EFFECT OF ABDOMINAL STRENGTH TRAINING ON STRENGTH ENDURANCE AND EXPLOSIVE POWER OF WOMEN PLAYERS

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Abstract: The purpose of the study was to find out the effect of abdominal strength training on selected strength endurance and explosive power of women players. To achieve these purpose thirty women players from various games and sports were selected as subjects at random. The age of the subjects were ranged between 17 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. The strength endurance and explosive power were selected as criterion variables. The abdominal strength training was selected as independent variable. The selected criterion variables such as strength endurance and explosive power were measured by using bent knee sit-ups and sergeant jump tests respectively. 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. The results of the study stated that the abdominal strength training had significantly improved the strength endurance and explosive power of women players.

Keywords: *Abdominal strength training, strength endurance and explosive power.*

Introduction

From the time when the fitness boom of the 1980s, different exercise methodologies have been presented and marketed with varying levels of success. However, sometimes what appears to be a new exercise methodology is really not new at all; but just a new perspective that seeks to improve on an old methodology based on current trends. This appears to be the case with core stability training, a trend that has become popular in commercial fitness centers and athletic strength and conditioning facilities. A core stability exercise can be defined as "any exercise that channels motor patterns to ensure a stable spine through repetition" [1]. However, the current trend toward core stability training in commercial fitness centers may have originated from physical therapy methodology [2, 3]. When performed in this setting, core stability exercises are different from the aforementioned free weight lifts in that the emphasis is on isometric muscle actions (e.g. prone or supine bridging) performed with body mass or relatively light loads [4, 5]. Furthermore, these exercises are often performed while lying, seated, or standing on unstable equipment such as a swiss ball, wobble board, low density mat, or air-filled disc.

Core stability is achieved through stabilization of one"s torso, thus allowing optimal production, transfer, and control of force and motion to the terminal segment during an integrated kinetic chain activity [6]. Research has demonstrated the importance and contributions of core stability in human movement [7] in producing efficient trunk and limb actions for the generation, transfer, and control of forces or energy during integrated kinetic chain activities. For example, Hodges and Richardson (1997) examined the sequence of muscle activation during wholebody movements and found that some of the core stabilizers (i.e., transversus abdominis, multifidus, rectus abdominis, and oblique]abdominals) were consistently activated before any limb movements [7]. These findings support the theory that movement control and stability are developed in a core-to-extremity (proximal-distal) and a cephalo-caudal progression (head-to-toe). Functional movement is the ability to produce and maintain a balance between mobility and stability along the kinetic chain while performing fundamental patterns with accuracy and efficiency [8]. Muscular strength, flexibility, endurance, coordination, balance, and movement efficiency are components necessary to achieve functional movement, which is integral to performance and sport-related skills. The aim of the present study was examine the effect of abdominal strength training on selected strength endurance and explosive power of women players.

Methods

Subjects

Thirty women players from various games and sports were selected as subjects at random. The age of the subjects were ranged between 17 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

The strength endurance and explosive power were selected as criterion variables. The abdominal strength training was selected as independent variable. The selected criterion variables such as strength endurance and explosive power were measured by using bent knee sit-ups and sergeant jump tests 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. Every day the workout lasted for 30 to 45 minutes approximately including warming up and warming down periods. Subjects in Group II as control were instructed not to participate in any strenuous physical exercise and specific training throughout the training programme. However, they performed regular activities as per the curriculum. 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 following Abdominal Strength Exercises are given in the Training Programme in table 1.

Table 1
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 2 that there is no significant difference between abdominal strength training group and control group on strength endurance and explosive power before commencement of training, as obtained *F* ratio of 1.30 and 1.69 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 a ssignment of subjects for the two groups is successful; however initial difference is not elicited in strength endurance and explosive power.

Table 2
ANCOVA on strength endurance and explosive power

Variables	Test	Abdominal Strength Training Group	Control Group	„F" ratio
Abdominal strength	Pre-test	32.17 ± 0.92	32.18 ± 0.89	1.30
	Post-test	35.58 ± 0.82	32.91 ± 0.89	20.23*
	Adjusted	34.89	32.88	15.40*
Explosive power	Pre-test	46.87 ± 3.58	47.84 ± 4.81	1.69
	Post-test	51.33 ± 4.85	48.21 ± 4.80	4.71*
	Adjusted	50.87	48.68	122.65*

Table 2 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 4.71 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 strength endurance and explosive power found to change significantly before and after twelve weeks of training.

Further, table 2 clearly shows that strength endurance and explosive power differ between the groups after adjusting the pre test score, as obtained obtained *F* ratio of 15.40 and 122.65 are greater than the required table value of 4.21 at = 0.05 for

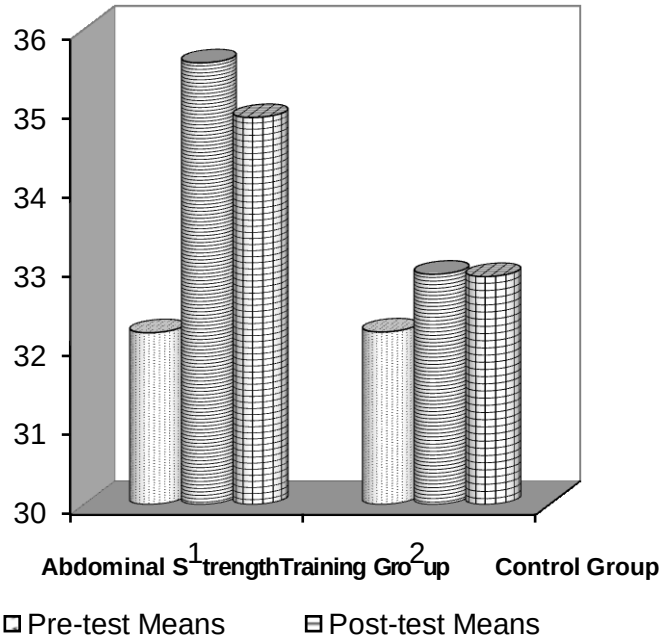
the df of 1 and 27, indicating that after adjusting pre-test scores, there was a significant difference between the two groups on adjusted post test scores on strength endurance and explosive power. Thus, it is concluded that twelve weeks of abdominal strength training significantly increased strength endurance and explosive power.

Discussion

In the present study, twelve weeks of abdominal strength training significantly increased strength endurance and explosive power. The changes in strength endurance and explosive power are presented in Figure 1 & 2.

Figure 1

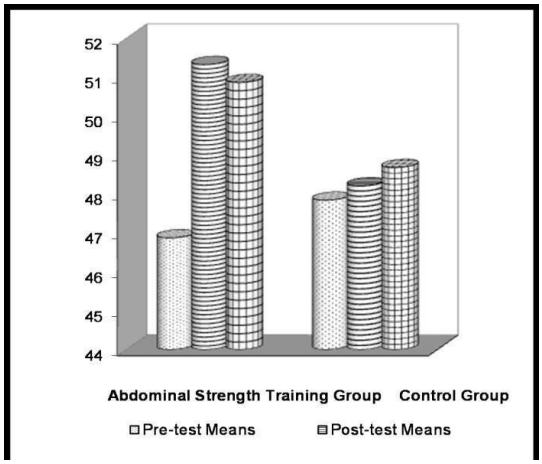
Mean Values of Abdominal Strength Training Group and Control Group on Strength Endurance



Abdominal strength is essential to the athletes 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. When applied to sports performance, the stability of the core provides a foundation upon which the upper and lower extremities may contract to accelerate or decelerate body segments [9]. For example, athletes that perform jumping type joint actions may benefit from greater core stability as ground reaction forces are transferred up through the lower extremities, across the trunk. Therefore, the core can be considered the kinetic link between the lower and upper extremities. Butcher and his colleagues (2007) found that trunk stability group had significantly greater vertical jump performance than the control group [10]. similarly, Cowley *et al*. (2007) demonstrated greater improvement in abdominal strength endurance [11]. The present findings are in line with results of Butcher *et al*. (2007) and Cowley *et al*. (2007) [10, 11]. In the present study, the abdominal strength training are specifically designed for women players and very close related with the selected criterion variables such as strength endurance and explosive power.

Figure 2

Mean Values of Abdominal Strength Training Group and Control Group on explosive power



Conclusions

Basketball is a sport that requires athletes to be explosive at any given moment. Athletes are constantly transferring forces between the extremities and are in need of support from the musculature of the core to keep the kinetic chain of the body intact. Twelve week of abdominal strength training program is efficient enough to improve strength endurance and explosive power.

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