IMPACT OF ABDOMINAL STRENGTH TRAINING ON SELECTED STRENGTH AND POWER PARAMETERS OF FEMALE BASKETBALL PLAYERS

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ABSTRACT

The purpose of the study is to find out the impact of abdominal strength training on selected strength and power parameters of female basketball players. To achieve the purpose, thirty female basketball players were randomly selected as subjects. The age of the subjects were ranged between 19 to 25 years. The selected subjects were assigned into two groups of 15 subjects each. Group I underwent abdominal strength training for three days per week for twelve weeks and group II acted as control. The strength enduranceand explosive power were selected as criterion variables. The abdominal strength training was selected as independent variable. The strength endurance and explosive power were assessed by bent knee sit-ups and vertical jump test 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 abdominal strength training for twelve weeks is more effective in enhancing the strength endurance and explosive power of female basketball players.

Key Words: Abdominal Strength Training, strength Endurance and Explosive Power

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. It is equally important for the athlete to be able to perform these skills in a variety of directions and in a controlled manner to ensure injuries do not ensue(Scott Lucett, 2013). Basketball is a team game, individual execution of fundamental skills is essential for team success (Hal Wissel, 2012). The complexity and sensitivity of training of basketball players are undeniable; hence, the scientific and professional approaches are very important in developing the process and controlling the effects of training (Magma, 2009).

The core muscles comprise of the muscles of abdomen, low back and hip. The muscles that are deep in the body, within the abdominal and back areas of the torso, attached to the spine and pelvis, are referred to as 'core'. Put simply, it's the place where movement originates and is also responsible for the body's stability and balance. The core is where the body's center of gravity is located and it is where the movement begins. Because all movement begins at the core and then progresses out to the arms and legs, core strength is very essential. However, it is often neglected by the sports persons in their fitness development. It is important to understand that the core muscles are antigravity muscles and are in use all the times. It is through the core muscles, the power is transferred to the limbs. If the trunk muscles are well conditioned, players will enjoy optimal transfer of energy from large to small muscles while sprint, twist, lift, jump, throw and perform other movements in sport. If the core is well trained, players are less likely to be injured in training and in competition. Training of core muscles is crucial for muscle stabilization maintaining good body posture and body balance as well (Manilal, 2005).

Strength endurance 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).

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.

METHODS

Subjects

Thirty female basketball players were selected as subjects at random. The age of the subjects were ranged between 19 to 25 years. They were divided into two equal groups and each group consisted of 15 subjects. Group-I underwent abdominal strength training for three days per week for twelve weeks and Group-II acted as control who did not participate any special training apart from the regular curricular activities.

Variables

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

Training Programme

During the training period, the experimental group (Group-I) underwent (n = 15) abdominal strength training for three days per week (alternative days) for twelve 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. Everyday the workout lasted for 30 to 45 minutes approximately including warming up and warming down periods. 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. The drills are designed to help improve core strength required for basketball players. Care should be taken when performing abdominal strength training on football field.

Guidelines for Abdominal Strength Training:(i) Start with one set of four to six repetitions for each exercise. (ii) Increase the number of repetitions per set and gradually increase the number of sets per session. (iii) Sets and repetitions will vary depending on the training phase (e.g. off-season, pre-season and in-season). (iv)Never sacrifice form for added set and repetitions.(v) Try to maintain a tight abdominal contraction throughout the set. (vi) Keep rest to a minimum between sets and never rest between exercises during a set. (vii) Always fatigue the "weaker" muscles first. Therefore, to maximize abdominal strength development, follow this sequence: (a) oblique, (b) lower abdominal and (c) upper abdominal. Because the upper abdominal assists with movements in the oblique and lower region, it is important not to fatigue the upper abdominal musculature first, which would decrease the amount of work performed by the other muscles of the trunk and low torso. (viii) Avoid exercises that place the spine in an arched position. (ix)Keep workouts balanced. Always train opposing muscle groups equally to prevent muscle imbalances. For example, after an abdominal workout, do several sets of low back extensions.

The following abdominal strength training drills are given in the training programme in Table I.

Table– I: Abdominal Strength Exercises

Sl.No	Exercises
1.	Straight Leg Oblique Crunch
2.	Bent Knee Oblique Twist
3.	Low "AB" Crunch
4.	Cross-over
5.	Curl - ups
6.	Wrist – Ups
7.	90 Degree Crunch
8.	Sky Walkers

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 -II that there is no significant difference between abdominal strength training and control group on strength endurance and explosive power before commencement of training, as obtained *F* ratio of 1.30 and 1.69are 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 strength endurance and explosive power.

Table–II: ANCOVA on Strength Endurance and Explosive Power

Variables	Testing Conditions	Abdominal Strength Training Group	Control Group	S o V	SS	df	MS	'F' Ratio
Strength Endurance (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	
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	

**Significant at 0.05 level of confidence*

Table -II also reveals that there is a significant difference on strength endurance and explosive power during post test. The obtained *F* ratio of 20.23 and 4.71are greater than the required table value of 4.20 at 0.05 for the df of 1 and 28. Thereby it infers that the strength endurance and explosive power found to change significantly before and after twelve weeks of training.Further, Table -II clearly shows that strength endurance and explosive power differ between the groups after adjusting the pre test scores, as obtained *F* ratio of 15.40and 122.65are greater than the required table value of 4.21 at 0.05 for the df of 1 and 27, indicating that after adjustingpre-test scores, there was a significant difference between the two groups on adjusted post test scores on strength endurance and explosive power. Thus, it is concluded that twelve weeks of abdominal strength training significantly increased both strength endurance and explosive power.

The pre, post and adjusted post test mean value on strength endurance and explosive power are graphically presented in figure- I&II.

Figure – I: Mean Values of Abdominal Strength TrainingGroupand Control Group on Strength Endurance

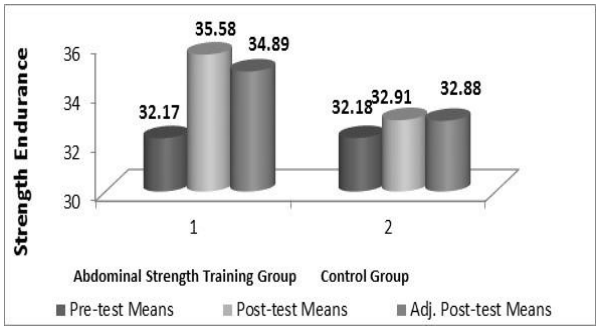
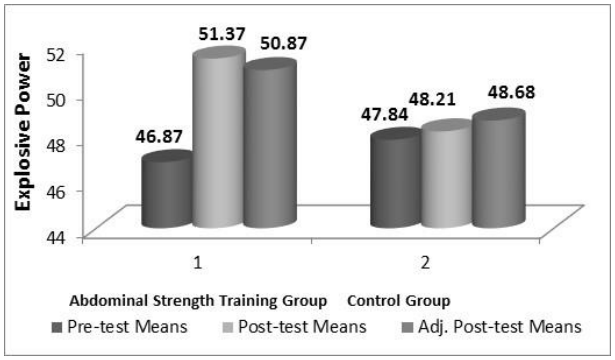


Figure – II: Mean Values of Abdominal Strength TrainingGroup and Control Group on Explosive Power



DISCUSSION

In the present study the abdominal strength training elicited improvements in strength endurance and explosive power. 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). Core muscle strength is an important prerequisite for several sport (e.g., track and field, climbing, soccer), and everyday activities (e.g., sitting, standing, walking in an upright position). (Akuthota et al., 2008). Functionally, the core can be thought of as the kinetic link that facilitates the transfer of torques and angular momentum between the lower and upper extremities that is of vital importance for sport-specific and everyday activities in different age groups (Kibler, Press & Sciascia, 2006). In fact, data from a cross-sectional study indicate significant

relationships between variables of core muscle strength, sprint, throw, and jump performance in young healthy individuals (Nesser et al., 2008 & Okada, Huxel & Nesser, 2011). With reference to these findings, it seems plausible to argue that core strength training may have the potential to improve core muscle strength as well as health-related (i.e., strength, flexibility) and skill-related (i.e., balance, coordination, speed) components of physical fitness in youth (Allen et al., 2014). According to Vispute et al., (2011) the six weeks of abdominal exercise training significantly improved muscular endurance to a greater extent than the control group. In the present study, the specifically designed abdominal strength training exercises are highly relevant to the selected criterion variables.

CONCLUSIONS

Observing the results derived from the impact of abdominal strength training, it is concluded that the abdominal strength practices are the sources to develop selected strength and power parameters of female 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. Even many elite-level players lack decent core stability. 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. One of the best ways basketball players can help protect themselves from the physical punishment of the game is to focus on the core, or more importantly, the pillar. The pillar encompasses the muscles of the hip, shoulder, and torso, all working together as a functional unit. The core, in the center of the pillar, is the foundation upon which all movement occurs. When the core muscles work in a smooth and synchronized manner, they help maintain correct spinal and pelvic alignment while the arms and legs are moving. Core stability also allows the body to prevent collapse and return to symmetrical balance after movement. In other words, strengthening this area can help a player develop greater body control on the court, hopefully decreasing their potential for injury. Using a well-planned and progressed core muscle conditioning program will allow basketball players of varying levels to create functionally efficient core muscles, giving them the solid base to perform dynamic athletic movements. Studies have proved that the ability to use the abdominal 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 twelve weeks abdominal strength training is efficient enough to improve strength endurance and explosive power. And also the specific abdominal strength training is very essential and inter related to selected criterion variables.

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