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"A COMPARATIVE STUDY OF PULMONARY FUNCTION VARIABLES IN YOUNG SMOKERS IN KANCHIPURAM POPULATION".

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ABSTRACT In India smoking is a common habit prevalent in both urban and rural areas irrespective of mode of smoking i.e. cigarettes, bidis, pipes, cigar, hookah etc. The cigarette / bidi smoke is a heterogeneous aerosol produced by the incomplete combustion of the tobacco leaf.Cigarette smoking has extensive effects on respiratory function and is clearly implicated in the etiology of a number of respiratory diseases.The pulmonary functions were done on a computerized spirometer in 300 subjects comprising of 200 non smokers and 100 smokers. All the pulmonary function parameters were significantly reduced in smokers.

KEYWORDS : Smokers, Cigarette, Bidi, Respiratory diseases and Pulmonary function

INTRODUCTION:

Smoking is the most common method of consuming tobacco, and tobacco is the most common substance smoked. The active substances in tobacco, especially cigarettes, are administered by burning the leaves and inhaling the vaporized gas that results. This quickly and effectively delivers substances into the bloodstream by absorption through the alveoli in the lungs. The lungs contain some 300 million alveoli, which amounts to a surface area of over 70 m2 (about the size of a tennis court).

Nicotine is the addictive drug in tobacco smoke that causes smokers to continue to smoke. Addicted smokers need enough nicotine over a day to 'feel normal' – to satisfy cravings or control their mood. Tobacco use leads most commonly to diseases affecting the heart and lungs, with smoking being a major risk factor for heart attacks, strokes, chronic obstructive pulmonary disease (COPD), emphysema, and cancer (particularly lung cancer, cancers of the larynx and mouth, esophageal cancer and pancreatic cancer).

The World Health Organization estimates that tobacco caused 5.4 million deaths in 2004 and 100 million deaths over the course of the 20th century. Cigarette smoking is the leading preventable cause of mortality. By the early 2030, tobacco related death would increase to about 10 million a year.

Nirmal Chand Kajal et al.,2017 in their study mentioned that the irritants present in the smoke cause release of elastase from alveolar macrophages that degrades structural elements of the lung which leads to loss of elastic recoil causing decrease in FVC%, FEV1%, PEFR. Pulmonary function testing is a routine procedure for the assessment and monitoring of respiratory diseases. Tests are also useful because they are less expensive, non-invasive, reproducible, and cause minimum discomfort for the subjects.

OBJECTIVE OF THIS STUDY:

To compare the pulmonary function variables between asymptomatic smokers and non smokers of age group [25-35 years]

STUDY DESIGN: This is a case control study.

Inclusion Criteria:

1. Non-smoker: According to definition non-smoker is a person who does not smoke tobacco.
2. Smoker: They are persons who are engaged in the inhalation and exhalation of fumes of burning tobacco from cigarette, bidis, hookah etc. Every smoker must have been smoking at least five cigarettes a day.
3. Normal males and females in the age group between25-35 years.

Exclusion Criteria:

1. Previous h/o chronic illness like Tuberculosis, Asthma and other lung abnormalities.
2. Age below 25 and above 35 yrs.
3. The person with occupational history of working in textile mills and cement factory, Coalmines or other places where lungs are affected by dust or fumes.

MATERIALS AND METHODOLOGY:

The study participants were selected randomly from MMCH & RI. The purpose of study was explained to all the participants and a detailed clinical history was taken with special reference to smoking, habits, drug addiction occupation. Height (in cm) of the subjects was measured in standing and erect posture. Weight (in Kg) was recorded using standard weighing machine both for subjects and control group in standing posture. Pulmonary function tests were performed in sitting position using a portable RMS Helios spirometer, according to the criteria of the American Thoracic Society (2005) for 200 non smokers and 100 smokers.

First the procedure for the PFT maneuvers was explained to the subject, as proper understanding and co-operation was essential to obtain optimum values. The subject was instructed to take a maximal inspiration, the mouth piece was placed firmly in the mouth and the subject was asked to breathe out maximally and rapidly till he/she was unable to expire anymore and immediately followed by deep inspiration, through the mouthpiece firmly in the mouth. Each maneuver was performed for three times. The highest reading was accepted. All the recordings were obtained with the subjects in the sitting position. The following spirometeric parameters were recorded for analysis.

Forced vital capacity (FVC)
(FEV1) Forced expiratory volume in 1st second
FEV1/FVC and
FEF 25-75

The results obtained from each group were compared, correlated and statistically analyzed.

DATA ANALYSIS: Statistical differences for Pulmonary function tests between mean values of smokers and non smokers were statistically analyzed using the Student's t-test. The data were analyzed using the Statistical Package for Social Sciences (SPSS) version 21. P value <0.05 was considered as statistical significant.

RESULT: The anthropometric measurements and the pulmonary function test parameters of 200 non smokers and 100 smokers are shown in table and graph given below. There was a significant decrease in the all the pulmonary variables in smokers when compared to non smokers.

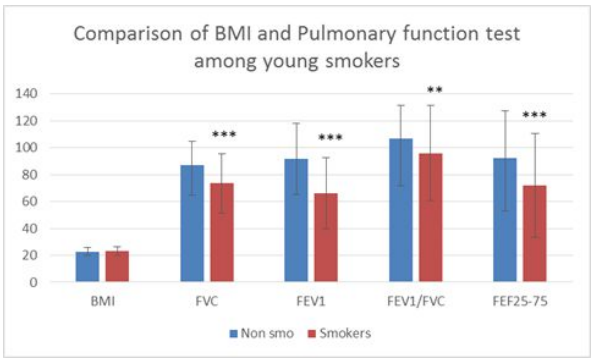
Table: Comparison of pulmonary functions & BMI among young Smokers.

Group Statistics						
	Group	No	Mean	Std. Deviation	Std. Error	Significance
BMI kg/m2	Non smokers	200	22.847	3.3025	.2335	P=0.376
	Smokers	100	23.186	3.0208	.3021	
FVC %	Non smokers	200	87.060	17.8963	1.2655	***P=0.000
	Smokers	100	73.530	22.0960	2.2096	
FEV1 %	Non smokers	200	91.575	26.4376	1.8694	***P=0.000
	Smokers	100	66.260	26.5336	2.6534	
FEV1FCV %	Non smokers	200	107.055	24.3001	1.7183	**P=0.002
	Smokers	100	96.020	35.3176	3.5318	
FEF2575 %	Non smokers	200	92.010	35.5484	2.5137	***P=0.000
	Smokers	100	71.930	38.8208	3.8821	

BMI: Body mass index, FVC: Forced vital capacity, FEV1: Forced expiratory volume in one second; FEF 25-75: forced expiratory flow rate, BMI =Wt in Kg / Ht in m2

P Value : * < 0.05 ,** <0.01 ,*** <0.001 . *Significance has been calculated by unpaired t test.

Graph: Comparison of pulmonary functions & BMI among young smokers



Non smo:Non smokers,BMI: Body mass index, FVC: Forced vital capacity, FEV1: Forced expiratory volume in one second; FEF 25-75: forced expiratory flow rate, BMI =Wt in Kg / Ht in m2

P Value: * <0.05 ,** <0.01 ,*** <0.001 .*Significance has been calculated by unpaired t test.

BMI: The mean BMI value and standard deviation of non smokers and smokers were 22.84 ± 3.3 Kg/m2 and 23.19 ± 3.02 Kg/m2 respectively. There was no significant difference(P=0.376) between BMI ofnon smokers and smokers

FVC: The mean FVC value and standard deviation of non smokers and smokers were 87.06 ± 17.89 % and 73.53 ± 22.09 % respectively. There was a significant difference(P=0.000) between FVC ofnon smokers and smokers

FEV1: The mean FEV1 value and standard deviation of exposed non smokers and smokers were 91.57 ± 26.43 % and 66.26 ± 26.53% respectively. There was a significant difference (P=0.000) between FEV1 of non smokers exposed and smokers.

FEV1/FVC ratio: The mean FEV1/ FVC value and standard deviation of non smokers and smokers were 107.05 ± 24.30 % and 96.02 ± 35.32 % respectively. There was a significant difference (P=0.002) in the FEV1/ FVC of non smokersandsmokers.

FEF 25–75: The mean FEF25-75 value and standard deviation of non smokers and smokers were 92.01 ± 35.54 % and 71.93 ± 38.82 % respectively. There was a significant difference (P=0.000) in the FEF25-75 of non smokers and smokers

DISCUSSION:

In our study, all the pulmonary function parameters (FVC, FEV1, FEV1/FVC and FEF2575%) showed a significant association between the smokers and the nonsmokers (p<0.001).Most cigarette smokers usually smoked non-filter cigarettes since they are cheap and easily available in rural areas. Also, most of our subjects who were smokers belonged to rural background and were of low socio-economic status. Though female subjects were included in our study they were of less in proportion when compared to males.

The most damaging components of tobacco smoke are Tar, Carbon monoxide, Hydrogen cyanide etc., The effects of tobacco smoke on the respiratory system include irritation of the trachea (windpipe) and larynx (voice box), reduced lung function and breathlessness due to swelling and narrowing of the lung airways and excess mucus in the lung passages ,impairment of the lung's clearance system, leading to the build-up of poisonous substances, which results in lung irritation and damage, increased risk of lung infection and symptoms such as coughing and wheezing, permanent damage to the air sacs of the lungs.

Our findings is also in accordance with the observation made by KhurramShahzad et al 2006 that smokers are at an increased risk of developing asthma as odds ratio was 2.22.

RubeenaBano et al 2009 also proved that the association between smoking and impaired PFT was statistically highly significant and also mentioned that the smokers had 17.3 times more risk of having impaired pulmonary functions as compared to non-smokers. This was also similar to the observations on the impairment of the lung function in smokers, as was reported by Dhand et al.; Gosaviet al., and Pandya et al.,

CONCLUSION

Our study reveals that the smokers showed a decline in pulmonary function compared to non smokers because smoking acts as an additional risk factors in the development of respiratory illness. It could be probably because smoking induces both airway disease and parenchymal disease by increasing neutrophilic infiltration, mucosal glandular hypertrophy and alveolar wall destruction.Our study also assumes importance in bringing out the early markers of an obstructive disease which will help the smokers to quit their smoking habit inorder to prevent further complications.

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