

## TO STUDY PREVALENCE OF CARDIORESPIRATORY HAZARDS AMONG SMOKERS

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### Abstract

**Background:** Cigarette smoking has been considered as the single most significant cause of preventable morbidity and premature death. Causal associations have been clearly established between active smoking and adverse reproductive outcomes, chronic obstructive pulmonary disease and cardiovascular diseases.<sup>1</sup> It is the most important modifiable risk factor for coronary artery disease, chronic obstructive pulmonary disease, hypertension and carcinomas originating in the naso-pharynx, bronchus etc.<sup>2</sup> smoking affects mainly the Cardiovascular and Respiratory systems, this study aims at determining the prevalence of Cardiorespiratory hazards among smokers. **Aims:** TO STUDY PREVALENCE OF CARDIORESPIRATORY HAZARDS AMONG SMOKERS. **Material and Method:** The study was conducted in Department of Pulmonary Medicine at Dr. Shankarrao Chavan Govt. Medical College, Nanded. After inclusion criteria were met, the study population included 100 male subjects comprising of 50 smokers and 50 non-smoker aged more than 13 years of age were considered for present study which underwent cardio-respiratory evaluation was done. **Results:** The patients who are smoker had abnormal ECG findings, higher heart rate, lower oxygen saturation, higher systolic and diastolic blood pressure. In 50 smokers cases, Obstructive airway was commonest pulmonary involvement observed in 19 (38%) followed by mixed airway involvement in 7(14%), restrictive airway involvement in 4(8%) respectively. **Conclusion:** The finding in our study proved that Smoking is an important associated risk factor in cardiovascular and respiratory diseases. There is significant elevation of systolic and diastolic blood pressure, heart rate, decreased oxygen saturation in smokers as compared to non – smokers. Almost all pulmonary function parameters like FEV1, FVC, FEV1/FVC and PEFr were significantly reduced in smokers and obstructive pulmonary impairment was the commonest abnormality detected.

**Key Words:** cardiorespiratory hazards, smokers, blood pressure, Spirometry

## Introduction

Tobacco use is one of the most important health concerns globally and also in India today. Though numbers have constantly increasing along with its socioeconomic and biological hazards, it kills nearly six million people worldwide each year.<sup>3</sup> For many young people, smoking usually begins for psychological reasons such as parental smoking, curiosity, rebelliousness and assertion of independence. Once it becomes regular the pharmacological properties of nicotine are a major influence on the persistence of the habit<sup>4</sup>. The World Health Organization (WHO) estimates that there are about 1.1 billion smokers in the world, one – third of which are aged between 15-20 years. Most of these smokers are in the developing countries (800 million), and are men (700 million). If current trends continue, the number killed by tobacco use will be more than triple to 10 million annually by the year 2020.<sup>5</sup>

It is the most important modifiable risk factor for coronary artery disease, chronic obstructive pulmonary disease, hypertension and carcinomas originating in the naso-pharynx, bronchus etc.<sup>2</sup> It has been estimated that an average of 7 minutes of life is lost for each cigarette smoked, roughly the time taken to smoke it. A person who begins smoking at the age of 15 years has an average of 8 years of reduced longevity, and one starting after 25 years of age faces an average 4-year reduction. Coronary heart disease, 2 cancer and various respiratory diseases account for the majority of excess mortality related to cigarette smoking. Smokers average a 16-fold increased risk of acquiring lung cancer, a 12-fold increased risk of acquiring COPD and a 2-fold increased risk of having a myocardial infarction as compared to non-smokers.<sup>6</sup> Since the early 1950, several studies have shown a direct relation between smoking, hematological parameters, peripheral vascular disease and stroke. The link between smoking and pulmonary diseases was first recognized in the 1870's but it was not until 1964 that the US Surgeon General's report warned of a potential relationship between smoking and emphysema.<sup>7</sup> In every population for which prevalence data are available, air flow obstruction is more common among smokers. In most multi-variety analysis, cigarette smoking is the only statistically significant predictor of air flow obstruction after adjustment for the effects of age and initial forced expiratory volume in one second (FEV1).<sup>8</sup>

Assessment of pulmonary function by various tests reveals the way a patient breathes, determines the cause for shortness of the breath and help to confirm the lung diseases. Pulmonary function tests are a group of procedures that have been used to assess lung function. PFTs are classified into various groups to study ventilation, ventilation perfusion interrelationship, diffusion/ gas exchange and pulmonary circulation.

India is facing epidemic of Smoking and smoking affects mainly the Cardiovascular and Respiratory systems, this study aims at determining the prevalence of Cardiorespiratory hazards among smokers. Many studies have shown that as smoking index increases the deleterious effect of smoking on health status worsens. Early detection and intervention can alter the overall morbidity and mortality associated with smoking related diseases both Cardiovascular and Respiratory, thereby increasing survival and quality of life.

## Material and Methods

The present cross-sectional study was conducted in tertiary care hospital during the period of January 2016 to august 2017. The study population included 100 male subjects comprising of

50 smokers and 50 non-smoker aged more than 13 years of age were considered for present study. Considering the low prevalence of tobacco smoking among females in the local population, and also its non-reporting by female smokers, females were not included in this study. The smokers were selected voluntarily amongst Patients coming to OPD/IPD with history of previous or current smoking with cardiorespiratory symptoms, were included in the study. The materials used in the study were a computerized RMS Med-spirometer, weighing machine, measuring tape, Blood Pressure set, biochemistry analyzer machine, pulse oximeter, BPL cardiart 9108 ECG machine, CXR machine.

After detailed clinical history and physical examination, patients were evaluated with various routine investigations. Special investigations like spirometry, CXR, ECG, lipid profile, CT scan were done. Prevalence of cardiorespiratory hazards were seen in smokers and non-smokers. Data was collected, tabulated and analysis was done

Operational definition:

1. Smokers: – An adult who has smoked at least 100 cigarettes in his/ her life time.
2. Non- smokers – An adult who has never smoked, or who has smoked less than 100 cigarettes in his/her lifetime.

**Inclusion Criteria:**

1. Smokers and non-smokers males with cardiorespiratory symptoms with age more than 13 years of age.
2. Patients who are willing to participate in study and given the written informed consent.

**Exclusion Criteria:**

1. Age less than 13 year of age.
2. Patient who were not willing to participate in study.
3. Patient with acute emergencies like acute myocardial infarction, acute stroke, acute exacerbation of COPD/asthma, arrhythmias.

**Materials used for the study:**

Examination proforma used for recording the clinical examination findings was designed and validated. Computerized data logging Spirometer for recording the pulmonary function tests (UNI-EM Spiromin 6.24.9 Ink). Portable weighing machine-to record the body weight in kilograms. Measuring tape to measure the standing height in centimetres. Mercury sphygmomanometer for recording blood pressure.

**Methodology**

A detailed history was obtained and recorded from the control and the study group in the prescribed proforma. Height (in cm) of the subjects was measured in standing and erect posture. Weight (in kg) was recorded using standard weighing machine both for study and control group in standing posture. Clinical examination of the subjects was done. Pulmonary function tests were carried out by using the computerized Spirometer. Heart rate of the subjects recorded in sitting posture. Blood pressure of the subjects recorded in sitting posture by using Mercury sphygmomanometer.

**Statistical Analysis**

Data was collected and compiled using Microsoft Excel 2010 and then analyzed using SPSS 20.0 version and Open Epi Software Version 2.3 by calculating frequency, percentage and cross-tabulations between various parameters. Chi square test of significance was applied to

test the significance of association wherever necessary. Suitable graphs, charts and photographs were added. BMI values of Respondents were divided into two broad categories for analysis of data- those who were found to be obese (BMI  $\geq 25.00$ ) and those who were not obese (BMI  $< 25.00$ ). A brief interpretation was included in the results below every table and summarized at the end.

### For Spirometry

After physical examination and investigations, an informed consent was obtained from all the patients. Patients were informed regarding withholding bronchodilator medications and smokers were instructed for abstinence from smoking. Patients were also instructed about the maneuver thoroughly prior to testing and were also positioned in a proper way. In all patient's baseline Spirometry was done with computerized Medgraphics Spirometer. This Spirometer met American thoracic society criteria and was volume calibrated daily.

Measurement accuracy of Spirometer was +2%. The patient was subjected to Spirometric study in PFT lab. Bronchodilator response was assessed by giving nebulized salbutamol in a dosage of 2.5 mg (0.5 ml) diluted with 2ml. 0.9% normal saline. Available as 5 mg / ml. 15 minutes after nebulization with salbutamol, Spirometry was performed. The best of three consecutive measurements were taken. Patients were categorized into Obstructive, restrictive, Mixed and Normal respiratory diseases.

### Results

The study included 100 patients who categorized in 2 groups.

1. Group A – Smokers
2. Group B – Non-smokers

Their demographic profiles is presented in table.1. There was no significant difference in Height, Weight, age, and BMI distribution of individuals across the two groups.

**Table 1: Demographic parameters in Smokers and Non-smokers**

Variables	Smokers (Group-A) (Mean $\pm$ SD)	Non-smokers (Group-B) (Mean $\pm$ SD)	P value
Height	159.34 $\pm$ 10.22	157.92 $\pm$ 5.85	0.39
Weight	55.95 $\pm$ 10.22	56.66 $\pm$ 5.47	0.66

**Table 2: Cardiovascular parameters and their association in smokers and non-smokers**

Parameters	Smokers (mean $\pm$ 2SD)	Non-smokers (mean $\pm$ 2SD)	P value
Heart rate	93.22 $\pm$ 17.26	72.24 $\pm$ 6.06	0.003
BP systolic	132.44 $\pm$ 15.64	123.44 $\pm$ 10.06	0.019
BP diastolic	81.52 $\pm$ 7.88	78.24 $\pm$ 10.12	0.021
Serum cholesterol	211.18 $\pm$ 36.11	193.56 $\pm$ 12.34	0.202
spo2	91.72 $\pm$ 4.73	94.3 $\pm$ 4.33	0.025

In this study we noted higher heart rate in smokers with mean  $93.22 \pm 17.26$  rate per minute as compared to non-smokers with mean  $72.24 \pm 6.06$  rate per minute. Higher systolic and diastolic blood pressure are noted in smokers with mean  $132.44 \pm 15.64$  mm hg systolic blood pressure and mean  $81.52 \pm 7.88$  mm hg diastolic blood pressure as compared to non – smokers with mean  $123.44 \pm 10.06$  mm hg systolic blood pressure and mean  $78.24 \pm 10.12$  mm hg diastolic blood pressure. In these study serum total cholesterol level in smokers is mean  $211.18 \pm 36.11$  mg /dl as compared with non – smokers mean  $193.56 \pm 12.34$  mg /dl but not significant in our study with p value 0. 202. In these study oxygen saturation in smokers is mean  $91.73 \pm 4.73$  as compared to non – smokers mean  $94.3 \pm 4.33$  with significant association between smokers and non- smokers with P value 0.025.

**Table 3: Interpretation of spirometry results in smokers and non- smokers.**

PFT Result	Smokers	Non-Smokers	Total
Obstructive	19(38%)	6(12%)	25
Restrictive	4(8%)	0(0%)	4
Mixed	7(14%)	0(0%)	7
Normal	20(40%)	44(88%)	64
<b>Total</b>	<b>50</b>	<b>50</b>	<b>100</b>

As per table:3 Obstructive airway disease was commonest pulmonary involvement observed in 19 (38%) followed by mixed airway involvement in 7(14%), restrictive airway involvement in 4(8%) respectively as compared to 50 non-smokers. obstructive airway was commonest pulmonary involvement in smokers.

**Table 4: comparison of spirometry parameters values in smokers and non- smokers.**

Parameters	Smokers (Mean $\pm$ 2SD)	Non-smokers (Mean $\pm$ 2SD)	P Value
FEV1	$1.717 \pm 0.757$	$2.469 \pm 0.787$	0.0001
FVC	$2.7302 \pm 0.908$	$3.266 \pm 0.439$	0.0003
FEV1/FVC	$62.734 \pm 17.035$	$70.5 \pm 16.683$	0.0234
PEFR	$353.244 \pm 103.289$	$422.92 \pm 104.141$	0.0011

FEV1, FVC, FVE1/FVC, and PEFR values were lower in smokers than non-smokers and this difference in mean parameters value of smokers and non-smokers was found to be Statistically significant (<0.05).

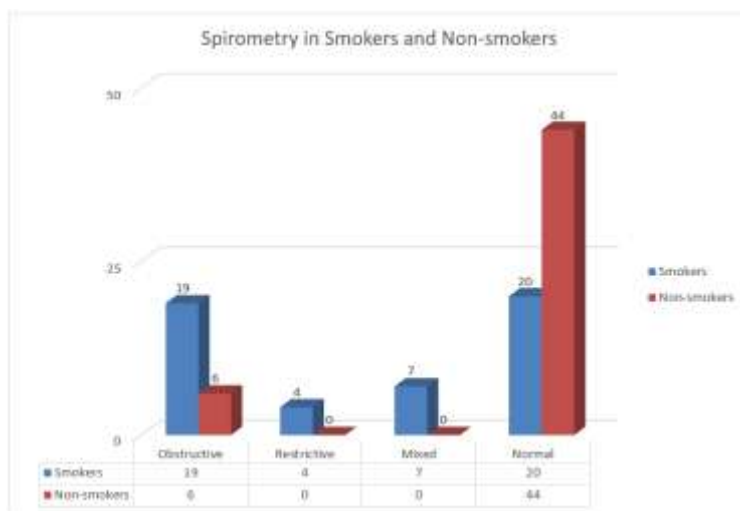


Figure 1

### Discussion

In this study 50 Smokers (**Group A**) satisfying inclusion criteria attending outpatient and indoor patients of a tertiary care government hospital were compared with 50 healthy Non-smoker subjects (**Group B**) which were matched on basis of age, height, weight and BMI from January 2016 to August 2017 over a period of 18 months. Considering the low prevalence of tobacco smoking among females in the local population, and also its non-reporting by female smokers, females were not included in this study. The Smokers were selected voluntarily amongst Patients coming to OPD/IPD with history of previous or current Smoking with cardiorespiratory symptoms were included in the study. The materials used in the study were a computerized RMS Med-spirometer, weighing machine, measuring tape, Blood Pressure set, pulse oximeter machine, CXR machine.

All the patients included in this study were subjected to detail history, physical examination, basic and specific investigation. For the purpose of meticulous data collection, a proforma was prepared and filled for every patient. Collected data was entered regularly in the MS EXCEL 2016 sheet and then by using SPSS the demographic, biochemical cardiovascular & spirometric parameters compared by Unpaired 't' test & results were compared with other similar studies done in India and across the World.

**M.R. renukadevi et al.**<sup>9</sup> in this study in which they found ECG changes in smokers and non – smokers. width of QRS complex increased and shortening of QT interval seen in smokers. In present study out of 50 smokers, 11(22%) patients had abnormal ECG as compared to non-smokers amongst which only 4(8%) patients had abnormal ECG out of 50 non-smokers and the association of smoking and abnormal ECG was significant. abnormal ECG include T wave inversion, P' pulmonale, right bundle branch block, left bundle branch block, right ventricular hypertrophy.

In this study we noted higher heart rate in smokers with mean  $93.22 \pm 17.26$  rate per minute as compare to non – smokers with mean  $72.24 \pm 6.06$  rate per minute which correlate with other studies as **Venkatesh et al.**<sup>10</sup> & **Khan IS et al.**<sup>11</sup>

In this study oxygen saturation in smokers is mean  $91.73 \pm 4.73$  as compare to non – smokers mean  $94.3 \pm 4.33$  with significant association between smokers and non- smokers with P

value 0.025. which correlate with similar studied done by **Mustafa ozadal et al.**<sup>12</sup> & **Miyong j et al.**<sup>13</sup>

In present study out of 50 smokers cases, 17(34%) patients were having higher systolic blood pressure and out of 50 non-smokers only 7(14%) patients were having higher systolic blood pressure. Systolic BP was significantly raised in smokers (p value 0.019) with 14(28%) patients had higher diastolic blood pressure as compared to non – smokers only 5 (10%) patients had higher diastolic blood pressure out of 50 non –smokers. Diastolic BP is significantly raised in non-smokers (p value 0.02 i.e. <0.05). which correlate with studies done by **Guojuli et al.**<sup>14</sup> & **Junichi minami et al.**<sup>15</sup>

In these study serum total cholesterol level in smokers is mean  $211.18 \pm 36.11$  mg /dl as compared with non – smokers mean  $193.56 \pm 12.34$  mg /dl but not significant in our study with p value 0.202. Similar study done by Dr. **Amit D Sonagra et al.** 2017<sup>16</sup> in which significant higher level of total cholesterol observed in smokers as compared to non-smokers. The mean value of FEV1, FVC, FVE1/FVC, and PEFR in smokers are  $1.717 \pm 0.757$ ,  $2.7302 \pm 0.908$ ,  $62.734 \pm 17.035$ ,  $353.244 \pm 103.289$  respectively as compared with non- smokers with mean value  $2.469 \pm 0.787$ ,  $3.266 \pm 0.439$ ,  $70.5 \pm 16.683$ ,  $422.92 \pm 104.141$  respectively. The difference in mean value of smokers and non –smokers was statistically significant. Our study correlate with similar studies done by **Sunita nighute et al.**<sup>17</sup> & **Rubeena bano et al.**<sup>18</sup>

Tobacco smoking is the major preventable cause of death in many parts of the world. Tobacco related lung diseases and cardiovascular diseases cause a significant proportion of total deaths and chronic disability. This study “A Comparative study of Cardio-respiratory functions in smokers and non -smokers” analyzes the effect of cigarette smoking on lung functions and on the cardiac functions of an individual.

## Conclusions

Smoking is an important associated risk factor in cardiovascular and respiratory diseases. Almost all pulmonary function parameters like FEV1, FVC, FEV1/FVC and PEFR were significantly reduced in smokers and obstructive pulmonary impairment was the commonest abnormality detected. This suggests that smoking affects respiratory systems in a significant way. As per findings in this study smoking causes significant cardiovascular hazards, also. There is significant elevation of systolic and diastolic blood pressure, heart rate, decreased oxygen saturation in smokers as compared to non – smokers. So, we can conclude from our study that periodic cardiorespiratory evaluation in the form of spirometry for respiratory system and early clinical evaluation with BP monitoring and ECG for cardiovascular system are recommended in smokers.

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