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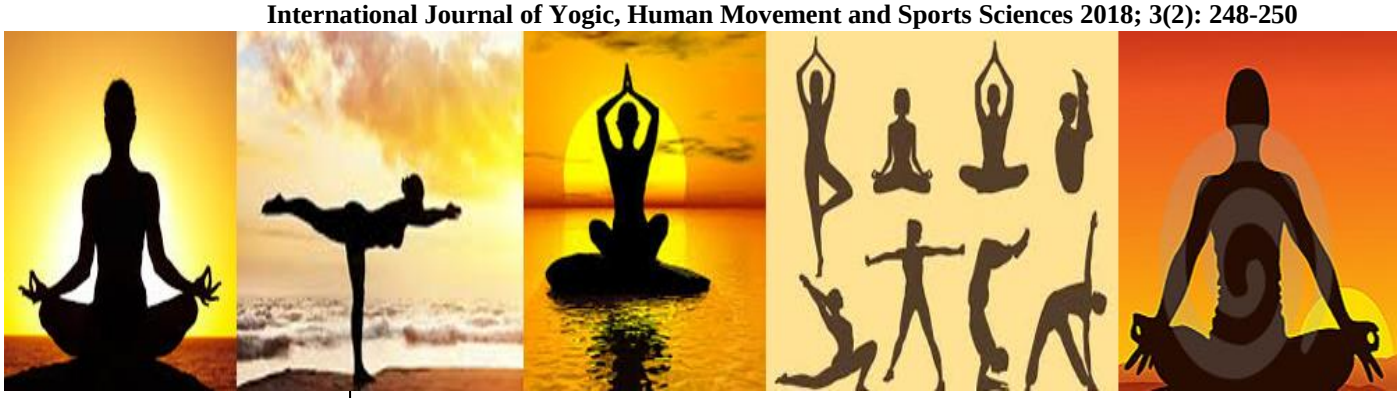

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Megha Chaurasiya
Research Scholar, School of Physical Education, Davv, Indore, Madhya Pradesh, India

Dr. Deepak Mehta
Professor, School of Physical Education Davv, Indore, Madhya Pradesh, India

Correspondence
Megha Chaurasiya
Research Scholar, School of Physical Education, Davv, Indore, Madhya Pradesh, India

Effect of core stability exercises in enhancing the upper and lower body strength of women cricket players

Megha Chaurasiya and Dr. Deepak Mehta

Abstract
The purpose of the study was to examine the effect of core stability exercises in enhancing the upper and lower body strength of women cricket players. Fifty (25= experimental group & 25= control group) women cricket players were selected as subjects. All were the players of state level. In the study Swiss ball core stability training was considered as independent variable and upper and lower body strength was considered as dependent variable. Upper and lower strength was measured by Shoulder, Arm, Abdominal, Left & Right hand grip, Back and Leg Strength for fitness assessment test. In order to find out the effect of eight week Swiss ball core stability training on upper and lower body strength, Descriptive statistic, and Analysis of covariance (ANCOVA) was used. The level of significance was set at 0.05. Based on the finding and within the limitation of the study it is noticed that practice of selected Swiss ball core stability training helped to improve upper and lower body strength of women cricketer players. The result reveals that there was significant (p<0.05) effect of Swiss ball core stability training on seven strength variables i.e. upper and lower body strength significantly improved after the training program in subjects of Experimental group of women cricket players accept Back strength.

Keywords: Core stability exercises, enhancing, upper, lower body strength, women cricket players

Introduction
The main purpose of core musculature in our body is to maintain the stability of the body. It improves sports performance by enhancing the stiffness of the trunk which enables an individual to produce greater torque while executing any body movement. In the current scenario, the term core exercise is often used in relation to abdominal muscles. Most of the fitness professionals use the term core exercises only to focus the potential aesthetic benefits rather than the potential benefits in sports. Therefore there is a need to establish a greater scientific method to effectively develop the core muscles instead of focusing only on abdominal muscles. In most of the sports for any movement torque production is started from the bigger muscles and sequentially distributed to the smaller muscles. The muscular torque production is greatly dependent on the core strength ability of the individual. For a sport like cricket, which involves movements like throwing, hitting are not only the result of only upper arm strength; this is the transformation of torque from bigger muscles to the smaller muscles and here the rule of core strength is of great importance. A movement like throwing of hitting can't be executed without the torque contribution from lower body bigger muscles to the upper body smaller muscles. Therefore the importance of core strength for a better and stable torque movement to execute any sports movement can be understood.

In sport like cricket, for the throwing movement, the core muscles are wholly responsible for the proper positioning of shoulder griddle. Core muscles are the source of power in the body. Having a strong core assists every player in every sport and game activities. A study of Subramanian A. (2014) had concluded that eight weeks core strength training programme had significant effect on selected physical and physiological parameters like Flexibility, Vital Capacity etc.

Therefore the purpose of the present study was to analyse the effect of six weeks core stability exercises in enhancing the upper and lower body strength of female sport person.

Methods

For the purpose of the study 50 (N=50) female players were purposively selected. The ages of the subjects were between 19 to 25 years. Further, for the requirement of the study the group was again divided into two sub groups, i.e. experimental group and control group. The experimental group went through a systematic core stability exercises programme for six weeks.

The researcher had selected seven variables to analyse upper and lower body strength of the female cricket players. They are as follows:

1. Shoulder Strength
2. Arm Strength
3. Abdominal Strength
4. Left Hand Grip Strength
5. Right Hand Grip Strength
6. Back Strength and
7. Leg Strength

In the current study the researcher implemented exercises i.e. back presses, chest press, pull-ups, kneeling shoulder press, jack knife, reverse curl, abdominal curl on ball, wrist extension and flexion, side to side jumping, back extension, squats on ball etc.

The researcher conducted a pre-test of the subjects before implementing the eight weeks core strength training programme and after the completion of the training programme the researcher again conducted the post test to record data for the all seven selected upper and lower body strength variables. In the current study the researcher implemented exercises like- back presses, chest press, pull-ups, kneeling shoulder press, jack knife, reverse curl, abdominal curl on ball, wrist extension and flexion, side to side jumping, back extension, squats on ball etc. The experimental group went through eight weeks core strength training programme whereas the core strength training group did not get any treatment.

To analyse the data, the researcher employed "Analysis of Covariate" (ANCOVA) statistical technique by means of SPSS (Statistical Package for Social Science) version 20 software package. The level of significant was set at 0.05.

Results and Discussion

The researcher had employed analysis of covariance test to find the effect of eight weeks core stability training programme on selected strength variables of female cricketers. The significant level of the test was set at 0.05. The researcher used SPSS version 20 to generate the statistical results.

Table 1: Descriptive statistics of selected Strength variables

Groups Variables	Control		Core Stability Training	
	Pre	Post	Pre	Post
Shoulder Strength	38.16±4.03	34.44±4.06	35.56±3.95	38.32±4.44
Arm Strength	6.60±1.19	6.48±1.05	5.68±1.15	7.48±1.01
Abdominal Strength	31.04±2.65	29.12±2.37	34.88±4.74	37.60±4.19
Left Hand Grip Strength	14.70±2.40	13.67±2.35	16.12±2.39	17.52±1.96
Right Hand Grip Strength	19.20±1.06	17.39±1.13	20.13±1.78	21.82±1.69
Back Strength	38.67±3.80	36.58±3.95	43.34±4.42	45.96±4.12
Leg Strength	41.40±4.01	39.36±3.94	41.66±5.06	43.02±4.89

The table 1 exhibits the descriptive statics of the selected variables. From the table the pre and post test results of both the groups can be compared. It can be seen that for the variable shoulder strength the control group was having pre mean score of 38.16±4.03 and the core stability training group was having pre score of 35.56±3.95 but after went through eight weeks training programme it became 34.44±4.06 and 38.32±4.44 respectively. It can be seen that for the variable Arm strength the control group was having pre mean score of 6.60±1.19 and the core stability training group was having pre score of 5.68±1.15 but after went through eight weeks training programme it became 6.48±1.05 and 7.48±1.01 respectively. It can be seen that for the variable Abdominal strength the control group was having pre mean score of 31.04±2.65 and the core stability training group was having pre score of 34.88±4.74 but after went through eight weeks training programme it became 29.12±2.37 and 37.60±4.19 respectively. It can be seen that for the variable Left hand grip strength the control group was having pre mean score of 14.70±2.40 and the core stability training group was having pre score of 16.12±2.39 but after went through eight weeks training programme it became 13.67±2.35 and 17.52±1.96 respectively. It can be seen that for the variable Right hand grip strength the control group was having pre mean score of 19.20±1.06 and the core stability training group was having pre score of 20.13±1.69 but after went through eight weeks training programme it became 17.39±1.13 and 21.82±1.69 respectively. It can be seen that for the variable Back strength the control group was having pre mean score of 38.67±3.80 and the core stability training group was having pre score of 43.34±4.42 but after went through eight weeks training programme it became 36.58±3.95 and 45.96±1.12 respectively. It can be seen that for the variable Leg strength the control group was having pre mean score of 41.40±4.01 and the core stability training group was having pre score of 41.66±5.06 but after went through eight weeks training programme it became 39.36±3.94 and 43.02±4.89 respectively.

The following figure 1 depicts the pre and post test results of the selected variables for both the groups. From the figure it can be seen that for most of the variables there is improvement in post test result for core stability training group but to know whether these improvements are statistically significant or not, need to move to the ANCOVA test result.

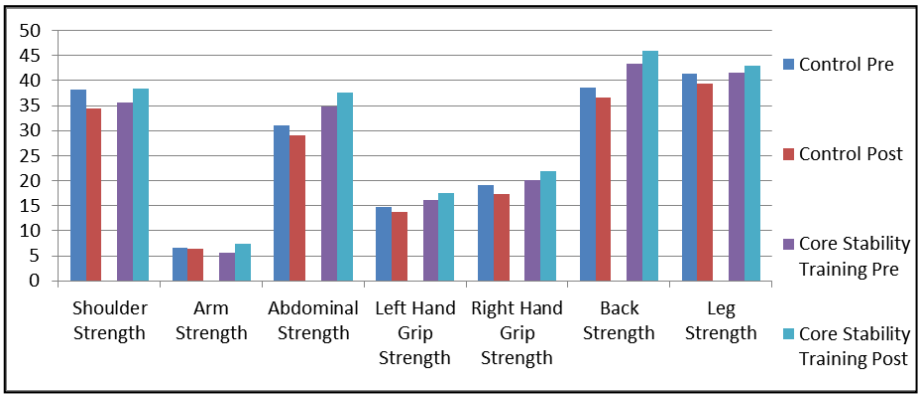

Fig 1: Mean differences of the variables between the two groups

The following table exhibits the results of the statistical test ANCOVA:

Table 2: ANCOVA test result

Source	Type I Sum of Squares	Df	Mean Square	F	Sig.
Shoulder Strength Group	192.368	1	192.368	10.451	.002
Arm Strength Group	28.014	1	28.014	61.590	.002
Abdominal Strength Group	303.217	1	303.217	102.595	.000
Left Hand Grip Strength Group	83.389	1	83.389	84.587	.000
Right Hand Grip Strength Group	154.485	1	154.485	203.093	.000
Back Strength Group	303.969	1	303.969	.137	.713
Leg Strength Group	146.272	1	146.272	130.041	.000

The statistical results of the study revealed that all of the selected strength variables have exhibited significant differences except one variable. After went through eight weeks training program the following variables have exhibited significant difference:

- Shoulder Strength
- Arm Strength
- Abdominal Strength
- Left Hand Grip Strength
- Right Hand Grip Strength
- Leg Strength

Whereas, the variable Back Strength has not exhibited any significant difference.

In such condition the researcher can conclude that eight weeks core stability training program was sufficient to improve shoulder strength of female sport person. It is also sufficient to improve arm strength. Though the result of the study exhibited that eight weeks core strength training programme is sufficient to improve abdominal strength, in case of back strength, it failed to say so. On the other hand rest of the variables like left hand grip strength, right hand grip strength and leg strength have exhibited significant improvement after went through eight weeks core strength training programme.

The result of the study indicated that there is significant effect of eight weeks core strength training programme on the strength variables Shoulder Strength, Arm Strength, Abdominal Strength, Left Hand Grip Strength, Right Hand Grip Strength and Leg Strength except the variable Back Strength. Had researched about the effect of core stability training programme on throwing velocity in female handball players and the result of the study exhibited that eight weeks consecutive core stability training significantly improve throwing velocity of female handball players. The current study is also exhibiting a similar result, therefore it can be concluded that eight weeks core stability training programme has significant effect on upper and lower body strength of female sport person.

Conclusion

Based on the findings of the current study, the following conclusions were drawn:

- Core stability training programme has significant effect on upper body strength variables.
- Core stability training programme has significant effect on all lower body strength variables except the variable back strength

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