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ORIGINAL ARTICLE

Evaluation of Peak Expiratory Flow Rates (Pefr) among Healthy Children of Khairpur Mir's City of Pakistan: A Cross-Sectional Study

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ABSTRACT

Aim: To assess the peak expiratory flow rates (PEFR) among healthy children aged 6 to 12 years
Study design: A cross-sectional study
Place and Duration: This Study was conducted at Gambat Medical College Khairpur Mir's, Pakistan from April 2019 to March 2020.
Methodology: A study using a random sampling technique was conducted in primary schools. Healthy school children of either gender ages 6 to 12 years were enrolled in the study. An EU scale peak flow meter measured PEFR (60-800 l/min). While standing, their PEFR was determined. A total of three readings were taken, with the highest value being recorded. SPSS version 21 was used for statistical analysis.
Results: Boys made up 56.15 percent (n=278) of the 495 participants. PEFR was measured at a minimum of 6 years old and a maximum of 12 years old in both genders. Boys aged 6 to 12 years had a PEFR of 179.71 ± 30.67 (L/Min), whereas girls had a PEFR of 159.15 ± 25.77 (L/Min). There was no discernible difference between genders and age categories (t=0.912, P=0.189).
Conclusion: Mean PEFR values may vary between gender and age. PEFR results from this study can be utilized as a clinical reference for children aged 6 to 12 years of age. Clinicians can use these PEFR values to measure lung function and airway obstruction in this population subset.
Keywords: Age, Gender, Lung Function Test, Peak Expiratory Flow Rates

INTRODUCTION

Many common childhood chronic lung illnesses cause variable degrees of airflow restriction inside the tracheobronchial tree. As a result, practical approaches are required to detect functional impairment and evaluate the outcomes of various therapy regimens; estimating the severity of airway blockage is critical. In physiologic research, direct measurement of airway resistance is routinely used. [1, 2] The method is not suitable for routine clinical use. Peak Expiratory Flow Rates (PEFR) have recently been an excellent indirect indicator of airway blockage.[3] The peak flow rate produced during a vigorous exhale, commencing from complete lung inflate, is called peak expiratory flow. It is essentially a reflection of significant airway flow and is dependent on the person's voluntary effort and muscular strength. [4]A peak flow meter is an effective tool for measuring PEFR, and both children and adults in good health can use it easily. [5].This process is simple to understand, straightforward to execute, and repeatable. Age, gender, weight, and height are the key characteristics that influence PEFR. [6] Numerous studies have found that regional disparities in lung function are linked to topographical, climatic, anthropometric, socioeconomic, and nutritional factors. [7-9] As a result, every city, geographical region, and community should have its own set of standards for these factors. Even though several studies have analyzed PEF levels in children and adults [10, 11], their findings cannot be extended to children in Khairpur Mir's City of Pakistan due to cultural, customary, and environmental differences. This study aimed to collect PEFR from children between 6 to 12 years and provide possible parameters for future references for the children of Khairpur Mir's City of Pakistan.

METHODOLOGY

This Study was conducted at Gambat Medical College Khairpur Mir's, Pakistan from April 2019 to March 2020. In this study students of Public schools of Khairpur Mir's city of Pakistan.Permission was taken from the ethical review committee of the institute.PEFR of children was recorded in the school by the investigators. The study included healthy school students of either gender aged 6 to 12 years. Children who had cough or flu within the last 15 days, history of respiratory problems, and systemic disease were excluded from the study.

A random sampling method was adopted. The children were thoroughly examined .PEFR (60-800 l/min) was measured using an EU scale peak flow meter. It had a mouthpiece and a plastic cylindrical tube with a graded scale on the surface. Graduation ranges from 60 to 800 l/min, with a precision of 10 l/min. Unless explicitly moved back by the operator, the PEFR indicator remains in the place of the reading. All PEFR measures were performed when the children were ina standing position. The participants were informed about the test's purpose and procedure. The process was then demonstrated in detail to familiarize them with it and gain their complete cooperation. Each child was instructed to take a deep breath and then blow into the peak flow meter as hard and as quickly as

possible through the mouthpiece while being closely monitored to verify that an airtight seal was maintained. The technique was done three times, with the highest of the three readings being used to determine the observed PEFR.The PEFR was measured using disposable mouth pieces. Descriptive statistics were calculated using mean and standard deviation for continuous data, whereas frequency and proportions were utilized for categorical variables. An Independent sample T-Test was executed to check the association of PEFR among genders at different ages. For statistical analysis, SPSS version 21 was utilized.

RESULTS

We performed the tests on 495 children between 6 years to 12 years. Boys were 56.16 % (n=278) of the participants. More boys were 12 years old and made up 15.82% (n=44) of the total male population. Among females, 7 to10 years students were in higher number. (As shown in Table 1**).** We evaluated that the mean PEFR increases with age. Mean PEFR among boys is higher than girls at a particular age group. Among boys, the mean PEFR at six years was 120.13 ± 33.13, and among girls, it was 103.44 ± 21.34. Similarly, among boys, the Minimum PEFR was 70, the maximum 190, and in girls, 60 and 180, respectively. At 12 years, the mean PEFR among boys was 228.43 ± 32.45, and in girls, 207.22 ± 22.13. At the same age, minimum and maximum values for PEFR were 190 and 410 among boys and 170 and 340 among girls, respectively. The mean PEFR of boys from age 6 to 12 years was 179.71 ± 30.67, and in girls, it was 159.15 ± 25.77. According to the Independent sample T-Test, there was no significant difference (t=0.91256, P=0.189721) among the genders between age groups. (As shown in Table 2

Table 1: Gender and Age Distribution

Age (Years)	Boys N (%)	Girls N (%)	Total N (%)
6	37 (13.30)	34 (15.66)	71 (14.34)
7	41 (14.74)	33 (15.20)	74 (14.94)
8	39 (14.02)	27 (12.44)	66 (13.33)
9	35 (12.58)	31 (14.28)	66 (13.33)
10	43 (15.46)	33 (15.20)	76 (15.35)
11	39 (14.02)	32 (14.74)	71 (14.34)
12	44 (15.82)	27 (12.44)	71 (14.34)
Total	278 (56.16)	217 (43.83)	495 (100)

Table 2: Mean, Minimum and Maximum PEFR (L/Min) of boys and girls at different age

Age (Years)	Boys			Girls		
	Mean PEFR (L/Min)	Minimum	Maximum	Mean PEFR (L/Min)	Minimum	Maximum
6	120.13 ± 33.13	70	190	103.44 ± 21.34	60	180
7	134.27 ± 28.23	80	210	114.09 ± 27.45	70	200
8	168.55 ± 35.44	110	270	128.33 ± 25.74	100	240
9	188.41 ± 28.55	130	320	168.16 ± 23.58	120	280
10	202.58 ± 24.55	140	350	190.41 ± 35.27	130	300
11	215.63 ± 32.35	160	390	201.78 ± 24.91	150	320
12	228.43 ± 32.45	190	410	207.83 ± 22.13	170	330
Total	179.71 ± 30.67	70	410	159.15 ± 25.77	60	340

DISCUSSION

We observed that mean PEFR increases with age in both genders. The mean PEFR of boys was higher than girls of the same age. But the difference is not statistically significant. Similar to the findings of our study, a study performed in Pakistan reported no significant difference in mean pulmonary function test values between boys and girls ($p>0.05$), except that boys aged 13 and 14 had higher mean values ($p <0.05$), and pulmonary function test values tended to increase as age, height, and weight increased. [12]

Other studies have also reported that male children's PEFR values were higher than the females. By the current study's findings, research conducted in Rajasthan, India, reported mean PEFR inboys 314.57 ± 114.91 and girls 147.50 ± 45.38. In that study, 188 students between 6 to 14 years were enrolled. [13] Our study didn't show a significant difference between the gender regarding PEFR. A study performed in Punjab also reported an insignificant difference in PEFR among gender between 6-14 years old. [11]

Lung function testing is an essential element of respiratory medicine for healthy and sick people. PEFR is a parameter that is affected by effort. Within around 100-120 m/s of the start of forced expiration, it emerges from the major airways and remains at its peak for 10 m/s. [14]PEFR has recently gained popularity and is now a widely utilized approach for evaluating obstructive and restrictive disorders. Because there are numerous sources of pulmonary function variation, each region should have its own value. Airway resistance, maximal voluntary effort, and the maneuver's probable compressive effect on the thoracic airways are some of the elements that produce an intraindividual variation. [15]

Several factors influence PEFR. Age, gender, BMI, geography, environmental pollution, season, height, environmental and occupational pollutants exposure, and socioeconomic status. [16, 17]The current study's weaknesses were its cross-sectional character and small sample size. In the future, large-scale multicentric research with a large population is advised to establish a unified database.This study measured and recorded the PEFR values of around five hundred children between 6 to 12 years of age. These findings could be used as reference values for children of that age range in our city or the surrounding areas.

CONCLUSION

Mean PEFR values may vary between gender and age. PEFR results from this study can be utilized as a clinical reference for children aged 6 to 12 years of age. Clinicians

can use these PEFR values to measure lung function and airway obstruction in this population subset.

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