Correlation of PEFR with BMI in men of age Group 25-40 Years at RIMS, Raichur

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Abstract

Background: Obesity has emerged as a major health problem in past few decades, in developing countries like India. It is found to affect the lung functions significantly. This study was designed to study the correlation of PEFR with BMI.
Methods: Sixty male volunteers were analyzed in the study. They were classified into obese (BMI> or =30) and non-obese (BMI<30). Subjects were grouped into two groups, age 25-32 years in one group and age 33-45years in another group. PEFR was measured using Wrights Mini peak flow meter. Data was analyzed using unpaired t test.
Results: There was no significant difference in PEFR values, with respect to BMI, in young age group. However it was found that, PEFR was inversely related to BMI, as age advances.
Conclusion: This study concludes that PEFR is inversely related to BMI as age increases, and obesity is an important risk factor for reduced airflow or lung functions.

Key words: PEFR, Obesity, Lung functions

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Introduction

Obesity has emerged as a major health problem in developing countries. It is simply a condition of accumulation of extra fat or adipose tissue.[1] It is usually found to be co-existing with other conditions like hypertension. It is linked with impaired pulmonary function and airway hyper responsiveness.[2,3]

The WHO defines obesity as BMI greater than or equal to 30kg/m^2. Normal range of BMI is 18.5-24.99 kg/m^2.

The reason why obesity is considered as a health problem is because it has got deleterious effect on the functioning of the body. It is found to impair the respiratory function. Due to the extra adipose tissue in the abdomen, and chest cavity, it causes a compressive force on muscles of respiration and also the lungs. The net effect is reduced compliance of chest wall, with reduced volumes and capacities.

PEFR is a parameter that can be conveniently measured and is an easy tool to assess the lung function in field studies[4]. PEFR values vary with various factors like age, sex, body surface area, obesity posture, physical activity and also environment. [5,6]. Studies on correlation of PEFR with BMI are many, but are conflicting. Thus the present study is an attempt to evaluate the correlation of PEFR with BMI.

Materials and Methods

The study was conducted on men of age group 25-40 years, working or at Raichur Institute of Medical Sciences. Sixty men were selected and nature of study was explained to them. Informed consent was obtained from the subjects prior to participation in the study. Institutional Ethical Committee clearance was also obtained.

A detailed history and clinical examination of the subjects was done. Subjects with history of smoking or any pulmonary abnormality were excluded from the study. Age was taken in years. Standing height was recorded with the help of measuring scale mounted on a wall. Weight was recorded using weighing machine. BMI was calculated using the formula,

$$BMI = \text{weight in kg} / (\text{height(meter)})^2$$

The PEFR was recorded with Wrights portable peak flow meter. Three readings were taken. Subjects were advised to maintain a tight seal with the mouth piece while performing the procedure.

Statistical Analysis: Subjects were stratified into age groups of 25-32 years and 33-45 years and based on BMI, they were classified as obese and non-obese. Unpaired t test was used for analysis. p value <0.05 was considered as significant.

Results

No significant difference in age or height was noted among the two groups. However, the weight and BMI was higher in the obese group as compared to non-obese group, in both the age groups. Mean value of PEFR did not show any significant difference in obese and non-obese group among younger age group. The PEFR values were found to be significantly lower in obese subjects of age in range of 33-45 years.

	25-32 years		33-45 years	
	Non obese	**Obese**	**Non obese**	**Obese**
Age(yrs)	25.4±3.0	26.5±5.6	35±1.2	38±3.1
Height(m)	1.6±0.1	1.7±0.1	1.69±0.8	1.65±00
Weight(kg)	25.32±1.1	35.00±2.1*	24.8±1.6	32.2±3.4*
PEFR(l/sec)	435.6±5.2	411.3±2.4	379.2±3.2	334.2±4.1*

All values are expressed as Mean±S.D.* Significant as $p<0.05$.
PEFR=Peak expiratory flow rate.

Discussion

By definition it is defined as the largest expiratory flow rate achieved with a maximum forced effort.[7] It is expressed in liters per minute. It is a convenient tool to measure lung functions[8,9]. The primary factors that affect PEFR are the elastic recoil of lungs, the airway resistance and strength of expiratory muscles.

Obesity affects the lung functions in many ways, like limiting the lung expansion, restricting the descent of diaphragm etc.

In this study, it was found that, there was no significant difference in PEFR values in obese and non-obese subjects in young age group that is between 25-32 years, whereas it was found that, PEFR was inversely related to BMI in age group of 33-45 years. Similar results were obtained in study conducted by Chen et al[10].

Age has been found to be one of the important factor determining PEFR in healthy subjects. Increasing age is found to be inversely related to PEFR, but the extent of correlation is not known. Studies conducted by Yogesh Saxena et al[11], Joffa Paul et al[12], Jepegnanam et al[13].

Decrease in expiratory muscle effort, elastic recoil of lungs, and airway size may be the reasons for decline in the values as age increases[14].

In addition to decreased muscle effort, reduced elastic recoil of lungs, reduced airway size, the mechanical effect on diaphragm due to deposition of fat could be the reason for decreased PEFR in older age group.

Conclusion

This study concludes that, both age and BMI, do affect PEFR. Decreased in elastic recoil of lungs, weakness of respiratory muscles, compression caused by the extra fat on thorax and lungs, all these factors result in decreased PEFR. Thus obesity is a risk factor, for lung functioning, and needs to be arrested.

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