (n)	Group Names	PEFR (L/min)
1	25	Non smoker healthy control	492 $\pm$ 10.7
2	25	Non smoker Petrol pump workers	326 $\pm$ 6.2*
3	25	Smoker Petrol pump workers	248 $\pm$ 6.3@

\*p< 0.05 as compared to group 1 (Student's t-test for unpaired observations)

@p<0.05 as compared to group 2 (Student's t-test for unpaired observations)



**Figure 1.A** PEFR values in L/min have been represented. (A) @ represent that smoking petrol pump workers had significantly reduced PEFR in comparison to non-smoking petrol pump workers.



**Figure 1 (B)** @ represent that non- smoking petrol pump workers had significantly reduced PEFR in comparison to non-smoking healthy controls not exposed to Petrol/diesel fumes.

## Discussion

In number of studies, harmful effects of tobacco smoking had been reported. Smokers develop abnormalities in pulmonary functions more frequently than non-smokers<sup>[10,12,15]</sup>. Early response of the lungs to smoking begins in small airways<sup>[4,6]</sup>. In the present study, smoking Petrol pump workers showed highly significant reduction in PEFR as they are also exposed to petrol/ diesel fumes.

The value of PEFR was reduced in Petrol pump workers as compared to control group and

reduction in PEFR was far more severe in smoking workers than non smoking workers. Determination of pulmonary functions is highly dependent upon the duration and amount of tobacco consumed. Considering the economic status, bidi smokers predominate in the lower income groups while in the high socio-economic status group, cigarette smoking is more common<sup>[14, 12, 15]</sup>. Our study showed that almost all the smokers smoked bidi. The reduction in PEFR in smoking Petrol pump workers is due to effect of tobacco exposure as well as occupational

exposure to petrol/diesel fumes. The reduction in PEFr among non-smoking Petrol pump workers as compared to control is mainly due to exposure hazards of petrol/diesel fumes which causes proliferative and fibrotic changes in the lungs. The present study concludes that smoking habits of Petrol pump workers acts as primary factor to which petrol/diesel fumes may contribute further leading to deterioration of their pulmonary functions.

In addition, there is no standardization regarding the number of petrol pumps in a particular area. Further, most of the petrol pump workers belong to the lower socioeconomics class, predisposing them to various illnesses<sup>[15]</sup>.

Health awareness has to be created among the petrol pump workers to use personal protective measures such as masks and respirators to reduce the inhaled dose of the a hazardous agents in petrol / diesel vapor and their exhaust<sup>[13]</sup>.

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