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PEAK EXPIRATORY FLOW RATE IN ADOLESCENT MALE SWIMMERS OF ALL INDIA RURAL SWIMMING MEET

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Abstract : Peak expiratory flow rate (PEFR), an important test to assess overall lung function, was determined in 84 male adolescent subjects, out of which there were 46 and 38 nonswimmers (NS). Their ages varied between 9 to 15 year. It was observed that a significant spurt in PEFR value occurs in S at the age of 12 years.

A similar spurt in growth (height & weight) in S, not so apparent in NS, was also observed at the same age period. The enhanced growth was recorded in S at all age groups in comparison with those of NS. It was further observed that with increase of height, the PEFR also increased in both the groups however significant by higher values ($P<0.05$) were obtained in S, as compareed with NS having the same height.

Key words : PEFR expiratory flow rate sports physiology swimming

INTRODUCTION

The overall ventilatory lung function can be assessed in field situations by determination of peak expiratory flow rate (PEFR). Although PEFR data for Indian population is available, there is still scope to add more observations to it (1-4). However, the PEFR data on sportsmen and women of our country which are available, are not sufficient (5, 6). Such data exclusively on adolescent swimmers, are not available. The present study was therefore, undertaken to assess in such subjects whether swimming training produces any effects on the lung function as determined by PEFR, and also on their physical growth. Individual factors like height, weight, age, muscle strength, airway resistance, lung recoil, body fat content etc affect the PEFR and so these were also taken into consideration (2, 7, 8).

METHODS

A total of 84 adolescent male subjects, consisting of swimmers (s) n 46, and non-swimmer (NS) n 38, with ages varying between 10-15 years chosen randomly were included in this study. They were all from middle class families. The S were taken from amongst the participants of the All India Rural Swimming Meet. The NS were all healthy students who did not take part in competitive sports and mostly used to be busy in studies and occasional casual sports. The various parameters recorded were age, height and weight. Their PEFR was measured with the help of Wrights peak flow meter (Clements Clarke International, England), and the best of the three readings was noted and presented in BTPS.

RESULTS

These are summarised in Tables I and II.

In Table I, the agewise distribution of height, weight and PEFR of both the groups (S & NS) are presented. In Table II, their heightwise distribution is presented. The PEFR in NS was noted to be significantly ($P<0.001$) different between the ages of 12 and 13 y. On the other hand in the swimmers, the PEFR was significantly ($P<0.01$) different as compared with age groups below this age. At this age, the height and weight of swimmers also showed significant difference ($P<0.001$ and <00.01 respectively).

TABLE I : Data of adolescent Swimmers (S), n 46 and Non-Swimmers (NS) n 38; Mean ± SD.

Age (y)	Number of subjects		Height (in cm)		Weight (in kg)		Peak Expiratory Flow Rate (l/min)	
	S	NS	S	NS	S	NS	S	NS
Below 12	6	7	137.75 9.12	140.43 10.71	29.16 6.87	30.50 9.35	314.17 63.20	313.00 44.82
12	6	9	158.25** 7.72	144.50 9.09	41.50** 7.18	30.39 5.35	411.67*** 59.47	298.78 23.15
13	10	15	152.05 ,8.05	147.93 6.37	38.90* 6.87	34.03 4.72	404.00 113.82	359.73 58.71
14	12	4	157.37 8.60	152.12 12.70	42.54 8.18	35.62 10.55	425.42 81.34	343.00 79.17
15	12	3	160.54 8.34	156.33 4.04	46.67 8.28	41.17 6.33	450.83 75.58	414.33 39.83
	46	38	Significance shown between swimmers and non-swimmers.					

TABLE II : Heightwise distribution of PEFR data in S and NS; Mean ± SD.

Height distribution (cm)	Number of subjects		Height (in cm)		Weight (in kg)		PEFR (l/min)	
	S	NS	S	NS	S	NS	S	NS
<150	14	25	141.61 6.86	142.14 6.41	30.75 4.27	29.62 4.23	319.64 52.60	317.96 35.73
Between 150-160	18	11	155.12*** 3.37	154.86*** 3.45	40.73*** 4.56	39.18*** 5.51	427.65*** 83.14	366.09*
Above 160	14	2	166.00*** 4.01	—	50.61*** 5.43	—	482.50* 46.81	—
	46	38	Significance shown between the groups of swimmers and between the groups of non-swimmers *P<0.05; **P<0.01; ***P<0.001					

When the NS and S subjects were grouped according to heights (a) <150 cm (b) between 150-160 cm and (c) >160 cm, the NS group showed a significant difference (P<.05) in PEFR values between two groups of ht <150 cm and between 150-160 cm. Further, their difference in weight was also significant (P<0.001). The similar comparison in S group had shown significantly higher PEFR between the subjects of having ht <150 cm and between 150-160 cm as well as between 150-160 cm and >160 cm group (P<0.001 and <0.05 respectively).

While comparing the subjects of S and NS at various age groups, it was observed that at the age 12, PEFR was signicfcantly higher (P<0.001) in S than NS, alongwith a significant increase in height and weight (P<0.01). In other age groups, the PEFR was not significiantly different between S and NS.

DISCUSSION

During the adolescence period thought the height and weight in NS group showed an increasing trend, but the age group sequential data (i.e. height and weight) were not significantly different. However, in the S group significant increase in height and weight (Table I) was observed at the age of 12. Such growth spurt at the onset of adolescence in S was probably due to the effect of training (8-10). Further, in this study only 2 subjects in NS and 14 subjects in S increased their height to more than 161 cm, indicating higher percentage of tall adolescents in S than NS. The value of PEFR in NS was observed to be significantly (P<0.001) increased of at 13y. However, significant

rise ($P < 0.01$) in PEFR in the S group occured at the age of 12 y. It might therefore, be presumed that swimming training produces a spurt in lung functions one year earlier, alongwith an earlier sprut in physical growth.

The PEFR reported by Malik et al (1) for NS of ages between 15-19y was comparable with the NS subjects of the present series, though the subjects of their study (1) were taller.

PEFR data of the elite swimmers of higher age groups is much higher than what was observed in the present study (10). The swimmer competitors (17-30 y) of South Asian Federation Games had much higher values than in the present group (8).

In conclusion, it is observed that the swimming training results in earlier onset of adolescent growth spurt, and better PEFR values depicting higher lung functions.

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