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Effect of selected aerobic and anaerobic training on selected fitness components of young athletes

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Abstract

The purpose of the study is to investigate the effect of selected aerobic and anaerobic training on speed among young athletes from Palta Training Centre (Athletics), West Bengal, India. To facilitate this study there were twenty (N=20) athletes of them ten (n=10) male and ten (n=10) female athletes were randomly selected from Palta Training Centre (Athletics), West Bengal, India ranging in age 15-20 years. Data were collected pre and post selective aerobic and anaerobic training on speed by administering 50 m dash, on strength by administering standing broad jump (lower body) and overhead back throw (4 Kg shotput, upper body strength), on agility by administering T-test, on endurance by administering bleep test (15m) and flexibility by administering v-sit reach test recorded manually. The data were tested for statistical significance by computation of independent t ratios. The analysis has shown significant difference in the pre and post-tests at 0.05 level of significance. Based on the findings of the study following conclusion was drawn that there was a significant difference when the records from the pre and post-test were compared among the young athletes.

Keywords: Aerobic, anaerobic, speed, strength, agility, endurance, flexibility, independent 't' test

Introduction

Given the importance of sprinting in most sports, development of Locomotor movement skills in childhood should be a priority. It has been suggested that this could be achieved with tailored physical education programs and modification of social and physical environments. Coordination patterns may also need to be reinforced throughout adolescence when body dimensions are rapidly changing. Children improved sprint performance around the time of peak height velocity (PHV).

Speed like strength and endurance, is a conditional ability. It has complex nature as it depends to a considerable extent on the central nervous system. Due to this fact the exact nature of speed ability is difficult to discover and understand. Moreover, because we can influence the functioning of central nervous system only to a very limited extent, therefore, speed performances cannot be improved to considerable extent as is the case of strength and endurance. Besides there is high role of co-ordination ability and has to be done with specific means and methods. Speed ability can be defined as the mechanical speed which is equal to the distance covered per unit time. Speed ability primarily signifies the ability to execute motor movements with high speed. These movement could be cyclic or acyclic in nature. From general point of view there are five speed abilities:

Reaction ability: it is the ability to react effectively and quickly to a signal (visual, tactical, acoustic).

Movement speed: it is the ability to perform a single movement in minimum of time. High relevant in acyclic sports. In acyclic sports movement speed is very closely bound with technique and tactics. But it generally depends heavily on explosive strength and technique further flexibility.

Acceleration ability: it is the ability to achieve high speed of locomotion from stationary position or from a slow-moving position. The ability depends greatly on explosive strength, technique and movement frequency. Locomotor ability: it is the ability to maintain maximum speed of locomotion for maximum possible distance or duration. The ability highly depends on mobility of the nervous system and further on technique, ability to relax, flexibility and explosive strength. Trainability is low of this ability.

Speed endurance: it is the ability to do speed movements under the condition of fatigue. It is combination of speed and endurance abilities. In cyclic sports the ability requires rapid movement in spite of accumulation of fatigue but in acyclic sports under accumulation of fatigue. Dependent factors are anaerobic capacity, technique and psychic factors.

Strength is a conditional ability; it depends largely upon the energy liberation processes in the muscles. All movement occurs due to muscle contraction and thus is a crucial part of fitness components of sports. Strength is the ability to overcome resistance or act against resistance.

Maximum strength is a motor ability involving force application in voluntary movement stimulated electrically.

Explosive strength is a combination of speed and strength abilities. It is defined as ability to overcome resistance with speed. Depending on the combination of strength and speed the explosive strength is sub-divided into:

Start strength, is the ability to develop maximal muscle force during the starting phase of movement e.g., Sprint start.

Strength speed is to overcome high resistance with high speed e.g., throws and jumps.

Speed strength is the ability to overcome low resistance with high speed. **Strength endurance** is the ability to overcome resistance or act against one under fatigue. Depending on the nature of combination:

Strength endurance is the ability to overcome high resistance or act against it under fatigue e.g., long duration events. **Endurance strength** is same with low resistance e.g., race walk.

Agility or nimbleness is an ability to change the body's position efficiently, and requires the integration of isolated movement skills using a combination of balance, coordination, speed, reflexes, strength and endurance. Agility is the ability to change the direction of the body in an efficient and effective manner and to achieve this requires a combination of:

Balance – the ability to maintain equilibrium when stationary or moving (i.e., not to fall over) through the coordinated actions of our sensory functions (eyes, ears and the proprioceptive organs in our joints)

Static balance – the ability to retain the centre of mass above the base of support in a stationary position;

Dynamic balance – the ability to maintain balance with body movement;

Speed - the ability to move all or part of the body quickly;

Strength - the ability of a muscle or muscle group to overcome a resistance; and lastly,

Coordination – the ability to control the movement of the body in cooperation with the body's sensory functions (e.g., in catching a ball [ball, hand, and eye coordination]).

In sports, agility is often defined in terms of an individual sport, due to it being an integration of many components each used differently (specific to all of sorts of different sports).

Endurance, like strength, is a conditional ability. It is primarily determined by energy liberation processes. The ability of the human body to maintain a certain level of energy production forms the physiological basis of endurance.

On basis of nature of activity

Basic endurance: it is the ability to do movement involving large number of muscle groups, at a slow pace (below anaerobic threshold) for prolonged period. The energy is predominantly supplied by aerobic process of energy liberation. Thus, also called aerobic endurance.

General endurance: it is the ability to do sports movement of general nature under condition of fatigue. it implies ability to

do various types of movements with higher or lower intensity for significantly long period of time. Since variation in intensity is there the energy liberation may be from aerobic, anaerobic or both metabolisms.

Specific endurance: this ability is to do sports movement of a particular sport according to its nature. Specific endurance is intricately combined with technical and tactical component of performance capacity.

On basis of duration of activity

Speed endurance: it is the ability required for cyclic activities lasting for more than 30 secs. The ability depends upon power and capacity of glycolactic mechanism of energy production. Thus, leads to high lactate production in turn fatigue. A good mobility of nervous system is prerequisite for speed endurance. In activities lasting for 20-22 secs, energy production is through alactacid metabolism (splitting ATP and CP). Example- 400m sprint

Sort time endurance: this ability for cyclic sports is for lasting from 45 secs to 2 mins. Energy production is a combination of glycolysis and oxidation. Amount of lactic acid concentration in the muscle and blood is high. Example- 800m sprint

Medium time endurance: the ability is required for cyclic activities lasting for 2-11 mins. Early in time around 3 mins both glycolysis and oxidation equally contribute in energy production but as the time increases glycolysis steadily decreases. Due to involvement of glycolysis high lactic acid is are produced. Example- 1500m, 3000m track events

Long-time endurance: it is the ability to continue activity for more than 11 mins. Contribution of glycolysis diminishes with time and oxidation of fatty acid increase steadily for activities lasting for 30 mins or more. Example- marathons

Flexibility is a motor ability which is not clearly a conditional or coordinative ability. It depends partly on energy liberation processes and partly on the coordinative processes of the CNS (Meinel and Schnabel 1987).

Flexibility is commonly mistaken as stretch ability, elasticity, suppleness, mobility etc. Flexibility is defined as the ability to execute movements with greater amplitude or range. Stretch ability and elasticity are the special qualities of the muscles and ligaments by which these can be stretched and can regain their normal length without adverse effect on tissue. Suppleness denotes the ability of a muscle to remain at a state of low tension. Mobility pertains to the degree of movement possible in different planes at a joint.

Flexibility is necessary prerequisite for maximal development of movement force and speed. It allows movements with minimum muscle tension and internal resistance. Quick acquisition of motor skills requires adequate level of flexibility. The stability of joints is optimum when its flexibility is optimum.

Passive flexibility: The ability to do movement with greater amplitude with external help. The flexibility is determined by the joint structure and stretch ability of the muscles and ligament.

Active flexibility: The ability to do movement with greater amplitude without external help. Active flexibility is further defined into static and dynamic. Static flexibility needs the person do movement without locomotion whereas dynamic flexibility requires movements with greater amplitude and locomotion.

In addition, general flexibility is for all important joints of the body and specific flexibility is for specific movement with greater amplitude.

Methodology

To achieve the purpose of this study on effect of selected aerobic and anaerobic training on selected components of fitness among young athletes from Palta Training Centre (Athletics), West Bengal, India; there were twenty (N=20) athletes of them ten (n=10) male and ten (n=10) female athletes randomly selected from Palta Training Centre (Athletics), West Bengal, India ranging in age 15-20 years to facilitate this study. Data were collected pre and post selective aerobic and anaerobic training by devising a battery of tests comprising of 50m dash (speed), Standing broad jump (lower body strength), Overhead back throw (4Kg Shot Put) (upper

body strength), T test (agility), Bleep test (15m) (endurance) and V-sit reach test (flexibility) recorded manually. The data were tested for statistical significance by computation of independent t ratios. The analysis has shown significant difference in the pre and post-tests at 0.05 level of significance.

Findings of the study

The comparison between the pre and post-test on the same group for the variable was statistically analysed using independent 't' test. The data appertained to the same is presented in Table 1.

Table 1: Descriptive statistics on the selected components of fitness

Variables	Sub-variables	N	Minimum	Maximum	Mean	Standard deviation	Paired t test*
50m Dash	Pre TIR	20	6.48	8.9	7.71	0.62	4.47
	Post TIR	20	6.58	8.8	7.69	0.56	
Standing broad jump	Pre TIR	20	1.63	2.52	2.07	0.25	6.87
	Post TIR	20	1.08	2.37	2.08	0.28	
Overhead throw	Pre TIR	20	3.44	12.18	6.87	2.04	3.29
	Post TIR	20	3.56	13.25	7.08	2.36	
T- Test	Pre TIR	20	9.8	15.09	11.41	1.29	4.14
	Post TIR	20	9.78	12.57	10.84	0.93	
VO2 max	Pre TIR	20	34.4	76.6	56.3	15.73	5.29
	Post TIR	20	36.8	78.5	62.77	10.85	
V-Sit test	Pre TIR	20	24	60	42.85	11.09	5.10
	Post TIR	20	25	63	42.90	12.93	

*Significant at 0.05 level, 't'.05(19) = 2.093

From the Table 1 the obtained independent 't' test values were greater than the tabulated value of 2.093 for 19 degrees of freedom at 0.05 level of confidence. It shows that there was

significant difference in the pre TIR and post TIR. Mean and standard deviation scores of the pre-test and post-test are depicted graphically in fig 1 and fig 2.

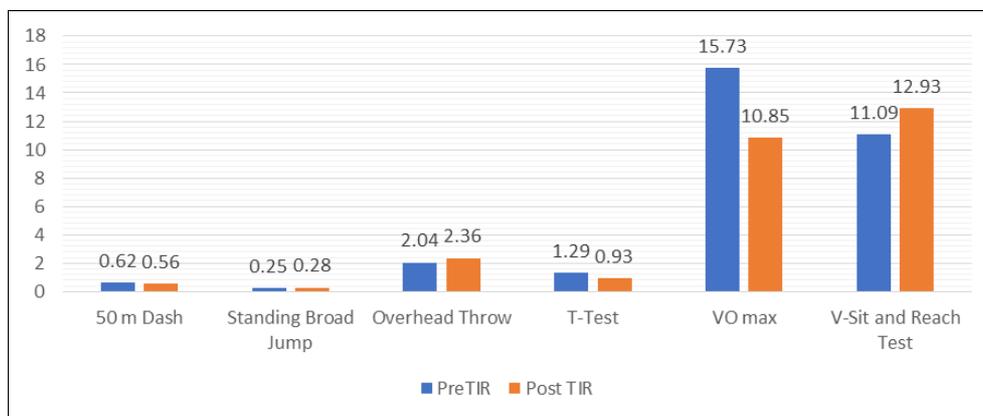


Fig 1: Graphical representation of Mean of the records in the test

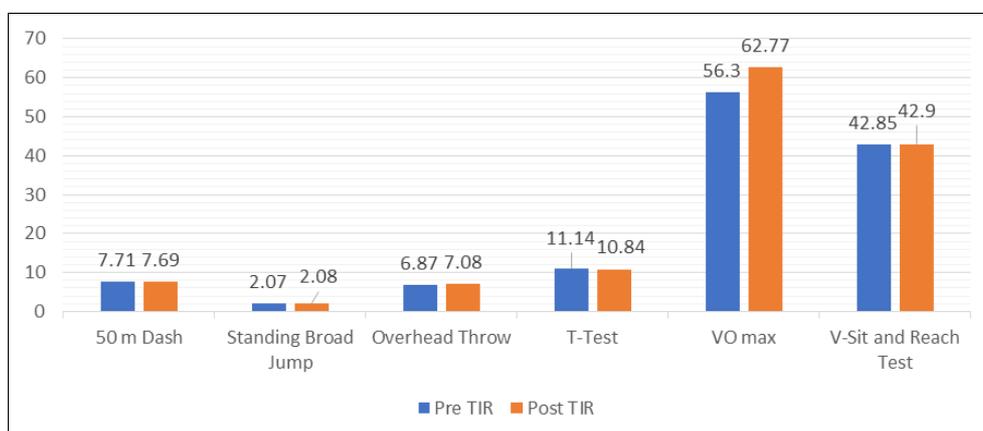


Fig 2: Graphical representation of standard deviation of the records in the test

The result of the study indicates that there was significant difference between the pre TIR and post TIR on the same group of athletes.

Conclusion

On the basis of the findings of the study the following conclusion was drawn that there was significant difference in the pre TIR and post TIR on the same group of athletes on the selected components of fitness in relevance to a training plan.

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