Research Paper

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Correlation Between Anthropometric and Pulmonary Function Tests Among The Subjects Living in Urban Slums Of Uttarakhand - a Cross-Sectional Study

Physiology

KEYWORDS : Slums, Anthropometric, Pulmonary function tests

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ABSTRACT

Objective: To measure the PFT levels among the population living in slum areas of Uttarakhand.

Methods: This was a cross-sectional study design conducted in the urban slum area of Uttarakhand. A total of 150 subjects comprising male and females were assessed for pulmonary function test. The parameters used as determinants of lung function were FVC, FEV1, FEV3 and PEFR were recorded as per standard procedure.

Results: Percent of predicted FVC (%FVC), FEV1 (%FEV1), FEV3 (%FEV3) and percent of predicted PEFR were analyzed for both male and female. The mean percent of predicted FVC of male was significantly higher among male subjects compared to females. Similarly, the % FEV1 of males (75.78±4.56) was significantly higher than females (62.56±3.67). There was higher mean percent predicted FEV3 as well as PEFR. The pattern of correlation between anthropometric and pulmonary function tests was almost similar among male and females. However, the correlation was not strong.

Conclusion: The study concludes that there is urgent need to improve the hygienic facilities around the slums to improve the health of slum persons.

INTRODUCTION

The persons living in slums are exposed to dust particles. The dust particles are either swallowed or coughed out to the exterior but the smaller particles between 1-5 micrometers settle down in the smaller bronchioles as a result of gravitational precipitation. Particles smaller than 1 micron in diameter diffuse in the wall of the alveoli and adhere to alveolar fluid which are then taken up by alveolar macrophages which later on leads to tissue destruction.

Pulmonary function tests (PFT) serve as a tool of health assessment and also to some extent as a predictor of survival rate. Spirometry is pivotal to the screening, diagnosis and monitoring of respiratory diseases and is increasingly advocated in primary care practice. Lung function parameters tend to have a relationship with lifestyle such as regular exercise and non- exercise[1,2].

Lung function tests provide qualitative and quantitative evaluation of pulmonary function in patients with obstructive and restrictive lung diseases. The parameters used to describe lung function are the lung volumes and lung capacities. It is well known that pulmonary functions may vary according to the physical characteristics including age, height, body weight and altitude. Regular exercise as in athletes produces a positive effect on the lung by increasing pulmonary capacity and thereby improving the lung functioning. The Pulmonary Function Capacities of normal individuals have been studied extensively in India[3-5]. There is lack of studies on PFT among slum population especially in Uttarakhand.

Thus, the present cross-sectional study was conducted to measure the PFT levels among the population living in slum areas of Uttarakhand.

MATERIAL AND METHODS

The study was conducted in 3 urban slums of district Dehradun, Uttarakhand among the subjects of 20-35 years. The cross-sectional study design was used. The study was approved by an external ethical committee. All the subjects were well explained about the purpose of the study and consent was taken from each participants. All subjects were nonsmokers and free from active respiratory diseases. Smokers active respiratory disorders and epileptic disorders were excluded from the study.

The lung function tests were carried on all the subjects as per the standards mentioned by Miller et al.[6-7]. The tests were carried by a well-trained doctor familiar with Medspiror (Computerized spirometry) after reinforcing the method of test to each subject. Measurements were taken in morning and before noon to avoid diurnal variations in lung functions. The study subjects undergoing the tests were well informed about the instrument and the technique of the test by demonstration of the procedure. Anthropometric measurements like height and weight of each subject was measured before the test procedure.

Analysis

The results are presented in mean±SD. The unpaired t-test was used to compare the anthropometric and PFT between male and female. The Spearman correlation coefficient was calculated between anthropometric and PFT separately for male and female. The p-value<0.05 was considered as significant. All the analysis was carried out by using SPSS 16.0.

RESULTS

The study population consisted total of 150 subjects. The mean age and mean anthropometric measurements of both groups is depicted in Table-1. These findings suggest that both the groups did not differ significantly and were comparable. The sex ratio was chosen equally for the comparison purpose.

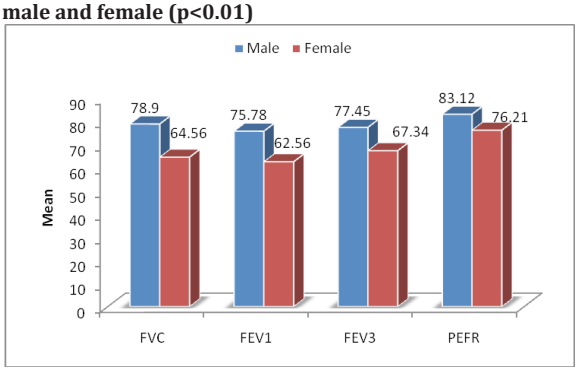
Table-1: Anthropometric parameters

	Male (n=75)	Female (n=75)	p-value
Age in years	25.15±9.10	26.34±10.80	p>0.05
Weight	51.45±7.78	48.56±8.67	p>0.05
Height	160.12±22.34	157.45±21.22	p>0.05
BMI	25.45±2.34	26.56±3.24	p>0.05

The four parameters were taken into consideration and the values obtained were recorded. The best value from three measurements were used and recorded by a spirometer. Predicted values were calculated by the standard formulae originally programmed in the spirometer.

Percent of predicted FVC (% FVC), FEV1 (% FEV1), FEV3 (% FEV3) and percent of predicted PEFR were analyzed for both male and female. The mean percent of predicted FVC of male was significantly higher among male subjects compared to females. Similarly, the % FEV1 of males (75.78±4.56) was significantly higher than females (62.56±3.67). There was higher mean percent predicted FEV3 as well as PEFR (Fig.1).

Fig.1: Comparison of Pulmonary function tests between male and female (p<0.01)



The pattern of correlation between anthropometric and pulmonary function tests was almost similar among male and females. However, the correlation was poor among both male and females. FVC was negatively correlated with age in male and females. The FVC was poorly positively correlated with weight, height and BMI in both male and females. Similar pattern was observed for FEV1 and percent predicted PEFR (Table-2 & 3).

Table-2: Correlation between anthropometric and pulmonary function tests among males

	Age	Weight	Height	BMI
FVC	-0.34**	0.14	0.36**	0.24*
FEV1	-0.13	0.11	0.15	0.16*
FEV3	-0.43**	0.23*	-0.17	0.21**
PEFR	-0.21*	0.10	0.16	0.14*

***p<0.05, **p<0.01**

Table-3: Correlation between anthropometric and pulmonary function tests among females

	Age	Weight	Height	BMI
FVC	-0.32**	0.11	0.33**	0.14*
FEV1	-0.12	0.12	0.13	0.14*
FEV3	-0.41**	0.15*	-0.13	0.20**
PEFR	-0.20*	0.13	0.12	0.24**

***p<0.05, **p<0.01**

DISCUSSION

In the present study, all the PFT tests were higher among males compared with females. A study conducted in Delhi showed that impairment of Lung Functions in 62% of the Landfill workers employed in disposal of solid waste compared to 27% of the control subjects [8]. Various other authors have found similar decrease in Lung Functions in other Occupationally exposed workers who were exposed to dusts and Bio-aerosols etc.[9,10] . However a study in Calabar, Nigeria did not found a statistically significant decrease in FVC, FEV1, and PEFR in Street cleaners as compared to Control subjects[11].

Further, the correlation analysis showed that there was poor correlation observed between anthropometric and all the PFT tests. Krishna et al[12] found positive correlation of FVC and $FEV_{1,}$ with age, height and BMI. There were differences in values obtained in our study and those previously conducted on Indian children, which could be attributed to other factors like, differences in body build, socioeconomic status, pollution, gender, ethnicity, etc.

CONCLUSION

The study concludes that there is urgent need to improve the hygienic facilities around the slums to improve the health of slum persons.

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