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Effect of Isolated and Parallel Core Strength and Mobility Training on Flexibility of Cricket Players

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Abstract

The purpose of this study was to examine the effect of isolated and parallel core strength and mobility training on flexibility of cricket players. To achieve the purpose of this study forty eight men cricket players studying various courses in Sri Chandrasekharendra Saraswathi Viswa Mahavidyalaya University, Kanchipuram, Tamil Nadu, India, during the academic year 2014-2015 was selected as subjects and their age ranged from 20 to 25 years and they were divided into four equal groups of twelve each (n=12) at random. Experimental group-I underwent core strength training, experimental group-II underwent mobility training and experimental group-III underwent parallel core strength and mobility training and group-IV acted as control. The training regimen lasted for twelve weeks for 3 days per week. The selected dependent variable flexibility was assessed by conducting sit and reach test, before and after the training regimen. Analysis of covariance was used to determine the significant difference existing between pretest and posttest on selected dependent variables. The analysis of data revealed that the flexibility of cricket players has significantly improved due to the effect of core strength training (14.82%), mobility training (22.02 %) and parallel training (30.24 %) however, parallel training is significantly better than isolated mobility training and core strength training in improving flexibility.

Keywords: Core Strength Training, Mobility Training, Flexibility.

Introduction

Traditionally, Cricket has been perceived as a relatively mild sport from a physiological point of view. The intermittent nature of the game with its long rest intervals provides plenty of recovery time between any short spells of higher intensity activity. However, the demands of Cricket may be underestimated (Noakes and Durandt, 2000). Fitness aside, Cricket players are susceptible to overuse injury (Leary & White, 2000; Finch, Elliott & McGrath, 1999; Orchard *et al*., 2005). Strength training and conditioning plays an important role in chronic and acute injury prevention, particularly in asymmetrical sports such as Cricket.

Core strength training differs from many traditional weight training routines by working both the lower back and abdominals in unison. The same is true for the upper and lower body. All athletic movements incorporate the core in some way. Very few muscle groups are isolated. Instead the whole body works as a unit and core strength training endeavors to replicate this. The muscles of the trunk and torso act to stabilize the spine, pelvis and shoulder girdle. From this solid, balanced base the limbs can be moved powerfully and under control. In fact before rapid movements of the extremities can take place, the central nervous system stabilizes the spine in anticipation (Hodges & Richardson, 1997). The rate at which the core muscles stabilize the spine may have a direct effect on the power of limb movement (Hodges & Richardson, 1997).

With this focus on core strength, the fitness industry has moved towards training the body as a whole, rather than focusing on separate muscle groups. This means incorporating torso training throughout our workout, rather than just doing the usual standard crunches. This type of functional training can be seen everywhere as more people use things like stability balls and wobble boards in their regular workouts. Although strong core muscles are believed to help athletic performance, few scientific studies have been conducted to identify the effectiveness of core strength training (CST) on improving athletic performance. A consensus has not been reached among strength and conditioning specialists regarding what kind of exercises are most effective to stimulate activity of the core muscles.

Flexibility may be an important health-related fitness component, proper flexibility may be helpful in the prevention of low back pain, the improvement of posture and physical appearance, and the prevention of minor injuries associated with everyday life and planned aerobic exercise programs. The soft tissues of the body, such as muscles, tendons, ligaments, and connective

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tissue, contain elastic fibres that can be stretched in order to improve flexibility. Although both static stretching and ballistic stretching techniques may improve flexibility, the static is recommended because the slow movement is less likely to cause an injury. In order to improve flexibility, the muscle must be overloaded (stretched beyond its normal range of motion) and held in position for about 15 to 60 seconds three times a day. The key to flexibility exercises for the low back area is to flatten out the forward curve in the lumber area-as it would appear if curled our self up into a ball. Joggers and runners may benefit from flexibility exercises for several body areas- the low back region, the hamstrings, the calf muscles or Achilles tendon, and the groin muscles. We can develop a flexibility program for almost any joint or muscle group in the body simply by stretching that muscle group and using the basic guidelines relative to overload and progression (Williams, 1990).The aim of the present study was to compare the isolated and parallel core strength and mobility training for differences in their effectiveness on flexibility of Cricket players.

Methodology

To achieve the purpose of this study forty eight men Cricket players studying various courses in Sri Chandrasekharendra Saraswathi Viswa Mahavidyalaya University, Kanchipuram, Tamil Nadu, India, during the academic year 2014-2015 was selected as subjects and their age ranged from 20 to 25 years. The selected subjects were randomly assigned to experimental and control groups of 12 each. The selected dependent variable flexibility was assessed by conducting sit and reach test, before and after the training regimen.

Training programme was administered to the Cricket players for twelve weeks with three training units per week. Experimental group-I underwent core strength training, experimental group-II underwent mobility training and experimental group-III underwent parallel core strength and mobility training. The subjects of group-I performed 6 core strength exercises for the period of 12 weeks. The subjects of group-II performed 6 mobility exercises for the period of 12 weeks. Whereas, the subjects of group-III performed core strength training (6 exercises) for the first six weeks and mobility training (6 exercises) for the remaining six weeks in parallel. The training intensity was progressively increased once in two weeks. The control group (group-IV) did not participate in any specialized training during the period of study.

The experimental design used in this study was random group design involving 48 subjects, who were divided at random into four groups of twelve subjects each. The data collected from the four groups prior to and post experimentation on selected dependent variables were statistically analyzed to find out the significant difference if any, by applying the analysis of covariance (ANCOVA). Since four groups were involved, whenever the obtained 'F' ratio value was found to be significant for adjusted post test means, the Scheffe's test was applied as post hoc test to determine the paired mean differences, if any. In all the cases the level of confidence was fixed at 0.05 for significance.

Results

The descriptive analysis of the pre and post test data showing mean and standard deviation, range, mean differences, 't' ratio and percentage of improvement on flexibility of experimental and control groups are presented in table-I .

Table I. Descriptive Analysis of the Pre and Post test data and 't' ratio on Flexibility of Experimental and Control Groups

group	Test	Mean	Standard Deviation	Range	Mean Differences	't' ratio	Percentage of changes
Core Strength Training	Pre test	28.67	3.47	10.00	4.25	10.35	14.82%
	Posttest	32.92	3.60	11.00			
Mobility Training	Pre test	28.75	4.31	13.00	6.33	17.82	22.02%
	Posttest	35.08	4.34	13.00			
Parallel Training	Pre test	29.50	5.09	16.00	8.92	20.52	30.24%
	Posttest	38.41	4.17	12.00			
Control Group	Pre test	29.25	4.39	15.00	0.33	0.84	1.13%
	Posttest	29.58	4.14	15.00			

Table t-ratio at 0.05 level of confidence for 11 (df) =2.20
**Significant*

Table-I showed that the mean, standard deviation, range and mean difference values of the pre and post test data collected from the experimental and control groups on flexibility. Further, the collected data was statistically analyzed by paired 't' test to find out the significant differences if any between the pre and post data. The obtained 't' values of core strength training, mobility training and parallel training groups were 10.35,

17.82 and 20.52 respectively which are greater than the required table value of 2.20 for significance at 0.05 level for 11 degrees of freedom. However, obtained 't' value 0.33 of control group is less than the required table value. It revealed that significant differences existed between the pre and post test means of experimental groups however, no significant difference was found in control group on flexibility. It was also observed that percentage of changes in flexibility of core strength training, mobility training, parallel training and control groups are 14.82%, 22.02 %, 30.24 % and 1.13 % respectively.

The pre and post test data collected from the experimental and control groups on flexibility was statistically analyzed by using analysis of covariance and the results are presented in table–II.

Table II. Analysis of Covariance on Flexibility of Experimental and Control Groups

	Core Strength Training Group	**Mobility Training Group**	**Parallel Training Group**	**Control Group**	**S oV**	**Sum of Squares**	**df**	**Mean Squares**	**'F' ratio**
Pre test Mean SD	28.67	28.75	29.50	29.25	B	5.75	3	1.92	0.96
	3.47	4.31	5.09	4.39	W	834.17	44	18.96	
Post test Mean SD	32.91	35.08	38.42	29.58	B	496.33	3	165.4	9.98*
	3.60	4.34	4.17	4.14	W	729.67	44	16.58	
Adjusted Post test Mean	33.25	35.34	38.01	29.40	B	475.33	3	158.5	92.33*
					W	73.79	43	1.72	

Table F-ratio at 0.05 level of confidence for 3 and 44 (df) = 2.82, 3 and 43 (df) = 2.82
**Significant*

Table-II showed that the pre-test means and standard deviation on flexibility of core strength training, mobility training, parallel training and control groups are 28.67 $\pm$ 3.47, 28.75 $\pm$ 4.31, 29.50 $\pm$ 5.09 and 29.25 $\pm$ 4.39 respectively. The obtained 'F' value 0.96 of flexibility is lesser than the required table value of 2.82 for the degrees of freedom 3 and 44 at 0.05 level of confidence, which proved that the random assignment of the subjects were successful and their scores in flexibility before the training were equal and there was no significant differences.

The post-test means and standard deviation on flexibility of core strength training, mobility training, parallel training and control groups are 32.91 $\pm$ 3.60, 35.08 $\pm$ 4.34, 38.42 $\pm$ 4.17 and 29.58 $\pm$ 4.14 respectively. The obtained 'F' value 9.98 of flexibility is greater than the required table value of 2.82 for the degrees of freedom 3 and 44 at 0.05 level of confidence. It implied that significant differences existed between the four groups during the post test period on flexibility.

The adjusted post-test means on flexibility of core strength training, mobility training, parallel training and control groups are 33.25, 35.34, 38.01 and 29.40 respectively. The obtained 'F' value 92.33 on flexibility is greater than the required table value of 2.82 for the degrees of freedom 3 and 43 at 0.05 level of confidence. Hence, it is concluded that significant differences existed between the adjusted post test means of core strength training, mobility training, parallel training and control groups on flexibility.

Since, the obtained 'F' ratio value in the adjusted post test means is found to be significant, the Scheffe's test was applied as post hoc test to find out the paired mean difference, and it is presented in table-III.

Table III. Scheffe's Post Hoc Test for the Differences among Paired Means of Experimental and Control Groups on Flexibility

Core Strength Training Group	Mobility Training Group	Parallel Training Group	Control Group	Mean Difference	Confidence Interval
33.25	35.34	---	---	2.09*	1.56
33.25	---	38.01	---	4.76*	1.56
33.25	---	---	29.40	3.85*	1.56
---	35.34	38.01	---	2.67*	1.56
---	35.34	---	29.40	5.94*	1.56
---	---	38.01	29.40	8.61*	1.56

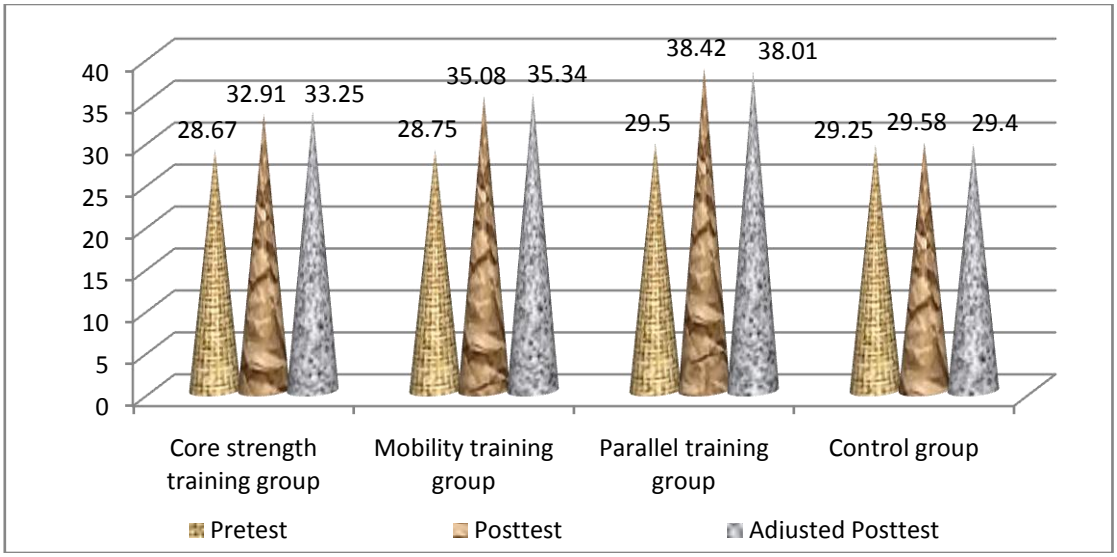
**Significant at 0 .05 level*

As shown in table-4.12 the Scheffe's post hoc analysis proved that significant mean differences existed between core strength and mobility training groups, core strength and parallel training groups, core strength training and control groups, mobility and parallel training groups, mobility training and control groups, parallel training and control groups on muscular strength. Since, the mean differences 2.09, 4.76, 3.85, 2.67, 5.94 and 8.61 are higher than the confident interval value of 1.56 at 0.05 level of significance.

Hence, it is concluded that due to the effect of isolated and parallel core strength and mobility training the flexibility of the subjects is significantly improved. It is also concluded that significant differences existed between experimental groups however, parallel training is better than isolated mobility training and core strength training in improving flexibility.

The pre, post and adjusted post test mean values of experimental and control groups on flexibility is graphically represented in figure-I.

Figure I. Diagram Showing the Pre, Post and Adjusted Post Test Mean Values on Flexibility of Experimental and Control Groups



Discussion

The above findings can also be substantiated by observations made by renowned experts in the science of sports training. Core strength training exercises can be used to provide improvement in the 60 and 90° s trunk flexion/extension, 60 and 240° s-1 lower limb flexion/extension, abdominal endurance, lower back muscular endurance, lower limb endurance, lower back flexibility, and dynamic balance measures in sedentary women (Sekendiz, Cug & Korkusuz, 2010). Authors have claimed that resistance exercises performed on unstable equipment are specific to sports skills because of the balance, proprioception, and core stability required to perform these exercises successfully (Bigatton, 2002; Chek, 1999). Therefore, performing resistance exercises on unstable equipment will make an individual to enhance the performance of sports skills.

Weight training can increase flexibility in previously sedentary middle-aged women in some, but not all joint movements (Monteiro *et al*., 2008). Resistance training can improve flexibility in young sedentary women in 8 weeks (Santos, 2010). Eight

weeks of low-frequency, supervised, progressive strength training emphasizing free weight, multijoint movements can safely cause significant gains in muscle strength, absolute endurance, and flexibility (Adams *et al*., 2001). Participation in a similarly structured weight training program to develop muscular strength would not impair flexibility but might increase it (Thrash & Kelly, 1987). Core strength training may be able to increase range of motion of a number of joints possibly due to an improvement in muscle strength.

Concentric, eccentric torque and range of motion (ROM) are changed after chronic stretching programs (Nittoli, 1995). Optimal method of stretching will improve hip flexion range of motion. Static stretching of the hamstring produced the greatest increases in both passive and active hip flexion ROM (Sundquist, 1996). Research findings on core strength and mobility training were reviewed. The investigator prepared to offer opinions based on the strength of collective studies. Most improvements are observed when core strength training was combined with mobility training. It appears that parallel core strength and mobility training may be superior to isolated core strength and mobility training in improving flexibility.

Conclusions

The result of this study demonstrated that, core strength training, mobility training, parallel core strength and mobility training has significant impact on flexibility of cricket players. It is also concluded that parallel core strength and mobility training is better than isolated core strength and mobility training in improving flexibility.

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