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A STUDY OF DYNAMIC LUNG FUNCTIONS IN CHILDREN AND ADOLESCENTS IN WESTERN ODISHA

Rajiv Kumar Nanda, Associate Professor Department of Physiology, VIMSAR, Burla. Dist- Sambalpur, State- Odisha, India, Pin-768017

Sanjeev Satpathy* Assistant Professor, Department of Physiology, VIMSAR, BURLA, Dist- Sambalpur, State- Odisha, India, Pin-768017.*Corresponding Author

ABSTRACT

Burla is a small town in Western Odisha in the district of Sambalpur. It has large number of sporadic cases of bronchial asthma, mostly in younger age groups. The following study was done to find out the reason for such occurrence here. PFT has been used as an important diagnostic tool to find out various pulmonary conditions. 72 boys from Government High School, Burla were taken and PFT done on them by Spirometer to detect the various dynamic lung functions like Forced Expiratory Volume in 1 second (FEV1), Vital capacities(VC), Peak Expiratory Flow Rate(PEFR) and Maximum Voluntary Ventilation(MVV). All the parameters studied gave lower values in comparison to the studies done on children of same age groups on other parts of the country and also Western countries. Children in this area have some weakness in ventilatory efficiencies which can be attributed to inadequate nutrition and environmental factors.

INTRODUCTION

Burla, a small town in Western Odisha, at the bank of river Mahanadi, near Sambalpur, has a lot of sporadic cases of bronchial asthma. Mostly children and adolescent groups are affected. Many medical and engineering students, after joining their respective colleges in Burla, too develop asthma.

The study was done to analyze the various dynamic lung function tests in children and adolescents here so that we can have an idea of their pulmonary conditions which will help us to understand the reason for these young mass developing bronchial asthma.

MATERIAL & METHOD

The present study was conducted in PG Dept of Physiolody, VIMSAR, Burla from June 2017 to Feb 2018 after receiving permission from Institutional Ethical Committee. The cases for the study were selected from Government High School, Burla. 72 boy students of age group 10 to 15 years were chosen. The children included were from average socio-economic status, free from any acute infections and had no history of cardio-pulmonary diseases, smoking or physical abnormality of chest wall.

The age, height and weight of the students were noted. The dynamic lung function tests done were Forced Expiratory Volume in 1 second(FEV1),Forced Vital Capacity(FVC), Maximum Voluntary Ventillation(MVV) and Peak Expiratioy Flow Rate(PEFR). The instrument used was Inco-Benedict Roth Spirometer to record FEV1, FVC and MVV. Mini-Wright's Peak flow meter was used to record PEFR.

Mean and Standard Deviations were calculated for all the parameters. Statistical analysis was done by the help of Windows Excel 2007 software.

Findings-

The following results were obtained from this study-

Table 1- Values obtained of the different parameters taken

SL. NO.	PARAMETER	MEAN	STD DEV
1	FEV1	96.26	9.21
2	FVC(ML)	1627	340.82
3	MVV	96.27	12.42
4	PEFR (LIT/MIN)	335.76	75.38

Table 2- PEFR is done in relation to age in years

AGE IN YRS	NO. OF STUDENTS	PEFR (MEAN)	SD(±)
10	11	246.36	26.48
11	09	264.44	38.76
12	12	330.83	38.09
13	14	338.92	53.21
14	16	376.87	53.38
15	10	433.00	37.72

Table 3- PEFR in relation to Height.

HEIGHT(IN CM)	NO. OF STUDENTS	PEFR(MEAN IN LIT/MIN)	SD(±)
116-125	4	272.50	42.72
126-135	12	265.00	63.46
136-145	23	313.47	50.05
146-155	24	389.37	54.49
156-165	4	412.50	62.92
166-175	3	393.33	45.09

TABLE – 4: PEFR IN Lit/Min in relation to body surface area in m2.

BODY SURFACE AREA	NO. OF STUDENTS	PEFR(MEAN IN LIT/MIN)	SD(±)
0.81-0.90	9	247.77	50.09
0.91-1.00	13	277.69	29.48
1.01-1.10	11	344.54	65.93
1.11-1.20	10	356.00	40.60
1.21-1.30	16	380.31	53.80
1.31-1.40	8	401.25	68.12
1.41-1.50	2	445.00	77.78
1.51-1.60	1	440.00	

TABLE 5- PEFR in lit/min in relation to body weight in Kg.

WEIGHT(KG)	NO. OF STUDENTS	PEFR(MEAN IN LIT/MIN)	SD(±)
16-20	7	245.71	51.59
21-25	17	274.11	39.69
26-30	11	366.36	52.96
31-35	12	337.91	57.73
36-40	13	381.53	62.82
41-45	6	411.66	50.76
46-50	2	470.00	42.42

Table-6: MVV in relation to age

AGE (Yrs)	NUMBER OF STUDENTS	MVV(Mean in Lit/min)	SD(±)
10	11	81.09	7.04
11	9	85.11	6.88
12	12	89.5	12.44
13	14	83.85	7.38
14	16	107.12	10.44
15	10	129.60	12.68

DISCUSSION

Bronchial asthma is a variant of Obstructive Lung Disease. The present study was under taken on 72 boys between the age group 10 to 15 years belonging to mid socio economical status of this zone.

FEV1 is important to distinguish obstructive disease of Respiratory system. FEV1 was best correlated with height 1. The present study shows that the average FEV1 was 96.26%(Table-1). Engstrom et al2 reported average FEV1 as 84.5% in male children. They had also found the range of FEV1 to be 62.5% to 97.2% in the age group of 6-16 years. Lyons et al3 found that FEV1 was never below 86.4%. In our study, we found that 62.4% of boys expired 100% of vital capacity in one second. Our findings are similar to that of Engtrom et al2, Utell et al4 and Lyons et al[3].

The FVC in the age group of 10-15 years was found to be 1627ml(Table-1). These values are comparable to other Indian workers, Singh and Prabhakaran10 who worked on 111 children of age 4-16 years and reported vital capacity as 1725ml. the vital capacity value in the present study was on the lower side as compared to the other workers from Western countries and other parts of India.

The mean PEFR was found to be 335.76 L/min(table-1). PEFR in relation to height as in Table no.3 and Fig2. Is comparable to the work of Nairn et al5 and Murray & Cook6. It is best correlated with age, BSA, weight and height. In a similar study by Ferris and Smith7, PEFR is best correlated with height.

In the present study mean values for MVV was found to be 97.27L/min. It is seen that the values are comparable to Bhattacharya and Utell4. Godfrey et al8 and Levitzky et al9 in their respective studies found it to be higher.

The reason for their higher values may be the more developed chest wall in western children and the lesser values in this area is due to poor nutritional status or there may be some environmental factors which predispose recurrent respiratory tract infections.

CONCLUSION

Despite enormous medical literatures relating to pulmonary function tests in children, in various journals and text books, the current study was attempted to set a standard for our laboratory. This study equally attributes to the increased geographical distribution of respiratory disease in this zone of the state. All the findings in this study are towards the lower side when compared with other Indian workers. So it is assumed that the environment in this zone has some effect on it. Clinicians and other workers from preventive medicines can use this data to find out the cause for this lower values and necessary preventive measures which will protect the people of this area from the suffering of bronchial asthma.

Conflict of interest- Nil
Source of funding- Self
Ethical clearance- The study was conducted in the Department of Physiology after receiving approval from the Institutional Ethics Committee of VIMSAR, Burla, Sambalpur University.

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