



Assessment of Smoking Effects On Respiratory System Using Peak Expiratory Flow Rate

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تقييم تأثيرات التدخين على الجهاز التنفسي باستعمال فحص ذروة معدل التدفق الزفيري

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ABSTRACT

Background: Cigarette smoking is a risk factor for many respiratory diseases. There are different instruments used to assess the effects of smoking. The purpose of our study was to assess the levels of peak expiratory flow rate (PEFR) between different types of smoking.

Methods: This is a cross-sectional study involved 190 subjects aged from 10-40 years, the sample was taken from multiple cafes in different areas in Hilla city, Iraq. The study involved smokers and passive smokers. The work was performed by taking information from each subject that included questions about age, sex, type of smoking, duration of smoking and symptoms. In addition to that the study included measurement of pulmonary function by using peak flow meter.

Results: Most of participants were passive smokers (60.53%). Regarding distribution of symptoms, the study showed that the highest percentage of them had no symptoms (67.4%) and only 1% of them had wheeze. The highest numbers of participants with low levels of PEFR were in the age group 20-29 years old and the differences were significant between groups (p value= 0.037), The study also revealed significant relation between increased duration of smoking and the decrease in the level of PEFR (p value=0.000)

Conclusion: The results showed considerable effect of smoking whether active or passive on the values of PEFR. In addition, there were increased respiratory symptoms among smokers.

Keywords: Peak expiratory flow rate; pulmonary function, passive smoking, cigarette smoking.



INTRODUCTION

The smoking represent the leading cause of morbidity and mortality across the world and according to the reports of UN Health Agency that mentioned that cigarette smoking cause death of 4.9 million people each year across the world [1]. In 2017,WHO reports that there were 2.7 billion people had no protection from diseases and death caused by active and passive smoking [2].Tobacco smoking is a major leading cause of death and essential public health challenge worldwide. Smoking is the main causative factor of diseases such as chronic obstructive pulmonary disease, heart attack, cancer. COPD is recognized as the leading cause of death in countries with varied economic developments all over the world [3-5]. Smokers usually had airways obstruction that is usually diagnosed late. The use of PEF test is very beneficial in those subjects, it can detect changes in airways caliber [4-6].The early detection of airways obstruction that followed by cessation of smoking can result in significant improvement in body health [5-7]. PEF can determine the degree of airways obstruction and monitoring the improvement in airways passages with time [7, 8] .The study aimed to assess the effect of smoking on the respiratory system using PEFR.

SUBJECTS AND METHOD

This is a cross-sectional study involved convenient sampling of a total 190 subjects aged from 10-40 years that were recruited from multiple cafes in different areas in Hilla city, Iraq. The inclusion criteria included participants who were healthy non-smokers and smokers who were in close contact with non-smokers. The study involved smokers and passive smokers. The participation of subjects were voluntary. The aim and procedure of the work were explained to the participants. The data were collected from each subject through a simple questionnaire that included questions about age, sex, type of smoking, duration of smoking and symptoms. the subjects of the study In addition to that the study included measurement of pulmonary function by using peak flow meter Medicate® (Fyne Dynamics Ltd). The measurement included the subject was in standing or sitting position and the mouth piece put in the mouth and firmly caught in it to prevent air leaks then the participant does maximal expiration and the process is repeated three times with 30 second interval between each measurement and other to avoid respiratory muscle fatigue and the highest one was taken.



Figure (1): The peak flow meter medicates (fyne dynamics ltd) [6].



STATISTICAL ANALYSIS

The data of this work were analyzed using SPSS Statistics version 22. T-test was used to compare between some categorical and continuous data. P values < 0.05 was taken to indicate to the level of statistical significance.

RESULTS AND DISCUSSION

Cigarette smoking is a risk factor form many diseases like chronic obstructive pulmonary disease (COPD), cardiovascular diseases and certain cancers especially lung cancer [5,7-10]. In Iraq, it is known that smoking represents alarming hazard on health especially in young age group. The present study focused on limited sample of individuals living in Hilla city in Iraq. It aimed to give a view about the prevalence of smokers and passive smokers, type of smoking, and the respiratory symptoms. In addition to evaluation of smoking effect on pulmonary function by using PEF meter. The study included 190 individuals, the prevalence was more in males (130) 68.9% vs 31.1% in females as illustrated in table (1). This difference in distribution between males and females may not be applied to all cities in Iraq especially the capital (Baghdad) due to difference in cultures and societies.

Table(1): demographic data

Sex distribution	NO. (%)
Male	131 (68.9)
Females	59 (31.1)
Total	190 (100)

The age group (20-29) represented the most predominant age group (82.1%) as revealed in table (2). Turčić *et al.*, showed a higher smoking prevalence among male (27.2%) compared to female subjects (12.6) among old population of Zagreb [7]. Moreover, this work revealed that the highest percentage of smokers found in the age group 20-29 years old and this represent the young age group in the society that refers to the age group that mostly present in cafes.

Table (2): Distribution of age groups

Age group	No. (%)
<20	15 (7.9)
20-29	156 (82.1)
30-40	19 (10)
Total	190 (100)

Figure (2) shows the patterns of smoking, most of participants were passive smokers (60.53%)

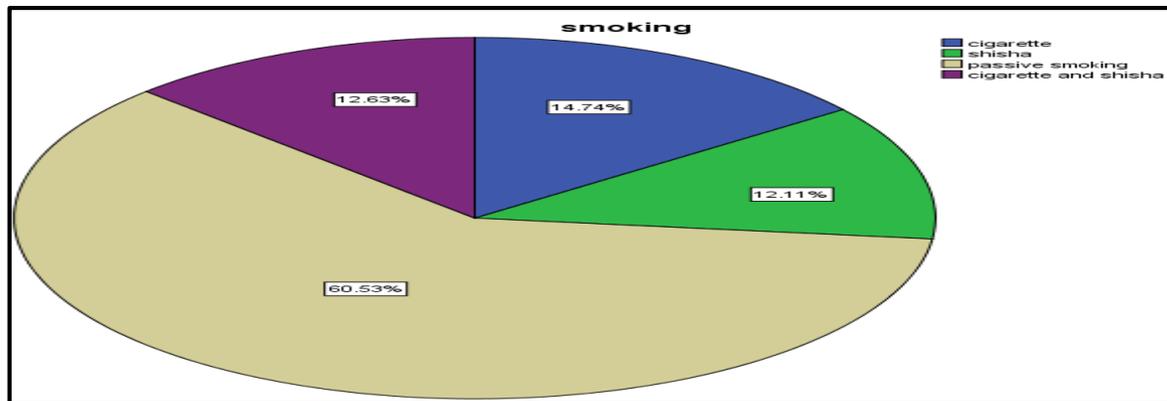


Figure (2): Types of smoking in the current study

Table (3) illustrate the symptoms distribution among participants , the highest percentage of them had no symptoms (67.4%) and only 1% of them had wheeze. The presence of symptoms without other cause than smoking reflects the adverse effects of smoking on respiratory system.

Table (3): Distribution of symptoms within participants

Type of symptom	No. (%)
No symptoms	128 (67.4)
Cough	13 (6.8)
Cough and sputum	19 (10)
Dyspnea	8 (4.2)
Wheeze	1 (0.5)
Other	2 (1.!)
Dyspnea and wheeze	10 (5.3)
Cough, sputum and dyspnea	9 (4.7)
Total	190 (100)

The study revealed that the severe decrease in the level of PEFR (less than 200) was found in males (6 participants), in females the level of PEFR between 200-299 represented the highest percentage (24 subjects) as illustrated in figure (3). The study also showed a reduction in the values of PEFR and there was negative significant relation between duration of smoking and the decline in values of PEFR ($P=0.000$) and this agreed with many studies like a study performed by Boskabadya *et al* 2011 which revealed that there were significant negative relationships between duration of smoking with all PFT values ($p<0.01$ to $p<0.001$) [11]. The explanation for this finding as follows: Airways inflammation, which is considered as a constant fact in smokers, could be a possible cause for the decrease in PEFR [12, 13]. This inflammation can lead to airways fibrosis, increased wall thickness, and lastly causes narrowing of airways and airflow limitation [14].

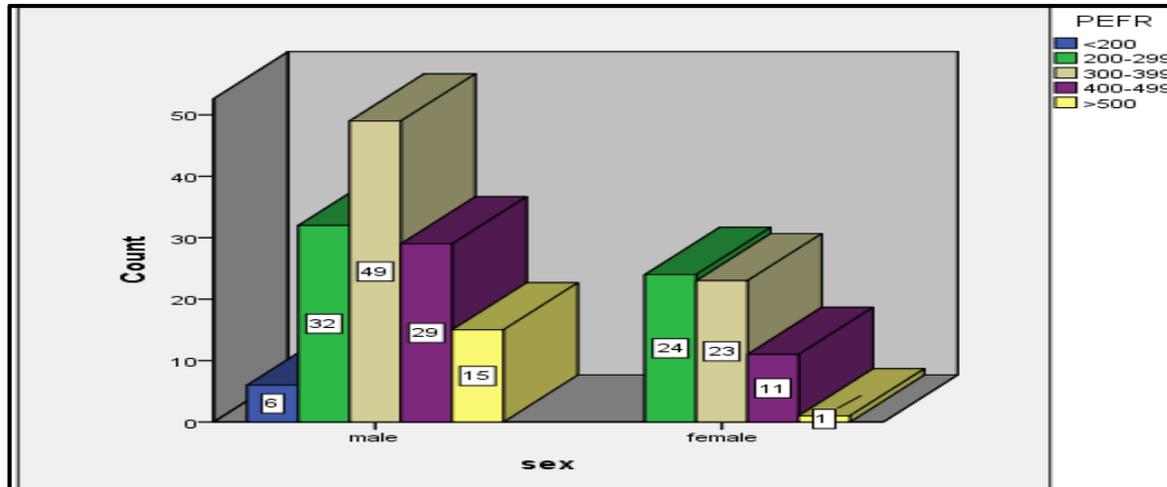


Figure (3): Relation between peak expiratory flow rate (PEFR) and sex group in the current study (p value= 0.007)

The highest numbers of participants with low levels of PEFR were in the age group 20-29 years old and the differences were significant between groups (p value= 0.037) as shown if figure (4)

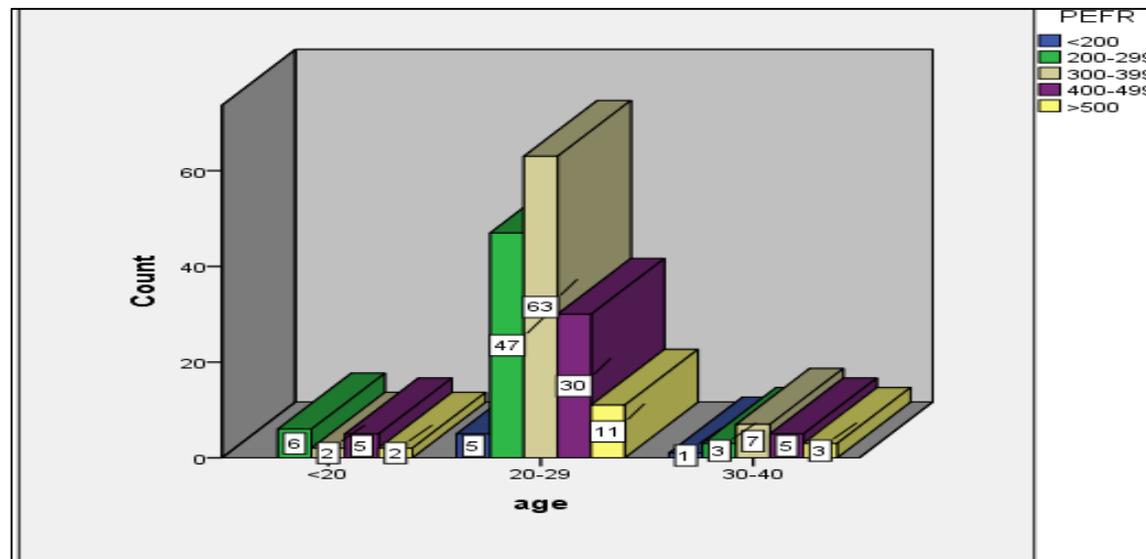


Figure (4): Relation between peak expiratory flow rate (PEFR) and age group in the current study (p value= 0.037)



The highest numbers of participants were passive smokers and the most decrease in the level of PEFR were found in those who smoke cigarette alone and cigarette and shisha together as shown in figure (5)

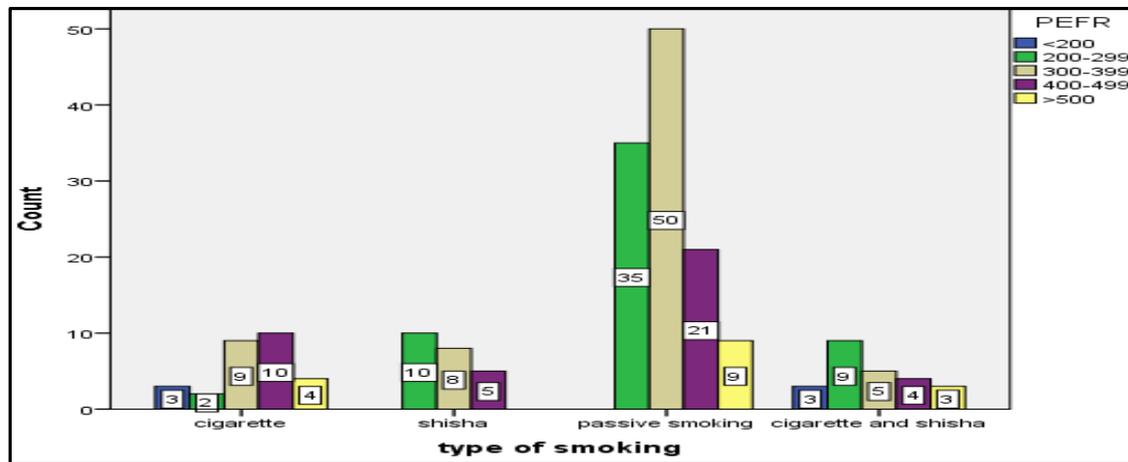


Figure (5): Types of smoking in the current study

Figure (6) shows the relation between symptoms and PEFR, most participants had no symptoms and the association was significant between distribution of symptoms and the level of PEFR (P value=0.000)

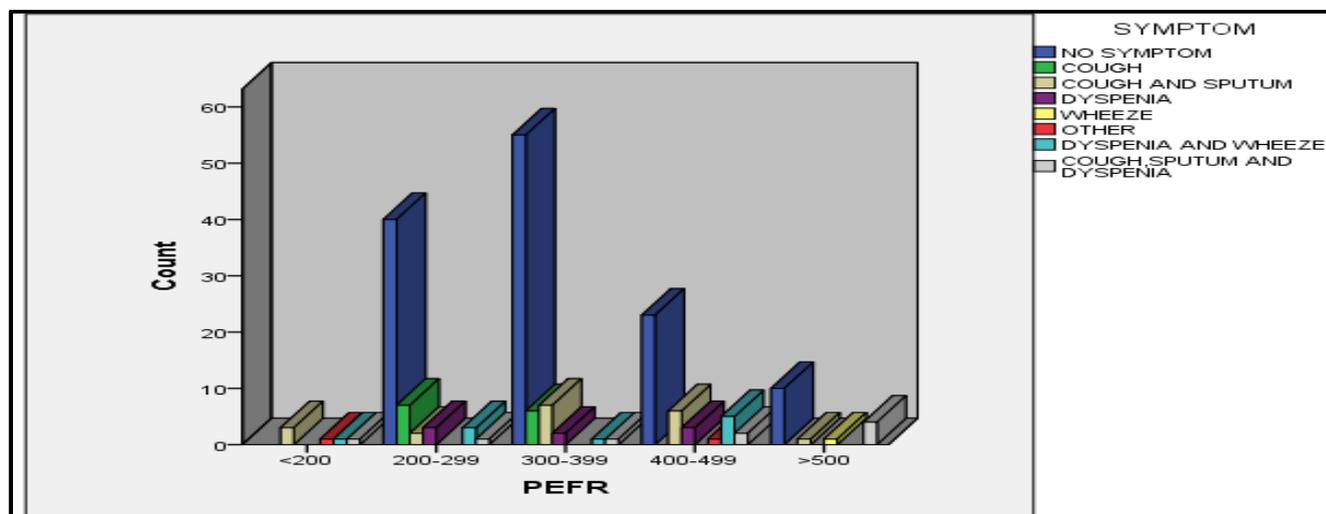


Figure (6): The relation between symptoms and PEFR in the current study (P value=0.000)

The study revealed significant relation between increased duration of smoking and the decrease in the level of PEFR (p value=0.000) as illustrated in figure (7)

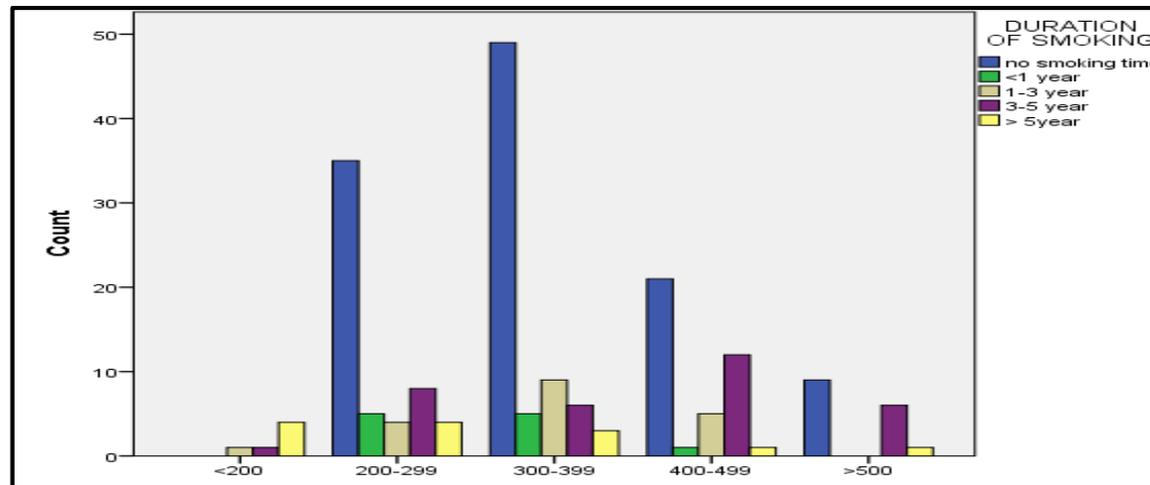


Figure (7): Relation between duration of smoking and PEFR in the current study (p value=0.000)

The highest numbers of passive smokers (108) had no symptoms and the relation was significant between types of smoking and symptoms (p=0.000)

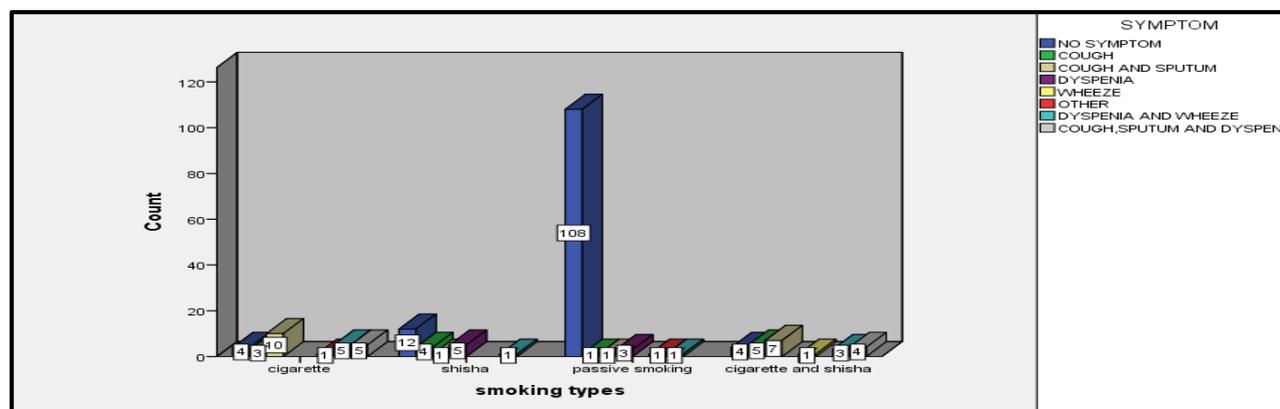


Figure (8): Relation between types of smoking and symptoms in the current study (p =0.000)

CONCLUSION

In spite of some limitations like small size of sample and confining the study populations to only some areas in center of Hilla city in Iraq, this work suggests that smoking can cause deleterious effects on pulmonary function as revealed by the decrease in PEFR. In addition, this study adds important information about the risk of smoking spread in the society and its effect on the body health. However, studies on large scale of population to involve all districts of the Hilla governorate to benefit from the results in order to enable making suitable policy decision.



Conflict of interests.

Non conflict of interest

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