Original Article

# A Study on the Lung Function Tests in Petrol-Pump Workers

Physiology Section

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## ABSTRACT

**Introduction:** Air pollution from vehicles is an inescapable part of the urban life. A long-term exposure to petrol and diesel fumes lead to a deleterious effect on the respiratory function. In-addition to the exposure to the hazardous exhaust of vehicles, petrol-pump workers are also exposed to the vapours of petrol.

**Aim and Objectives:** The aim of this study was to assess the extent of altered pulmonary functions in petrol-pump workers who were exposed to petrol and diesel fumes. In-addition, the effect of the duration of the service at the petrol-pumps was also studied and these changes were compared with those of age-matched healthy controls.

**Materials and Methods:** The study comprised of 150 petrol-pump workers who were categorized into three groups, depending on the duration of the exposure. Fifty, healthy, age-matched males served as the controls. Each subject's age, smoking habits, the duration of the exposure and health conditions were recorded. Their pulmonary-function tests were studied at their workplace by using a Med-spiror. The statistical analysis was done by using one-way ANOVA (analysis of variance).

**Results:** The results showed a statistically significant decline in the values of FVC, $FEV_{0.5}$, $FEV_1$, $FEV_3$, FEF 50%, FEF 25-75% and PEFR in the petrol-pump workers. However, a decline in the mean values of MVV, FEF 25%, FEF 75%, FEV 0.5 / FVC, FEV1/ FVC and FEV3 / FVC was statistically insignificant.

**Conclusion:** Our findings are suggestive of the adverse effects of petrol/diesel fumes on pulmonary functions. In order to prevent these changes in the petrol filling workers, we suggest a medical observation including pre-employment and periodic medical check-ups, including pulmonary function tests. The early recognition and the removal of the susceptible workers from the work place before chronic impairment develops will prove to be beneficial.

**Key Words:** Petrol and Diesel Fumes, Occupational Exposure, Respiratory Function, Pulmonary Function Tests, Timed Vital Capacity

## INTRODUCTION

Air pollution from vehicles is an inescapable part of the urban life throughout the world. A long term exposure to the air pollutants leads to deleterious effects on the respiratory functions. Air pollutants and chemicals like benzene, lead and carbon monoxide can cause adverse health effects by interacting with molecules which are crucial for the biochemical or physiological processes of the human body.The rapidly multiplying number of automobiles in most cities is causing a corresponding increase in air pollution, which is a cause of grave concern. Also, the failure to use personal protective equipment poses a great risk for the petrol-filling workers [1].

Petrol is a mixture of volatile hydrocarbons, while diesel fuel is a distillate of petroleum which contains paraffins, alkenes and aromatics [2]. Both petrol and diesel undergo combustion in automobile engines and give rise to combustion-derived nano-particles (CDNPs). Diesel exhaust particles are the most common CDNPs in the urban environmental air. These particles are highly respirable and have a large surface area where organic materials can be adsorbed easily. The particles which are generated from diesel exhaust are sub-micronic by virtue of their greater surface area-to-mass ratio- and can carry a larger fraction of toxic hydrocarbons and metals on their surface. They can remain airborne for longer time periods and can be deposited in greater numbers and deeper into the lungs than the large-sized particles [3]. Benzene occurs naturally in crude oil and is a constituent of petrol. It is a major monocyclic aromatic hydrocarbon which is largely used as a solvent in automobiles and solvent gasoline. In India, the percentage of benzene in automobile engines is about 3%. Petrol-pump workers who are exposed to the petrol fumes exhibit a number of clinical signs and symptoms which may be due to benzene toxicity. Improvement in the engine design, soot filters and fuel modification may provide the best approach to control the exposure to these fumes [4].

It was necessary to carry out the present study was as a detailed study on the lung function abnormalities among petrol pump workers as such a study which was caused due to work exposure was lacking in this geographical region. The aim of this study was to assess the extent of altered pulmonary functions in petrol-pump workers who were exposed to petrol and diesel fumes. In-addition, the effect on the duration of the exposure to the petrol/diesel fumes was also studied and these changes in the lung function tests were compared with age- matched healthy controls.

## MATERIALS AND METHODS

This study was conducted in the Department of Physiology, Govt. Medical College, Amritsar. The subjects comprised of 150 males who were working in different petrol pumps. Their ages, smoking habits, the duration of exposure, physical status and health conditions were recorded by using a questionnaire. After recording their brief history, their examination was done as per the proforma, which was attached. The ethical committee clearance and an informed consent of the subjects were taken.

Subjects with clinical abnormalities of the vertebral column and the thorax, diabetes mellitus, pulmonary tuberculosis, bronchial asthma, chronic bronchitis, bronchiectesis, emphysema and malignancy and those who were drug addicts, cigarette smokers, tobacco chewers and those who had undergone abdominal or chest surgery were excluded from the study. The study group was categorized according to the duration of the service at the petrol pumps, which was as under:

| Group | Duration of service | No. of cases |
|---|---|---|
| I | Upto 1 year of service | 50 |
| II | 1-5 years of service | 50 |
| III | More than 5 years of service | 50 |

There were 50 controls which comprised of age and sex matched healthy adult males, non-smokers working in the hospital as attendants, medical assistants and other hospital personnel (Group IV).

The pulmonary function tests were performed at their workplace by using a Med-spiror (Recorders and Medicare System, Chandigarh). It is a computerized spirometer which is designed to be used with electromechanical pneumotach. The testing procedures are quite simple and non invasive and are harmless to the patients. Only 2 manoeuvers were required from the subject to accumulate all the test data, a forced vital capacity and maximal voluntary ventilation.

The FVC, FEV 0.5, FEV 1, FEV 3, PEFR, FEF 25-75%, FEF 25%, FEF 50%, FEF 75%, FEV 0.5/FVC, FEV 1/FVC, FEV3 /FVC and MVV values were calculated. All the gas volumes were corrected to B.T.P.S (Body temperature, ambient pressure and saturated with water vapour) automatically by the instrument. The data was analyzed by using the computer software, Microsoft Excel Statistical Package of Social Sciences (SPSS version 10.0). The mean and standard deviation (SD) were calculated and reported for the quantitative variables. The statistical difference in the mean values was tested by using one way ANOVA (analysis of variance) with post-hoc turkey tests. A p-value of < 0.05 was considered as statistically significant.

## OBSERVATIONS AND RESULTS

[Table/Fig-1] shows that the mean value of the ages of the subjects was 28.23 ± 9.21 and that the mean value of the controls was 23.36 ± 2.71 and that the difference was statistically insignificant. The mean value of the heights of the subjects was 164.05 ± 8.13 and the mean value of the controls was 165.98 ± 8.51. The difference was statistically insignificant. The mean value of the weights of the subjects was 55.23 ± 8.58 and that of the controls was 59.36 ± 10.70. The difference was statistically insignificant. The mean value of the BSA of the subjects was 1.53 ± 0.11 and that of the controls was 1.57 ± 0.13. The difference was statistically insignificant.

| Variables | Mean ± SD | P-Value |
|---|---|---|
| AGE (years): subjects<br>Controls | 28.23 ± 9.21<br>23.36 ± 2.71 | 0.24 : NS |
| HEIGHT(cm): subjects<br>Controls | 164.05 ± 8.13<br>165.98 ± 8.51 | 0.46 : NS |
| WEIGHT (Kg): subjects<br>Controls | 55.23 ± 8.58<br>59.36 ± 10.70 | 0.98 : NS |
| BSA ($m^2$): subjects<br>Controls | 1.53 ± 0.11<br>1.57 ± 0.13 | 0.77 : NS |

**[Table/Fig-1]:** Characteristics of the Subjects
p >0.05; NS = Non significant.

[Table/Fig-2] shows the mean value of FVC as 3.05 ± 0.46, 2.77 ± 0.42, 2.38 ± 0.61 and 3.80 ± 0.54 in Groups I, II and III and in the controls respectively. On comparison between Groups I and III, Group I and the controls, Group II and the controls and Group III and the controls, a decline was observed, which was statistically highly significant (p<0.001). But the decline showed significance at a 5% significance level when a comparison was done between Groups I and II (p<0.05). However, a decline in the mean FVC value in Group II versus III was statistically significant at a 1% significance level.

[Table/Fig-3] shows the mean value of FEV 0.5 as 1.77 ± 0.65, 1.76 ± 0.59,1.27 ± 0.72 and 2.60 ± 0.32 in Groups I, II and III and in the controls respectively. On comparison between Groups I and III, Groups II and III, Group I and the controls, Group II and the controls and Group III and the controls, a decline was observed, which was statistically highly significant(p<0.001).However, when a comparison between Groups I and II was done, a statistically insignificant decline was observed (p>0.05).

Table /Figure 4 shows the mean values of $FEV_1$ as 2.65 ± 0.43, 2.55 ± 0.41, 1.98 ± 0.77 and 3.21 ± 0.55 in Groups I, II and III and in the controls respectively. On comparison between Groups I and III, Groups II and III, Group I and the controls, Group II and the controls and Group III and the controls, a decline was observed, which was statistically highly significant (p<0.001).However, when

| Group | N | Range | Mean ± SD |
|---|---|---|---|
| I | 50 | 2.3 – 3.7 | 3.05 ± 0.46 |
| II | 50 | 1.9 – 3.7 | 2.77 ± 0.42 |
| III | 50 | 1.1 – 3.4 | 2.38 ± 0.61 |
| Controls | 50 | 2.9 – 5.0 | 3.80 ± 0.54 |

| Comparison | P-value | Significance |
|---|---|---|
| I vs II | 0.032* | S |
| I vs III | < 0.001*** | HS |
| II vs III | 0.001** | S |
| I vs Controls | < 0.001*** | HS |
| II vs Controls | < 0.001*** | HS |
| III vs Controls | < 0.001*** | HS |

**[Table/Fig-2]:** Showing Mean FVC (L) in Subjects and Controls
* p<0.05; Significant at 5% significance level.
** p< 0.01; Significant at 1% significance level.
*** p< 0.001; Highly significant.

| Group | N | Range | Mean ± SD |
|---|---|---|---|
| I | 50 | 0.4 – 2.9 | 1.77 ± 0.65 |
| II | 50 | 0.1 – 3.0 | 1.76 ± 0.59 |
| III | 50 | 0.1 – 2.5 | 1.27 ± 0.72 |
| Controls | 50 | 1.7 – 1.96 | 2.60 ± 0.32 |

| Comparison | P-value | Significance |
|---|---|---|
| I vs II | 1.000 | NS |
| I vs III | < 0.001*** | HS |
| II vs III | < 0.001*** | HS |
| I vs Controls | < 0.001*** | HS |
| II vs Controls | < 0.001*** | HS |
| III vs Controls | < 0.001*** | HS |

**[Table/Fig-3]:** Showing Mean Fev 0.5(L) in Subjects and Controls
NS: p> 0.05; Not Significant; *** p< 0.001; highly significant.

a comparison between Groups I and II was done, a statistically insignificant decline was observed ( p>0.05).

[Table /Fig-5] shows the mean values of $FEV_3$ as 3.04 ± 0.47, 2.73 ± 0.42, 2.36 ± 0.68 and 3.59 ± 0.70 in the Groups I,II and III and in the controls respectively. On comparison between Groups I and III, Group I and the controls, Group II and the controls and Group III and the controls , a decline in the values was found, which was statistically highly significant (p<0.001). But, a comparison between Groups I and II and between Groups II and III showed the decline to be statistically significant at a 5% significance level (p<0.05).

[Table /Fig-6] shows the mean values of FEF 50% as 3.78 ± 1.06, 4.16 ± 1.22, 3.30 ± 1.76 and 5.17 ± 1.32 in Groups I, II and III and in the controls respectively. The decline in the mean FEF 50% was highly significant when it was compared between Group I and the controls and between Group III and the controls (p<0.001). When Group II was compared with group III and when Group II was compared with the controls, a decline was found, which was statistically significant at a 5% significance level (p<0.05).However, a decline in Group I versus II and Group I versus III was found to be statistically insignificant (p>0.05).

[Table/Fig-7] shows the mean FEF 25-75% as 3.29 ± 1.01, 3.60 ± 1.33, 2.66 ± 1.54 and 4.75 ± 1.11 in Groups I, II and III and in the controls respectively. When a comparison was done between Group I and the controls, between Group II and the controls and between Group III and the controls, a decline was observed, which was statisticallyhighly significant(p< 0.001). It was significant at a 1% significance level when compared between Groups II and III (p<0.01). However, a comparison between Groups I and II and Groups I and III showed a statistically insignificant decline (p>0.05).

[Table/Fig-8] shows the values of the mean PEFR as 6.03 ± 1.88, 6.20 ± 1.64, 5.12 ± 2.84 and 7.91 ± 1.27 in Groups I, II and III and in the controls respectively. On comparison between Groups I

| Group | N | Range | Mean ± SD |
|---|---|---|---|
| I | 50 | 1.92 – 3.74 | 2.65 ± 0.43 |
| II | 50 | 1.86 – 3.52 | 2.55 ± 0.41 |
| III | 50 | 0.38 – 3.14 | 1.98 ± 0.77 |
| Controls | 50 | 2.54 – 4.76 | 3.21 ± 0.55 |

| Comparison | P-value | Significance |
|---|---|---|
| I vs II | 0.822 | NS |
| I vs III | <0.001*** | HS |
| II vs III | <0.001*** | HS |
| I vs Controls | <0.001*** | HS |
| II vs Controls | <0.001*** | HS |
| III vs Controls | <0.001*** | HS |

**[Table /Fig-4]:** Showing Mean $FEV_1$ (L) in Subjects and Controls
NS: p> 0.05; Not Significant; ***p< 0.001; highly significant.

| Group | N | Range | Mean ± SD |
|---|---|---|---|
| I | 50 | 2.3 – 4.0 | 3.04 ± 0.47 |
| II | 50 | 1.9 – 3.7 | 2.73 ± 0.42 |
| III | 50 | 0.9 – 3.4 | 2.36 ± 0.68 |
| Controls | 50 | 2.5 – 4.9 | 3.59 ± 0.70 |

| Comparison | P value | Significance |
|---|---|---|
| I vs II | 0.045* | S |
| I vs III | <0.001*** | HS |
| II vs III | 0.010* | S |
| I vs Controls | <0.001*** | HS |
| II vs Controls | <0.001*** | HS |
| III vs Controls | <0.001*** | HS |

**[Table/Fig-5]:** Showing Mean $FEV_3$ (L) in Subjects and Controls
*p<0.05; Significant at 5% significance level; *** p< 0.001; highly significant.

| Group | N | Range | Mean ± SD |
|---|---|---|---|
| I | 50 | 2.04 – 6.57 | 3.78 ± 1.06 |
| II | 50 | 2.42 – 7.57 | 4.16 ± 1.22 |
| III | 50 | 0.56 – 6.57 | 3.30 ± 1.76 |
| Controls | 50 | 3.04 – 7.35 | 5.17 ± 1.32 |

| Comparison | P value | Significance |
|---|---|---|
| I vs II | 0.496 | NS |
| I vs III | 0.309 | NS |
| II vs III | 0.010* | S |
| I vs Controls | <0.001*** | HS |
| II vs Controls | 0.002* | S |
| III vs Controls | <0.001*** | HS |

**[Table/Fig-6]:** Showing Mean FEF 50% (L/Sec) in Subjects and Controls
NS: P> 0.05; Not Significant; *p<0.05; Significant at 5% significance level; ***p< 0.001; Highly significant.

| Group | N | Range | Mean ± SD |
|---|---|---|---|
| I | 50 | 1.71– 5.48 | 3.29 ± 1.01 |
| II | 50 | 0.85 – 6.07 | 3.60 ± 1.33 |
| III | 50 | 0.26 – 6.02 | 2.66 ± 1.54 |
| Controls | 50 | 3.31 – 6.32 | 4.75 ± 1.11 |

| Comparison | P value | Significance |
|---|---|---|
| I vs II | 0.636 | NS |
| I vs III | 0.062 | NS |
| II vs III | 0.002** | S |
| I vs Controls | <0.001*** | HS |
| II vs Controls | <0.001*** | HS |
| III vs Controls | <0.001*** | HS |

**[Table/Fig-7]:** Showing Mean FEF 25-75% (L/Sec) in Subjects and Controls
**p< 0.01; Significant at 1% significance level; ***p< 0.001; Highly significant.

| Group | N | Range | Mean ± SD |
|---|---|---|---|
| I | 50 | 3.3 – 10.8 | 6.03 ± 1.88 |
| II | 50 | 3.5 – 10.4 | 6.20 ± 1.64 |
| III | 50 | 0.7 – 13.1 | 5.12 ± 2.84 |
| Controls | 50 | 4.5 – 10.4 | 7.91 ± 1.27 |

| Comparison | P value | Significance |
|---|---|---|
| I vs II | 0.994 | NS |
| I vs III | 0.018* | S |
| II vs III | 0.400 | NS |
| I vs Controls | 0.001* | S |
| II vs Controls | 0.400 | NS |
| III vs Controls | 0.400 | NS |

**[Table/Fig-8]:** Showing Mean PEFR (L/Sec) in Subjects and Controls
NS: p> 0.05; Not Significant; * p<0.05; Significant at 5% significance level.

| Parameters | Group I Mean ± SD | Group II Mean ± SD | Group III Mean ± SD | Groupiv (Controls) Mean ± SD |
|---|---|---|---|---|
| FEF 25% | 5.30 ± 1.68 | 5.50 ± 1.54 | 4.60 ± 2.13 | 6.61 ± 1.73 |
| FEF 75% | 2.01 ± 0.82 | 2.37± 1.02 | 1.72 ± 1.12 | 3.12 ± 0.91 |
| FEV 0.5/FVC% | 63.74 ± 14.34 | 67.80 ± 15.11 | 59.42 ± 21.03 | 67.50 ± 23.02 |
| FEV 1/FVC% | 85.70 ± 9.76 | 92.08 ± 8.77 | 79.96 ± 21.90 | 91.28 ± 11.14 |
| FEV 3/FVC% | 98.20 ± 3.88 | 98.82 ± 4.55 | 96.76 ± 8.61 | 100 ± 0.00 |
| MVV | 100.62 ± 20.05 | 100.30 ± 22.58 | 92.74 ± 23.62 | 130.18 ± 26.28 |

| Parameters | P Value | Significance |
|---|---|---|
| FEF 25% | 0.67 | NS |
| FEF 75% | 0.42 | NS |
| FEV 0.5/FVC% | <0.001*** | NS |
| FEV 1/FVC% | 0.50 | NS |
| FEV 3/FVC% | <0.001*** | NS |
| MVV | 0.35 | NS |

**[Table/Fig-9]:** Mean Values of Lung Function Parameters in Groups and Controls

and III and between Group I and the controls, a decline was observed, which was statistically significant at a 5% significance level ($p<0.05$), while a comparison between groups I and II, groups II and III, group II and the controls and group III and the controls showed a statistically insignificant decline ($p>0.05$).

[Table/Fig-9] shows the other parameters that were studied. However, on comparison, a statistically insignificant difference was observed among the different groups.

## DISCUSSION

The various lung function parameters were recorded and compared between the subjects and the controls. In addition, the intergroup comparison of the various lung function parameters was done among the subjects on the basis of the duration of the service at the petrol-pumps.

Forced Vital Capacity FVC – As shown in [Table/Figure 2], the mean FVC for the Group I subjects was 3.05 ± 0.46 L, for the Group II subjects, it was 2.77 ± 0.42 L, for the Group III subjects, it was 2.38 ± 0.61 L and for the controls, it was 3.80± 0.54 L. Hence, a progressive decline in the mean value of FVC among the subjects was seen according to the duration of exposure. When a comparison was done between Groups I and III, Group I and the controls, Group II and the controls and Group III and the controls, a decline was observed, which was highly significant ($p<0.001$). But it showed significance at a 5% significance level when a comparison was done between Groups I and II. However, a decline in the mean FVC values in Group II versus III was significant at a 1% significance level. Our findings were corroborative with those of other studies [5,6] which reported a statistically significant decline in FVC and found a significant correlation between the three exposure groups when compared to the controls.

FEV 0.5– the mean $FEV_{0.5}$ for the Group I subjects was 1.77 ± 0.65 L, for Group II, it was 1.76 ± 0.59 L, for Group III, it was 1.27±0.72 L and for the controls, it was 2.60 ± 0.31 L. [Table/ Fig-3] When a comparison was done between Groups I and III, Groups II and III, Group I and the controls, Group II and the controls and Group III and the controls, a decline was observed, which was highly significant ($p<0.001$). However, when a comparison between Groups I and II was done, no significant decline was observed ($p>0.05$).

FEV 1– In the present study, the mean value of $FEV_1$ in the Group I subjects was 2.65 ± 0.43 L, in the Group II subjects, it was 2.55 ± 0.41 L , in the Group III subjects, it was 1.98 ± 0.77 L and in the controls, it was 3.21 ± 0.55 L[Table/Figure 4]. On comparison between Groups I and III, Groups II and III, Group I and the controls, Group II and the controls and Group III and the controls, a decline was observed, which was statistically highly significant ($p<0.001$). However, when a comparison between Groups I and II was done, a statistically insignificant decline was observed ( $p>0.05$). It was consistent with the findings of other studies [7,8], which reported a statistically significant decline in $FEV_1$ in the petrol pump workers with increased years of exposure.

FEV 3 – The mean value of $FEV_3$ for the Group I subjects was 3.04 ± 0.47 L , for the Group II subjects, it was 2.73 ± 0.42 L, for the Group III subjects, it was 2.36 ± 0.68 L and for the controls, it was 3.59 ± 0.70 L [Table/Fig-5]. On comparison between Groups I and III, Group I and the controls, Group II and the controls and Group III and the controls, a decline in the values was observed, which was statistically highly significant ($p<0.001$). But a comparison between Groups I and II and Groups II and III showed the decline to be statistically significant at a 5% significance level. ($p<0.05$) Our study showed a progressive decline in the mean values among the subjects according to the duration of the exposure. However, other studies did not comment on this parameter.

FEF 50% – In our study, the mean values of FEF 50% was 3.78 ± 1.06, 4.16 ± 1.22, 3.30 ± 1.76 and 5.17 ± 1.32 in Groups I,II and III and in the controls respectively [Table/Fig-6]. This decline was highly significant when compared between Group I and the controls and Group III and the controls ($p<0.001$).When Group II was compared with group III and Group II with the controls, a decline was observed, which was significant at a 5% significance level ($p<0.05$). However, a decline in Group I versus II and Group I versus III showed no statistical significance ($p>0.05$). The findings of our study are in agreement with the findings of other studies [5,6,7], as they reported a statistically significant decline in the values of FEF 50%.

FEF 25-75% – Our present study showed the mean FEF 25-75% (L/sec) as 3.29 ± 1.01 , 3.60± 1.33 , 2.66± 1.54 and 4.75± 1.11 in Group I,II and III and in the controls respectively [Table/Fig-7].

The decline in FEF 25-75% was significant at a 1% significance level when compared between Groups II and III($p<0.01$).When a comparison was done between Group I and the controls, Group II and the controls and Group III and the controls, a decline was observed, which was highly significant ($p< 0.001$). However, a comparison between Groups I and II and Groups I and III showed no statistical significance ($p<0.05$).The findings are the same as in the study by [8] which showed a statistically significant decline. The results are in disagreement with the work [11] which showed statistically insignificant changes in FEF 25-75% during the exposure to diesel exhaust.

PEFR-the mean value of PEFR (L/sec) was 6.03 ± 1.88, 6.20 ± 1.64, 5.12 ± 2.84 and 7.91 ± 1.27 in Group I,II and III and in the controls respectively.[Table/Figure 8] When a comparison was done between Groups I and III and between Group I and the controls, it was found to be significant at a 5% significance level ($p<0.05$), while a comparison between Groups I and II, groups II and III, group II and the controls and group III and the controls showed no statistical significance ($p>0.05$).Our results are in agreement with the study[9,10] which showed that the mean value of PEFR with the years of exposure (Group I < 5 years versus, Group II ≥ 5 years) was statistically insignificant. It may be due to the short duration of exposure or because of a different statistical test which was adopted for the analysis.

However, a decline in the mean values of MVV, FEF 25%, FEF 75%, FEV0.5/FVC, FEV1/FVC and FEV3/FVC was found to be statistically insignificant and was hence not discussed [Table/ Fig-9]

## CONCLUSION

The petrol-pump workers showed a decline in the mean values of FVC, FEV 0.5, FEV 1, FEV 3, PEFR, FEF 50% and FEF 25-75%, which was statistically significant. However, a decline in the mean values of MVV, FEF 25%, FEF 75%, FEV0.5/FVC, FEV1/FVC and FEV3/FVC was statistically insignificant. These findings are suggestive of significant pulmonary ventilatory impairment.

The impairment in the lung function was associated with a dose-effect response to the duration of the exposure to petrol fumes, diesel exhaust, etc. A chronic exposure in the petrol pump workers for more than 5 years revealed statistically significant decrements, as compared to the workers who were employed for less than five years.

In order to prevent these changes in the petrol filling workers, we suggest a medical observation including pre-employment and periodic medical check-up like pulmonary function tests. The use of face masks and the early recognition and removal of the sensitive workers from their working places before the chronic impairment develops will prove to be beneficial. Any decline in the lung functions with time merits attention, despite the fact that the observed values may be within the normal range, since it indicates likely morbidity in the event of continuing exposure to the offending agent. Since most individuals are likely to remain asymptomatic till significant pulmonary damage results, a regular monitoring of the lung function is desirable.

A valuable message can be the upcoming new concept of bio-diesel, which can be a gift for the generations to come. The fatty acid, methyl ester – , which is the most widely used biodiesel which is obtained from vegetable oil/ animal fats, produces 50% lesser emissions. In fact, it can be a boon for the generations to come.

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**DECLARATION ON COMPETING INTERESTS:**

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