(e) ISSN Online: 2321-9599

(p) ISSN Print: 2348-6805

ORIGINAL ARTICLE

Assessment of pulmonary function parameters among smokers

[1]Priteshkumar Hariprasad Gandhi, [2]Jayanti Singh

[1]Assistant Professor, Department of Physiology, Santosh Medical College & Hospital, Ghaziabad, Uttar Pradesh, India;
[2]Assistant Professor, Department of Physiology, Saraswathi Institute of Medical Sciences, Hapur, Uttar Pradesh, India

ABSTRACT:
Background: Smoking is known to have a significant negative impact on respiratory functioning and is a known contributing factor to the development of certain respiratory illnesses. The present study was conducted to assess pulmonary function parameters among smokers. **Materials & Methods:**120 subjects of both genderswere divided into 3 groups viz, smokers, ex-smokers and non-smokers. First group included the subjects who were currently smoking and have smoked at least 5 pack-years. Second group included those who had smoked at least 5 pack years in the past and have quit smoking minimum one year before this study.Third group consisted of those who did not smoke at all.The parameters of PFT studied, included Forced Vital Capacity (FVC), Forced Expiratory Volume in first second (FEV1), Forced Expiratory Flow (FEF25-75%) and Peak Expiratory Flow Rate (PEFR), and Maximal Voluntary Ventilation (MVV). **Results:** Out of 120 subjects, males were 75 and females were 45. The mean age (years) was 45.2, 47.4, and 48.0. The mean height (cm) was 163.5, 165.4 and 164.2. The mean weight (kgs) was 64.5, 64.7 and 68.1. The mean BMI was 23.5 kgs/m2, 23.6 kgs/m2, and 26.2 kgs/m2 in groups I, II, and III respectively. The difference was significant (P< 0.05). The mean FVC (ltrs) was 1.4, 2.3 and 3.6, FEV1 (ltrs) was 1.7, 2.5 and 3.2, FEF 25-75% (ltrs/min) was 2.4, 3.2 and 4.8, MVV (ltrs/min) was 91.4, 90.5 and 117.3 and PEFR (ltrs/min) was 5.2, 6.3 and 7.6 in group I, group II and group III respectively. **Conclusion:** Smoking causes a significant decline in lung function and that quitting smoking can lead to signs of recovery.
Keywords: chronic bronchitis, Smoking, Tobacco

Corresponding author: Jayanti Singh, Assistant Professor, Department of Physiology, Saraswathi Institute of Medical Sciences, Hapur, Uttar Pradesh, India

This article may be cited as: Gandhi PH, Singh J. Assessment of pulmonary function parameters among smokers. J Adv Med Dent Scie Res 2016;4(3):215-218.

INTRODUCTION

Smoking is known to have a significant negative impact on respiratory functioning and is a known contributing factor to the development of certain respiratory illnesses. Tobacco smoke contains more than 2000 potentially harmful ingredients, many of which have the potential to cause cancer.[1] The prevalence of chronic bronchitis among heavy smokers is not as low as previously believed. Years of persistence may cause it to develop into Corpulmonale, Metaplasia of the respiratory epithelium, and chronic obstructive pulmonary disease (COPD), which creates an ideal environment for malignant changes. The overwhelming body of research shows a positive correlation between smoking and lung cancer, both epidemiologically and clinically.[2]

One of the main risk factors for COPD development is smoking. It is essential to diagnose COPD early to lower the rates of morbidity and death. It is well known that smoking aggravates respiratory tract inflammation and impairs lung function.[3] Nonetheless, there is a lot of room for variance in the rate of deterioration in the various pulmonary function test (PFT) measures. One of the variables that could affect how smoking affects the PFT parameters is their exposure at work.[4] The topic of whether PFT parameters revert to normal when a smoker stops smoking is another unanswered one. Few researches have been conducted to determine if smoking's harmful effects persist long after a smoker gives up the habit.[5,6]The present study was conducted to assess pulmonary function parameters among smokers.

MATERIALS & METHODS

The present study consisted of 120 subjects of both genders. All gave their written consent to participate in the study.

Data such as name, age, gender, etc. was recorded. All were divided into 3 groups viz, smokers, ex-smokers and non-smokers. First group included the subjects who were currently smoking and have smoked at least 5 pack-years. Second group included those who had smoked at least 5 pack years in the past and have quit smoking minimum one year before this study.Third group consisted of those who did not smoke at all.The parameters of PFT studied, included Forced Vital Capacity (FVC), Forced Expiratory Volume in first second (FEV1), Forced Expiratory Flow (FEF25-75%) and Peak Expiratory Flow Rate (PEFR), and Maximal Voluntary Ventilation (MVV).Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Total- 120		
Gender	**Male**	**Female**
Number	75	45

Table I shows that out of 120 subjects, males were 75 and females were 45.

Table II Anthropometric parameters

Parameters	Group I	Group II	Group III	P value
Age (years)	45.2	47.4	48.0	0.31
Height (cm)	163.5	165.4	164.2	0.85
Weight (kgs)	64.5	64.7	68.1	0.05
BMI (kgs/m^2)	23.5	23.6	26.2	0.04

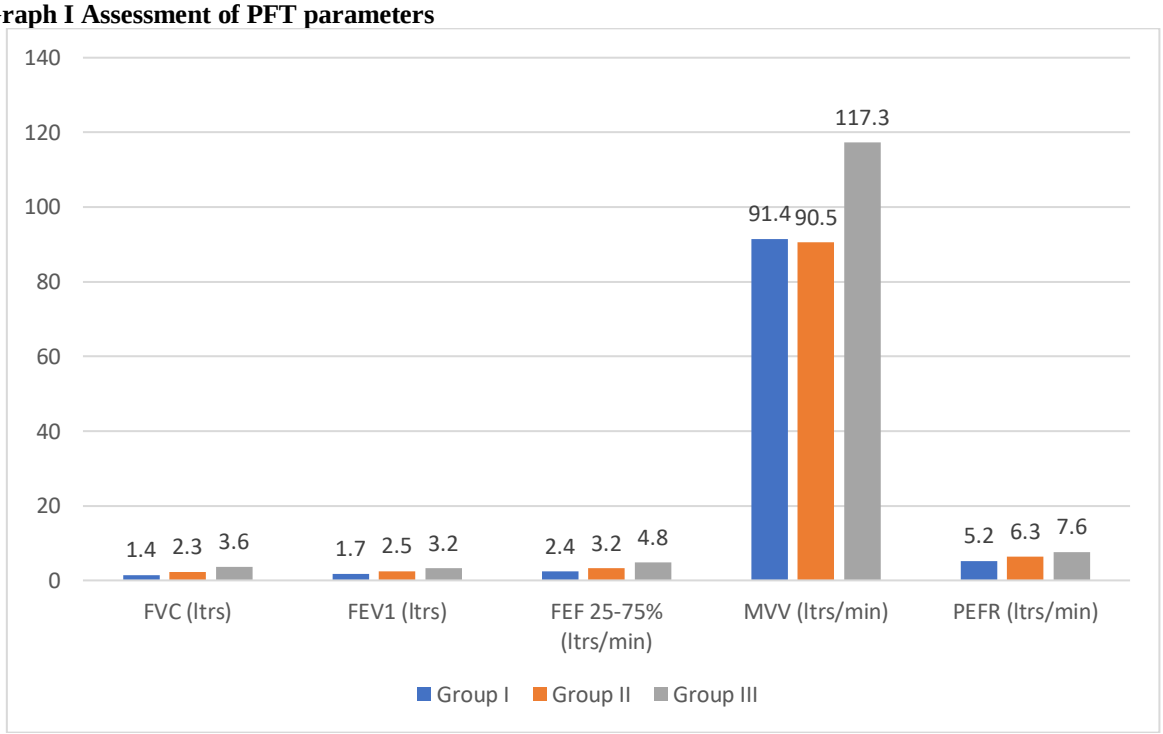
Table II shows that the mean age (years)was 45.2, 47.4, and 48.0. The mean height (cm) was 163.5, 165.4 and 164.2. The mean weight (kgs) was 64.5, 64.7 and 68.1. The mean BMI was 23.5kgs/m2, 23.6kgs/m2, and 26.2kgs/m2 in groups I, II, and III respectively. The difference was significant (P< 0.05).

Table III Assessment of PFT parameters

Parameters	Group I	Group II	Group III	P value
FVC (ltrs)	1.4	2.3	3.6	0.01
FEV1 (ltrs)	1.7	2.5	3.2	0.02
FEF25-75% (ltrs/min)	2.4	3.2	4.8	0.01
MVV (ltrs/min)	91.4	90.5	117.3	0.01
PEFR (ltrs/min)	5.2	6.3	7.6	0.01

Table II. graph I show that the mean FVC (ltrs) was 1.4, 2.3 and 3.6, FEV1 (ltrs) was 1.7, 2.5 and 3.2, FEF 25-75% (ltrs/min) was 2.4, 3.2 and 4.8, MVV (ltrs/min) was 91.4, 90.5 and 117.3 and PEFR (ltrs/min) was 5.2, 6.3 and 7.6 in group I, group II and group III respectively.

Graph I Assessment of PFT parameters



DISCUSSION

One of the variables that could affect how smoking affects the PFT parameters is their exposure at work.[7] The topic of whether PFT parameters revert to normal when a smoker stops smoking is another unanswered one.[8,9] Few researches have been conducted to determine if smoking's harmful effects persist long after a smoker gives up the habit. There is conflicting evidence on the PFT parameters in ex-smokers returning to normal.[10,11]The present study was conducted to assess pulmonary function parameters among smokers.

We found that out of 120 subjects, males were 75 and females were 45.Sreenivas et al[12]conducted a cross-sectional study on 84 bus-depot workers consisting of equal number of smokers, ex-smokers and non-smokers. PFT observations were obtained using Medspiror following standard methods and precautions.Comparisons among three groups were performed employing one-way ANOVA and post-hoc tests. There were substantial effects of smoking on PFT parameters (deterioration was up-to half). Partial recovery was found in all the parameters of ex-smokers. Frequency and duration of smoking were negatively correlated with some of the parameters.[11,12]
We found that the mean age (years) was 45.2, 47.4, and 48.0. The mean height (cm) was 163.5, 165.4 and 164.2. The mean weight (kgs) was 64.5, 64.7 and 68.1. The mean BMI was 23.5 kgs/m2, 23.6 kgs/m2, and 26.2 kgs/m2 in groups I, II, and III respectively. We found that the mean FVC (ltrs) was 1.4, 2.3 and 3.6, FEV1 (ltrs) was 1.7, 2.5 and 3.2, FEF 25-75% (ltrs/min) was 2.4, 3.2 and 4.8, MVV (ltrs/min) was 91.4, 90.5 and 117.3 and PEFR (ltrs/min) was 5.2, 6.3 and 7.6 in group I, group II and group III respectively.
Higgins et al[13]investigatedrelationships between cigarette smoking and pulmonary function in elderly men and women. The prevalence of cigarette smoking was 10% to 20% and higher in women than men and in blacks than whites. Forced vital capacity and FEV1 levels were related positively to height and white race and negatively to age and waist girth. Age- and height-adjusted FEV1 means were 23% and 18% lower in male and female current smokers, respectively than in never-smokers but not reduced in never-smokers currently living with a smoker. Smokers who quit before age 40 years had FEV1 levels similar to non-smokers, but FEV1 levels were lower by 7% and 14% in smokers who quit at ages 40 to 60 years and older than 60 years, respectively. Lung function was related inversely to pack-years of cigarette use. Prevalence rates of impaired lung function were highest in current smokers and lowest in never smokers. Regression coefficients for the smoking variables were smaller in persons without cardiovascular or respiratory conditions than in the total cohort.
Hu et al[14] in their study 596 cases (deaths) and 596 age and sex-matched controls (survivals) were selected. Lung function was assessed using forced vital capacity (FVC) expressed as the normal percent predicted (FVC %pred) and the ratio of forced expiratory volume in 1 second (FEV1) to FVC (FEV1/FVC). Allergy skin tests were performed with extracts of house dust, candidiaalbicans and mixed fungal samples (bronchomycosis). The Brinkman index was used to assess smoking intensity. The Cox proportional hazards model was used to evaluate whether lung function was associated with mortality after adjustment for other potential confounding variables.Those categorized into the first- or second-lowest quartile of FVC %pred had a higher mortality [hazard ratios (HRs) and 95% confidence intervals (CIs): 2.01 (1.26–3.19) and 1.84 (1.11–3.05)], respectively. On top of these, heavy smoking (BI≥400) was associated with a higher mortality [HR and 95% CI: 1.73 (1.18–2.53)]. There were only weak of associations between the results of allergy skin tests and mortality.
The limitation of the study is the small sample size.

CONCLUSION

Authors found that smoking causes a significant decline in lung function and that quitting smoking can lead to signs of recovery.

REFERENCES

1. Mwaiselage J, Bratveir M, Moen BE, Marshalla Y. Respiratory symptoms and chronic obstructive pulmonary disease among cement factory workers. Scand Work Environ Health 2005; 31: 316–323.
2. Mehrotra PK, Varma N, Tiwari S, Kumar P. Pulmonary functions in Indian Sportsman playing different sports. Indian J PhysiolPharmacol 1998; 42: 412–416.
3. Hideo kobayashi, Soichiro Kanoh, Kazuo motoyoshi. Serum surfactant protein, but not Surfactant protein-D or KL-6, can predict preclinical lung damage induced by smoking. Biomarkers 2008; 13: 385–392.
4. American Thoracic Society (ATS). Standardization of spirometry 1994 update. Am J Respir Crit Care Med 1995; 152: 1107–1136.
5. Viju T Mhase, Reddy PSN. Effect of smoking on lung functions of workers exposed to dust and fumes. Indian Journal of Community Medicine 2002-03; 27: 26–29.
6. Lakhera SC, Kain TC. Comparison of Pulmonary function amongst Ladhaki, Delhi, Varanasi and Siddi boy atheletes. Indian J PhysiolPharmacol 1995; 39: 255–258.
7. Gregg I, Nunn AJ. Peak expiratory flow in symptomless elderly smokers and ex-smokers. Br Med J 1989; 298: 1071–1072.
8. Stanescu D, Sanna A, Veriter C, et al. Airways obstruction, chronic expectoration and rapid decline of FEV1 in smokers are associated with increased levels of sputum neutrophils. Thorax 1996; 51: 267–271.
9. Wright JL, Lawson LM, Pare PD, Wiggs BJ, Kennedy S, Hogg JC. Morphology of peripheral airways in current smokers and ex-smokers. Am Rev Respir Dis 1983; 127: 474–477.
10. Craig PJ, wells AU, Doffman S, et al. Desquamative interstitial pneumonia, Respiratory bronchiolitis and their relationship to smoking. Histopathology 2004; 45: 275–282.
11. Santos S. Peinado VI, Ramirez J, et al. Characterization of pulmonary vascular remodeling in smokers and patients with mild COPD. Eur Respir J 2002; 19: 632–638.
12. Sreenivas BS, Sunitha MS, Nataraj SM, Dhar M. A study of deterioration of pulmonary function parameters among smokers and recovery among ex-smokers in bus depot workers. Indian J PhysiolPharmacol. 2012 Apr 1;56(2):154-60.
13. Higgins MW, Enright PL, Kronmal RA, Schenker MB, Anton-Culver H, Lyles M, Gregory LB, Cruise RG, Ettinger WH, Elster A, Furberg CD. Smoking and lung function in elderly men and women: the

Cardiovascular Health Study. Jama. 1993 Jun 2;269(21):2741-8.
14. Hu L, Sekine M, Gaina A, Wang H, Kagamimori S. Nested case-control study on associations between lung function, smoking and mortality in Japanese population. Environmental health and preventive medicine. 2007 Nov;12:265-71.