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IMPACT OF COMBINED TRAINING MODULATES BIOMOTOR PARAMETERS OF BASKETBALL PLAYERS

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Abstract

The purpose of the study is to find out the impact of combined training modulates on selected biomotor parameters of women basketball players. To achieve the purpose, thirty women basketball players were randomly selected as subjects. The age of the subjects were ranged between 18 to 25 years. The selected subjects were assigned into two groups of 15 subjects each. Group I underwent PLYO with strength training for 6-weeks and Group II acted as control who did not participate in any special training apart from the regular curricular activities. The explosive power and abdominal strength were selected as criterion variables. The explosive power and abdominal strength were assessed by vertical jump and bent knee sit-ups tests respectively. All the subjects of two groups were tested on selected dependent variables at prior to and immediately after the training programme. The data was analyzed using Analysis of covariance (ANCOVA). The .05 level of confidence was fixed as the level of significance to test the "F" ratio obtained by the analysis of covariance, which was considered as an appropriate. The results of the study showed that the PLYO with strength training for 6-weeks is more effective and significantly improved explosive power and abdominal strength of women basketball players.

Keywords: Combined PLYO with Strength Training, Explosive power and Abdominal strength.

INTRODUCTION

Basketball is one of the most widely viewed and most popular sports in the world. Basketball is an extremely dynamic sport that requires movements in multiple planes of motion as well as rapid transitions from jogging to sprinting to jumping. Basketball is a fast moving game that involves a lot of variety, including shooting, dribbling, passing, rebounding, defense and much more. Basketball is a multifaceted and complex team game that combines cyclic and acyclic movement structures (Erčulj & Bračič, 2010). This game consists of short but very intense activities, broken by longer or shorter periods of passive or active rest, during which a basketball player recovers (Taylor, 2004). Each player performs close to 1000 different short actions (lasting around 2 seconds) such as standing, walking, jogging, running, sprinting, jumping, sudden acceleration, change of direction, defense etc. (Boone & Bourgois, 2013) and these short activities are performed with a different frequency (Abdelkrim, Fazaa & Ati, 2007). The basketball players during a match spend 34% of the time in running and rebounding, 56.8% in walking and 9% of the time in standing still (Narazaki *et al.*, 2008).

Plyometric consists of a rapid stretching of a muscle (eccentric action) immediately followed by a shortening (concentric action) of the same muscle and connective tissue aiming at the development of maximum force in the shortest possible time. This rapid combination of eccentric and concentric work by muscle is known as 'stretch shortening cycle' (SSC) (Baechle, Earle & Wathen, 2008). It is considered a high-intensity, physical training method, consisting of explosive exercises that require muscles to adapt rapidly from high intensity eccentric contraction to powerful concentric contractions (Chu, 1998). Explosive power mainly depends on strong muscle. The abdominal and leg strength play a vital role on a performance of jumpers. In order to develop the abdominal and leg strength, jumping exercise play a major role. Explosive power represents one of the most important features of track and field. Explosive power is conditional ability and is a combination of strength and speed. The components of either elastic strength are combined together in different proportions in different activities. Explosive power is need for satisfactory completion of all types of jumps and sprint in various sports and games. Abdominal strength is used to develop the athlete's capacity to maintain the quality of their muscles contractile force. All athletes need to develop a basic level of strength endurance. Strength endurance is the ability to overcome resistance or to act against resistance under the conditions of fatigue. Strength endurance can be a form of static or dynamic. Strength is depending on the fact whether the movement is static (iso-metric) or dynamic (iso-tonic). Depending on the nature of the combination of strength and endurance the strength endurance can be further classified into proper strength endurance and endurance strength (Thomas Baechle, 1994).

METHODS

SUBJECTS

Thirty women basketball players were selected

as subjects at random. The age of the subjects were ranged between 18 to 25 years. They were divided into two equal groups and each group consisted of 15 subjects. Group-I underwent PLYO with strength training for three days per week for 6-weeks and Group-II acted as control who did not participate any special training apart from the regular curricular activities.

VARIABLES

Among the biomotor parameters, explosive power and abdominal strength were selected as criterion variables respectively. The PLYO with strength training was selected as independent variable. The explosive power and abdominal strength were assessed by vertical jump and bent knee sit-ups tests respectively.

TRAINING PROGRAMME

During the training period, the experimental group (Group-I) underwent (n = 15) PLYO with strength training for three days per week (alternative days) for 6-weeks and subjects in Group II as control were instructed not to participate in any strenuous physical exercise and specific training throughout the training programme apart from the regular curricular activities. The subjects underwent the respective programmes as per the schedules under the supervision of the investigator. Each training session was conducted only in the morning time. After the warm-up period the PLYO with strength training group performed plyometric exercises (45 minutes), following that the participants took part in the strength training programme (45 minutes). Each training session ended with 10 minutes of cool down activities with static stretching. The participants performed a total number of 282 low intensity, 264 medium intensity, 124 high intensity foot contacts and medicine ball exercise in six weeks. During the training, all subjects were under direct supervision and were instructed on how to perform each exercise. The work rest ratio of 1:1between exercises and 1:3 between set was given.

The strength training program designed to involve the following muscle groups: quadriceps, hamstrings, calf, abdomen and obliques, gluteus maximus, deltoid, biceps, triceps, pectorals, latisimus and trapezius muscles by performed variety of upper body, lower body and trunk exercises. The strength training was designed to incorporate with overload principle and specific adaptation to imposed demands (S.A.I.D) principle. The work rest ratio of 1:1 between exercises and 1:3 between set was given.

STATISTICAL PROCEDURES

All the subjects of two groups were tested on selected dependent variables at prior to and immediately after the training programme. The analysis of covariance (ANCOVA) was used to analyze the significant difference if any, between the groups on each selected criterion variables separately. In all the cases, .05 level of confidence was fixed to test the significance, which was considered as an appropriate.

RESULTS

It is clear from Table - I that there is no significant difference between PLYO with strength training and control group on explosive power and abdominal strength before commencement of training, as obtained *F* ratio of 1.69 and 1.30 are less than the required table value of 4.20 at 0.05 for the df of 1 and 28. It denotes that the random assignment of subjects for the two groups is successful; however initial difference is not elicited in explosive power and abdominal strength.

TABLE - I
ANCOVA ON EXPLOSIVE POWER AND ABDOMINAL STRENGTH

Variables	Testing Conditions	PLYO with Strength Training Group	Control Group	SOV	SS	df	MS	'F' Ratio
Explosive Power (Centimeter)	Pre (M ± SD)	46.87 ± 3.58	47.84 ± 4.81	B	93.64	1	93.64	1.69
				W	1551.33	28	54.40	
	Post (M ± SD)	51.33 ± 4.85	48.21 ± 4.80	B	161.64	1	161.64	4.71*
				W	961.06	28	34.32	
	Adjusted (M)	50.87	48.68	B	105.85	1	105.85	122.65*
				W	23.30	27	0.863	
Abdominal Strength (Number)	Pre (M ± SD)	32.17 ± 0.92	32.18 ± 0.89	B	61.27	1	61.27	1.30
				W	1321.85	28	47.21	
	Post (M ± SD)	35.58 ± 0.82	32.91 ± 0.89	B	92.85	1	92.85	20.23*
				W	128.53	28	4.59	
	Adjusted (M)	34.89	32.88	B	96.11	1	96.11	15.40*
				W	168.58	27	6.24	

*Significant at 0.05 level of confidence

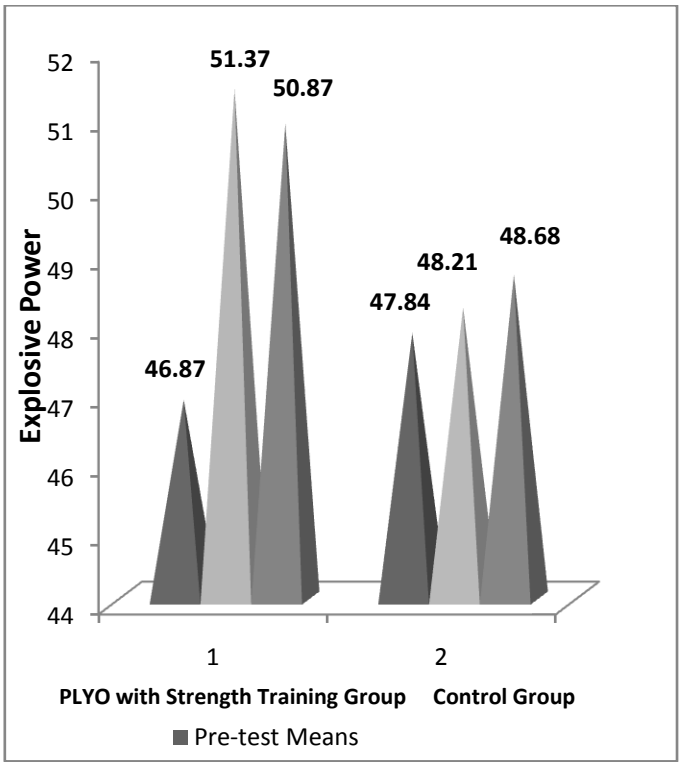
Table - I also reveals that there is a significant difference on explosive power and abdominal strength during post test. The obtained *F* ratio of 4.71 and 20.23 and are greater than the required table value of 4.20 at 0.05 for the df of 1 and 28. Thereby it infers that the explosive power and abdominal strength found to change significantly before and after 6-weeks of training.

Further, Table -I clearly shows that explosive power and abdominal strength differ between the groups after adjusting the pre test scores, as obtained *F* ratio of 122.65 and 15.40 are greater than the required table value of 4.21 at 0.05 for the df of 1 and 27, indicating that after adjusting pre-test scores, there was a significant difference between the two groups on adjusted post test scores on explosive power and abdominal strength. Thus, it is concluded that 6-weeks of PLYO with strength training significantly increased both explosive power and abdominal strength.

DISCUSSION

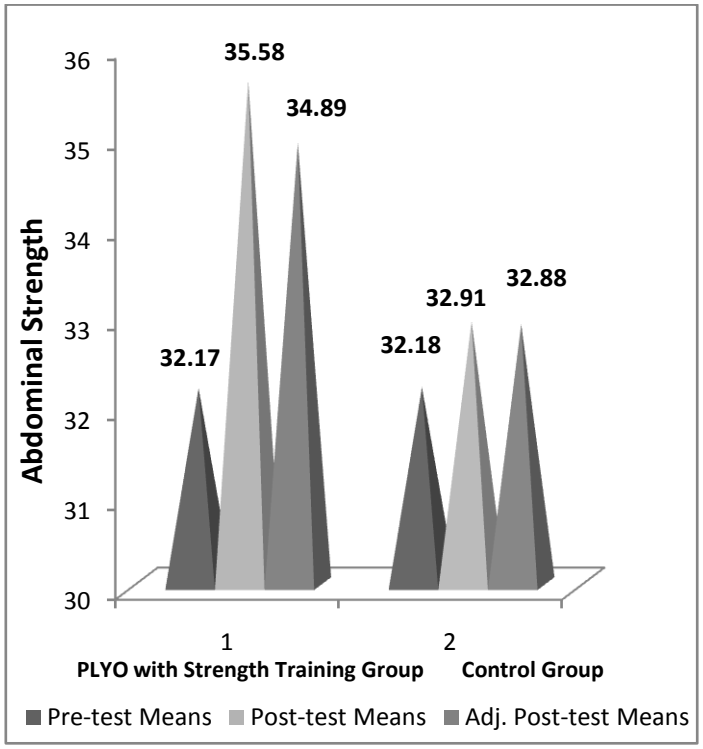
In the present study, 6-weeks of PLYO with strength training significantly increased explosive power and abdominal strength are presented in Figure - I & II.

FIGURE – I
MEAN VALUES OF ABDOMINAL STRENGTH TRAINING GROUP AND CONTROL GROUP ON EXPLOSIVE POWER



In the present study the PLYO with strength training elicited improvements in explosive power and abdominal strength. This finding is in agreement with the studies of Andrejic (2012), who found that 6-weeks of short-term combined plyometric and strength training (CT) significantly ($p < 0.05$) greater improvements in vertical jump (3.2 cm vs. 0.6 cm) performance than the strength training (ST) of young basketball players. In addition, Rejilin Kiruba, Elango & Johnson Premkumar (2013) designed 6-weeks of combined plyometric exercises with weight training has made a significant enhancement in explosive power among the women basketball players. Abdominal strength is essential to the athlete because it helps protect the body from injury, notably to the lower back area. It also helps create greater stability throughout the mid section and aids the spinal erectors in postural alignments of the vertebral column and pelvis. Greater abdominal and hip flexor strength may also help increase running speed, stamina and knee lift (National Basketball Coaches Association, 1997). These results are consistent with the findings reported by Kilinc (2008). He found that 10-weeks of intensive combined training program performed on university women basketball players had a significant ($p < 0.05$) effect on abdominal strength (sit-up).

FIGURE – II
MEAN VALUES OF ABDOMINAL STRENGTH TRAINING GROUP AND CONTROL GROUP ON ABDOMINAL STRENGTH



CONCLUSIONS

Observing the results derived from the impact of PLYO with strength training, it is concluded that the PLYO and strength trainings are the sources to develop selected criterion variables of women basketball players. The game of basketball needs sudden burst of speed, unexpected stops, jumps, turns, changes in direction and pace with and without the ball, in response to the direct action of the opponent. Basketball players are bigger, stronger, faster, and more powerful. Play is much more physical. As the game has become more physically demanding, the number of injuries has increased. Proper conditioning can significantly reduce the risk of injury and improve performance, but the most critical areas to develop are often the ones nobody wants to train. Using a well-planned and progressed PLYO and strength program will allow basketball players of varying levels to create functionally efficient explosive power and abdominal strength, giving them the solid base to perform dynamic athletic movements. Studies have proved that the ability to use the PLYO and strength training has the greater impact in performing or moving in to different offensive and defensive positions. Hence, it was concluded from the results of the study, that 6-weeksof PLYO with strength training is efficient enough to improve explosive power and abdominal strength. And also the specific PLYO with strength training is very essential and inter related to selected criterion variables.

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