International Journal of Behavioral Social and Movement Sciences

Volume 02, Issue 04, Oct-Dec 2011 | ISSN: 2277-7547 | www.ijobsms.org

Development of Aerobic and Anaerobic Motor Abilities among 10 to 14 Years Boys

Pintu Sil

Assistant Professor, Government College of Physical Education for Women, Dinhata, Cooch Behar, West Bengal, India

Abstract: The aerobic fitness may be defined as the result of a physiologic capacity of the individual to sustain movement over a period of time. The anaerobic ability is the capacity to perform work, which is usually short term in nature, without presence of sufficient oxygen. Present study is concerned with the development pattern of aerobic and anaerobic fitness among preadolescent boys. Total 500 boys were selected randomly from different schools of CoochBehar district for the present study. The range of age of the school boys were from 10 years to 14 years. Cardiovascular endurance and strength endurance were considered to assess aerobic motor ability and running speed and explosive strength were considered to assess anaerobic motor ability. Standard tests were used to measure the performance for all motor abilities. Multiple group design was adopted and five independent groups were formed according to the age of the boys. Total five hundred boys were stratified in equal five age groups and each age group included 100 boys. Mean and SD were used as descriptive statistics and to assess the age trend development of motor abilities ANOVA was used in this study. To find the exact location of difference LSD was used as post hoc test. Result revealed that all aerobic and anaerobic ability increased as the age increases from 10 to 14 years. Peak velocity of development occurred at 11-12 years for CVE and speed but for explosive strength and strength endurance peak velocity of development took place at 12-13 years age for the present subjects.

Key Words: *Aerobic Ability, Anaerobic Ability and Development.*

Introduction:

The study of growth and development of childhood and adolescence is one of the important areas in education as well as physical education. The term ‘development’ stands for the overall changes occurring in both the quantitative and qualitative aspects of an individual. In

this study, the term 'development' is used to indicate improvement in performance. The aerobic fitness may be defined as the result of a physiologic capacity of the individual to sustain movement over a period of time. This kind of ability associated with circulatory-respiratory systems is characterized by a physiological fitness and is related to the phenomenon of 'wind'. In this instance, exercise is carried on with sufficient duration and intensity to place stress on the heart, circulatory-respiratory system to prolong action. Such endurance enables the individuals to sustain moderate contraction of the skeletal muscles over a comparatively long period of time. The anaerobic ability is the capacity to perform work, which is usually short term in nature, without presence of sufficient oxygen. The source of energy of these type activities are mainly ATP-PC and lactic acid system. Short distance run standing, broad jump etc. are the example of such type of activities. Physical education teachers and professionals must be acquainted with the nature of development of such fitness among school going boys. Several studies have been conducted to understand the developmental pattern of this aerobic and anaerobic fitness among children and school going boys. Present study is concerned with the development pattern of aerobic and anaerobic fitness among school boys. Findings will be helpful for the physical education teachers and coaches to plan educational curriculum as well as sports training schedule for the school level athletes. The purpose of the study is to understand the pattern of the development of aerobic and anaerobic fitness in respect to age of high school boys.

Metirials and Methods:

Total 500 boys were selected randomly from different schools of CoochBehar district for the present study. The range of age of the school boys were from 10 years to 14 years. All the students selected for this study were from lower income group.

The criterion measure for the present project was aerobic ability and anaerobic ability. Cardiovascular endurance and strength endurance were measured to assess aerobic motor ability and running speed and explosive strength were considered to assess anaerobic motor ability.

AAHPERD Health Related Fitness Test (AAHPERD, 1984) was used to assess Cardio Vascular Endurance and strength endurance [1]. AAHPER Youth Fitness Test (AAHPER, 1976) was used to assess running speed and explosive strength of the subjects in the present study.

Multiple group design was adopted and five independent groups were formed according to

the age of the boys. Total five hundred boys were stratified in equal five age groups and each age group included 100 boys. Mean and SD of each motor abilities were computed for each age group i.e. 10years, 11years, 12 years, 13years, and 14 years and ANOVA was administered to find out the effect of age on motor ability development. To find out the exact location of the difference between means LSD was used as post hoc test. All statistical calculations were done by using standard statistical software (SPSS).

Results and Discussion:

The mean value and standard deviation of different motor abilities have been presented in Table-1. Table-1 indicated that that the mean values of all components were different for different age groups. In order to find out effect of age on development of motor abilities ANOVA was administered and details result is presented in Table-2. From Table-2 it is found that the F-value was statistically significant for all selected motor abilities. Exact location of the difference between means was computed by Least Significance Difference (LSD) method and results are presented in Table-3.

Table-1: The Mean Score and SD of Performance of Different Motor Abilities of Each Age Group

Motor abilities	10years	11years	12years	13years	14years
Cardiovascular Endurance (CVE)	1533.71 ±213.18	1621.94 ±198.18	1653.64 ±316.76	1646.01 ±269.99	1704.08 ±300.08
Strength-endurance	17.64 ±6.67	18.41 ±7.78	19.38 ±7.33	21.38 ±7.13	21.67 ±5.78
Speed	8.87 ±0.69	8.47 ±0.74	8.07 ±0.60	7.84 ±0.79	7.80 ±0.75
Explosive strength	136.11 ±17.45	139.12 ±34.55	151.82 ±32.94	164.81 ±24.80	177.56 ±25.80

Table-2: Computed F-Value and P-values for Different Motor Abilities

Motor Abilities	F-Value	P-Value
CVE	5.611**	.000
Strength-endurance	6.541**	.000
Speed	39.92**	.000
Explosive strength	39.389**	.000

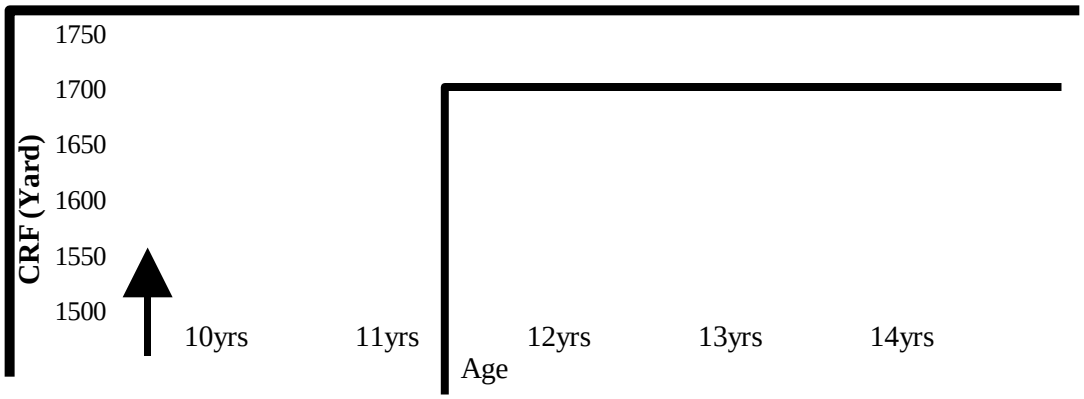
* Significant at both 0.05 and 0.01 level

Table-3: LSD of Motor Abilities for Different Age Group

Motor Abilities	10–11 Years	11–12 Years	12–13 Years	13–14 Years
CRF	88.23*	31.69	7.63	58.07
Strength-Endurance	0.77	0.97	2.00*	0.29
Speed	0.40*	0.40*	0.23*	0.04
Explosive Strength	3.01	12.69*	12.99*	12.75*

* Significant at both 0.05 level

List of Figures:



Figure–1: Cardio-Respiratory Fitness (CRF) among Different Age Groups of Boys

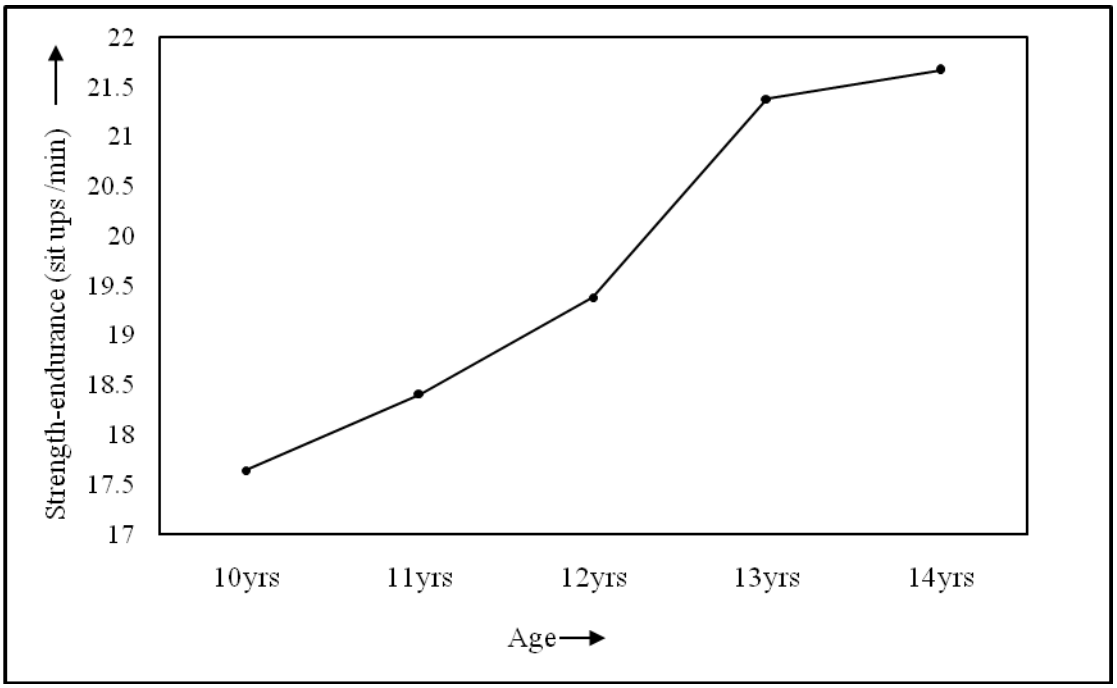


Figure-2: Strength-endurance for different age groups of the present boys

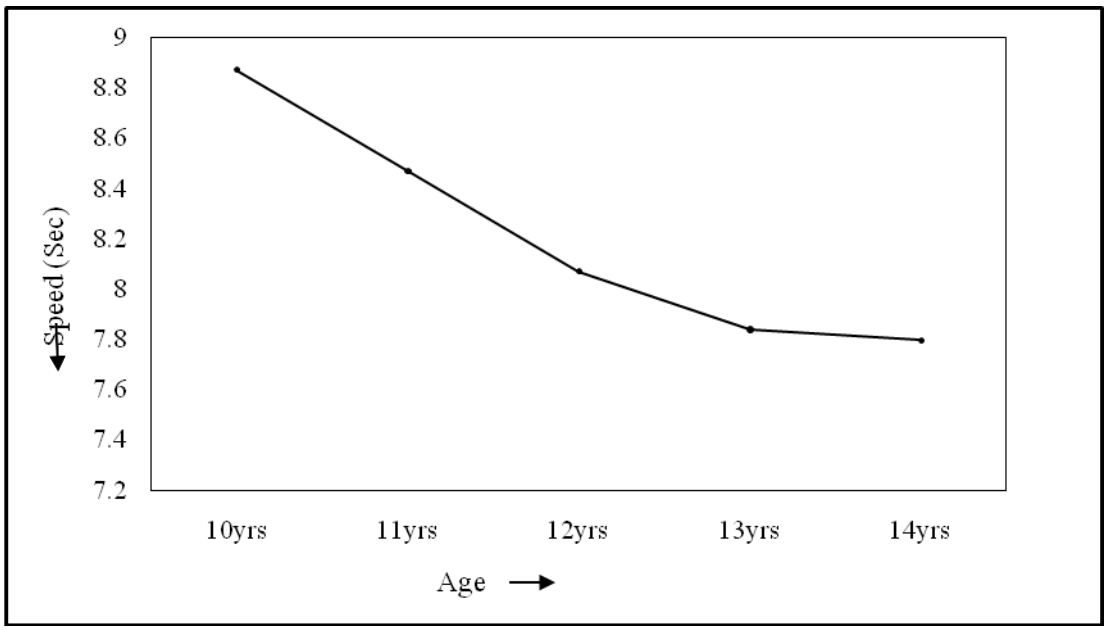


Figure-3: Speed for different age groups of the present boy

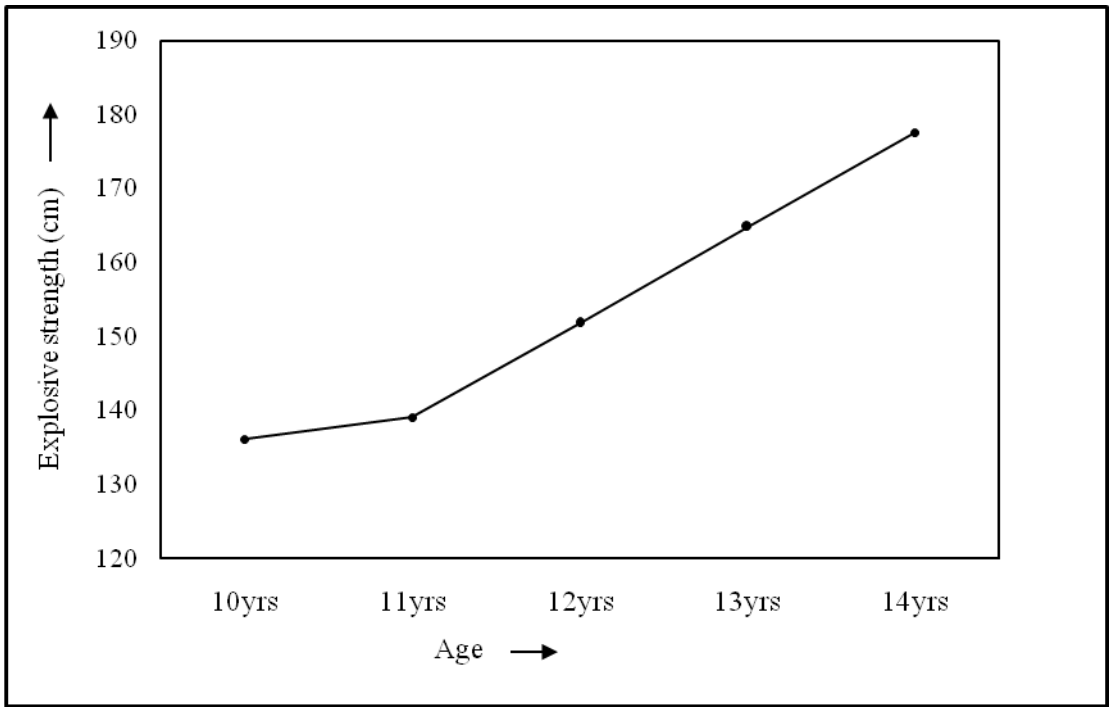


Figure-4: Explosive strength for different age groups of the present boys

Development of aerobic motor abilities as age increased is presented in Figure-1 and Figure-2. Figure-1 shows that the cardio vascular endurance (CVE) increased as the age of the boys increased from 10 to 14 years for the present subjects. This ability found improved for 10 – 11 years, 11 – 12 years and again for 13 – 14 years but slightly decreased in 12 – 13 years age. Similar finding was reported by the studies conducted for American urban children

(Chatrath et al. 2002); for Panjabi boys of India (Dutt, 2005) and for Hungarian boys (Eiben, Barabas and Nemeth, 2005). Improvement in this parameter as age increased also reported for the same aged boys of Kerala in a survey work done by Kerala State Sports Council, 2009. Similar increasing trend in this aerobic capacity for Manipur boys was reported by Singh, 2010. Peak velocity of increase in this parameter was found for 10 – 11 years age for present subjects.

Strength endurance was also increased as the age of the present boys grew from 10 to 14 years. Figure-2 shows that strength endurance increased constantly but with different rate. Peak velocity of increase was observed in this parameter for 12 – 13 years age for present subjects and rate of increase for 10 to 13 years was comparatively higher than the 13 – 14 years. Sit ups measure the strength-endurance of abdominal group of muscles and grip strength includes the muscles of lower and upper limb. With the increase in age the strength and aerobic capacity of these muscles increases with greater rate. Findings were similar with the other studies conducted by Dutt, (2005), Gukhar and Malik, (1999). Eiben, Barabas and Nemeth (2005) also found that after early childhood performance in muscular endurance increased gradually with age. Continues increasing trend of strength endurance with growing age was also reported for the school boys of Kerala (Kerala State Sports Council, 2009).

The anaerobic motor ability-speed improved continuously from 10 – 14 years for present subjects and has been shown graphically in Figure-3. Figure-3 shows that the speed was improved with higher rate for 10 to 13 years and after then with slower rate for 13 – 14 years. Peak velocity of improvement was found at 10 to 12 years age for speed in this study. Trend of improvement of these motor ability parameters with different rate was similar with the results of the study conducted by Konar (2010) for urban Bengali boys of West Bengal, Singh (2010) for Manipur boys and Shang et al. (2010) for Chinese boys. Improvement in this parameter in terms of velocity was reported for older age than the younger counterpart by Milanese et al. (2010).

Explosive strength was considered another anaerobic motor ability in this study. As per results mean values for different age groups for explosive strength increased continuously from 10 to 14 years in present study with different rate. Figure-4 shows that explosive strength increased with slower rate in 10 – 11 years age span and after that it increased rapidly with higher rate from 11 to 14 years. Peak velocity of increase in explosive strength for the present boys was noticed in 12 – 13 years age span. Overall trend of increase in this parameter as age grew was reported by Singh (2010) for Manipur boys, Konar (2010) for

urban Bengali boys of West Bengal, Shang et al. (2010) for Chinese boys. Milanese et al. (2010) also found higher mean value of standing broad jump for 10 to 12 years age group than their younger counterpart.

Performance of aerobic and anaerobic motor abilities improved as age grew from 10 to 14 years might be due to the adolescents' growth. As the height and weight increases the boys enter into adolescent phase and different physiological changes took place in their body. Specially muscular development and its associated structures like tendons, ligaments etc. lead to more gain in the flexibility; larger size of the heart, more amount of blood etc. which is more helpful to achieve greater muscular endurance and cardio vascular endurance during the this adolescents growth. With this, maturation of neuron also plays an important role for the increase of these aerobic motor abilities in growth process. Increase in CVE as the age grew might also be due to the fact that peak increase in leg and arm length of the present boys occurred in this age which in other way were more helpful to increase stride length of the boys. This increase in stride length was main thing to cover more distance in less time. Heyward and Stolarczyk (1996) reported a low body fat while a large muscle mass was important for strength and power activities. As the boys of this age gain proportionately greater muscular and skeletal masses which may provide better mechanical efficiency in performing anaerobic motor activities like speed, and explosive strength.

References:

1. AAHPER (1976), AAHPER Youth Fitness Manual: American Alliance of Health, Physical Education and Recreation, Washington, D.C.
2. AAHPERD (1984), AAHPERD Health related physical fitness test technical manual: American Alliance of Health, Physical Education and Recreation and Dance, Reston, Virginia. pp 23-32.
3. Chatrath, R. Shenoy, R. Serratto, M. and Thoele, D.G: (2002), Physical Fitness of Urban American Children, Pediatric cardiology, 23(6), pp: 608-612.
4. Dutt, S. (2005), Health Related Fitness of boys aged 8 to 18 years, Journal of Exercise Science and Physiotherapy, 1(1 & 2), 12-22.
5. Eiben, O.G. Barabas, A. and Nemeth, A. (2005), Comparison of Growth, Maturation and Physical Fitness of Hungarian Urban and Rural Boys and Girls, J. Hum. Ecol., Vol.17, No.2, pp: 93-100.
6. Eiben, O.G. Barabas, A. and Nemeth, A. (2005), Comparison of Growth, Maturation and Physical Fitness of Hungarian Urban and Rural Boys and Girls, J. Hum. Ecol.,

Vol.17, No.2, pp: 93-100.

7. Gukhar, I. and Malik, S.L. (1999), Physical fitness: age changes and sex differences among the Jats of Delhi, Anthropologist, Vol.1, No.1, pp: 37-57.
8. Hayward, V. H. and Stolarczyk, L. M. (1996), Applied body composition, Champaign, I. L: Human Kinetics, pp.143-144.
9. Kerala State Sports Council, Kerala Total Physical Fitness Programme Test results-2008: report to the Govt. (2009): http://www.tpfp.org
10. Konar, S. (2010), Longitudinal Study of Growth Status and Motor Fitness of High School Urban Boys, Doctoral Thesis, University of kalyani, Nadia, West Bengal.
11. Milanese, C. Bortolami, O. Bertucco, M. Verlato, G. and Zancanaro, C. (2010), Anthropometry and Motor fitness in children aged 6-12 years, Jurnal of Human Sporta and Exercise, Vol. 5, No. 2; pp: 265-279.
12. Shang, X. Liu, A. Li, Y. Hu, X. Du, L. Ma, J. Xu, G. Li, Y. Guo, H. and Ma, G. (2010), The
13. Association of Weight Status with Physical Fitness among Chinese Children, International Journal of Pediatrics, Vol.2010, Article ID 515414, pp: 1-6.
14. Singh, L. D. (2010), Bio-Motor Performance of the Meitei Boys of Manipur, J Hum Ecol, Vol.29, No.3; pp: 159-164.