Research Paper Physical Education

Effects of Plyometric Training and Resistance Trainng on Specific Speed of Basketball Players

* Dr. Sagarika Bandyopadhyay ** Dr. Sentu Mitra *** Mr. Arup Gayen

* Associate Professor, Department of Physical Education, Visva-Bharati, Santiniketan, West Bengal, India

** Assistant Professor, AKPC Mahavidyalaya, Subhasnagar, Bengai, Hooghly, West Bengal. India

*** Rsearch Scholar, Department of Physical Education, Visva-Bharati, Santiniketan, West Bengal. India

ABSTRACT

The objective of the study was to find out the effects of Plyometric Training and Resistance Training on Specific Speed of Basketball Players. For the purpose of the study 60 male basketball players of West Bengal who had participated in various national/ inter-varsity/ state level tournaments in basketball were selected. Their age ranged from 18-23 years. Specific Speed was selected as a dependent variable and plyometric training and resistance Training was considered as Independent Variables. For the study pre test-post test randomized group design comprising of two experimental groups (n=20 in each group) namely plyometric training group (PT) and resistance training group (RT) and one active control group (n=20) were adopted. To test the Specific Speed of basketball players, 20 meter dash Test was used. To compare the effects of plyometric training and resistance training on speed of basketball players, Analysis of co-variance (ANCOVA) was used. The level of significance was set at 0.05. The result revealed that there was significant effect of both the plyometric and resistance training programme on specific speed of basketball players.

Keywords : Plyometric training, Resistance training, Specific Speed

INTRODUCTION:

The main focus of the training process is improving performance. In fact, improved performance is a process that leads to adaptation. Many adaptations occur in the neuromuscular system as a result of physical exercises.

To improve and refine a player's basketball skills which are crucial for enhancing the quality of play, it is essential to improve the athletic skills that allow him to elevate his play to a higher level. Athletic skills include variables such as speed, power, endurance, agility, coordination, balance and reaction time that contribute to the total development of the player. The level at which basketball skills are performed is directly related to the level of the athlete's total conditioning (Brittenham G., 1996).

Basketball is a game of quickness (hand and foot) and speed (overall body motion) that are used at the proper time. Coaching should continually emphasize the principle of doing things right then quickly making the right move at the right time while developing and maintaining individual physical, emotional and team balance and correct offensive and defensive positions (Krause J.V. et al 2008).

Offensive fundamentals embrace the skills necessary to advance the ball into opponent's territory and score. Champion teams have been and always be teams that have mastered the fundamentals of basketball and enjoy the game (Lindeburg F. A., 1967).

Plyometric is a rapid pre stretching of a muscle during an eccentric action, followed by a concentric action of same muscle and connective tissue. This system involves stretch-shortening cycle of the muscle. It is a form of exercise which links strength with speed of movement. Plyometric or reactive jumps are known to be effective for development of explosive strength. Resistance training involves exercise programme that causes the muscles to contract against an external resistance with the expectation of increasing strength, tone, mass, and/or endurance. A great body of research has been carried out over the last fifty years, providing a firm scientific grounding for resistance training and its application in health and sports (Moeini Z. 1999)

The basic need of a basketball player in the competitive world is the ability to rapidly switch between forward, backward, lateral and vertical movements. To enhance such movement qualities in basketball high levels of power, strength, endurance, flexibility and agility are required to achieve the goal. Undoubtedly, such components are inter-dependent and as such may be developed through common training regimen. Thus, it was thought reasonable to investigate whether, and if so, how much plyometric training and resistance training can improve specific speed of basketball players.

OBJECTIVES OF THE STUDY:

(i) To investigate the effect of plyometric training programme on specific speed of basketball players.
(ii) To find out the effect of resistance training programme on specific speed of basketball players.

METHODOLOGY:

Sixty male basketball players from West Bengal, ranging the age between 18-23 years who had participated in various basketball tournaments at the national/ inter-varsity/ state level, were selected as the subjects of the study. Specific Speed

was selected as a dependent variable and plyometric training and resistance training were considered as independent variables. To test the specific speed, 20 meter dash Test was used and measured in seconds.

The pre test- post test randomized group design which consisted of two experimental groups

(n=20 in each group) namely plyometric training group (PT) and resistance training group (RT) and one control group (AC) was used in the study.

The treatment was administered on both the experimental groups for three days a week (45 min/day) for the period of eight weeks while the control group underwent traditional practice of basketball. The plyometric training group was given training using equipment like ladder, mini hurdles, cones etc. and resistance training group was given resistance exercises with the use of elastic bands, weight training equipments and partner's body weight. .Before the administration of training schedule, pre test data on specific speed was collected from all the three groups. Similarly after the completion of eight weeks post training data of all the groups were collected.

To find out the effects of plyometric training and resistance training on specific speed of basketball players, Analysis of Co-Variance (ANCOVA) was used. The LSD post hoq test was used to find out the paired mean difference. The level of significance was set at 0.05.

Findings: The findings pertaining to the study are presented in Tables 1 and 2.

TABLE-1
Descriptive statistics and mean gains of Specific Speed of different groups of basketball players (Seconds)

	PT		RT		AC	
	Pre test	Post test	Pre test	Post test	Pre test	Post test
M(sec)	3.759	3.56	3.812	3.627	3.76	3.64
SD	0.070	0.095	0.108	0.125	0.067	0.075
HS (sec)	3.64	3.41	3.65	3.48	3.65	3.47
LS(sec)	3.89	3.78	4.1	3.9	3.9	3.82

M-mean, SD-standard deviation, HS-Highest score, LS-lowest score

Table No. 1 depicts the descriptive statistics on agility of the two experimental groups and one active control group.

TABLE-2
Analysis of co-variance among the two Experimental groups and Active control group on Specific Speed (seconds)

Mean	PT	Rt	AC	Sum of Square		df	Mean Sum of Square	F-ratio
Pre Test	3.759	3.812	3.76	A	0.036	2	0.018	2.577
				W	0.402	57	0.007	
Post Test	3.56	3.627	3.64	A	0.074	2	0.037	3.645*
				W	0.579	57	0.010	
Adjusted Post Test	3.575	3.597	3.654	A	0.065	2	0.032	6.753*
				W	0.277	56	0.004	

***Significant at 0.05 level $F_{0.05}(2, 57) = 3.15$, $F_{0.05}(2, 56) = 3.16$**

Table 2 revealed no significant difference in specific speed in pre test phase among PT group, RT group and AC group. The obtained 'F' value 2.577 was found lesser than the tabulated 'F' value 3.15 at 0.05 level of significant with 2, 57 degree of freedom.

However, the 'F' ratio values in post test phase (3.645), and adjusted post-test phase (6.753) were found significant for being greater than the tabulated 'F' values 3.15 and 3.16 at 0.05 level of significant with 2, 57 and 2, 56 degree of freedom respectively.

As in analysis of co-variance the significant improvement in specific speed in adjusted post-test means among PT group, RT group and AC group were found, further in order to find out the significant difference among the paired adjusted final means, the post-hoc test were computed, which is presented in table 3.

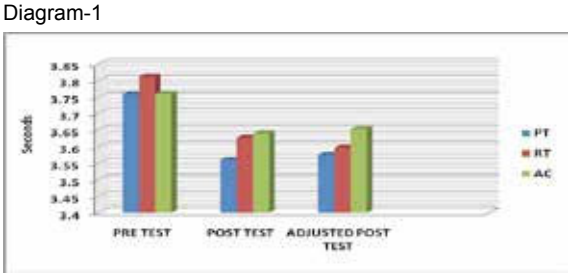
Table-3
Paired means among the two experimental groups and one active control group on specific speed (Seconds)

PT	RT	AC	Mean difference	Critical Difference
3.575	3.597		0.022	0.044
3.575		3.654	0.079*	0.044
	3.597	3.654	0.057*	0.044

The Table 3, (LSD post-hoc test) in respect to the paired adjusted final mean differences in specific speed clearly indicates significant difference between PT group and AC group (0.079), and between RT group and AC group (0.057) which were found greater than that of the critical value 0.045.

However, no significant difference between PT group and RT group (0.022) were observed in the difference of mean values which were found lesser than that of the critical value (0.044).

Diagram-1



Graphical Representation of specific speed between Pre and Post test means among the three groups

DISCUSSION ON FINDINGS:
As the result reveals significant improvement in Experimental groups in comparison to the Active Control group in specific speed, it may be attributed to the fact that the plyometric training and resistance training were effective in developing specific speed of basketball players. However, no significant difference was found between two experimental groups i.e. plyometric and resistance training groups in improving specific speed.

The result of developing speed by plyometric exercises might be due to the fact that the phenomenon of the stretch-shortening cycle (SSC) and is especially prevalent in intermittent game like basketball. SSC actions exploit the myotatic reflex as well as the elastic qualities of tendons and muscle, and the resulting performance is independent of maximum strength in players.

The result is supported by the study of Asadi and Arazi, (2012) who evaluated the effects of highintensity plyometric training programme on dynamic balance, agility, vertical jump, and sprint performance in young male basketball players and they concluded that a 6-week high-intensity plyometric programme can improve power, agility, sprint and balance in young male basketball players. The result is supported by the study of Faigenbaum et al (2007) who studied on the effects of a short-term plyometric and resistance training program on fitness performance in boys age 12 to 15 years and they concluded that the plyometric training group made significantly ($p< 0.05$) greater improvements than resistance training in long jump (10.8 cm vs.2.2 cm), medicine ball toss (39.1 cm vs. 17.7 cm) and pro agility shuttle run time (-0.23 sec vs. -0.02 sec) following training. The study is also supported by Shahidi et al (2012) who evaluated the effect of two resist-

ance training types on muscle fitness and anaerobic capacity in 16-18 years old male soccer players. The results showed that except for agility, both resistance training types led to change in lower-body explosive power, lower-body muscle endurance, running speed, maximum lower-body strength, and abdominal muscle endurance.

CONCLUSION:

Within the limitations of the study, it may reasonably be concluded that plyometric training and resistance training are effective in significantly improving specific speed of basketball players and plyometric training has greater impact on speed of basketball players than resistance training.

REFERENCES

Asadi, A. and Arazi, H. (2012). Effects of High-intensity Plyometric Training on Dynamic Balance, Agility, Vertical Jump and Sprint Performance in Young Male Basketball Players.Journal of Sports and Health Research, 4(1), 35-44. | | Shahidi, F. et. al. (2012). The effect of two resistance training types on muscle fitness and anaerobic capacity in 16-18 years old male soccer players". Annals of Biological Research, 3(6), 2713-2717. | | Krause, J. V. et.al. (2008). Basketball Skills and Drills. U.S.A.: Human Kinetics. | | Faigenbaum, A.D. et. al. (2007). Effects of a Short-Term Plyometric and Resistance Training Program on Fitness Performance in Boys Age 12 to 15 Years. Journal of Sports Science and Medicine, 6, 519- 525. | | Young, W.B., McDowell, M.H. and Scarlett, B.J. (2001). Specificity of spring and agility training methods. Journal of Strength and Conditioning Research. 15, 315-319. | | Brown, Lee E., Ferrigno Vance A. and Santana Juan Carlos (2000). Training for Speed, Agility and Quickness, USA. | | Yap, C.W. and Brown, L.E. (2000). Development of speed, agility, and quickness for the female soccer athlete. Strength and Conditioning. 22, 9-12. | | Moeini, Z. (1999). Sports physiology and physical exercise. Mobtakeran Pub. | | Brittenham, G. (1996). Complete Conditioning for Basketball. New York Knicks:Human Kinetics. | . | Brzycki, M. and Brow, S. (1993). Conditioning for Basketball. U.S.A: Masters Press-A Division of Howard W. Sams & Company. | Lindeburg, F.A. (1967) How to Play and Teach Basketball. New York: Association Press. |