

## **Research Article**

# **Effect of Passive Smokers on Lung Function (Ventilatory) in Age Group of 20-60 Years Old in Jaipur**

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**Abstract:** Tobacco smoking is known risk factor for the development of distressing breathlessness, chronic obstructive lung diseases, burger's disease, CHD, emphysema etc. In India, smoking is becoming more and more popular among young adults. Hence, a study planned to evaluate impact of smoking on adult lung functions test. This study evaluated the effect of smoking on pulmonary functions in the 108 adults (smokers, non-smokers) in the age group of 20-60 years. In this study, spirometric analysis was done by Medspiror which is a dry type of a spirometer. The testing procedure is quite simple from the patient's point of view. Depending of course, upon patents cooperation and health, a full series test and related printout take four to five minutes. Study showed that cigarette smoking leads to obstruction of peripherals airways with subsequent in equality of ventilation distribution.

**Keywords:** Smoking, Lung functions, Light smoker, Heavy smoker, Non-smoker

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## **INTRODUCTION**

Smoking is wide spread habit. Before 1950, there was little evidence to suggest that smoking could cause serious damage to health but in a number of diseases has been demonstrated carcinoma of bronchus has been the most intensively studied thus far, but it seems probable that cigarette smoking is an important cause of chronic pulmonary disease, which has a much greater prevalence than bronchial carcinoma [1].

Smoking is not only a physical handicap, but a psychological one as well. That an individual select this method as an adaptive measure in handling the stress of life, is significant. Several serious diseases, in particular lung-cancer, coronary artery disease and chronic obstructive lung disease affect smoker more than non-smokers [2]. Smoking in adults can have a profound impact on the overall health of a person. In a developing country like India, the tobacco products are easily accessible and are cheap. This can easily influence the young adults leading to prolonged use and addiction. This study has therefore been planned to examine the cardiovascular responses in young adult male smokers especially from Jaipur city in Rajasthan, India.

Tobacco consumption continues to rise even as evidence mounts regarding its hazards. Young people are smoking earlier and more heavily. Tobacco smoke has components which may cause cancer, irritation of bronchi. Tar and oxides of sulphur and nitrogen exert

effects upon bronchial epithelium and may predispose to emphysema. Smoke from cigarette is in general more potent than that of from pipes, cigars and biddies.

Generally people are aware of long term effects of prolonged and heavy smoking but there is paucity of knowledge on the early effects of smoking. It not only shortness of life, but it also causes prolonged ill health, which is in the form of distressing breathlessness, chronic obstructive lung disease, burgers disease, CHD, emphysema etc.

The relationship with cigarette smoking and chronic broncho pulmonary disease has been the subjects of much discussion, speculation and investigation in recent years. There is frequent association between cigarette smoking and syndromes of chronic cough, bronchitis and pulmonary emphysema. Incidence of admitted cough and shortness of breath was found to be slightly greater among smokers than nonsmokers. The accumulated evidences from many studies leads to following conclusion with respect to chronic obstructive lung disease morbidity. Within few years after beginning to smoke, smoker experience higher prevalence of abnormal function in the small airway than non-smoker. The prevalence of abnormal small airway function increases with age and duration of smoking habit and is greater in heavy smokers than light smokers.

**MATERIALS AND METHOD**

The present study was carried out on a group of 108 healthy subjects from medical college .the mean height in cm. was 167.5 ±4.5 and mean weight in kg. 56.3 ±8.68.

Subjects were selected on the of apparent good health and an unequivocal history of being chronic smokers, thus formed the cigarette smokers group of 72 subjects similarly a nonsmokers group of 36 subjects having neither history of cigarette smoking nor tobacco chewing were selected for comparison . These criterions provided two groups of subjects having similar socio-economic back ground and physical characteristics.

**Classification of subjects**

**Smokers**

Subjects with history of smoking at entry. We included only cigarette smokers were further divided into following groups according to amount of smoking.

- Light smokers (LS): those who smoked less 10.000 cigarettes in their life time.
- Heavy smokers: those who smoked more than 10.000 cigarettes in their life time.

**Non-smokers**

30 subjects were history of neither cig. Nor tobacco chewing was included in this group.

**Lung function tests**

**Apparatus:** In the present study, Spiro metric analysis was done by medspiror, which is dry type of a spirometer.

Medspiror is designed as a low cost high performance instrument capable of giving highly accurate, repeatable tests result and represents a major advancement in computerized pulmonary function testing. Its development stems from the routinely screen many subjects without manual calculation & to standardize testing procedures and predictions.

The testing procedure is quiet simple from the patient’s point of view. Depending of course, upon patient’s cooperation and health, a full series of test and related printout usually take four or five minutes.

Only two maneuvers are required to accumulate all test data. Forced vital capacity (FVC) and maximum voluntary ventilation (MVV) with these easily explained and performed maneuvers the computer stores and calculates the necessary flow and volume data.

**Procedure**

Though only two maneuvers FVC and MVV are required to accumulate all the test data, the method of performing these two are following:

**FVC**

Subjects were asked to perform maximum inspiration and then to place mouthpiece tightly in mouth so that air could not escape from the sides of mouth. Now the subject was asked to expire forcefully with nose closed and then mouthpiece was allowed to remove.

**MVV**

Before performing MVV test subject was allowed to rest for a while and then with released position (sitting) he was asked to place mouthpiece into his mouth and with nose closed we made him begin to breath as rapidly and deeply as possible up to the 10 seconds (as time 10 seconds was fed in machine) than calculated for one minute.

Following pulmonary functions were observed:-

- Forced vital capacity
- Forced expiratory volume in 1 second
- Forced expiratory volume in 3 second
- Peak expiratory flow rate
- FEV1/ FVC%
- Maximal voluntary ventilation (MVV)

**Table 1: Showing grouping with respect to age and smoking habits figure in parenthesis indicates of subjects in each group**

Age Group	20-30 year	30-40 year	40-50 year	50-60 year	Total
Light smoker	9	9	9	9	36
Heavy smoker	9	9	9	9	36
Non-smoker	9	9	9	9	36
Total	27	27	27	27	108

**Table 2: Showing Mean and S.D. of observed values of FVC, FEV<sub>1</sub>, FEV<sub>3</sub>, PEFR and MVV in subject of different age groups of light smokers**

Age Group/ Respiratory Parameters	20-30 year (Mean ±SD)	30-40 year (Mean ±SD)	40-50 year (Mean ±SD)	50-60 year (Mean ±SD)
Forced vital capacity (FVC)	2.93 ±.78	2.67 ±.61	2.58 ±.34	2.57 ±.50
Forced expiratory volume (FEV <sub>1</sub> )	2.59 ±.62	2.15 ±.30	2.28 ±.35	1.97±.51
Forced expiratory volume (FEV <sub>3</sub> )	2.84 ±.48	2.74 ±.44	2.58 ±.33	2.16 ±.52
Peak expiratory flow rate (PEFR)	5.91 ±1.94	4.34 ± 1.44	4.44 ±.84	4.9 ±1.48
Maximum voluntary ventilation (MVV)	90.66±15.24	93.66±20.07	73.00±13.84	75.44 ±19.93

**Table 3: Showing Mean and S.D. of observed values of FVC, FEV<sub>1</sub>, FEV<sub>3</sub>, PEFR and MVV in subjects of different age groups of Heavy smokers**

Age Group/ Respiratory Parameters	20-30 year (Mean ±SD)	30-40 year (Mean ±SD)	40-50 year (Mean ±SD)	50-60 year (Mean ±SD)
Forced vital capacity (FVC)	2.19±.41	2.69±.70	2.80±.62	2.23±.43
Forced expiratory volume (FEV <sub>1</sub> )	1.87±.28	1.97±.39	2.28 ±.71	1.89±.33
Forced expiratory volume (FEV <sub>3</sub> )	1.84 ± .31	2.71±.69	2.78±.62	2.15±.44
Peak expiratory flow rate (PEFR)	4.13±.77	3.96± 1.92	6.34 ±1.67	3.37±1.36
Maximum voluntary ventilation (MVV)	87.44±22.59	80.66±25.70	96.77±28.57	53.66±16.16

**Table 4: showing Mean and S.D. of observed values of FVC, FEV<sub>1</sub>, FEV<sub>3</sub>, PEFR and MVV in subjects of different age groups of Non-smokers**

Age Group/ Respiratory Parameters	20-30 year (Mean ±SD)	30-40 year (Mean ±SD)	40-50 year (Mean ±SD)	50-60 year (Mean ±SD)
Forced vital capacity (FVC)	3.12±.29	3.10±.33	2.88±.34	2.67±.26
Forced expiratory volume (FEV <sub>1</sub> )	3.01 ±.28	2.97±.12	2.68 ±.34	2.49±.50
Forced expiratory volume (FEV <sub>3</sub> )	3.06± .30	3.11 ±.69	2.84±.32	2.70±2.61
Peak expiratory flow rate (PEFR)	8.90±1.22	7.04± .39	6.13 ±.53	5.34±.50
Maximum voluntary ventilation (MVV)	135.11±10.39	123.44±9.82	101.66±5.33	95.22±4.36

## DISCUSSION

Cigarette smoking has been correlated with a number of respiratory and other diseases, as an etiological factor. It is well documented that cigarette smoking affects pulmonary function soon after it is started. These early changes are mild and reversible following cessation of smoking or modification of smoking habit but with continued smoking, irreversible changes in pulmonary functions occur [3].

The advent of pulmonary function tests has opened a new era towards the scientific approach in the diagnosis, prognosis and management of broncho pulmonary disorders. In recent years, great studies have been made on pulmonary function. Now, elaborate techniques and appliances have been made study of physiology and pathophysiology of lung easy. Out of various pulmonary functions tests, however, the study of lung volume and detailed study of the spirogram are tremendous basic aid in the delineation the problem of overall management. Ventilator dysfunction both of obstructive and restrictive pattern can diagnose by such a study.

Result of study showed evident derangements in ventilator function among healthy asymptomatic smokers in form of decreased values of FVC, FEV<sub>1</sub>, FEV<sub>3</sub>, PEFR, FEV<sub>1</sub>/FVC% and MVV. The results presented focused primarily on the smoking issue, with age, height and weight being controlled in the analysis. Observed data showed lowest values in non-smokers while mean values of various parameters of light smokers fall in between, but much nearer to nonsmokers because of short history of smoking. Age groups of each smoking groups and nonsmoking group did not show any regular pattern of derangements which is clear from observation. Mean values of FVC and FEV % of heavy smokers and nonsmokers showed significant differences and mean values of FEV<sub>1</sub>, FEV<sub>3</sub>, PEFR, and MVV showed highly significant

difference between heavy smokers & nonsmokers and between light smokers & nonsmokers. For all six ventilator parameters we did not found any significant differences between light smoker and heavy smokers.

Forced expiratory spiogram is useful in detection of abnormalities. A decrease in FVC means that air is trapped in the lungs. This is due to closure of the finest airway, and is accentuated by the high intrapleural pressure during a maximal expiration changes in the elastic properties of the lung also play a part. FVC does not seem to be such a sensitive index of change in airway resistance as is FEV<sub>1</sub> [5-9].

A decrease in timed vital capacity determination such as the forced expiratory volume in 1 second and 3 second reflects a lowered expiratory flow rate this change depends on increased airway resistance caused by a narrowing of bronchi due to smooth muscle spasm of mucosal edema and mucous secretion. A change in airway diameter of 1.3% thus gives rise to approximately a 10 percent change in expiratory flow [4, 10]

Although the smokers, as a group, showed significantly low pulmonary function values, not all smokers showed these changes. In some smokers the values of FEV<sub>1</sub>/FVC% and MVV were greater than the predicated values. Moreover as seen in observation tables, the standard deviations of most of the pulmonary function measurements in the heavy smokers were greater than those of the non-smokers, showing the marked variability in their responses to smoking. Thus all subjects who smoke do not seem to develop changes to the same degree.

## CONCLUSION

The result of this study showed that cigarette smoking leads to obstruction of peripherals airways with subsequent in equality of ventilation distribution.

This derangement can be detected by simple ventilatory functions for example FVC, FEV1, FEV3, PEFr, FEV1/FVC% and MVV. It may help in clarifying the suspected relationship between cigarette smoking and certain pulmonary disorders as well as in defining the etiological role of cigarette smoking in lung disease.

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