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Original Research Article

Prediction of peak expiratory flow rate from armspan in healthy children aged 8 to 12 years

Deepak Saxena[1] and Pradeep Kumar[*2]

[1]*Department of Physiology, HIMS, Baranki, UP, India*
[2]*Department of Physiology, KGMU India Lucknow, UP, India*

***Correspondence Info:**
Dr. Pradeep Kumar,
Professor,
Department of Physiology,
KGMU India Lucknow, UP, India
E-mail: pradeepkgmu@gmail.com

Abstract

Peak expiratory flow rate (PEFR) was measured in 400 normal healthy school going children in the age group of 8 to 12 years of Lucknow city. It was observed that there was a gradual, parallel progressive increase in the magnitude of arm span, a physical growth parameter and peak expiratory flow rate (PEFR) per year increase in age. A highly significant positive correlation exited between arm span and PEFR to predict PEFR from arm span multiple and partial "Bivariate" prediction equation was calculated.

Keywords: PEFR, Arm span, Physical growth parameter.

1. Introduction

In children the respiratory tract is probably more often affected by disease than any other system of the body [1]. The prevalence of childhood pulmonary diseases especially bronchial asthma is increasing worldwide [2,3]. Spirometry is the method of choice for evaluation of pulmonary function test is not yet a routine in India especially in children [4]. A number of studies of lung functions have been conducted in the adults [5-7] but there are a few studies that have established reference standards for pulmonary functions in Indian children [2,8]. These tests are important in the initial evaluation of respiratory disorders and help in the planning treatment as well as predicting prognosis [1]. There are only a few studies that have established reference standards for pulmonary functions of Indian children [8-11]. However many reference standards for pulmonary functions of white children have been published [12-14]. Therefore the aim of this study was to derive accurate prediction equation to predict PEFR from arm span.

2. Material and Methods

The present study was carried out to study the correlation of Peak expiratory flow rate (PEFR) with arm span. In this study PEFR was measured in 400 normal healthy school going children in the age group of 8-12 years of Lucknow city. Those children were excluded from the study who had sign/symptoms of;

- Structural deformity of thoracic cage like: Scoliosis, Kyphosis, Kypho-Scoliosis, Pigeons chest
- Major medical illness or deformity
- Evidence of grossly enlarged tonsils and adenoids.
- Acute upper and lower respiratory tract infection within seven days of the study.
- Chronic respiratory diseases like – Chronic bronchitis, Bronchial asthma
- Allergic diseases.
- Any known cardiac disease
- Anaemia
- Those having family history of Asthma in first degree relatives

Age was recorded in years. Arm span was measured in cms. With upper extremities spread out laterally, as distance between tip of middle finger of one hand to another. PEFR was obtained with the help of standard "Wright" peak flow meter in the sitting position. Multiple and partial "Bivariate" prediction equation was obtained to predict PEFR from arm span using the formula, Y= a+bx

3. Results

Mean values of arm span and PEFR with standard deviation are given in table I while statistical analysis between arm span & PEFR is given in Table II Coefficient of correlation between arm span and PEFR is given in Table III.

Table I: Mean values of armspan and PEFR

Group	No. of Children	Age in years	Arm span (cm.)	PEFR(L/Min)
I	100	8-9	Mean 120.96 SD 5.04	183.00 26.42
II	100	9-10	Mean 128.00 SD 5.01	210.20 21.00
III	100	10-11	Mean 133.90 SD 5.81	250.00 39.01
IV	100	11-12	Mean 142.46 SD 7.50	305.00 49.01

Table II: Statistical Analysis

Group	PEFR	ARMSPAN
I vs II	HS	HS
II vs III	HS	HS
III vs IV	HS	HS

HS- highly Significant (P<0.01)

Table III: Coefficient Correlation (r) between arm span and PEFR

Spirometric Function	Coefficient Correlation with arm span
PEFR	0.858**

****=P<0.01**

PEFR= Peak expiratory flow rate.

The "Bivariate" prediction formula to predict PEFR from armspan is

PEFR(L/min)= -310.06+4.10 x armspan (cm)

7. Discussion

Normal values of pulmonary functions are affected by various factors like physical activity, environmental conditions and altitude of living[15], ethnic variations[16] and physical characteristic like age, height, weight, arm span and sex[7,17]. It was observed in the present study that there was a gradual parallel progressive increase in the magnitude of arm span and PEFR per year increase in age in children from 8 to 12 years of age. In the present study there was an increase in arm span in children as the age advanced. Our observations that there was a linear relationship between the spirometric functions like PEFR and physical characteristics like arm span were similar to the studies reported earlier [2,8,12]. The PEFR values increased with increase in age and arm span. The results of analysis of variance showed that PEFR values were significantly associated with arm span of children ($p< 0.01$). These observation were similar to the studies reported earlier [2,8,12,18,19]. In the present study the correlation between arm span and lung function test parameters (PEFR) were calculated. Highly significant positive correlation ($p<0.01$) was observed between arm span and PEFR. These observation were similar to the previous studies [12,18,19]. Multiple and partial "Bivariate" prediction equation was obtained to predict PEFR from arm span using the formula Y= a+b x The equation is,

PEFR (L/min) = -310.06+4.10 X arm span (cms)

Values of PEFR observed in the present study are in close agreement with the values reported by Chowgule *et al*[8], Shamssain[19] and Nairn *et al*[20]. Lower values are reported by Rivera *et al*[21], Godfray *et al*[22], however higher values of PEFR are reported by Veerana *et al*[23], Dikshit *et al*[24], Taksande *et al*[25], Doctor *et al*[26], Chhabra *et al*[27]. The differences in values may be due to difference in physical parameter, physical activity, environmental condition, ethnic variation, socio economic status etc [7,15-17].

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