

## **Effect of smoking on peak expiratory flow rate in Tikrit University**

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### **Abstract**

This is a cross sectional study designed to evaluate the effect of smoking on pulmonary function test using Peak Expiratory Flow Rate measurement. It was conducted in Tikrit University during the period from the 1st of November to the 30 of December 2010 on 103 healthy smokers and nonsmokers, both students and university employees whose age range was (23-60) years. Peak Expiratory Flow Rate was measured , the results were expressed as Mean and Standard Deviation. The results showed that 70 subjects(68%) of the total are smokers smoking. The number and percentage of passive smokers was 21 subjects (64%) of those who does not smoke. Those who smoke <10 cigarettes per day was 16 subjects (23%), 20 cigarettes per day was 30 subjects(43%), those who smoke>20 cigarettes per day were 24 subjects(34%) of the total. There was a statistically significant difference in the Mean and Slandered Deviation in Peak Expiratory Flow Rate between smokers and non smokers, also the same difference was found between those who are exposed to passive smoking and those who are not exposed from those who were non smokers

### **Introduction**

Cigarette smoking is probably one of the most addictive and dependence-producing self-gratifications known to man (1).

Cigarettes is the leading known risk factor for the development of chronic obstructive

pulmonary disease and 50% of smokers develop clinically significant airflow obstruction (2). A defensive lung reflex resulting in narrowing of the airways and a consequent rise in airway resistance has been reported.(3)The lung functions of cigarette smokers showed

accelerated decline when compared with the non-smokers (4). Cigarette smokers have a number of structural abnormalities including mucus plugs, accumulation of pigment laden macrophages, goblet and squamous cells metaplasia, ulceration, inflammatory cell infiltrate, smooth muscle hypertrophy, fibrosis and excessive pigments. Studies using a combination of tests have shown that, depending on smoking history, 70% of smokers have an abnormality in one or more test (5,6). Smoking causes airway obstruction, chronic expectoration and decline in lung functions. All these effects are directly proportional to number of pack years and there is a definite tendency to narrowing of both the larger and smaller airway (7,8 9,10). It has also been suggested that passive smoking is a contributing factor to the development and persistence of airflow limitation in wheezing children.(11) Earlier detection of airflow obstruction and smoking cessation may result in significant health gain. If a cigarette smoker stops smoking, peak expiratory flow rate (PEFR) improves with the passage of time.(12,13,14) Peak expiratory flow rate measure the maximal airflow rate achieved while

forcefully expelling air from the lungs, following maximal inspiration; expressed in liters/ min. Tests of PEFR reflect changes in airways caliber (15). Wright peak flow Meter is inexpensive & portable & can be used efficiently without much specialized training. With Wright peak flow meter PEFR is perhaps the fastest & easiest single breath pulmonary function test available (16,17). This study was designed to evaluate the effect of smoking cigarettes on PEFR in the students and employees of Tikrit University.

### **Subjects and Methods**

This is across sectional study conducted in Tikrit University campus in the period between 1st of November to 30 of December. One hundred and three students and faculty members were included whose age range was (23-60) years. Subjects with history of asthma or chronic obstructive airway disease and those who take does not take any drug which alter the results of pulmonary function tests were excluded

from the study. The smoking history was recorded including the number of cigarettes smoked per day, those who smoked < 10, < 20, and > 20 cigarettes per day were included. The state of passive smoking was also included. Peak Expiratory Flow Rate was measured using mini Wright Peak Expiratory Flow Meter. The subjects were asked to take deep breath and then blow out as hard as possible, in a short sharp blasts through the mouth piece of peak Flow Meter., Student tests was used to compare the Mean and Standard Deviation (SD) of the PEFR of the studied subjects. The level of 0.05 was considered significant.

## **Results**

This is a cross sectional observational study conducted at the Tikrit University campus on 103 subjects from the students and the employees randomly selected.. Table 1 summaries the frequency and percentage of the studied subjects. The total number were 103 subjects, 70 (68%) of them was smokers, while 33 (32%) were non smokers. Regarding passive smoking 21(64%) of those who does not smoke were exposed to passive smoking, while 12(36%) not exposed.

Table 2 illustrate the number and percentage of subjects in reference to the number of cigarettes smoked. It shows that 16 (23%) smoke < 10 cigarettes per day, those who smoke < 20 cigarette per day were 30 (43%), while those who smoke > 20 cigarettes per day was 24 (34%) of total. Table 3 illustrate the mean and standard deviation (SD) of PEFR of smokers and non smokers, also the mean and SD of those who exposed and non exposed to passive smoking from those who does not smoke, it showed that there was a highly statistically significant difference in PEFR between those who were smokers and those who were non smokers. Also there was a statistically significant differences in PEFR between those who were exposed to passive smoking and those who were not exposed from those who were non smokers.

## **Discussion**

It is an established fact that inhalation of tobacco smoke either

actively or passively is highly injurious to health. Tobacco has remained as one of the most important predisposing factors responsible for so many respiratory and cardiovascular diseases. Chronic obstructive Pulmonary Diseases (COPD) has been recognized as one of the most important causes of morbidity and mortality in chronic tobacco smokers all over the world (18).

In the present cross sectional comparative study ,103 subjects were randomly selected to study the effect of smoking habits on pulmonary function by using PEFr measurement.. The percentage of subjects who smokes is rather high, (68%) of the total sample, other studies in other countries showed lower prevalence rates. The median prevalence of current adult smoking in USA between university students was 23.5 percent with state-specific prevalence ranging from 15.9 percent in Utah to 31.5 percent in Kentucky.(19) In a study performed in malta to find out the prevalence of smoking, it was found that as a total study population 35 % of the males and 21% of the females ( $p = 0.0013$ ) were regular smokers (20). The result of our study is higher than the other studies. The adverse political, social and

economical situations that has affected our country during the last two decades may forced more people to smoke to attain mental quietness and relaxation, also to alleviate anxiety and depression. Those who were exposed to passive smoking comprises 64% of those who does not smoke. This result is in agreement of a study performed in USA (21).. The result of this study is higher than the study done in Malta (22) , this may be due to the higher prevalence of smoking in our community as shown in the present study and the lack of knowledge about the health hazards of exposure to cigarettes smokes in the environment. Cigarette smoking is a major component of indoor and outdoor air pollution causing environmental tobacco smoke and secondary smoking in other people,(23,24,25 ). Exposure to environmental tobacco smoke or passive smoking leads to reduced lung function, increased risk of lower respiratory tract illness and acute exacerbation of asthma. (26,27,28) Regarding the effect of smoking on PEFr, the study showed a statistically significant differences

between smokers and nonsmokers, also between those who are exposed to passive smoking and those who are not exposed at 0.04 respectively.  $< 0.01$  and  $<$ the level of These results are in agreement with many other studies done to evaluate the possible effect of smoking on lung function tests. In a study performed in Allahabad in India to evaluate the effect of various factors influencing PEFR in healthy northern Indian subjects selected randomly. Smokers were found to have significantly lower value of PEFR in comparison to nonsmokers. (29) The effect of smoking on PEFR on Indian sportsmen, the results indicated that the smoker sportsmen, despite exhibiting some degree of lung function impairment in relation to non-smoker sportsmen, still maintained rather better lung function status than the smoker non-sportsmen.(30) Other studies done in Japan and Lahore in India also showed that the PEFR of smokers was less than non-smokers.(31,32). The effect of passive smoking on PEFR has been evaluated in several studies Some researchers showed that passive smoking depressed lung functions but others could not demonstrate similar

effect. (33,34) Smoking is responsible for more than 90% of chronic obstructive airway disease within one to two years of smoking regularly and many young smokers will develop inflammatory changes in their small airways . After twenty years pathophysiological changes in the lung develop and progress in proportional to intensity and duration of smoking(35). In conclusion , in this study there was a high prevalence rate of smoking among students and employees of tikrit university, the effect of smoking and passive smoking on PEFR was statistically significant. Further studies are needed to study the prevalence of smoking in different subsets of Iraqi communities with the utilization of sophisticated respiratory function tests.

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**Table1:** Subjects Characteristics

	No exposed to smoking		Exposed to smoking		Total
<b>Sample according to smoking</b>	33	32%	70	68%	103
<b>Passive Smoking of non smokers</b>	12	36%	21	64%	33

**Table 2:** Frequency & Percentage of Subjects according to the number of Cigarette smoked per day

Number of Cigarettes	Frequency	Percentage
<b>&lt;10</b>	<b>16</b>	<b>23%</b>
<b>&lt;20</b>	<b>30</b>	<b>43%</b>
<b>&gt;20</b>	<b>24</b>	<b>34%</b>
<b>Total</b>	<b>70</b>	<b>100%</b>

**Table 3:** The Mean & Standard Deviation of PEFR in the Studied Groups

<b>Variable</b>	<b>Not exposed to smoking</b>	<b>Exposed to smoking</b>	<b>P value</b>
<b>Total Sample according to smoking</b>	487± 129	364± 118	0.001*
<b>Passive Smoking</b>	420± 145	372± 127	0.042*

- **Statistical significance at  $p < 0.05$**