

Assessment of lung function tests by spirometry in smoker and non-smoker males: A cross-sectional study

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Abstract

Background: Smoking is a major health problem across the world with an increasing trend of smoking among younger individuals and it has been known to adversely affect respiratory system. Lung function tests may indicate deterioration in lung function prior to onset of clinical symptoms and provide an opportunity for early detection and corrective measures. **Objective:** To evaluate and compare Lung Function Tests by spirometry in smoker and non smoker males.

Materials and Methods: A Cross Sectional study was conducted in 40 smoker and 40 non-smoker males in age group of 20 to 50 years. Smokers who were smoking ten or more cigarettes per day for more than 3 years and having no other respiratory disease and no other addiction including tobacco in any other form apart from smoking were included. Matched non smoker controls were enrolled. Spirometry parameters evaluated were: FVC, FEV1, FEV1/FVC and FEF (25-75%). Statistical analysis was done by using unpaired t test. **Results:** Mean values of FVC and FEV1 were significantly lower in smoker males as compared to non- smoker males. **Conclusion:** The reduced spirometry lung parameters in smokers may indicate the deterioration of lung function contributed by smoking.

Key Word: Vital capacity; Forced Expiratory Volume; Expiratory Flow Rate

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INTRODUCTION

Smoking is a major health problem across the world with an increasing trend of smoking among younger individuals and it has been known to adversely affect respiratory system. Lung function tests may indicate deterioration in lung function prior to onset of clinical symptoms and provide an opportunity for early detection and corrective measures.¹⁻³ Chronic obstructive

pulmonary disease is globally a major cause of morbidity and mortality and smoking has been found to be the most common risk factor.⁴⁻⁶ The symptoms of chronic obstructive pulmonary disease like sputum and cough are often overlooked and by the time the diagnosis is done there is marked reduction in ventilatory reserves as much as half and that too irreversibly. Therefore, it is prudent to timely assess the lung function so as to effectively manage any derangement and suggest steps for arresting further decline in lung function. Smoking cessation has been reported to stall the decline in respiratory function. Early detection of reduced lung function by spirometry in symptomatic smokers may motivate them for cessation of smoking.⁵⁻⁹ Smoking being a common and modifiable risk factor and spirometry a well accepted measure of lung function, the present study was done to evaluate the lung function by spirometry in male smokers and compare it with non smoker males.

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METHODS

Study Design: Cross-sectional Study.

Cases: 40 males in the age-group of 20-50 years who were smokers and were smoking ten or more cigarettes per day for more than 3 years and having no other respiratory disease and no other addiction including tobacco in any other form apart from smoking were studied for spirometry parameters.

Controls: Age, height, weight matched healthy subjects of same number from similar socioeconomic status were selected as controls for the study. Subjects with past history of major respiratory illness like Tuberculosis, pleural effusion, COPD, asthma and smokers were excluded from the study. At least 2 hours abstinence from smoking was there for smokers group. Spirometry parameters like FVC, FEV₁, FEF (25-75%) were recorded in sitting position. The standard protocol and precautions for the spirometry procedure as per American Thoracic Society guidelines were followed. Three recording were taken and the best effort was included in the results. All the recordings were done between 9 am to 11am to eliminate any effect of diurnal variation. The results were analyzed by Microsoft Excel 2007. The results were interpreted as mean ± S.D. Unpaired t test was applied for comparison between the two groups. p value was obtained from unpaired t test and value of < 0.05 was considered as statistically significant

OBSERVATIONS

Mean age of the cases was 32.2 ± 7.7 years and in controls was 30.8 ± 8.4 years.

Table 1: Comparison of Spirometry parameters in Smokers and Non Smokers

Lung Parameters	Non Smokers (n=40)	Smokers (n=40)	'p' value
	Mean ± SD	Mean ± SD	
FVC (Litres)	2.73 ± 0.48	2.52 ± 0.46	0.049*
FEV ₁ (Litres)	2.27 ± 0.35	1.96 ± 0.56	0.004*
FEV ₁ /FVC (%)	84.81 ± 8.89	81.13 ± 14.13	0.17
FEF _{25-75%} (Litres/s)	2.63 ± 1.09	2.55 ± 0.88	0.71

* Statistically significant

DISCUSSION

Mean values of FVC and FEV₁ were significantly lower in smoker males as compared to non- smoker males. FEV₁/FVC and FEF 25-75% did not show any significant decrease among smoker males. It has been found that among the susceptible smokers, there are irreversible obstructive changes due to smoking. Also, if a susceptible smoker quits smoking, although the lung function may not recover, the average further rates of loss of timed vital capacity will revert to normal. Therefore, progression to severe or fatal obstructive pulmonary disease could be

prevented by screening for smokers' lung function in the early middle age and motivating those with reduced lung function for cessation of smoking.¹⁰ In a large cohort study by Kohansal R *et al* it was observed that smoking has deleterious effects on lung function parameters like FEV₁ and that cessation of smoking had a beneficial effect if a person quits smoking at any age but the earlier the person quits smoking, more is the beneficial effect.¹¹ Cigarette smoking leading to decrease in forced vital capacity has been attributed to its effect on the respiratory muscles due to the influence of the free radicals on the vascular system.¹² Tantisuwat A and Thaveeratitham P study among Thai youth subjects observed that the chest expansion, Forced Vital Capacity and Maximal Expiratory Pressure of the smokers was significantly lesser than those of non smokers. They concluded that the early adverse effects of cigarette smoking observed in youths may cause problems with the lung function and suggested that this information should be utilised to encourage younger people for smoking cessation.¹ Banur A *et al* study done at Davangere, Karnataka in India reported that there were significantly lower values of FVC and FEV₁ in smokers as compared to the non smokers.¹³ Similarly Raj TJB *et al* study has also noted a significant reduction in forced expiratory lung volumes in smokers as compared to non smokers.¹⁴ Padmavathy KM study from Chennai in South India also noticed a reduction in FVC, FEV₁ and maximal voluntary ventilation volumes in cigarette smokers as compared to non smokers.¹⁵ Limitations of present study include small sample size, cross-sectional design and also the confounding factors may contribute to the results. To conclude, spirometry being a convenient, non invasive and cost effective way of assessing lung function, there is a need for evaluation of spirometry parameters among smokers to educate them about its health impact especially on respiratory system. The awareness of derangement of spirometry parameters may motivate and help the smokers for quitting the addiction of smoking

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