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COMPARATIVE STUDY OF PEAK EXPIRATORY FLOW RATE IN SCHOOL-GOING BOYS AND GIRLS

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ABSTRACT

In diagnosis and treatment of respiratory diseases, the assessment of lung functions is of considerable importance. So, normal reference values for pulmonary function tests of any population need to be assessed. An attempt has been made in the present study to measure the peak expiratory flow rate (PEFR) in healthy school going children. One hundred two (173) students were selected by inclusion criteria from different schools in Rajanagaram Rajahmundry Andhra Pradesh. The anthropometric measurements and peak expiratory flow rate (PEFR) were measured by standard procedures. Positive correlation was seen between age, height, weight, Body surface area, and PEFR. The regression equations for PEFR were determined for boys and girls separately. In both boy and Girl children, PEFR significantly increases (p<0.05) with height, weight, age, and Body Surface Area (BSA). PEFR is a reliable measurement, which can be used in desert areas for assessment of airway obstruction. Prediction formula is derived for use in this population.

Keyword: Peak Expiratory Flow Rate (PEFR) Forced Vital Capacity (FVC), Maximum Expiratory Flow Rate (MEFR), Body Surface Area (BSA)

INTRODUCTION

Disease of Respiratory system accounts for up to a third of deaths in most countries (Hutchinson R 2002) In diagnosis and treatment of respiratory diseases, the assessment of lung functions is of considerable importance, key tests being vital capacity (VC), forced vital capacity (FVC), maximum expiratory flow rate (MEFR) or peak expiratory flow rate (PEFR), maximum ventilator volume (MVV) (Pococka and Christopher, 1999). PEFR is the maximum rate of airflow achieved during a forced expiration after maximal inspiration. So, normal reference values for lung function tests of any population need to be assessed. PEFR measurement by peak flow meter is an easy way to measure lung functions in field study³ (Wright and McKerrow, 1959). Lung functions including PEFR are affected by various factors such as sex, body surface area, physical activity, posture, environment, racial differences etc (Benjaponpitak, 1999; Srinivas, 1999; Raju, 2004, 2005). Peak flow meter is an easy and cost effective instrument by which PEFR can be measured. For different Respiratory disease treatment, routine lung functions measurement is required to follow up the patients. And for this reason PEFR is one of the best choices. However, it is very much important to know the standard lung function values of children's. So, an attempt has been made in the present study to evaluate the effect of body size and obesity on PEFR in healthy school going Boys and Girls.

MATERIALS AND METHODS

The present study was conducted in the department of physiology Ganni Subba Laxmi Medical College and General Hospital, Rajahmundry, Andhra Pradesh from 2011 to 2012 after approval of institutional ethical committee. About One hundred seventy three (n=173) students age ranging from 7 to 14 years were selected randomly from the different schools in Rajanagaram for study. Out of 173 students, boys=100 and girls=73, was selected for the study. A structured proforma was designed to evaluate and record the personal data of the selected subjects regarding their name, age, sex, height and weight, personal history like smoking, with duration and quantity, any history of lung disease, history of persistent cough etc. The student were included with no history of smoking; living with sedentary

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lifestyle and no regular physical training or sports activity, no history of any respiratory disease, no persistent cough/phlegm, hemoptysis, dyspnoea and wheezing at the time of the study. The anthropometric measurements such as height, weight, waist circumference, hip circumference, thigh circumference were measured by standard procedures. Body surface area (DuBois and DuBois, 1916) (BSA) were calculated by the standard anthropometric measurements.

RESULTS AND DISCUSSION

Results

The present study was conducted in the department of physiology Ganni Subba Laxmi Medical College and General Hospital, Rajahmundry, Andhra Pradesh. About 173 healthy children of age group 7-14 yrs comprising 100 boys and 73 Girls were used for determination of PEFR. Mean values of Height, weight and BSA showed a gradual increase with the increment of age of children among both sexes, but Anthropometric parameters were better boys shown in Table 1 and this table also shows variation of PEFR in boys and girls according to their age .in all age groups boys shows higher mean PEFR showed significant correlation with each other p<0.001(B), p<0.05(G).

Table 1: Shows Mean \pm SD value of Weight, Height, BSA and PEFR in boys and girls subjects according to age

	Bo	ys=100				Gir	rls=73			
Age	No	Weight	Height	Mean BSA	PEFR	No	Weight	Height	Mean BSA	PEFR
7	8	23.25 ± 3.54	124.38 ± 3.54	0.770 ± 0.09	148.36±44.83	6	20.83 ± 2.14	118.5 ± 3.83	0.697 ± 0.05	117.67 ± 58.07
8	15	24.53 ± 3.47	124.88 ± 7.64	0.802 ± 0.09	157.29 ± 55.83	11	24.27 ± 4.22	129.55 ± 5.87	0.809 ± 0.11	147.91 ± 35.05
9	13	26.38 ± 4.29	132.92±5.35	0.868 ± 0.11	209.31±71.73	8	24.38 ± 4.63	132.5 ± 8.33	0.820 ± 0.13	148.38 ± 29.74
10	18	29.35 ± 6.35	138.90±6.56	0.955 ± 0.16	179.25 ± 45.14	10	33.83 ± 8.40	138.67 ± 5.16	1.056 ± 0.19	170.83 ± 50.61
11	18	34.48 ± 4.19	145.14±6.36	1.095 ± 0.11	227.86±66.79	13	36.15 ± 9.06	145.92 ± 6.42	1.133 ± 0.22	171.15±57.99
12	12	36.73±7.16	$152.20{\pm}10.46$	1.170 ± 0.19	195.20 ± 84.27	10	$42.0{\pm}12.85$	150.85 ± 9.81	1.279 ± 0.31	165.23 ± 72.37
13	7	$42.45{\pm}11.22$	152.64±6.55	1.295 ± 0.25	261.82±88.66	9	40.2 ± 6.90	153.33±10.53	31.253±0.19	191.67±60.90
14	9	46.71±7.76	160.86 ± 8.21	1.425 ± 0.19	$314.57{\pm}114.91$	6	36.25 ± 3.40	$151.5{\pm}10.08$	1.157 ± 0.10	147.50 ± 45.38
					p<0.001					p<0.05

Table 2 shows variation of PEFR with height in boys and Girls children. For the similar height boys show higher PEFR than Girls. PEFR and Height shows significant correlation in both genders p<0.001(M), p<0.01(F).

Hoight	Boys=100			Girls=73		
neight	No	Mean±SD	No	Mean±SD		
111-120	06	144.17±62.47	05	129.40±65.00		
121-130	20	174.18±62.04	12	142.83±37.93		
131-140	26	189.30±50.96	16	142.94±39.83		
141-150	26	209.37±57.40	17	174.50±58.92		
151-160	12	253.71±71.13	19	191.58±67.41		
161-170	10	293.70±150.62	03	152.33±29.67		
>170	-		01	211.00±0.00		
		p<0.001		p<0.01		

Table 2: Mean±SD values of PEFR in subjects according to their Height

Table 3 shows variation of PEFR in both boys and Girls subjects according to their weight. Observations show that in both age genders PEFR were higher in boys except in 46-50kg weight were Girls show higher values. In both the genders weight and PEFR show significant correlation p<0.001(M), p<0.02 (F).

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Weight	Boys =10	00	Girls =73	Girls =73		
weight	No	Mean±SD	No	Mean±SD		
<21	3	193.67±71.86	07	143.86±58.90		
21-25	25	164.03 ± 52.55	13	137.69±35.22		
26-30	24	186.76±53.24	13	156.60±45.26		
31-35	24	220.33±59.65	12	158.58 ± 51.84		
36-40	08	229.10±103.29	08	204.44 ± 70.70		
41-45	06	270.75±105.20	09	182.33±68.95		
46-50	05	170.00±61.01	07	181.71±59.45		
51-55	04	370.25±80.91	02	115.0±57.98		
>55	01	345.00±0.00	02	175.50±50.20		
		p<0.001		p<0.02		

Table 4 shows variation of PEFR with BSA in boys & Girl children. For the similar BSA boy shows higher PEFR than Girls. PEFR and BSA shows significant correlation in both genders, p<0.001(M), p<0.001(F).

DS A	Boys=100		Girls=73		
BSA	No	Mean±SD	No	Mean±SD	
0.600-0.799	19	164.63±56.09	17	137.53±44.96	
0.800-0.999	34	188.77±59.02	15	154.29±43.83	
1.00-1.199	25	205.83±57.26	16	163.00±48.18	
1.20-1.399	12	260.21±97.20	14	197.40±74.71	
1.40-1.599	07	282.75±135.87	09	166.89±62.74	
1.60-1.799	02	330.50±20.51	01	140.00±0.00	
>1.799	01	331.10±00.08	01	211.00±0.00	
		p<0.001		p<0.001	

Table 4: Mean±SD values of PEFR in subjects according to their BSA

Discussion

PEFR measurement by peak flow meter is an easy way to assess lung capacity and ventilatory functions of the subjects. The lung function tests including PEFR are influenced by various factors such as age, body size, physical activity, and environmental condition ethnicity etc. (Benjaponpitak, 1999; Srinivas, 1999; Raju, 2005). PEFR is very useful in monitoring the long term management of asthma and determining its severity. PEFR is expressed in L/min. PEFR is a simple and reliable way of monitoring the severity of bronchial asthma and assessing the response to treatment. The subjects included in the present study were from the same place with almost same socio-economic status. On the other hand they all were non-smokers and sedentary people. So, the age wise and sex wise comparison of PEFR and physical characteristics were done. Our data indicate that PEFR values for same age is higher in boy children in comparison to their counterparts. Most of the other studies have recorded similar trends. However, Singh and Peri (1978), and Deshpandey (1983) in their studies a normal South Indian children did not show any sex variability in PEFR. Another important fact is that correlation coefficients were better for boy children in present study as well as all other studies except in the study done by Deshpandey (1983). Overall, the study showed that in both boy and Girl children, PEFR significantly (p<0.05) increases with height, weight, age and BSA. In present Study, positive correlation was found between PEFR and anthropometric variables. Rahman (1990) reported that in the same age group girls had higher PEFR than the boys. Our correlation coefficient-values are lower in comparison to all other workers yet the correlation between PEFR and age, height, weight and BSA were positive and statistically significant (p<0.01 for all variables).

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