



**STUDY OF AIRWAY OBSTRUCTION IN SMOKERS USING SPIROMETRY**

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**ABSTRACT**

**Background:** Screening spirometry might help identify patients with chronic obstructive pulmonary disease (COPD) at an earlier stage. In this study, we evaluated the prevalence of airway obstruction in a symptomatic and asymptomatic smokers who underwent spirometry.

**Aim:** Aim of this study is to identify airway obstruction and its severity in smokers with the help of spirometry.

**Methods:** This is a cross-sectional observational study, conducted at Dept. Of Pulmonary Medicine, Dr D.Y Patil Medical college and Hospital from February to August 2017. The study consisted of a consecutive sample of 150 symptomatic and asymptomatic smokers ( $\geq 5$  pack-years) with or without a history of COPD or asthma, who completed spirometry. Findings was recorded and statistical analysis was done

**Results:** Among 150 patients 57.3% had a smoking history  $>15$  years of smoking. Out of 150 smokers 60% had airway obstruction ( $FEV1/FVC < 0.7$ ), 9.30% had isolated small airway obstruction and 30.66% had normal study. Among symptomatic smokers 68% had airway obstruction, among asymptomatic smokers 14 % had obstruction. On comparing years of smoking with severity of obstruction, the number of smokers with smoking years  $>15$  were high among all stages of obstruction.

**Conclusions:** Airway obstruction was detected in majority of smokers (69.3%). Severity of obstruction was correlating with number of years of smoking. Number of patients with smoking history of 10-15 years was high among all stages of obstruction.

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**INTRODUCTION**

Smoking is the most important factor associated with the occurrence of chronic airway obstruction. About 80-90% of cases of chronic airway obstruction is contributed by smoking. But among the smokers only 15-30% are affected and in significant numbers of smokers pulmonary function remains within normal limit. A clear association has been established between cigarette smoking and development of chronic airway obstruction. Recent advances indicate the involvement of CD8+ lymphocyte and possibly eosinophils in the genesis of the structural changes leading to airway obstruction. Cigarette smoke is the most important factors associated with occurrence of chronic airway obstruction, being responsible for 80-90% of chronic airway obstruction. Dose response relationship exists between amount of tobacco smoked and the level of obstruction. Progressive reduction in mean flow rates and an increase in the incidence of severe obstruction with increasing pack year exposure. In significant number of heavy smokers pulmonary function remains within normal limits, other factors, genetic and or enviroimant factors are also involved.

Even though a linear dose response relationship has been established between the increasing pack year exposure and incidence of severe obstruction, some heavy smokers have good pulmonary function.

This indicates the relevance of susceptibility of individual smokers to develop airway obstruction. Many factors have been identified which act as risk factors increasing the susceptibility of smokers. Studies in general population have shown bronchial hyperresponsiveness (BHR) to be an important predictor of lung function. Another important factor which play a important role is genetic predisposition eg alpha 1 anti-trypsin deficiency state. Other factors include advanced age, air pollution, childhood illnesses, occupation, social class and alcohol usage. In this study we attempt to characterize smokers according to occurrence of airway obstruction measured by spirometry.

**METHODS**

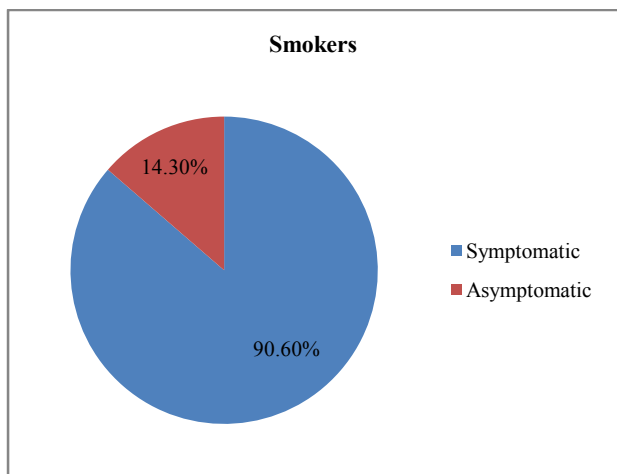
Our study is a cross-sectional observational study conducted at Department of Pulmonary Medicine in Dr D.Y Patil Medical College and Hospital, Nerul, Navi Mumbai from Febuary to August 2017. Study consisted of 150 symptomatic or asymptomatic smokers with or without history of COPD or

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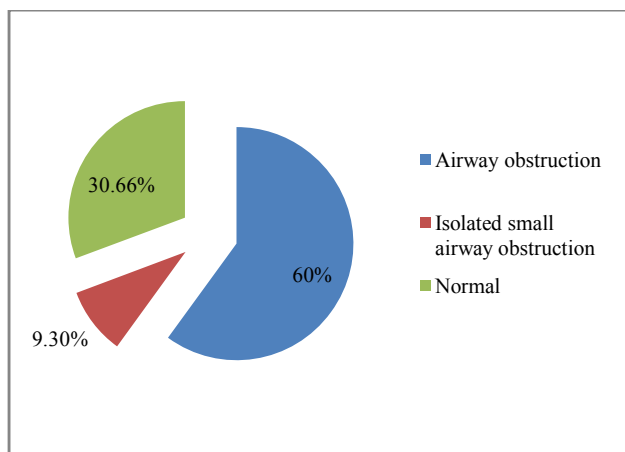
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Asthma who have history smoking >5 pack years all were male and above 30 years of age. Findings were recorded in proforma and statistical analysis was done.

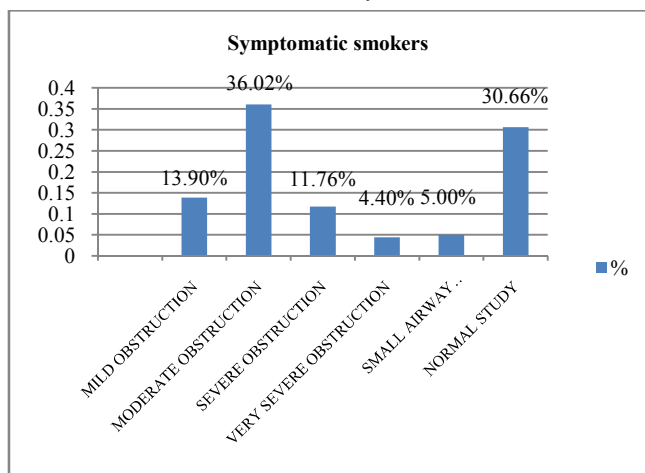
**RESULTS**



135/150 patients(90.6%) were symptomatic with complaints of breathlessness(84%), chest pain(8%), and cough(8%), 15 were asymptomatic(14.3%). Mean age was 51 years of age and all patients were male.

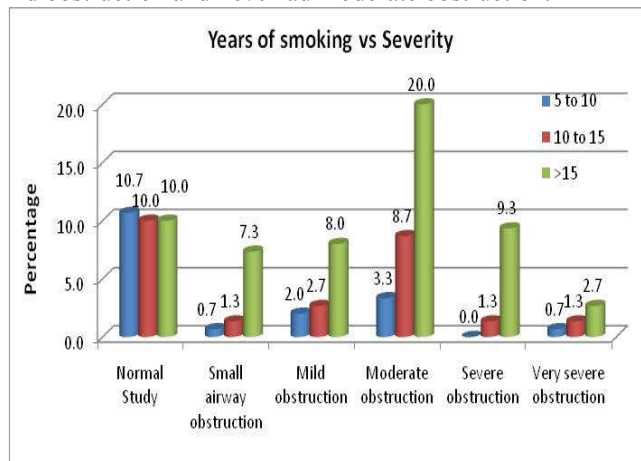


69.3% patients had obstruction in spirometry out of which 9.30% subjects had isolated small airway obstruction.



Obstruction was noted in 68% of symptomatic patients and 14% asymptomatic patients had airway obstruction. In symptomatic patients 13.9% patients had small airway obstruction, 36.02% had moderate obstruction, 11.76% had sever obstruction, 4.40% had very severe obstruction, 5% had isolated small airway obstruction and 30.66% had normal

study. In asymptomatic patients with obstruction 90% had mild obstruction and 10% had moderate obstruction.



**5-10 pack years** smokers: 61.8% subjects had normal spirometry, 15.6% had mild or small airway obstruction and 23.1 had moderate to severe or very severe obstruction.

**10-15 pack years** smokers: 39.5% subjects have normal spirometry, 15.8% had mild or small airway obstruction and 43.8% had moderate to severe or very severe obstruction.

**>15 pack years** smokers: 27.5% heavy smokers had normal study, 55.8% have moderate to severe or very severe obstruction in those who who had >15 pack years of smoking.

**DISCUSSION**

Cigarette smoking is the most important risk factor for development and prognosis of chronic obstructive pulmonary disorder(COPD) and smoking cessation is the most effective intervention to slow down the loss of lung function. In our study among 150 smokers , 135 were symptomatic and 15 were asymptomatic , 60%smokers had airflow obstruction, which is correlating with previous study which compared the airflow obstruction in symptomatic smokers using ERS, ATS, GOLD criteria (ERS 89.7%, ATS 76.6%, GOLD 63%) This correlation may be due to increased number of symptomatic smokers and diagnosed COPD patients in our study population. Another population study from Switzerland airflow obstruction ranged from 3.2-15% (Age group 30 years-70years). On comparing to this study, we have a higher incidence because the above study is a population based study (3400 subjects) which indicates both symptomatic and asymptomatic smokers.

Among the asymptomatic smokers 14% had obstruction compared to previous study by Juan *et al* in 2014 where 2.3% of patients had airway obstruction. A Study done by Abhishek *et al* shows that 47% subjects had obstruction in 100 symptomatic and asymptomatic smokers. Spirometry in asymptomatic smokers could be used for screening, which helps in identifying airflow obstruction. Evidence supporting spirometry as independent motivational tool remain uncertain. In my study 10% of each smoking group(5-10, 10-15, >15) pack years have normal spirometry study.

In my study symptomatic smokers 12.66% had mild, 32.66% had moderate, 11% had severe, 6% very severe and 9% had small airway obstruction. In comparison to study done by Bednarek *et al* in Poland of symptomatic smokers, 30.6%had mild obstruction, 51.7% moderate obstruction, 15.3% severe obstruction and 2.7% very severe obstruction was present. The

severity was calculated according to the ATS criteria while severity in our study is calculated according to GOLD criteria. Asymptomatic smokers who do not have obstruction may continue smoking.

**5-10 pack years** smokers: In my study 61.8% subjects had normal spirometry, 15.6% had mild or small airway obstruction and 23.1 had moderate to severe or very severe obstruction.

**10-15 pack years** smokers: In my study 39.5% subjects have normal spirometry, 15.8% had mild or small airway obstruction and 43.8% had moderate to severe or very severe obstruction.

**>15 pack years** smokers: In my study 27.5% heavy smokers had normal study, 55.8% have moderate to severe or very severe obstruction in those who who had >15 pack years of smoking. In a study done by Geijer *et al* in 2007 in Brussels, 30% smokers having >15 pack years of smoking between 35-40 years of age had airway obstruction, another study by Vandevoorde *et al* demonstrated that 46.7% had airway obstruction in smokers having >15 pack years of smoking in age group between 50-70 years of age. In both the studies they have differentiated the severity of obstruction and Vandevoorde has used ERS criteria to determine obstruction. In my study 26.7% of heavy smokers had only small airway obstruction and mild obstruction.

Thus, 75% of subjects with 5-10 pack years had normal to mild obstruction, but 23% had moderate to severe or very severe obstruction, thus some mild smokers also had severe airway involvement. A majority-57.3% of heavy smokers had moderate to severe airway obstruction but many (42.7%) had also normal spirometry or mild obstruction. Thus some heavy smokers did not have much airway involvement while some light smokers had severe airway involvement. This variation in results could be due to genetic susceptibility or environmental factors.

## CONCLUSION

1. Airway obstruction was present in 14% asymptomatic smokers.
2. 23.1% of light smokers had severe airway involvement 15.6% had mild or small airway obstruction.
3. 55.8% heavy smokers had moderate to severe obstruction and 26.7% had normal to mild obstruction.
4. Thus genetic susceptibility or environmental or other factors seem to play a large part in airway obstruction in smokers

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