

## Study of Pulmonary Function Tests (PFT) in the Workers of LPG Bottling Plant, Yedyur

Ravi GN\*, Narasimhaswamy KN, Anand KSS

Department of Physiology, Adichunchanagiri institute of medical sciences, B. G. Nagara, Nagamangala Taluk, Mandya district, Karnataka, India

\*Corresponding author: Ravi GN

| Received: 05.02.2019 | Accepted: 15.02.2019 | Published: 28.02.2019

DOI: [10.21276/sjams.2019.7.2.85](https://doi.org/10.21276/sjams.2019.7.2.85)

### Abstract

### Original Research Article

**Context:** Respiratory problem is one of the major health hazards in chemical exposed workers. Individuals Working in LPG bottling plants are exposed to dusty environment and are at a risk of inhaling particulate matter (butane and propane) which has adverse effects on respiratory system. A long term exposure to butane and propane in the bottling plant leads to many effects of respiratory functions as they play an important role in the pathogenesis of various respiratory diseases. Hence the present study was planned to assess the pulmonary functions in the workers of LPG bottling plants. **Aim:** This study was conducted to determine the pulmonary function test parameters like FVC, FEV1 in the Workers of LPG Bottling Plant, Yedyur. **Settings and Design:** The present study was a cross sectional study consisting of 50 workers of LPG Bottling Plant in the age group of 20-40 years. **Materials and Methods:** This study was conducted in the Workers of LPG Bottling Plant, Yedyur, Nagamangala taluk, Mandya district, after the institutional ethical clearance and written consent from each participant. FVC and FEV1 was recorded. **Results:** The parameters thus recorded was analyzed for statistical significance using Students't' test and  $p < 0.05$  was considered the level of significance. FVC and FEV1 were significantly decreased at ( $p < 0.001^{**}$ ) in the workers of the LPG bottling plant. **Conclusions:** The results of this study indicate that pulmonary function test is decreased in the individuals working in the LPG Bottling Plant.

**Keywords:** FVC - Forced Vital Capacity, FEV1 – Forced Expiratory Volume in 1<sup>st</sup> second.

**Copyright © 2019:** This is an open-access article distributed under the terms of the Creative Commons Attribution license which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use (NonCommercial, or CC-BY-NC) provided the original author and source are credited.

## INTRODUCTION

Respiratory problem is one of the major health hazards in chemical exposed workers. It is a major cause of morbidity & mortality all over the world [1]. Source of air pollutants include power plant, cement factories, refineries & petrol chemical industries [2]. Long term exposure to the air pollutant leads to effects on respiratory functions. Air pollutants & chemicals play a role in the pathogenesis of respiratory diseases [3]. Individuals Working in LPG bottling plants are exposed to dusty environment and are at a risk of inhaling particulate matter (butane and propane) which has adverse effects on respiratory system [4]. About 95% of components in petrol vapours are aliphatic & cyclic compounds & less than 2% are aromatics. Prolonged exposure to petroleum vapours causes bronchoconstriction [5]. Although protective gears should be worn, reports from many countries indicate that industries rarely provide precautionary measures [6]. The present study was designed to determine the pulmonary function test parameters in the workers of LPG bottling plant,

## METHODOLOGY

Subjects were volunteers in the age group of 20 – 40 years who were selected randomly from the workers of LPG bottling plant. All the subjects were non- smokers and were not on any medications. Those already performing some form of yoga or breathing exercises were excluded from the study. Individuals suffering from any respiratory diseases such as COPD, bronchiectasis, interstitial lung disease, upper & lower respiratory tract infections that might affect the pulmonary function were also excluded from the study.

The study was prior reviewed and approved by the Institutional ethical committee. Each subject gave a written consent before participating in the study.

A sample size of 50 was calculated based on the results of a similar pilot study done.

- Height – The standing height was measured in centimeters nearest to 1 cm with a measuring tape attached over a wall. While measuring the height,

the subject removed their shoes and stand with their heels together.

- Weight – Weight was measured in kilograms in empty bladder and empty stomach on a standardized digital weighing machine nearest to 0.1 Kg.

Pulmonary function test was recorded using a computerized spirometer – BPL ARPEMIS version 3.1 between 8-9AM. Statistical analysis of the data

obtained was done using Student-‘t’ test, and other relevant statistical tools.

## RESULTS

The parameters thus recorded were analyzed for statistical significance using Students‘t’ test and  $p < 0.05$  was considered the level of significance. FVC and FEV1 was significantly decreased at ( $p < 0.001^{**}$ ) in the subjects

### Comparison of Pulmonary function test in the subjects

Parameters	Subjects	P value
FVC (L)	2.79±0.59	<0.001
FEV1(L)	1.61±0.51	<0.001

## DISCUSSION

The present study showed that FVC and FEV1 was significantly decreased at ( $p < 0.001^{**}$ ) in the subjects. LPG vapours contain particulate matter (butane and propane) with diameter less than 10 micrometers. These small particles are easily inhaled & deposit in the lungs. Exposure to these particulate matter leads to respiratory symptoms and derangement in the pulmonary functions. These changes are mainly due to increase in airway resistance & inflammatory changes in lungs due to exposure. Li X.Y *et al.* reported neutrophil influx into the lungs and increase in broncho alveolar lavage fluid concentrations of tumor necrosis factor in rat’s intratracheal inhalation of ultrafine carbon particles [7]. Particulate matter of size between 2.5-10 micrometers remains airborne for a long period & get deposited deeper in smaller airways of the lungs [8]. Fuel vapours alter the properties of surfactant which contribute to the early closure of small airways which is other reason for decline in pulmonary functions [9]. The results of the present study was consistent with the study done by Aprajita *et al.* [10] were pulmonary functions were decreased in petrol pump workers.

## CONCLUSION

The findings of our study suggests that pulmonary functions is decreased in workers of LPG bottling plant, who are exposed to chemicals

### Acknowledgements

We sincerely thank workers of LPG bottling plant, Yediyur for participating in the study.

## REFERENCES

1. El-Salamoni OK, Ibrahim HM, EL-DIN WS. Pulmonary Problems among Stone Cutting Workers in West Bank-Palestine. Med. J. Cairo Univ. 2015 Sep;83(1).
2. Fatusi A, Erhabor G. Occupational health status of sawmills workers in Nigeria. Journal of the Royal Society of Health. 1996 Aug;116(4):232-6.

3. Bhide A, Munisekhar K, Hemalatha D, Gouroju SK. Pulmonary function tests in petrol pump workers in Chittoor district. Int J Physiother Res. 2014;2(1):354-58.
4. Lakshmi Sumana P V, Alice Jemima M, Joya Rani D, Madhuri T “Cement dust exposure and Pulmonary Function Tests in Construction Site workers” Asian Pac. J. Health Sci.2016; 3(2):43-46
5. Aprajita PN, Sharma RS. A study on the lung function tests in petrol-pump workers. J Clin Diagn Res. 2011;5:1046-50.
6. Preetha S, Priya J. Evaluation of pulmonary function test in construction workers. Drug Invention Today. 2018 Nov 1;10(11).
7. Li XY, Brown D, Smith S, MacNee W, Donaldson K. Short-term inflammatory responses following intratracheal instillation of fine and ultrafine carbon black in rats. Inhalation toxicology. 1999 Jan 1;11(8):709-31.
8. Choudhari SP, Doiphode RS, Zingade US, Munibuddin A, Badaam KM. Evaluation of Airway resistance and Spirometry in Petrol Pump Workers: A Cross-sectional study. Age (years). 2013;29(5.7):30-4.
9. Evans RG, Webb K, Homan S, Ayres SM. Cross-sectional and longitudinal changes in pulmonary function associated with automobile pollution among bridge and tunnel officers. American journal of industrial medicine. 1988;14(1):25-36.
10. Aprajita, Panwar NK, Sharma RS. A study on the lung function tests in petrol pump workers. Journal of clinical and diagnostic research. 2011;5(5):1046-1050.