



A STUDY TO DETERMINE PEFR OF ADOLESCENT SCHOOL GOING CHILDREN OF DIFFERENT AREAS OF AHMEDABAD CITY.

Physiotherapy

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ABSTRACT

INTRODUCTION: Respiratory disease is a major cause of morbidity and mortality in our country. Nowadays bronchial asthma is most common chronic disease, apart from common cold, in children due to environmental factor and change in life style. Peak Expiratory Flow Rate [PEFR] recording is an important noninvasive respiratory function test for evaluation, monitoring, management and follow-up of patient with bronchial asthma

NEED OF STUDY: To find out the respiratory risk in children.

AIMS AND OBJECTIVES: To determine and correlate the PEFR values in children of slum area and privileged area of Ahmedabad.

METHODOLOGY: Children with the normal BMI and age was taken in the study. PEFR was measured using a peak flow meter in normal sitting position. The subject was encouraged to blow as vigorously as possible after taking full inspiration. Subjects who fulfilled the criteria were included.

Outcome Measure: Peak expiratory flow rate

RESULTS: There wasn't any significant difference between the groups in this population. p value is 0.070

KEYWORDS

PEFR, children, different area.

INTRODUCTION:

Diseases affecting the respiratory tract are the most common cause of death worldwide. Among the obstructive airway disease affecting children bronchial asthma is most common type. The prevalence as well as mortality and morbidity due to asthma has been increasing with increasing industrialization according to ISAAC. It is projected to increase at an alarming rate with an estimated prevalence of 400 million by the year 2025, as contrasted to 300 million at present.¹ Monitoring this disease involves both subjective and objective modalities. The peak flow meter is one of the means of objectively assessing and monitoring the airway function of the patient with bronchial asthma. It is a common respiratory disease of childhood which is associated with fluctuation in the airway calibre and one of the earliest signs of attack is a fall in peak expiratory flow rate.²

The Peak Expiratory Flow Rate (PEFR) is the lung function test which is helpful in evaluating obstructive lung diseases especially bronchial asthma. It is also helpful in monitoring the disease progression and response to treatment. Peak flow meter is a hand held device. Peak flow, is the maximal rate at which a person can exhale during a short maximal expiratory effort after a full inspiration. In patients with asthma, the predicted PEFR correlates reasonably well with the predicted value for the forced expiratory volume in first second (FEV1). Serial PEFR monitoring is a convenient method for investigating and diagnosing asthma. A variation of greater than 20 percent of baseline indicates airway reactivity.³ Monitoring the PEFR is useful for detecting changes or trends in a patient's asthma control, although significant variability of the test makes it important to confirm or exclude airflow limitation with a more reliable test, such as spirometry. The simplicity and the cost of the instrument make it a simple tool which can be used by patients to measure the airflow obstruction early in cases of reactive airway disease and predict any deterioration before the acute event sets in. Normal predictive values are essential for clinical interpretation of lung function tests.

Normal predictive values are essential for clinical interpretation of lung function tests. Normograms predicting PEFR from anthropometric measurements are available for various populations groups.⁴ The PEFR values are affected by age, sex, weight and height (Anthropometry) and also the PEFR varies from urban to rural areas. Moreover it varies from region to region also.

Normal (GREEN ZONE)	80-95% of Predicted	A peak flow reading in the green zone indicates that the asthma is under good control.
Mild Obstruction (YELLOW ZONE)	66-80% of predicted	Indicates caution. It may mean respiratory airways are narrowing and additional medication may be required.
Moderate Obstruction (YELLOW ZONE)	51-65% of Predicted	Indicates caution. It may mean respiratory airways are narrowing and additional medication may be required.
Severe Obstruction (RED ZONE)	<50% of predicted	Indicates a medical emergency. Severe airway narrowing may be occurring and immediate action needs to be taken. This would usually involve contacting a doctor or hospital.

Need of the study:

Study finds the respiratory risk in children, so it determines the PEFR values and compares it with baseline values to know the risk. Comparison of PEFR of urban and rural children will be useful in determining whether the factors affecting PEFR are causing significant differences in their measured values.⁵

Aims and objectives:

To objectively assess the Peak expiratory flow rate in healthy school children between the age group of 6 -15 years using Mini-Wright peak flow meter.

1. To determine the PEFR values in children of slum area.
2. To determine the PEFR values in children of privileged area.
3. To compare PEFR values of slum and privileged area.

MATERIAL AND METHOD:

This was a cross sectional study which was done in the different areas of Ahmedabad City. It was done in period of one month. Considering the age (6-15 years) and socioeconomic status (higher and lower class) the students from different areas in city were included in the study. The investigator cross checked her own peak flow readings to demonstrate the reproducibility of PEFR every time before determining the children's PEFR. Permission was obtained from Principals/ Headmasters of the institute. Written consent was taken from the parents. From each school targeted samples were selected randomly. Information regarding students was taken from the teachers of students belonging to Class I to Class III and directly from the students of Class IV and above. These children were interviewed to rule out the following, a. H/o acute respiratory tract infection within preceding three weeks. b. H/o chronic respiratory disease, asthma c. H/o skeletal deformities of thorax d. H/o cardiac and neurological disease e. H/o smoking in adolescents Students who fulfilled the inclusion criteria were separated, and further details were taken. Height was measured by stadiometer and weight was recorded by weighing scale without shoes and minimum clothes. Accuracy of the weighing machine was \pm 500 grams. Any fraction of weight thus measured was corrected to the nearest kilogram. BMI was calculated by using following formulae.

$BMI = \text{weight (kg)} / \text{height (m)}$

Mini Wright Peak Flow Meter (mWPFM) (60-800L/min) was used to record PEFR (L/min).

Before asking to perform peak flow (50 students in each group), students were demonstrated how to use mWPFM correctly. The mouthpiece attached to the device was placed in the subject's mouth and was held firmly by lips. The subject was encouraged to blow as

vigorously as possible after taking full inspiration. The neck was in a neutral position, and the subject was asked to not to cough in the instrument. This was performed three times and the largest value from at least three acceptable blows was recorded

STATISTICAL ANALYSIS:

The data was analysed using SPSS 16.0 version separately for boys and girls with respect to age, weight, height (BMI ratio) and PEFR for all children. Mann-whitney test was applied to determine the PEFR values of different areas.

RESULTS AND DISCUSSION:

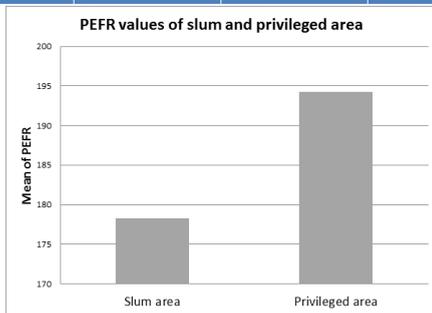
To compare the PEFR between groups of slum and privileged area Mann whitney test was used as population was not following the normal curve distribution ; p=0.070 which is non-significant

Table 1 Comparison of PEFR of Slum and Privileged area.

	Mean	Standard Deviation	Mann – Whitney Test	P Value
Group1 (Slum)	178.25	54.532	612.500	0.070
Group 2 (Privileged)	194.25	39.216		

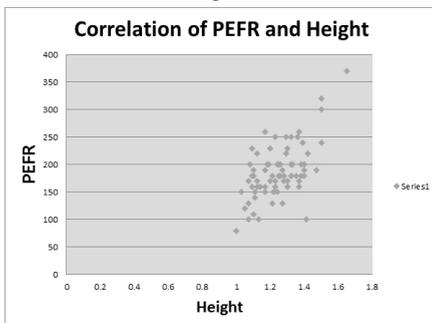
Table 2: Correlation of different variables with PEFR.

	BMI	HEIGHT	GENDER
Pearson's Correlation with PEFR (r value)	0.370	0.583	-0.30
P value	0.012	0.005	0.062



However Mean of PEFR slum area < privileged area

- Correlation was found between PEFR and various anthropometric parameters like height, weight and body mass index.
- Age was to have a positive correlation with PEFR; with increase in age PEFR also increases.
- PEFR values of girls were always lower than that of boys (with regarding to height) ;however there is no statistically significant difference and shows weak negative correlation.



- The most significant correlation was between height and PEFR
- As the height correlates the best it can be used to predict PEFR of children.
- Peak expiratory flow rate readings were taken from 100 healthy children between the age of 6-15 years to look for any significant differences.
- This study found the values of PEFR (litre/minute) in boys and girls of privileged and urban schools in relation to height, weight, age BMI. ⁶

DISCUSSION:

The study was aimed to finding out, if there was any significant difference in the peak flow rates of children due to their different environment and differences in various anthropometric parameters

and exposure to environmental pollution and allergens. The children from slum areas had different environmental factors and lower socioeconomic backgrounds. Children from privileged areas on the other were mostly from higher socioeconomic backgrounds. Difference between PEFR of urban and rural children was not statistically significant as also proven by studies done by Paramesh et al⁷, Glew et al⁸ and Pasek et al⁹ in different parts of the world .In contrast certain studies done in North India by Budhiraja et al¹⁰ showed a significant difference between urban and rural children, with urban children having better PEFR. However in adult studies done by Dhillon et al rural adults had better PEFR in comparison to their urban counterparts. Age was found to have a positive correlation with PEFR. With increase in age in children PEFR increases however in adult studies the PEFR decreases after 30 yrs. ¹¹ PEFR values of girls (in relation to height) were always lower than that of the boys however there is no statistically significant difference. This was similar to the findings of studies done by Malik et al¹² and Paramesh et al. ⁷ However, certain other studies observed higher PEFR in boys in comparison to girls. ¹²

Correlation was found between PEFR and various anthropometric parameters like height, weight, arm span, body surface area and body mass index which were also found in other studies by Mohammadzadeh et al¹³, Malik et al¹⁴, Paramesh et al⁷. The most significant correlation was between height and PEFR (Malik et al¹⁴). As the height correlates the best it can be used to predict PEFR of children. Several recent studies had also shown the highest correlation coefficient between PEFR with height, which was also proven in our study where the highest correlation was found between the two. ^{7,15} Mean PEFR derived in this study is comparable to that in other studies done in West Bengal, Maharashtra, Bangalore and studies done in Dublin16 (western data). Studies done in Chennai show lesser values in comparison to our study and studies done from others states. Hence the authors had recommended developing PEFR charts for different states. In addition data was collected about exposure to smokers in family, cooking fuel, pet exposure and socioeconomic status. ¹⁶ Exposure to animals showed a drop in their recorded PEFR and an improvement in the same was observed during periods of abstinence from work (away from animals). This would be of significance to detect early reactive airway changes in children who have been exposed to pets and are symptomatic.

In those belonging to lower class the : Family size is large, Most of them do not have access to good nutrition ,Living in unhygienic surroundings, Resulting in lower body proportions when compared with that of well-nourished children.This was considered to be the reason for lower PEFR in slum group in this study.

CONCLUSION:

PEFR is an important tool to assess obstructive changes in the airway which can be useful for further management. PEFR of children does not vary significantly between slum and privileged area despite varying environmental factors. As age increases there is an increase in the peak flow readings in children. Significant correlations were found between PEFR and biological variables like age, weight, height and BMI. The correlation is more robust with regard to height. Boys have more PEFR values than girls across all age groups. PEFR has correlation with socioeconomic status, as better nutrition improves overall lung functioning.

LIMITATION:

Small sample size

ACKNOWLEDGEMENT:

None

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