Original Research Article

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Comparison of forced expiratory volume among the smokers and non-smokers in brick kiln workers

Seema P.1*, Damayanthi M. N.2

¹Department of Community Medicine, ESI Medical College & Hospital, Rajajinagar, Bangalore – 10, Karnataka, India ²Department of Community Medicine, Rajarajeswari Medical College & Hospital, Bangalore -74 Karnataka, India

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*Correspondence:

Dr. Seema P.,

E-mail: seema_97in@yahoo.co.in

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ABSTRACT

Background: Smoking is a common habit prevalent both in urban and rural areas. It has an impact on the impairment of Lung function. Pulmonary function test is a routine procedure for the assessment and monitoring of the Respiratory diseases. This study was undertaken to see the effect of smoking on lung function. The objectives were to compare the effect of smoking on pulmonary function test (FEV1) among the smokers and non-smokers men working in brick kiln factory.

Methods: The study was carried out in three brick factories which comes under the purview urban health training center, Agara Rajarajeswari medical college, Bangalore .It is a cross sectional study conducted for two months. Study participants include all adult men aged above 19 years working in the brick factory. The sample technique & size were 100 subjects with purposive sampling. Data Collection: Using Pre-designed questionnaire, information on Socio-demographic profile, history of Smoking, anthropometric measurements height, weight, FEV1 recording using Wrights Peak Flow Meter. Data analysis used was SPSS v19.

Results: Mean FEV1 among the smokers was 2.13 ± 1.00 and 2.40 ± 0.51 among the non-smokers; FEV1 was ranging between 150-300 liters in 88.9% of those who had smoked for more than 10yrs of duration, FEV1 value among the smokers was reduced compared to non –smokers, which was statistically significant (p<0.05.). Significant association was found with duration of smoking and the reduction of FEV1 values.

Conclusions: Smoking causes reduction of FEV1 values, which was significant among the smokers than the Non-smokers.

Keywords: Brick kiln workers, FEV1, Pulmonary function test, Smokers

INTRODUCTION

Cigarette smoking is the leading cause of pre-mature morbidity and mortality. It is estimated that nearly 5 million people will be killed annually world wide because of smoking and by early 2030 tobacco related deaths would increase to about 10 millions a year. Smoking is a common habit both in the rural and urban areas. Studies have identified that smoking may act with physical and

chemical agents found in the work place that may not be mutually exclusive.²

Many occupational lung diseases is associated with exposure to dusts and fumes, brick factory is one among them. It has an impact on their pulmonary impairment at an earlier stage. Pulmonary function test are performed for the assessment of lung function. It plays a significant role for diagnosis and prognosis of these diseases.

Limited studies have been reported among the brick workers. Hence an effort has been made to study the effect of smoking on their lung function (FEV₁) among the brick workers.

Objectives of the study

- To compare the effect of smoking on pulmonary function test (FEV₁) among the smokers and nonsmokers men working in brick kiln factory.
- To study the correlation of FEV₁ with physical parameters among the study participants.

METHODS

The study was carried out in three brick factories which comes under the purview of Department of Community Medicine, Rajarajeswari Medical College and Hospital, Bangalore. Ethical clearance was obtained from the Institutional Ethical Committee. Prior permission was obtained from the factory owners.

A cross sectional study was carried out for duration of two months. The participants were the adult male who were 19 years and above. They were interviewed with pre-designed questionnaire which included the study variables like socio- demographic profile, history of smoking, duration of smoking measurement of height, weight using the standard procedure. Wright's Peak Flow meter was used to measure Forced Expiratory Volume by one second (FEV1) to assess their lung function .The participants were made to perform the maneuver three times after adequate rest and the best of the three reading was considered. Equipment's used were peak flow meter, adult weighing machine, measuring tape and stethoscope.

Statistical analysis was done using SPSS v 19. Unpaired t test was applied. The level of significance was established at the value of p<0.05. Correlation was applied for the comparison of FEV1 with other variables.

Definitions used:

WHO classification (3) was used to classify smoking behavior of workers.

- Smokers: Someone who at the time of study, smokes any product of tobacco, daily or occasionally.
- Non- smokers: Someone who at the time of study does not smoke at all.
- Ex -smokers: Someone who was formerly a smoker but currently does not smoke at all.

FEV1 (Forced expiratory volume in first second): It is the fraction of Forced Vital Capacity expired during the first second of the forced expiration. Normally at least 80-83% of the forced vital capacity can be expired in first second.

Peak expiratory flow rate (PEFR): The person was asked to take deep breath and exhale as forcefully as possible in to the mouthpiece in a single blow.

Inclusion criteria

Adult male above 19 years of age and with history of smoking for more than a year and willing to participate in the study.

Exclusion criteria

- Female subjects
- Patients who are suffering from Bronchial Asthma

RESULTS

Among 100 study participants, 62% of them were smokers and 38% were non- smokers (Figure 1).

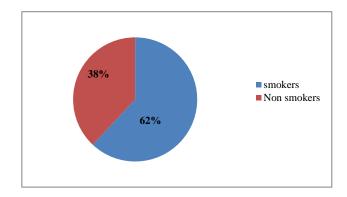


Figure 1: Distribution of smokers and non-smokers.

Majority of the smokers were in the age group of 20-40 years (69%) while the non–smokers were in age group of 40-50 years (62.5%) (Figure 2).

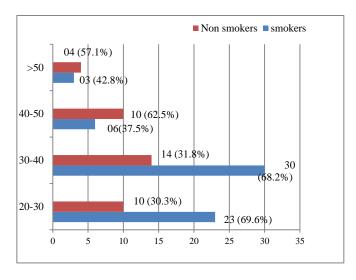


Figure 2: Age wise distribution of the study participants.

Table 1 shows the mean age in years, mean height in centimeters, mean weight in kilograms and mean Body Mass Index of the study participants.

Table 1: Mean anthropometric measurements.

Variables	Smokers Mean±2 SD		Non-smokers Mean±2SD	
Age (years)	23.15	10.0	26.9	9.54
Height (meters)	1.56	0.11	1.67	0.10
Weight (Kgs)	65.4	8.8	64.4	11.5
BMI	23.52	3.20	23.10	3.27

Among the smokers, most had the habit of smoking Bidi (61.3%), cigarette (12.9%) both bidi and cigarette was 25.8%.

The mean values of FEV1 and PEFR significantly reduced among the smokers than the non-smokers. The association was statistically significant by applying unpaired t test (Table 2).

Table 2: Comparison of mean FEV1 among smokers and non –smokers.

Mean	Smokers	Non smokers	Unpaired t test	p value
FEV ₁ (L)	2.13±1.00	2.40±0.56	8.4	< 0.001
PEFR (L/S)	5.25±1.50	8.15±2.2	4.3	< 0.001

Among the smokers who smoked for less than 10 years, their FEV_1 were ranging between 300-500 (73.1%) while those who smoked for more than 10 years duration had their FEV_1 ranging between 150- 300liters (88.9%). The observation was found to be statistically significant at p< 0.001 (Table 3).

Table 3: Duration of smoking in years and FEV1 (n=62).

Duration	FEV ₁ (liters)		
in years	150-300 (%)	300-500 (%)	Total
<10	07 (26.9)	19 (73.1)	26 (42)
>10	32 (88.9)	04 (11.1)	36 (58)
Total	39 (62.9)	23 (37.1)	62

df=1; x^2 =24.8; p<0.001.

There is correlation between weight, age and BMI to FEV_1 among smokers and non-smokers which was statistically at p<0.0001 (Table 4).

Table 4: Paired sample correlation among the study participants.

Variables	N	Correlation	Significant
Age & FEV1	100	0.361	0.0001
Weight & FEV ₁	100	0.355	0.0001
BMI & FEV ₁	100	0.186	0.063

DISCUSSION

Exposure to bricks burning in brick factory as well as smoking is known to cause respiratory morbidities. In this study, the effect of smoking on FEV₁ among the brick factory workers was conducted.

In the present study 62% of the workers were smokers. Among the smokers most of them had the habit of smoking bidi (61.3%), cigarette (12.9%) both bidi and cigarette was 25.8%. Ahmad N reports in his study that most of the workers were bidi smokers.¹

It was observed in our study that FEV₁ and PEFR was significantly reduced among the smokers than the non – smokers which was statistically significant. Ajay KT and Bano RR et al supports our study.^{4,5}

More the duration of exposure to smoking higher the risk of lung impairment. Our study have shown that FEV₁ values were less among the smokers who smoked for more than 10 years duration Saoji A et al.⁶ In recent time Kumar A et al conducted study among smokers and nonsmokers and concluded that the actual values of FVC, FEV₁, ratio of FEV₁/ FVC, FEF 25-75% and PEFR are decreased in smokers compared to non-smokers and all the values are more decreased with increase in duration of smoking and increase in number of cigarettes smoked per day.⁷

It was observed from our study that Correlation was observed between FEV1 and parameters like weight, age and BMI among smokers and non- smokers but Nighute S has quoted in her study that there was no significant differences in the mean physical parameters like age, height, weight and BMI.⁸

CONCLUSION

To conclude, Smoking in any form has an effect on FEV₁. Pulmonary functions was impaired among the smokers than the non – smokers. Further studies on large sample size may be carried out for effective results that help in generalizing to whole population.

Health education regarding cessation of smoking to be emphasised to protect our people for good quality of life.

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Institutional Ethics Committee

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