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AN APPRAISAL ON PULMONARY FUNCTION ASSOCIATED WITH SEASONS, SMOKING AND FOOD HABITS IN HIGHLY POLLUTED AREA

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Abstract
At present times environmental changes are evident. Increase of global temperature affects seasons, consequently respiratory dynamics also may be changed. On the other hand, anthropometric parameters, food habits, smoking are also the significant factors which are measured in spirometry can also affect the respiratory efficacy.
The present study focuses on the effect of environmental changes including seasons, pollution, smoking and food habits associated with spirometry.
For this study a total number of 203 volunteers, both male and female of age group between twenty to fifty years had been selected.
The study based on the seasons using result from Spirometry. Anthropometric parameters and spirometric data including FVC (Forced vital capacity), PEFR (Peak expiratory flow rate), FEV_1 (forced 1-s expired volume), FEV1/ FVC and FEF_{25-75} have been measured for all subjects. The values of data have been tabulated as mean, median and co-efficient variation. FVC, PEFR and FEV_1 were increasing in winter though decreasing in summer.
Anthropometric parameters, smoking, pollution, food habits and seasons were the important factors which can affect the respiratory efficiency measured in spirometry. Besides with that respiratory rate and functions changes with seasons.

Key words: Forced vital capacity, forced 1-s expired volume, Peak Expiratory flow rate, Spirometry, respiratory rate, smoking.

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INTRODUCTION

Tobacco Smoking has been identified as the most important risk factor in Chronic Obstructive Pulmonary Disease (COPD), [1] cardiovascular disease (CVD), cancers. Which was a morbidity and mortality with tobacco use is entirely preventable. [2] Smoking harms nearly every organ in the body, causing many diseases and reducing health in general.

In addition to this, some smokers develop COPD [3] which is the fourth commonest cause of death across the world. [4] It is well proved that the system of external respiration changes on a regular basis and it is related to the seasonal factors occurring throughout the year. [5]

In winter, the resistance of airways increases. [6] It was identified that the way and extent of appearance of respiratory functional changes depended on the severity of temperature. Diet and nutrition are increasingly recognised as modifiable contributors to the prevention, development and progression of chronic diseases such as cancer and CVD, [7, 8] but dietary impact on lung function is not well established. PEFR (Peak expiratory flow rate) was a useful parameter to monitor airway obstruction, Hence the assessment of pulmonary function test is important for monitoring of airway obstruction, its severity and disparity and for evaluating the effects of treatment. [9]

METHODS

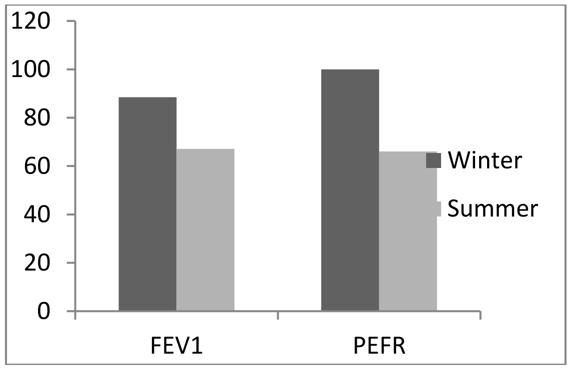
Present study has been done at the clinical laboratory of department of Physiology ESICMC, Kolkata. A total number of 203 volunteers, both male and female of age group between twenty to fifty years had been given their personal information including general history, food and smoking history etc. the volunteers with recent history of any acute or chronic respiratory disease were excluded. The anthropometric parameters and the spirometric parameters including FVC, PEFR, FEV_1, FVC/ FEV_1, FEF_{25-75} has been recorded in summer and winter seasons. Record has been taken after five minutes of rest and the posture was sitting. Data was taken between 8 am to 12 pm to avoid diurnal effect. All data had been calculated with the using of SPSS software and Microsoft office excel®. P value <00.05 was considered as statistically significant.

RESULT

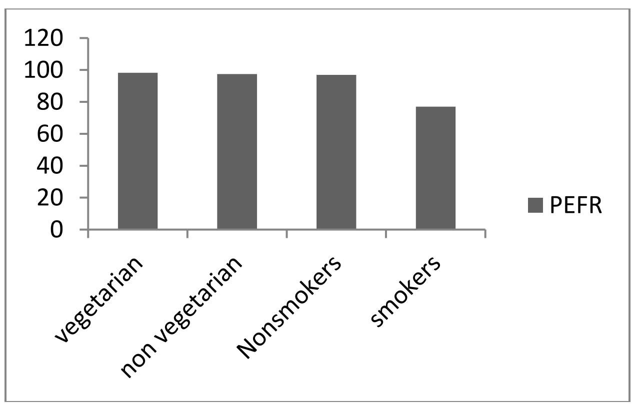
The mean anthropometric data including height and weight were significantly higher in men when compared with women (Table 1). Respiratory parameters changed significantly by seasons. FVC and PEFR values were significantly increased in winter season. (Graph 1).
On the other hand, PEFR is decreased in cigarette smokers compared to non-smokers (Graph 2).

Table 1: Showing anthropometric parameters (n= 203)

Trait	Male (n = 103)	Female (n = 100)	T value	P value
Age (year)	31.24± 8.11	31.10± 8.50	0.07	0.45
Height(cm)	167.34±9.67	159.4±5.41	5.4	<00.01
Weight(kg)	62.87± 8.49	58.54± 8.88	2.6	<00.01
BMI (kg/m²)	22.54± 3.22	23.01± 3.46	-0.76	0.76



Graph 1: Showing the comparison between FEV1 and PEFR by seasons



Graph 2: Showing PEFR based on the food habits and smoking

DISCUSSION

In this study was recorded the environmental temperature during winter was 10 ˚C - 29 ˚C from October to March and in summer the temperature was 28 ˚C - 40 ˚C during the month from April to May. In this study FEV_1 and PEFR increased with decreasing temperature and decreased with increased temperature and humidity. PEFR is decreased in cigarette smokers compared to non-smokers. Lung volumes and flow rates of the inhabitants according to gender. The respiratory parameters such as FVC, FEV1, FEF 25-75 and PEFR significantly lower in females when compare to male group respectively. Previous studies stated that PEFR was a method which needed effort developing from large airways. [10-12] though it did not detect small airway obstruction. [13] It was also found that smoking affected medium and large airways. [14] Other studies reported that smoking affected both small and large airways. [15, 16] It was also found that PEFR value was lower in smokers than in non-smokers. [17-20] This can be attributed to the fact that men have bigger lungs for the same height as compared to females. Another contributing factor could be the muscularity in men that accounts for higher values of PFTs. In addition to the anatomical and physiological differences, sex hormones, sex hormone receptors or intracellular signaling pathways also may be accountable for the gender differences in lung functions. [21-25]

It was concluded that seasonal changes and smoking habits effects on respiratory rate and associated with pulmonary function test.

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