ISSN- O: 2458 - 868X, ISSN–P: 2458 – 8687
Index Copernicus Value: 49. 23
PubMed - National Library of Medicine - ID: 101731606

International Journal of Medical Science and Innovative Research (IJMSIR)
IJMSIR : A Medical Publication Hub
Available Online at: www.ijmsir.com
Volume – 4, Issue – 1, February - 2019, Page No. : 272 - 275

A Comparative Study on Variations in Pulmonary Function Test in males of rice mill workers on their smoking habit

Dr. Sunitha Narendrula*, Associate Professor Physiology, Kamenenei Institute of Medical Sciences, Narakatpally, Nalgonda, Telengana.

Corresponding Author: Dr. Sunitha Narendrula, Associate Professor Physiology, Kamenenei Institute of Medical Sciences, Narakatpally, Nalgonda, Telengana.

Type of Publication: Original Research Paper

Conflicts of Interest: Nil

Abstract

Pulmonary diseases are on rise among smokers of rice mill workers. Pulmonary function test is a procedure to evaluate lung diseases. As per the WHO 51% of world populations are smokers and are prone to respiratory disorders. Industrial dust inhalation over a long period of time leads to pathological changes in the lungs of people exposed. Rice being major food for Indians, many people are employed in rice mills as daily wage labours. These individuals have more exposure to grain dust, this population is at risk especially smokers. Exposure to grain dust has a long history of association with diseases on various organs such as eyes, nose, skin, lung and the airways. The current study is designed to know the variations in the values of the forced vital capacity (FVC), peak expiratory flow rate (PEFR), forced expiratory volume in the first second (FEV1), and FEV1/FVC percentage among smokers and non-smokers of rice mill workers. A cross-sectional study was conducted at Osmania Medical College, Hyderabad from 1996 to 1998 were the sample size considered was 100. Mixed population of male and female was enrolled for the study to avoid bias in current study 78 male smokers with age of 20 to 40 years were considered for studies. Smokers with previous history of lung disease were excluded from the studies. P value<0.05 considered as statistically significant and confidence interval (CI) was 95%.Total of 78 male workers participated in the study, the average values of FVC in smokers was 1.70±0.42 when compared to non smokers 2.80±0.26 L (t-13.98), accordingly FEV_1 was 1.19±0.31L in smokers and 2.49±0.21 in non smokers (t-9.71), $FEF_{25-75\%}$ (L/S) was 1.41±0.28 in smokers and 2.89±0.47 in non smokers. The FEV_1: FVC ratio 69.83±8.91% in smokers and in nonsmokers were 87.92±7.87, PEFR 3.43±0.21L in smokers and 5.38±0.26 in non smokers. The recorded FVC was found to be significantly reduced in smokers of rice mill workers. The mean FVC, FEV_1 and PEFR were lower in smokers. Health awareness and educational campaigns are needed to keep the society to avoid smoking and to reduce respiratory diseases especially among the rice mill workers.

Key words: FVC,FEF, FEV_1, respiratory diseases, restrictive diseases.

Introduction:

Cigarette smoking and pollutants are one of the causative factors for lung cancer and COPD. Cardio vascular diseases such as coronary artery disease (CAD), angina

pectoris and cardiac arrest are the common diseases caused due to tobacco smoking and inhalation of pollutants. [1,2,3]. 60 known carcinogenic substances which can cause cancer are present in tobacco smoke. Acetone, Arsenic, Butane, Cadmium, Carbon monoxide, Naphthalene, Hydrogen Cyanide and Vinyl chloride are some known carcinogenic compounds in tobacco smoke. The mortality rate is high due to the presence of carcinogenic substances in tobacco smoke and act as a trigger to pollutants which can cause variety of diseases [4]. As per the WHO (1998) defined smokers as the person who daily use of tobacco in the form of smoking and occasionally, according to report published by WHO by 2030, 7 million deaths will be reported by the use of tobacco [5,6]. As per the earlier reports of WHO, 100 million people suffered death till end of 21st century. One in ten adults is the victim smoking. Smoking is vital etiological factor in cardiac and lung diseases [7,8]. The presence or absence of obstructive, restrictive or mixed pulmonary disorders can be accessed by performing pulmonary function test (PFT). Many researchers have reported the harmful effects of cigarette smoking on lungs such as chronic bronchitis, emphysema and lung cancer can be caused by cigarette smoking alone, which has an extensive effect on the lung functions [9]. Nicotine in tobacco blocks the nicotinic receptors of cardiac ganglion and affects the CVS functions by stimulating and then paralyzing all the ganglia causing cardiac slowing, followed by the increase in the heart rate [10]. Decrease in FEV_1 and more COPD mortality rate is found in smokers rather than non-smokers. These differences are directly proportional between smokers and non-smokers on quantity of cigarettes smoked and exposure to air pollutant at rice mill. The effects also depend upon the duration of exposure. Tobacco smoking leads to decrease in pulmonary functions specially those concerning with diameter of the airways such as forced expiratory flow in one second FEV_1 , FEV_1/FVC, PEFR, $PEFR_{25-75\%}$, MVV [11,12]. The current study is under taken to find out the effect of pollutants released from rice mills over and above the smoking habit of rice mill workers and their lung functions.

Material and Methods

A cross sectional study was conducted from May 1996 to 1997 in rice mill workers after obtaining the ethical clearance from institutional review committee Osmania Medical College, Hyderabad. Informed consent was obtained from each study participant of Helenski type and procedure was explained to them in their native language. The study population was 78 male adults with the age limit of 20-40 years. Subjects with a history of 5 cigarettes per day for five years were enrolled for studies and non smokers without smoking, chewing tobacco were considered as non smokers. Smokers less than five years of smoking history and of any lung diseases in the past were excluded from the study. It was verified that none of the subjects had any significant or history of any disease of the respiratory system in present or past. The best three readings were recorded and analyzed one was considered for statistical studies. PFT curves were recorded and FVC, FEF, PEFR, FEV1, FEV1 /FVC ratio were obtained by using computerized Medspior version 3.0 QC was followed.

Statistical analysis

Statistical was done by using Graphpad Prism version (7). P value < 0.05 was considered to be significant and confidence interval was 95%. Paired t-test was used find out statistical significance between two groups.

Results

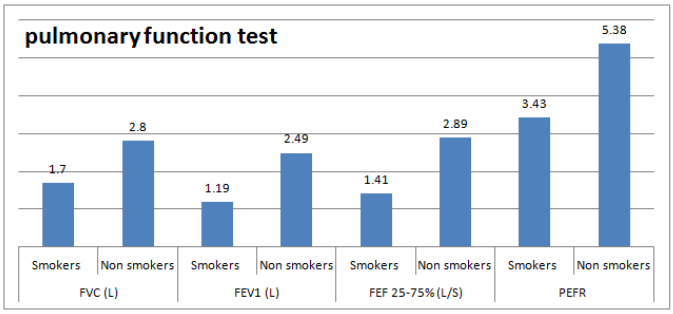
Data obtained was analysed by using Graphpad Prism Version (7), USA for statistical significance. Descriptive analysis such as mean, confidence interval (95%) and t-test was done to ensure the statistical significance between variables $p<0.05$. From the result, the FVC, FEV_1, FEF, FEV_1/ FVC ratio were analysed. The mean difference in values for pulmonary function was highly significant ($P < 0.0001$) between smokers and nonsmokers. The mean FVC in smokers was 1.70 ± 0.42 L and in non-smokers was 2.80 ± 0.26 L with the t value of 13.98. The FEV_1 in smokers 1.19 ± 0.31L as compared to non-smokers was 2.49 ± 0.21L with t-value of 9.71. $FEF_{25-75\%}$ (L/S) in smokers was 1.41±0.28 when compared to no smokers 2.89±0.47 with t-value of 16.66. The value of PEFR in smokers was 3.43±0.21 L in non smokers recorded was 5.38±0.26 L with t-value of 36.89. FEV1/ FVC % was 69.83±8.91 and in nonsmokers was 87.92±7.89 with t-value of 9.51. (Table 1, Figure 1)

Table 1: Variations in variables of lung function test between smokers and non smokers male rice mill workers.

S.NO.	Variables -PFT	Smokers	Non-smokers	t- value	p-value
1.	FVC (L)	1.70±0.42*	2.80±0.26	13.98	0.0001
2.	FEV_1 (L)	1.19±0.31*	2.49±0.21	9.71	0.001
3.	$FEF_{25-75\%}$ (L/S)	1.41±0.28*	2.89±0.47	16.66	0.0001
4.	PEFR	3.43±0.21*	5.38±0.26	36.66	0.0001
5.	FEV1/ FVC %	69.83±8.91*	87.92±7.87	9.51	0.001

Values represented as Mean±SD, paired t-test, $p<0.05$, *statistically significant with other group

Figure 1: Pulmonary function test in males of rice mill workers



Discussion

Pulmonary function test is the routine test, done to find out pulmonary functions in individuals. It reflects the original values of FVC, FEV_1, FEF, FEV_1/ FVC ratio of the subject to the predicted values. The interpretation of respiratory function varies on the comparison of the values obtained from a normal healthy population of the similar physical characteristics (Height and weight). The decrease of air way conductance was discovered by Nadel and Comore [11,12] in smokers and our study is in way with compromise with the studies of Wihelmensen and Tibblin [13] who postulated the reduction in PFT values in smokers. In a study conducted by the M.S. Islam [14] observed the decrease in ventilation capabilities of lung and reduction in FVC in smokers when compared to non smokers and $FEF_{25-75\%}$ was significantly reduced amongst smokers which is in agreement with our studies. Nighute S and Awari A [15] found obstructive lung abnormality as a common finding in smokers as they observed decrease in FVC, FEV_1, FEF, FEV_1/ FVC ratio which is in agreement to our study. Restrictive type respiratory disorder are one of the cause in industries, especially people working in rice mills are more exposed to the air pollutants born during polishing of rice. The fine dust inhaled by the rice mill works for longer duration may suffer with respiratory disorders. Previous researchers concluded that more than two million people in India are employed with rice grain production, processing and

storage. Many of them experience the symptoms like cough, breathlessness, asthma. More symptoms were observed among the workers employed for more than 10 years and suffered with occupational asthma with decrease of FEV_1. In our research highlighted the restrictive type of respiratory disorders as we found decrease in FEV_1 values.

Conclusion

Smoking has become major health problems not only in India but also in developing and developed countries. Smoking habit of an individual and pollutants released from rice mill will effectively reduce the lung functions and smoking may trigger restrictive type of respiratory disorders in individuals who are working in rice mills. Preventive measures like use of nose mask and quitting smoking may be an alternative measures to reduce further damage to lungs.

References

1. Chhabra SK. The rising menace of environmental tobacco smoke. Indian J Chest Diseases and Allied Sciences 1999; 41:191–4.

2. Jayant K, Balakrishnan V, Sanghvi LD, Jussawalia DJ. Quantifications of the role of smoking and chewing habits in oral, pharyngeal and oesophageal cancers. Br J Cancer 1977; 35:232–5.

3. Notani PN, Sanghvi LD. A retrospective study of lung cancer in Bombay. Br J Cancer 1974;29: 477–82.

4. The WHO Guidelines for controlling and monitoring the tobacco epidemic. WHO Geneva 1998;76-101.

5. Abdullah ASM, Husten CG. Promotion of smoking cessation in developing countries: a framework for urgent public health interventions. Thorax 2004; 59: 623–30.

6. Lucchesi BR, Schuster CR. The role of nicotine as a determinant of the cigarette smoking frequency in man. Clinical Pharmacology and Therapy 1967;8:789-96.

7. WHO report: Tobacco could kill one billion by 2100. Science Daily2008 Aug; 24:71.

8. Dunn A, Zeine L. Health effects of exposure to environmental tobacco smoke. Sacramento CA, USA: California Environmental Protection Agency, 1997.

9. Lebowitz MD, Burrows B. Quantitative relationships between cigarette smoking and chronic productive cough. Int J Epi-demio. 1977;16:107-13.

10. Greenspan K, Edemands RE. Some effects of nicotine on the cardiac automatic conduction and introphy. Arch Intern Med. 1969; 123:707-12.

11. Jaakkola MS, Ernst P, Jaakkola JJ, L N'gan'ga W, Becklake MR. Effect of cigarette smoking on evolution of ventilatory lung function in young adults: an eight year longitudinal study. Thorax. 1991;46:907-13.

12. Gold DR, Wang X, Wypij D, Speizer FE, Ware JH, Dockery DW. Effects of cigarette smoking on lung function in adolescent boys and girls. N Engl J Med. 1996;335:931-7.

13. Wilhelmensen L. And G. Tibblin: Tobacco smoking in fifty year old man. Respiratory symptoms and ventilatory function tests. Scand. J. Resp. Dis. 1966, 47: 121.

14. Rees PJ, Chowienczyk PJ, Clark TJ. Immediate response to cigarette smoke. Thorax. 1982;37:417-22.

15. M.S. Islam, P.K. Dutta, D.K. Mitra and M.K. Chakraborty: Changes of ventilatory functions among smokers and non-smokers. Ind. J. Of Physiology and Pharmacology. July 1970 vol.14, no.3, 165-173.

16. Nighute S, Awari A. Study of pulmonary function test in smoker and non-smoker in rural area of Gujarat. Journal of Clinical and Diagnostic Research. 2011;5:1151-3.