# Spirometric Assessment In Undergraduate Medical Students

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## Abstract

**Background & objectives:** Examination of the respiratory system by pulmonary function tests has been evolved as clinical tool in diagnosis, management and following up of respiratory diseases because it provides objective information about the state of an individual's respiratory system. The present study aimed at evaluating pulmonary function among the smokers students of medical college of Babylon University and to compare their data with that of non-smokers students.

**Methods:** A total of 80 (45 smokers students and 35 healthy young subjects) were randomly sampled for the study from the medical college of the Babylon University. The study population (20-25 year age group) had similar socioeconomic background. Each subject filled up the questionnaire to record their personal demographic data, health status. Subjects with any history of pulmonary diseases were excluded from the study.

**Results:** The study showed significant differences between smoker and non-smoker groups regarding forced expiratory volume in one second (FEV1) and body mass index (BMI) ($P \leq 0.05$), few of students had changes in respiratory function (mild obstruction), there was also significant relation between FEV1 and pack year, the students were not heavy smokers, no female student was found to be smoker.

**Conclusions**: From the present study it can be concluded that the students in all groups have normal range of pulmonary function, most of the students smoke few number of cigarettes, and the smoking had considerable effect on lung function.

**Key words:** FEV1 , smokers, pulmonary function.

## الخلاصة

**المقدمة والاهداف:** فحص الجهاز التنفسي عن طريق اختبارات وظائف الرئة يمثل وسيلة مهمة في تشخيص, علاج وكذلك متابعة المصابين بالأمراض التنفسية لأنه يعطي معلومات مرئية للجهاز التنفسي لكل شخص يتم فحصه.

تهدف هذه الدراسة الى تقييم وظيفة الجهاز التنفسي بين الطلبة المدخنين داخل كلية الطب في جامعة بابل ومقارنتهم بالطلبة غير المدخنين.

**طريقة العمل:** تم اخذ 80 طالبا (45 طالب مدخن و35 طالب سليم البنيه وغير مدخن) من داخل كلية الطب في جامعة بابل. تراوحت اعمار الطلبة بين 20–25 سنة وكان لديهم نفس الاساس الاجتماعي والاقتصادي.

كل شخص مشارك بالدراسة قام بملء الاستمارة الخاصة بالدراسة والتي تضمنت معلومات شخصية ومعلومات تخص الحالة الصحية لكل فرد, الاشخاص الذين لديهم امراض تنفسية تم استبعادهم من الدراسة.

**النتائج:** بينت الدراسة وجود فروقات معنوية بين مجموعة الطلبة المدخنين ومجموعة الطلبة غير المدخنين فيما يخص فحص الحجم الزفيري الاجباري في الثانية الاولى وكذلك في مؤشر كتلة الجسم, كذلك كانت هناك مجموعة من الطلبة لديهم تغيرات في وظيفة الجهاز التنفسي (انسداد من النوع البسيط في القصبات الهوائية), وكان هناك فرق معنوي بين الحجم الزفيري الاجباري في الثانية الاولى وبين السنة الضامة, بشكل عام كانت نسبة التدخين لدى الطلبة ليست من النوع الشديد كما بينت الدراسة عدم وجود مدخنات بين الطالبات داخل الكلية.

**الكلمات المفتاحية:** الحجم الزفيري الاجباري في الثانية الاولى, المدخنون, وظيفة الرئة.

## Introduction

Spirometry is the measurement of air moving in and out of the lungs during various respiratory maneuvers (Bianca *et al.*,2010). It plays a pivotal role in the diagnosis and monitoring of patients with respiratory diseases (Zwarun,2006). It is most commonly used in screening procedure in the studies involving patients with heart and lungs disease (Prajapati *et al.,* 2008). Some of the important parameters like forced expiratory volume in one second (FEV1), forced vital capacity (FVC), FEV1 /FVC, peak expiratory flow rate (PEFR) are the key parameters generally used in the assessment and evaluation of respiratory disease (Nadeem, *et al.*,1999; Walter and Jeyaseelan, 1992).

Tobacco smoke is a mixture of more than 4000 compounds, it can cause various pathophysiological effects, it affect the respiratory system first, it causes changes in the central and peripheral airways, alveoli and capillaries, it affects all the parameters of pulmonary function tests (Vianna *et al.*,2008; Debrayet *et al.,* 2008). There are numerous harmful substances found in tobacco and tobacco smoke. Nicotine is one of these substances that may be acquired through active and passive smoking (Milaat and el-Ganai, 1998). This research has important values as the research on pulmonary function tests in Iraq is limited. There has been few studies on effect of smoke on pulmonary function of medical students. So this study aims at evaluating respiratory function in smokers medical students.

## Subjects and Methods

The study was performed at College of Medicine of Babylon University during the period from November 2014 to March 2015,it involved 80 students from the first to the sixth classes, (range of age from 18 to 25 years old). The students completed a questionnaire and underwent examination by spirometer. The interview took about 15 minutes for each examined subject.

The questionnaire included questions about the ages, gender, family and personal history of allergy, and residence whether at cities or rural areas, also if the student had respiratory symptoms, measurement of weight and height of students and body mass index BMI ($kg/m^2$) would be calculated as weight (in kilograms) divided by square of the height (in meters), in addition to assessment of smoking by calculating the pack years (numbers of cigarette per day for a year). Pulmonary function tests were performed by Mir spirobank 2 spirometer according to the recommended guidelines of the American Thoracic Society. The following needed parameters were taken in the study: Forced expiratory volume in one second (FEV1), forced vital capacity (FVC), and FEV1/FVC ratio.

## Statistical analysis:

Data were analyzed using SPSS version 18. The data of all the variables were expressed in terms of mean ± standard deviation. Means and standard deviations were worked out for continuous variables, t-test was used for comparison between both groups. Regression analysis was used to find correlation between some parameters. Statistical significance was indicated by p value $< 0.05$.

## Results

The study involved 80 students (45 smokers and 35 non-smokers), there was no significant difference in ages in both groups and all are males.

**1.Distribution of amount of cigarettes in smokers group:**

The study revealed that the students were not heavy smokers, few of them smoke 30 and 40 cigarettes per day (17% and 11% respectively) as shown in table (1)

**Table (1): Distribution of amount of cigarettes in smokers group**

| No. of cigarettes | No.(%) |
|---|---|
| 5 | 1 (2 %) |
| 7 | 2 (5 %) |
| 10 | 1 (2 %) |
| 12 | 1 (2 %) |
| 15 | 3 (7%) |
| 17 | 1 ( 2%) |
| 20 | 18 (41 %) |
| 25 | 5 (11 %) |
| 30 | 7 (17%) |
| 40 | 5 (11 %) |
| **Total** | **45 (100%)** |

**2- Comparison between both groups regarding FEV1 and BMI**

There was no significant differences between severity of obstruction as indicated by FEV1% predicted in smoker and non-smoker groups, but body mass index was significantly different in both groups as shown in table (2).

**Table (2) : Comparison between groups in some clinical parameters**

| Parameters | Mean ± SD (NO = 80) | | P-value |
|---|---|---|---|
| | Smokers group (NO=45) | Non-smokers group (NO=35) | |
| **FEV1%Pred.*** | 95.76±18.268 | 103.91±16.99 | 0.06 |
| **Body mass index (BMI)** | 25.06±6.9 | 27.72±5.2 | 0.04 |

**FEV1%Pred.*: forced expiratory volume in one second**

**3- Distribution of spirometric findings in both groups**

The highest percentage of students had normal lung function in smoker and non-smoker groups, mild obstruction was more predominant in smokers than it was in non-smokers group as illustrated in table (3).

**Table (3): Distribution of respiratory dysfunction in smoker group**

| Spirometric findings | Smokers group No. (%) | Non-smokers group No. (%) | Total |
|---|---|---|---|
| **Normal** | 37 (82%) | 33 (94%) | 70 |
| **Mild obstruction** | 8 (18%) | 2 (6%) | 10 |
| **Total** | 45 (100%) | 35 (100%) | 80 |

**4-Relation between pack years and severity of obstruction in smoker group**

There was significant negative correlation between pack years and FEV1% predicted as illustrated in figure (1).

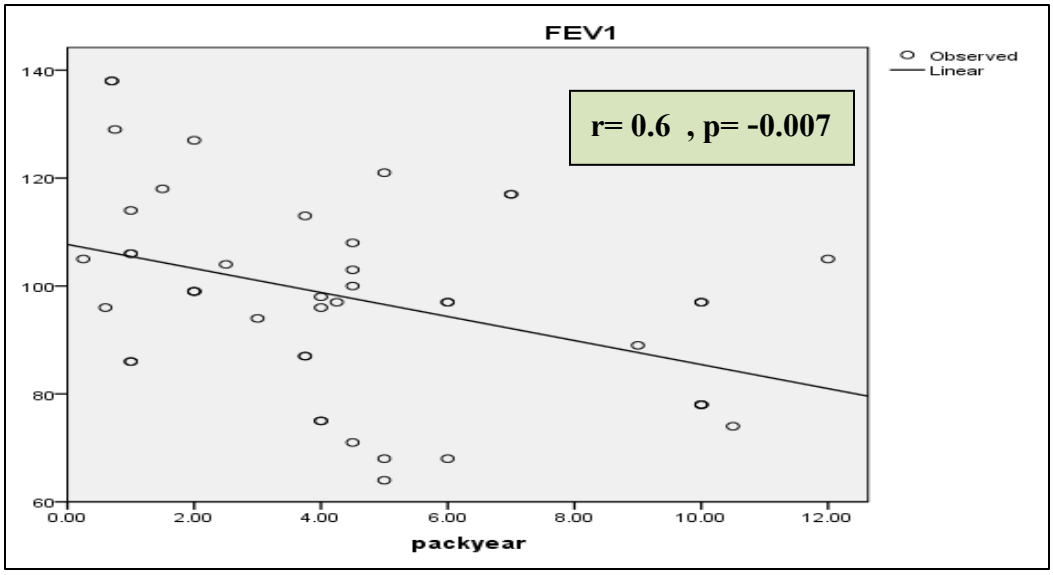


**Figure (1): Relation between pack year and forced expiratory volume in one second (FEV1)**

**5- correlation between body mass index and forced expiratory volume in first second (FEV1% predicted) in smokers group**

Figure (2) shows significant negative correlation between body mass index and forced expiratory volume in first second (FEV1% predicted) (p value=0.007)

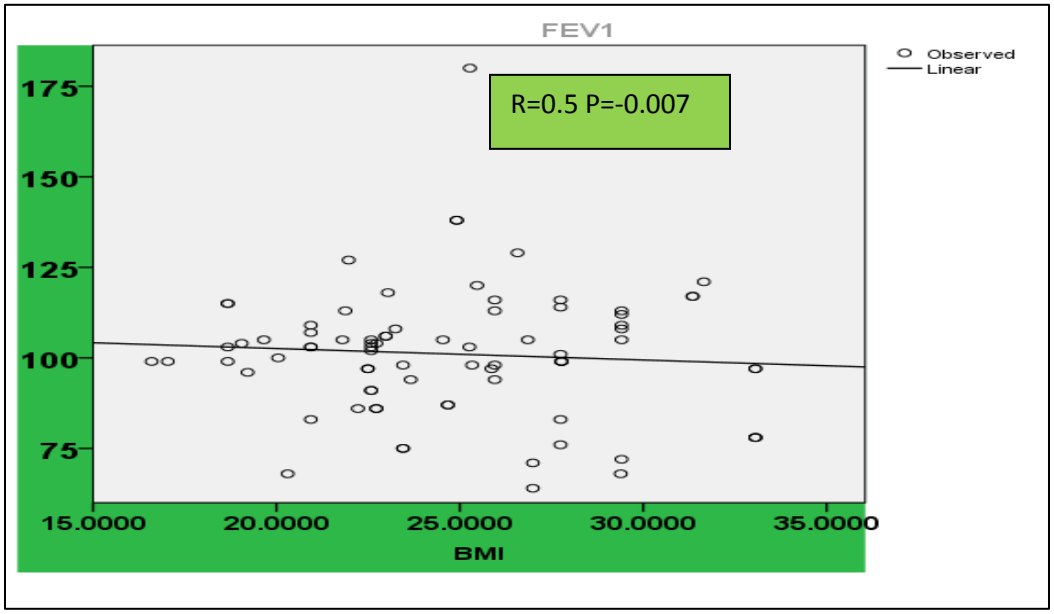


**Figure (2): correlation between body mass index (BMI) and forced expiratory volume in one second (FEV1) in smokers group**

## Discussion

The great mass of literature on the effects of smoking on health has left no doubt that smoking is a major preventable cause of morbidity and mortality (Shaikh *et al.*, 2012). According to the World Health Organization (WHO), smoking causes about 4 million deaths annually. This number is likely to increase if current smoking patterns persist (Khan *et al.*,2005). This study was performed at the college of medicine of Babylon University, there was few numbers of smokers relative to the high total numbers of students and the cause could be due to the knowledge of students about the harmful effects of smoking on health, there was no female student found to be smoker which may be due to social limits. This work showed that few students had airway obstruction because only few number of cigarette smoked. There was significant decrease in respiratory function with the amount of cigarette smoked and this was expected because smoking caused gradual obstructive changes in respiratory airways and the results were consistent with a study performed by Jawed *et al.*, 2012. In addition, the study showed significant difference between both groups regarding BMI which means that smoking caused decrease in weight which could be due to loss of appetite in smokers.

## Conclusions

From the present study it can be concluded that the most students in smokers group have normal range of pulmonary function although the value of spirometric parameters are lower in active tobacco smokers than they are in non-smokers students.

## Recommendation

There should be active control programme toward tobacco control which must aim to inform the students about the hazards of tobacco use and to provide restriction on the use of or purchase of tobacco must be started. This will be helpful to change policies towards tobacco use, in order to prevent tobacco induced morbidity and mortality.

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