MEAN PEAK EXPIRATORY FLOW RATE IN IRAQI YOUTH MALE POPULATION AGED 18 TO 38 YEARS OLD [+]

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Abstract:

The objective of this study was to Measure the Peak Expiratory Flow rate which has been suggested as an important tool used to test ventilator capacity in Iraqi youth population. In this research 101 young Iraqi students aged 18 to 38 years (mean ±S.D 20.20±0.99) were included to measure their peak expiratory flow values using peak flow meter. The mean values of peak expiratory flowrate achieved of three successive attempts and take the highest reading; standing height in centimeter (cm) was measured. Results show deviation from the European scale standard to measure PEFR, confirming that peak expiratory flow reading in Iraqi young population aged 18 to 38 is different from that in European scale. The data from this sample size is not representative of characteristics of the studied population, therefore, the findings of the present study should be considered preliminary and call for further studies with a large sample size based on random selection to confirm the peak expiratory flow readings of normal individuals to be used in the follow up on Asthmatic Iraqi patients. This study showed deviation from European scale in the enrolled individuals.

Keywords: peak expiratory flow rate (PEFR), peak flow meter.

قياس نسبة معدل التدفق الزفيري البالغ الذروه في مجتمع الشباب العراقي والذين تتراوح أعمارهم 18-38 سنه

يسر ماجد جميل

المستخلص:

أن الغرض من هذه الدراسه هو قياس نسبة التدفق الزفيرية البالغة الذروهوقد أقترحت كأداة لاختبار قدرة التهوية (التنفس) في مجتمع الشباب العراقي. في البحث تضمنت العينه المدروسه على مئة وواحد طالب شاب وشابه عراقيين ضمن المرحله العمريه ١٨-38 سنه(المتوسط الحسابي±الأنحراف المعياري ٢٠،٢٠±٠،٩٩)لقياس نسبة التدفق الزفيرية البالغة الذروه باستخدام جهاز peak flow meter. وسجل معدل ثلاث محاولات متعاقبة كقيمة نسبة التدفق الزفيرية البالغة الذروه وأخذت القراءة الاعلى كما أخذت أطوال

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الاشخاص بالسنتمتر. أظهرت النتائج تغاير عن المخطط الأوربي لقياس نسبة التدفق الزفيرية البالغة الذروه، مما يدعم أن قراءات قياس نسبة التدفق الزفيرية البالغة الذروه في مجتمع الشباب العراقي والذين تتراوح أعمارهم18-38 تختلف نتائجهم عن المخطط الاوربي. أن نتائج هذه الدراسة الحالية وبهذا الحجم الصغير من العينات لاتمثل خصائص حجم عينة كبيرة ويجب أن تؤخذ بنظر الاعتبار تمهيدا لدراسات أخرى مستندة على الاختيار العشوائي للتأكد من صحة قراءة قياس نسبة التدفق الزفيرية البالغة الذروه للأشخاص الأصحاء لأستقراء وجود الربو لدى المرضى العراقيين المصابين به. و أظهرت نتائج العينة المدروسه تغاير عن نتائج المخطط الأوربي في الاشخاص المشمولين بالدراسه.

Introduction:

Peak Expiratory Flow (PEF) (liters per minutes), also called peak expiratory flow rate (PEFR) is a maximal expiratoryflow that is applied clinically in asthma monitoring [1, 2, 3, 4]. Peak expiratory flow rate is one of the tests that detect pulmonary function supplying a quantifiable measurement of lung function [5]. And it is a beneficialcriterion for evaluating respiratory function in health and disease [6, 7].The maximal airflow occurs through the effort-dependent portion of the expiratory manoeuvre, so low values may be caused by a less than maximal effortrather than airway obstruction.However, the facility of measuring peak flow rate with an inexpensive small portable apparatus has made it common as a means of following the grade of airway obstruction in asthmatic patient and other pulmonary conditions [8, 9, 10, 11].PEF" is one of the lung function tests that can be used to measure the functionality of the lungs, examples of the device can be applied to measure PEF, includingpneumotachometers, spirometers, turbines and anemometers. The maximumconvenient and commonly applied devices in clinical practice are flow meters which exclusively calibrate PEF and hence, may be referred to as Peak flow meters [2, 6, 12]. A peak flow meter is a small, hand-held device that was utilized to monitor a human's ability to breathe out air. It measures the airflow via the bronchi and therefore the grade of obstruction in the airways [13, 14, 15]. It is a beneficial device for monitoring PEFR in children and adult, and has been applied to test ventilatory capacity in many epidemiological scanning, for estimating the severity of asthma and bronchial hyper-reactivity since about 40 years ago [16]. Moreover, it is applied for measuring the changes in pulmonary function following the treatment or environmental conditions [17, 18]. Readings of Peak flow are higher when patients are well and lower when the airways are constricted. Patients and doctors may determine lung functionality, severity of asthma symptoms, andtreatment optionsfromchanges in registered values of PEF readings [19, 20, 21].The respiratory illnesses that are increasing in rate all over the world specifically in developing countries such as Asthma and chronic obstructive pulmonary disease (COPD) [4, 22]. The impact of the disease in the United States reached to above than 4% in adult individuals and its prevalence is rising [23, 24,

25]. The Peak expiratory flow meters are inexpensive & convenient instruments that supply reproducible, objective measurement of lung function [19, 25].Sex, age, weight, height, environmental and ethnicity factors, could affect the lung function [26]. While the lung function test is applied as an aid in diagnosis, the signal is always the patient's outcomes compared with the expected outcome for individuals without illness however similar in the personal characteristics that limit lung function for example; sex, age, weight, height and ethnicity or race of a person [5]. Whereas the guidelines of current asthma recommend routine assessments of peak expiratory flow rate (PEFR) and administration of symptoms for asthmatic out patients[25, 27]. PEFR can be registered even by the patients or parents at home [28]. Depending on individual′s age, sex, weight and heightthere are obtainable Graphs or tables that couldpredicted the normal values. There is a broad natural diversity in the outcomes from test of healthful persons [29, 30]. In United Kingdom within 2004 they were switched from the original Wright scale to the newer, more accurate European scale.Restricted data on switching between the scales present [31] Mini wright. Dr. Basil Martin Wright was pioneeredinmeasurement of peak expiratory flow, which made first meter specially destined to gauge this index for functioning of lung.In the End of 1950s the original design of the device was introduced, and gradually progressed to device have lower price, and more portable(the Mini-Wright peak flow meter), through the world otherdesigns and copies have become obtainable [20].The preferable of the three readings is applied as a registered value for the rate of peak expiratory flow. It may be designed on graph paper charts together with a record of symptoms or applying peak flow charting software [2, 32, 33]. The present study was undertaken to determine the normal values of PEFR for healthy Iraqi young youth and compare with normal values of EU scale standardin the same age, gender, weight, height.

Figure (1): This peak flow meter uses the EU scale standard.

Material:

1. Sample of study: In this study one hundred and one young Iraqi students included to measure their PEF values using peak flow meter.
2. Peak flow meter: The device used was Peak Flow Meter PFM20, manufactured by Omron healthcare UK LTD., Opal Drive, Fox Milne, Milton Keynes MK 15 0DG, United Kingdom [33] (figure **-1-**).

3. Questionnaire sheet includes many demographic parameters were as:age, gender, weight, height, family history of asthma, having asthma or not, Asthma symptoms (shortness of breath and cough), smoker or not and finally PEF three readings. (Appendix-1). All the results are shown in table (1). Results were compared with the EU scale standard, to determine the validity of using this scale for follow up on Iraqi youth males and females.

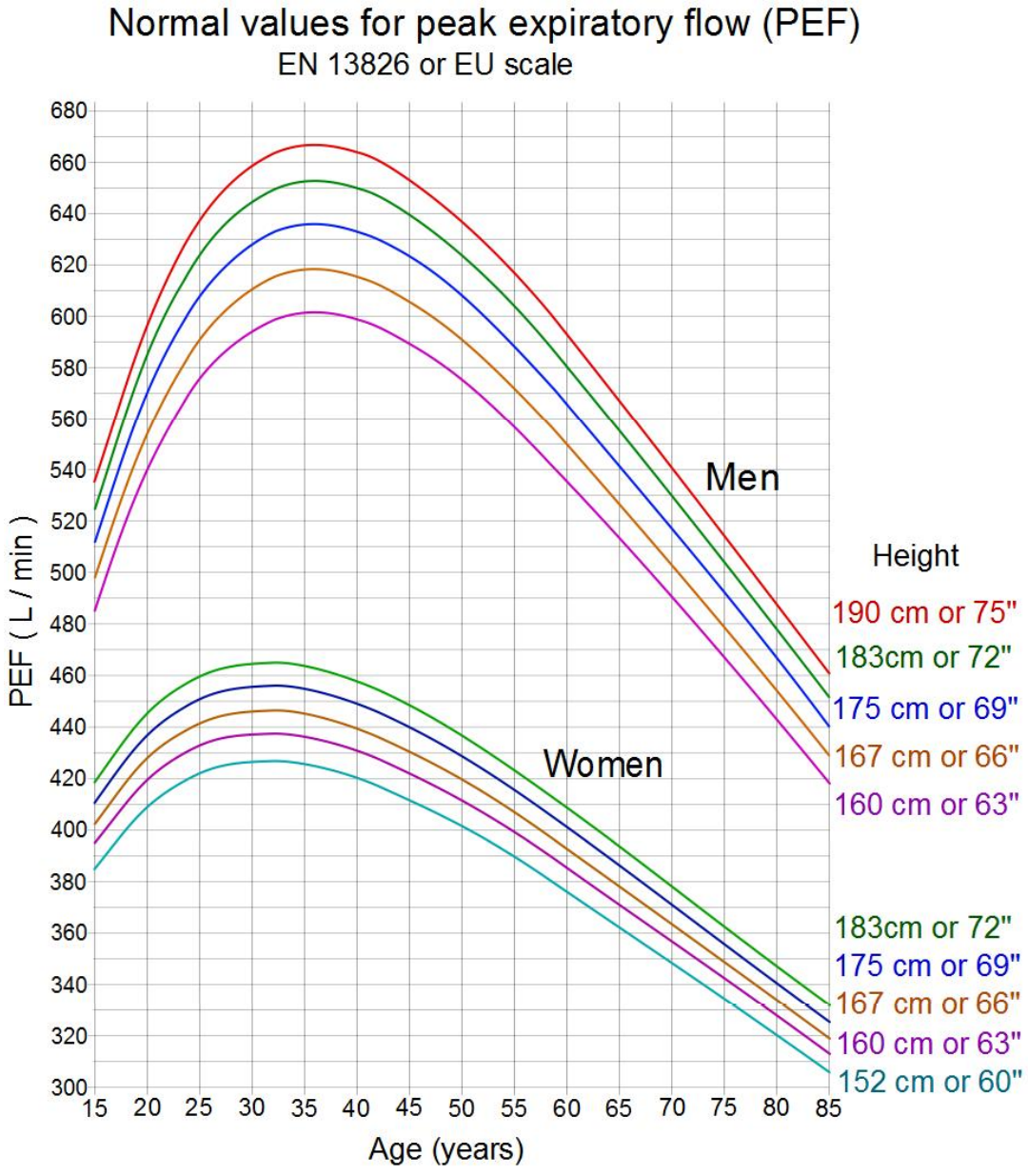

Figure (2): Normal values of peak expiratory flow (PEF), EN 13826 or EU scale [29& 30].

Methods:

PEFR was obtained from our subject in the standing situation using peak flow meter [34]. They were taught to inhale to the maximum degree, tightly close their mouths around the meter′s mouth piece and exhale as maximally and forcefully to the peak and fast as much as you can. PEFR measurement were achieved in surrounded temperature and pressure saturated with water vapor.

1. The procedure for measuring respiratory function, as follows according to the recommendations of manufacturing company:

a- Make sure that the pointer is adjusting to(0).

b- Catch the peak flow meter exhibiting the fingers of you to be obvious on other scale and vent. Do not obstruct the holes at the end of the peak flow meter, or the slots at the side of the mouthpiece.

c- Halt. Take a deep inhale, put the peak flow meter in the mouth and the catching should be horizontally closing to the lips around the mouthpiece, then blowrapidly and strongly.

d- Come back the pointer to (0) and echo the operation two times to gain three records. Take the top of the three records.

2. The inclusion criteria were: young healthy voluntary participants (male and females) of age (18-38 years), but participants with shortness of breath and cough were included; their height (cm) without shoes (height was gauged carefully by a scale signalized on the wall by applying a meter rule) and weight (Kg) without shoes.

3. The exclusion criteria were: participants should not have asthma nor had a history of febrile or chest infection two months before examination, also no positive family history of asthma and participant aged more > 40 years were excluded.

4. Statistical analysis:

The statistical analysis revealed that the measuredmean±S.D and (t-test) and regression analysis. The PEFR and the various anthropometric parameters measured were compared to EU scale (figure-2-). PEFR was also correlated with the anthropometric parameters (age, weight, height and EU scale standard. The observed PEFR values obtained in the present study were also compared with presence of other related factors (cough and shortness of breath). $P<0.05$ was taken as statistically significant [35, 36].

Result:

Our studied population age, weight and height were shown in table (1). There is a statistical significant difference between male and female for their height ($P<0.05$) and we notice there is no significant difference between age and weight among the male and female of our study ($P>0.05$).

Table (1): The age, weight and height of the study population.

Measured parameters	Male (m±SD)	Female (m±SD)	All (Mean±S.D)	t-test, P value (male&female)
Age (years)	20.20±0.99	19.95±1.36	20.68±2.36	0.021173 (>0.05)
Weight (Kg)	72.13±11.21	61.79±11.34	73.78±61.41	0.060768 (>0.05)
Height (cm)	173.70±6.73	160.2±6.5	169.6±8.4	7.98255* (<0.05)

***=P value significant at level of 0.05 (P<0.05).**

Regarding the correlation coefficient of PEF with different parameters (age, weight & height) showed that there were no correlations between PEF with age, weight and height (r= -0.084, -0.12 & -0.159) respectively as shown in figure (2) a, b, c and d.

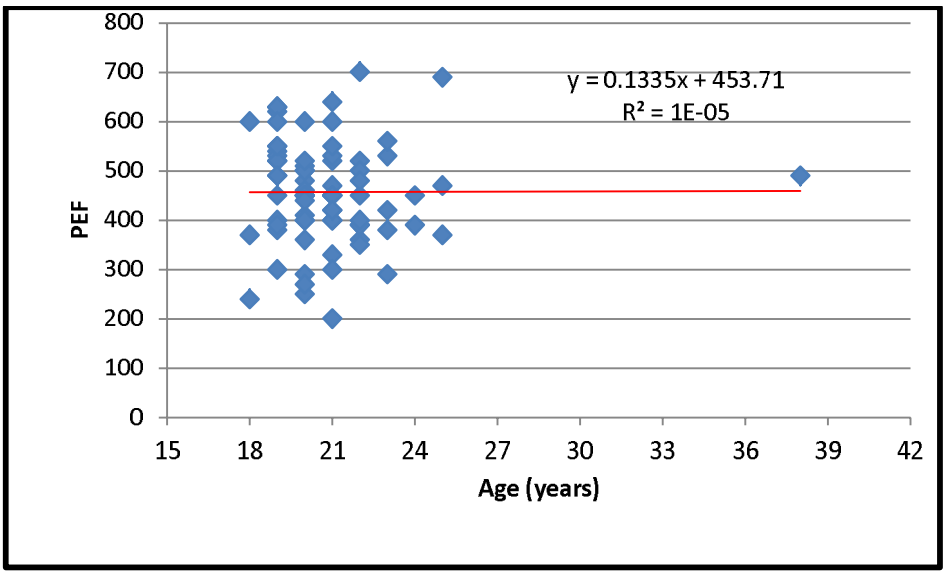

Figure (2) a: The correlation between PEF and age of Iraqi youth male subjects.

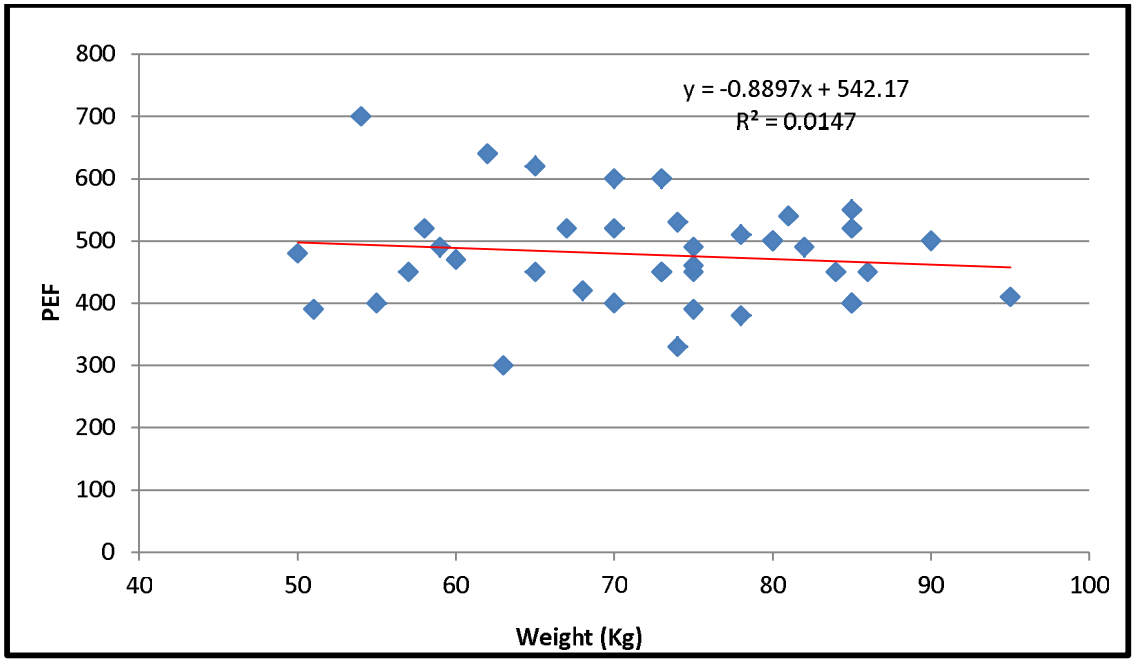

Figure (2) b: The correlation between PEF and weight of Iraqi youth male subjects.

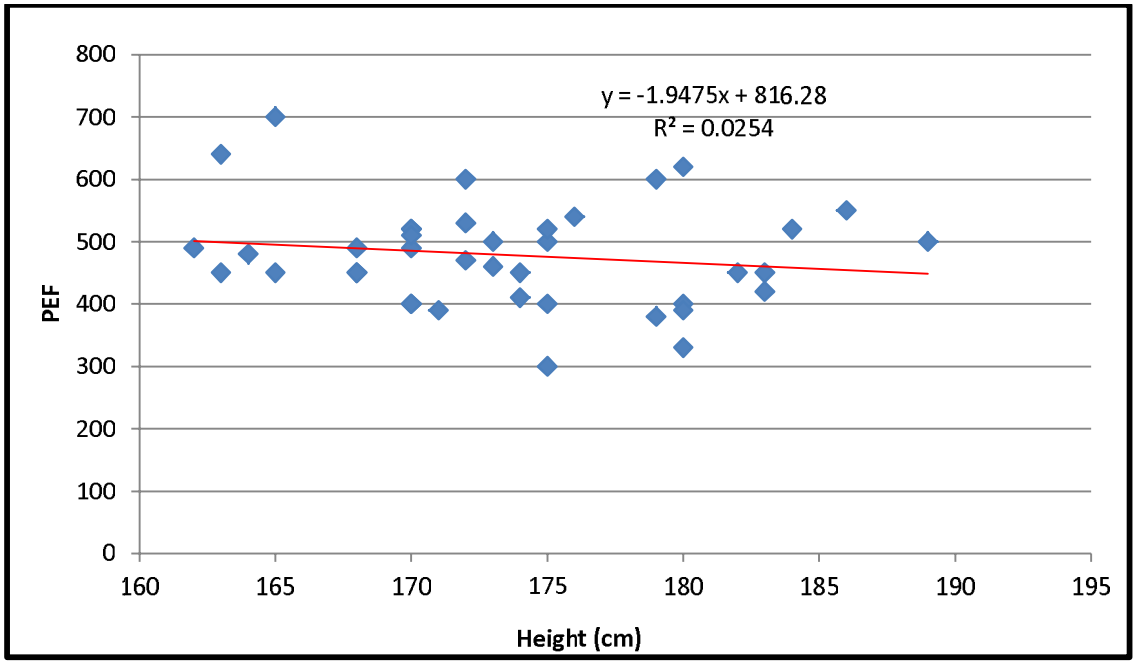

Figure (2) c: The correlation between PEF and height of Iraqiyouth male subjects.

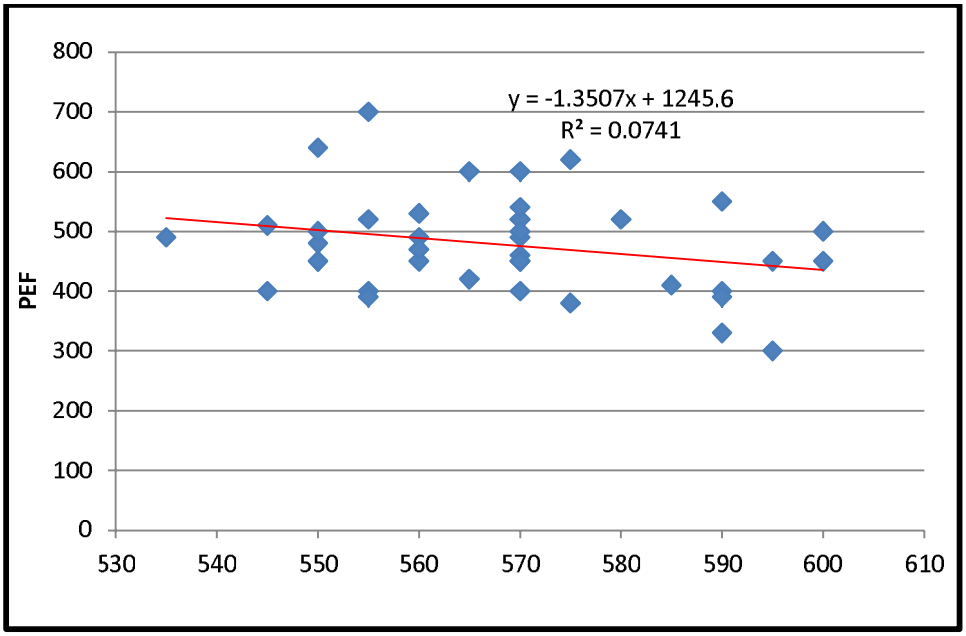

Figure (2) d: The correlation between PEF and European scale standard of Iraqiyouth male subjects.

The result appeared in table (2) clarify that the mean PEF readings were (478.0±82.28) ranging (300-700), which was significantly lower than EU scale standard (European Scale) readings for PEF according to age, gender, height and weight.

The mean of difference between the PEF of Iraqi sample and the EU scale standards were -90.25±88.25 (- 295.0 to 145.0); the giving percent difference of PEF were-15.7±15.27 as shown in table (2) and figure (3).

Table (2): The PEF measurements of Iraqi subjects comparing with EU scale standards.

	Mean±SD	Range
PEF of Iraqi subjects	478.00±82.28	300.0 - 700.0
EU scale standards	568.25±16.59	535.0 - 600.0
PEF Difference	-90.25±88.25	-295.0 - 145.0
PEF Difference percent	-15.70±15.27	-49.6 - 26.1

-Difference in mean PEF of Iraqi subjects and EU scale standards is significant using Students-t-test for two independent means (P=0.0001)

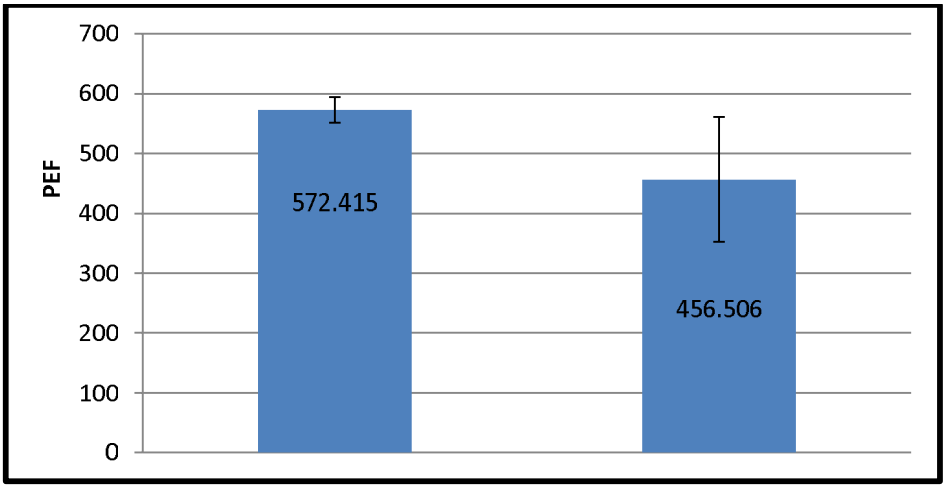

Figure (3): The mean PEF measurments of Iraqi subjects with EU scale standards.

Table (3) showed that shortness of breath was present only in (9) students while the rest (31) did not report shortness of breath for the last 24 hours. There PEF were not significantly differing in the two groups.

Table (3): The mean PEF of Iraqi subjects with shortness of breath.

	Shortness of breath				P value
	Yes (n=9)		No (n=31)		
	Mean±S.D.	Range	Mean±S.D.	Range	
PEF of Iraqi subjects	470.00±55.23	390.0 - 550.0	480.32±89.24	300.0 - 700.0	0.745
EU scale standard	572.78±15.43	555.0 - 600.0	566.94±16.92	535.0 - 600.0	0.359
Difference	-102.78±51.73	175.0 - -30.0	-86.61±96.70	-295.0 - 145.0	0.635
Difference percent	-17.97±9.11	-29.9 - -5.4	-15.04±16.70	-49.6 - 26.1	0.619

***Significant difference using Students-t-test for two independent means at 0.05 level of significance**

Results showed in Table (4) that healthyyouth male who having cough was present only in (4) students, while the rest (36) did not report cough for the last 24 hours, there PEF were not significantly differ in the two groups.

Table (4): The mean PEF of Iraqi subjects with cough.

	Cough				P value
	Yes (n=4)		No (n=36)		
	Mean±S.D.	Range	Mean±S.D.	Range	
PEF of Iraqi subjects	492.50±50.58	450.0 - 550.0	476.39±85.43	300.0 - 700.0	0.715
EU scale standard	570.00±16.33	550.0 - 590.0)	568.06±16.83	535.0 - 600.0	0.827
Difference	-77.50±38.62	-120.0 - -40.0	-91.67±92.36	295.0 - 145.0	0.765
Difference percent	-13.70±6.98	-21.1 - -6.8	-15.93±15.97	49.6 - 26.1	0.786

-Data were presented as mean±S.D. (Range).

***Significant difference using Students-t-test for two independent means at 0.05 level of significanc.**

Discussion:

The PEFR is an agreeable indicator for performance of the lung and vastly applied in respiratory medicine.

In this study, it was observed that the mean PEFR was significantly lower in Iraqi boys than in EU scale. Also, it was observed that PEFR was not correlated with age, height and weight, this was agreed with Researchers who observed that there was no linkage of PEF values with weight or age [37, 38]. But at the same time our study disagrees with another study which stated that PEFR was positively linked with height and weight in the youth adult for males and females [39].

Other researchers also disagree with our results they mentioned that variousagents influencing PEFR, and the linkage of height with PEFR was preferable than weight and gender [40].

PEFR demonstrates the worth for identification of chronic bronchitis and to estimate the follow-up of asthma. The finding of other workers clarified that PEFR was badly related with age and weight [41] which was agreed with our results. While other researchers disagree with us, they found that age and height was highly elevated in both gender [42]. Another study explained that PEFR was greatly linked with all anthropometric parameters for both gender in children [43]. Also the observed PEFR in this study was compared with EU values using EU scale standards, results that were significantly different from the standard values suggesting that the populations from which they were derived are various to the population in the present study. Thus suggesting that lung function is significantly reduced during this study group may be because of polluted air and most of the Iraqi population do not have access to good nutrition and are living in unhygienic surroundings resulting in lower body proportions compared to other population. I would like to state that a data from this sample size is not representative of characteristics of a youth population, therefore, the findings of the present study should be considered preliminary and call for further studies with a large sample size based on random selection.

Appendix-1
Name:
Gender:
Age (years):
Height (cm):
Weight (Kg):
Family history of Asthma:
Asthma:
Asthma Symptoms (shortness of breath):
Asthma Symptoms (cough):
Smoking
PEF reading (reading 1):
PEF reading (reading 2):
PEF reading (reading 3):

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