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AN APPRAISAL ON SPIROMETRY IN THREE PEAK SEASONS IN NORMAL POPULATION

Physiology

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ABSTRACT

Background: Nowadays worldwide ecological changes are apparent. Intensification of global temperature effects on seasons, these changes may consequence on respiratory dynamics. Objectives: The aim of this study is to evaluatethe effect of three peak seasons on pulmonary function.

Materials and Method: This was a longitudinalstudy based on the seasons using result from Spirometry, questionnaires to investigate the participants' respiratory system, sedentarism and smoking habit etc. Anthropometric parameter has been taken. All participants are performed spirometry. Spirometry values were tabulated with mean, median & Co-efficient of variation.

Result: At spirometry assessment, based on the season were changed significantly. FVC (Forced vital capacity), FEV1 (forced 1-s expired volume) and PEFR (Peak Expiratory flow rate) FEV1 / FVC and FEF 25-75 values were increase in winter and decreases with increasing environmental temperature.

Conclusion: Respiratory functions changes with seasons.

KEYWORDS

Spirometry, Sedentarism, Ecological, Season

INTRODUCTION:

Human beings and environment are the two faces of a same coin, which are much complex, dynamic, inter-dependent, equally sensitive and inter-related. Seasonal change leads to disturbance in the equilibrium of mental, physiological functions including metabolism in the body leads to further various diseases[1], may effects on respiratory dynamics also.Human beings are directly affected by seasonal variations, leading to disturbance in equilibrium in thebody. Observance of different seasons maintains the balance of physiological activity, individual temperamentand physical constitution and makes theperson free from seasonal diseases[2].

Pulmonary function tests (PFT) serve as a tool of health assessment and also to some extent as a predictor of survival rate[3].The Pulmonary Function Capacities of normal sedentary individuals have been studied extensively in India[4-7] but less in the context on seasonal effect/ variation.

Nowadays due to global warming worldwide environmental changes are evident. The sudden temperature changes and humidity may effect on cardiorespiratory system. Therefore the study of seasonal changes is important.

MATERIALS AND METHOD:

The longitudinal study was carried out at the Department of Physiology, ESI-PGIMSR & ESIC Medical College, Kolkata. Total 121 subjects both male and female with age group of twenty to fifty years were recruited as the subjects. Subjects had completed questionnaires with personal information including health history and physical activity habits and smoking habits etc. Before testing, the subjects with recent history of any acute / chronic respiratory disease at the time were excluded from the study. The anthropometry including height, weight and Body mass index (BMI) were measured. Spirometry was done with FEV, FEV_1, FEV_1/FVC, FEF25-75, PEFR values. Spirometry had been recorded in three pick seasons i. e winter summerand rainy on same subjects. Record had been taken at sitting position after at least 10 minutes of rest. Measurements were taken between 8 AM and 12 PM to avoid diurnal variations in lung functions. Data was analysed using appropriate statistical tests, using frequencies and percentages for categorical variables and central tendency and dispersion measures (Standard Deviation [SD]) for quantitative variables. Independent t test and one way ANOVA was done. All statistical parameters were done using of statistical software stata and Microsoft Office Excel®. P-value < 0.05 was considered to be statistically significant.

RESULT:

Respiratory parameters changed significantly in three different seasons. The mean for anthropometric parameters including height, weight were significantly greater in men than in women (Table 1). The mean value for all respiratory parameters increase in winter than rainy and summer. The mean values were less in summer than rainy season. The value for FVC, FEV_1, FEF 25-75 and PEFR were non-significant when comparisons by seasons however the values for FEV_1 / FVC are highly significant (Table 2). The ratio of FEV_1 and FVC were significantly increase in winter compares to other seasons and the value for $FEV_1$was also increases in winter (Figure 1).

Table 1: Description of different physical characteristics of sample (n= 121)

Trait	Male (n=60)	Female (n=61)	T value	P value
Age (year)	31.25± 8.12	31.11± 8.51	0.08	0.46
Height(cm)	167.35±9.68	159.5±5.42	5.5	<0.01
Weight(kg)	62.88± 8.50	58.55± 8.89	2.7	<0.01
BMI(kg/m^2)	22.55± 3.23	23.02± 3.47	-0.77	0.77

Table 2: The effect of seasons on respiratory parameters of subjects

Parameters	Seasons (mean±SD)			P Value
	Winter	Rainy	Summer	
FVC	92.47±10.73	85.29±10.28	75.08±8.86	0.09
FEV1	89.28±10.46	81.28±11.22	74.37±9.69	0.27
FEV1 / FVC	98.66±5.19	93.42±6.92	88.09±7.97	<0.01
FEF 25-75	97.73±12.6	88.38±12.96	81.36±11.14	0.22
PEFR	101.19±19.67	91.52±19.14	85.2±17.35	0.36

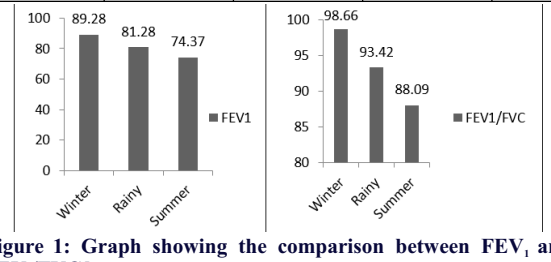

Figure 1: Graph showing the comparison between FEV_1 and FEV_1/FVC by seasons

DISCUSSION:

The present study revealed that season and environmental temperature effects on respiratory dynamics. The ratio of FEV_1 and FVC increases significantly in winter with compare to summer and rainy. Pulmonary capacity decrease in summer its maybe increase of environmental temperature and humidity.Pulmonary functions are usually determined by the strength of respiratory muscles, compliance of the

thoracic cavity, airway resistance and elastic recoil of the lungs[8]. If it is well known that forced vital capacity and respiratory rate are increases with anthropometric determinants, and also affected by altitude, exercises, parental smoking and seasons[9-11] but present study demonstrated that the respiratory dynamics changes with seasons also. Some limitations are demonstrated by similar finding was that spirometry is not enough for the providing of a clinical diagnosis[12] but present context throws light on the changes season and environmental temperature and humidity may effect on respiratory parameters.

CONCLUSION: The awareness of individual towards wellseasonal routine is essential among the community, may control some sporadic respiratory diseases. The present study reveals that the seasonal observation of dynamic lung functions has direct influence on sudden changes of temperature and humidity.

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