International Journal for Life Sciences and Educational Research
Vol.1(2), pp. 76 - 80, July- 2013
Available online at http://www.ijlser.com
E-ISSN : 2321-1229; P – ISSN : 2321-1180

Research Article

Motor fitness parameters response to core strength training on Handball Players

E. Balaji* and K. Murugavel**
*Department of Physical Education, CBM College Coimbatore, Tamilnadu, India
**Department of Physical Education, Bharathiar University, Coimbatore, Tamilnadu, India

Article History : Received 10 April 2013, Accepted 18 June 2013

Abstract

The study was designed to investigate the "motor fitness parameters response to core strength training on handball players. The experimental group was given training for the period of 8 weeks of core strength training. The criterion variables were chosen namely speed, agility, leg explosive power and upper body strength. All the dependent variables were assessed before and after the training period. The collected data on motor fitness parameters due to effect of core strength training was analyzed by computing mean and standard deviation. In order to find out the significant improvement if any, 't' test was applied. 0.05. The study revealed that the motor fitness parameters were significantly improved due to the influence of core strength training.

Key words : Core strength training, Motor fitness, Speed, Agility and Upper body strength.

Introduction

The human core is described as the human low back-pelvic-hip complex with its governing musculature (Clarke, 1998). The core is important because it is the anatomical location in the body where the center of gravity is located, thus where movement stems (Gracovetsky *et al.,* 1985). The core muscle is defined as the muscles around the spine and the abdomen, and functions essentially to maintain spinal stability and pelvic balance (Akuthota *et al.,* 2008). The core functions to maintain postural alignment and dynamic postural equilibrium during functional activities, which helps to avoid serial distortion patterns (Clark *et al.,* 2000). Core stability is the motor control and muscular capacity of the lumbopelvic-hip complex (Leetun, 2004). The normal function of the stabilizing system is to provide sufficient stability to the spine to match the instantaneously varying stability demands due to changes in spinal posture, and static and dynamic loads, within the three subsystems (Panjabi, 1992). Panjabi proposes that spinal stabilization is dependent on the interplay between passive, active and neural control systems.

The necessary mechanics and strategies utilized in handball are widely known, but through a systematic review of the literature, a lack of studies pertaining to performance enhancement was noted, specifically regarding training of the core. Only a few studies supported the use of a core stabilization program in athletes. Swaney and Hess (2003) found positive results with posture after a nine-week core stabilization program implemented with swimmers as a group two times per week, using the National Academy of Sports Medicine's standard core protocol. Piegaro (2003) found improvement in a four-week core stabilization program with exercises based on a foam roll for twice a week and Lewarchick *et al.* (2003) saw trends in performance measurements

*Corresponding Author : E. Balaji, Email : sportybalaji_99@rediffmail.com

in football athletes using a plyometric based core program for four times a week for seven weeks. Jeffreys (2002) has suggested a systematic progressive approach to introducing core stabilization in athletes.

Core strength is an essential part of any athlete's total fitness. Handball athletes cannot ignore this facet in their physical training because handball is not a one dimensional game; players are constantly shifting their body from side to side or rotating their bodies toward the ball. One strategic level of handball requires that one keeps their opponents running and off-balance, hence many directional changes during a match.

Therefore, this study aimed to analyse the motor fitness parameters in male handball players after 8 weeks of the core training programme. It was expected that a scientific core muscle training method for male handball players could be proposed.

Materials and Methods

The 30 male handball players were randomly selected from the Coimbatore district as subjects and their age ranged between 18 and 25 years. They were divided into two groups. The group - I was considered as a control group and group - II was considered as the experimental group. The control group was not given any exercise and the experimental group was given core strength training for five days per week for 8 weeks. The evaluated parameters were speeding (50 m dash), agility (4×10 m shuttle run), leg explosive power (standing broad jump) and upper body strength (6 pound medicine ball throw). The parameters were measured before and after the core strength training programme and the effects of the training programme were examined (Table-1). The collected data on motor fitness parameters due to effect of core strength training was analyzed by computing mean and standard deviation. In order to find out the significant improvement if any, 't' test was applied.

Result and Discussion

Table - 2 reveals the computation of 't' ratio between the mean of pretest and posttest of control and experimental groups on speed, agility, leg explosive power and upper body strength of college level male handball players. The mean values of pre and post test on the control group were 8.09 and 8.08, 28.10 and 28, 1.96 and 1.97 and 5.21 and 5 respectively. Since the obtained 't' ratio 0.45, 1.90, 1.11 and 1.01 were lesser than the required table value 2.145, it was found statistically not significant for the degree of freedom 1, and 14 at 0.05 level of confidence.

The mean values of pre and post test of the experimental group were 8.09 and 8.05, 28.10 and 27, 1.96 and 2.05 and 5.21 and 5.46 respectively. Since the obtained 't' ratio 4.88, 4.06, 2.67 and 3.10 were greater than the required table value 2.145, it was found statistically significant for the degree of freedom 1, and 14 at 0.05 level of confidence.

The results clearly indicated that the speed, agility, leg explosive power and upper body strength of experimental group improved due to the influence of 8 week core strength training programme.

One of the most important fitness levels for handball players is strength in the lower body and the core body region. Therefore, this study aimed to provide scientific training techniques for improving core muscle strength of college level handball players. The abdomen and lower back are considered to be power zones and the regions that play a fundamental role in producing power. In addition, muscles around lumbar region display important neuromuscular control to maintain functional stability of the whole body (Akuthota and Nadler, 2004).

In this study the subjects who underwent core strength training were able to improve their motor fitness in handball on t-test. Therefore, it is found a positive relationship between core strength

Table – 1. Training schedule of Handball players

Weeks	Core strength training	Sets X repetitions	Rest and recovery
1-2 weeks	Seated Oblique Twist Plank abdominal Plank with arm lift Sky reach Abdomen twist crunch	3 X 8	1 minute rest between exercise and 2 minutes rest between sets
3-4 weeks	Seated Oblique Twist Plank abdominal Plank with arm lift Sky reach Abdomen twist crunch	3 X 10	
5-6 weeks	Plank with Leg Lift V-Sit abdomen Hip Lift Marching Lunge and Twist Clap Overhead	3 X 12	
7-8 weeks	Supine elbow stand leg lift Decline push ups Alternating Super mans Bridge Incline Push Ups	3 X 15	

Table – 2. Summary of mean and 't' test for the pre and post tests on speed, agility, explosive power and upper body strength of control and experimental groups

Parameters	Group	Test	Mean	Standard deviation	Mean difference	't' ratio
Speed	Control group	Pre	8.09	0.35	0.003	0.45
		Post	8.08	0.36		
	Experimental group	Pre	8.09	0.35	0.039	4.88*
		Post	8.05	0.36		
Agility	Control group	Pre	28.10	0.90	0.09	1.90
		Post	28	0.87		
	Experimental group	Pre	28.10	0.90	1.09	4.06*
		Post	27	1.09		
Leg Explosive Power	Control group	Pre	1.96	0.15	0.006	1.11
		Post	1.97	0.15		
	Experimental group	Pre	1.96	0.15	0.09	2.67*
		Post	2.05	0.19		

Upper Body Strength	Control group	Pre	5.21	0.56	0.20	1.01
		Post	5	1.04		
	Experimental group	Pre	5.21	0.56	0.25	3.10*
		Post	5.46	0.60		

* Significant at 0.05 level of significance

training and improvements of motor fitness. This improvement in motor fitness is beneficial for athletes who require motor fitness while performing their sport and support the results from other studies.

In the present study the low intensity plyometric training has improved the speed, agility, leg explosive power and upper body strength over 0.5%, 3.91%, 4.60% and 4.80% respectively by finding significant differences in comparison from baseline to post test.

Sato and Mokha (2009) demonstrated enhanced athletes' records on the track and field after 6 weeks' core muscle training and subsequently emphasized that muscular strength training was a beneficial training modality for improving performance of track and field athletes.

The muscular strength training focused on the abdominal and erector spine muscles has influenced biomechanical functions and stability of the spine and pelvis (Nadler *et al.,* 2002). And systemic and continuous lower back exercises have improved the neuromuscular functions in the unstable lower back region (Rendawitz *et al.,* 2006), Indicating the importance of core muscle training in handball players. Since researches on core muscle training for handball players are scarce, the understanding of core muscle training which can help enhance muscle strength is very limited. Thus, research on core muscle training according to age and performance level should continue to be conducted. This study utilized core muscle training program lasting 8 weeks, but further studies are needed, which will elucidate the effectiveness of longer durations of training. In particular, a training regimen based on periodization aimed at improving not only core muscle but whole body flexibility, strength, power and muscle endurance should be applied to college level male handball players.

It is our belief that the positive results found in the present study may be related, though in a subjective and empirical way, to the athletes' adherence to the training program. Its unusual design and diversified structure may have contributed to improved performance and to the maintenance of high levels of motivation. Furthermore, we believe that such a program greatly contributes to motor learning with positive repercussions on future motor behaviours.

Finally, it is worth reporting that no injury was caused during this program. This is an advantage for the proposed program, confirming that core strength training in youths helps to prevent and reduce injury risk when correctly designed and competently supervised.

Conclusion

Eight weeks of core strength training programme produced significant improvements in the speed, agility, leg explosive power and upper body strength of men hand ball players.

Core strength training is an appropriate training protocol to bring out desirable changes over motor fitness parameters for handball players. Thus a continuous and systemic core training aimed at maximizing performance capacity should be applied to college level male handball players.

Recommendations

The proposed core strength training programme should be a part of physical preparation

of handball players, because of their significant influence on raising the level of the player physically and skillfully.

It is necessary to raise the awareness of the trainers with the importance of the specific core strength exercises in the direction of the skill because of their significant influence on raising the physical and skillful level of handball players. Studies should be conducted in the same area on different samples in terms of age and gender.

References

Akuthota, V., Ferreiro, A., Moore, T. and Fredericson, M. 2008. Core stability exercise principles. *Curr. Sports Med. Rep.,* 7(1) :39-44.

Akuthota, V. and Nadler, S. F. 2004. Core strengthening. *Arch. Phys. Med. Rehabil.,* 85 (3 Suppl1), S86-92.

Clark, M. 1998. Essentials of integrated training part 5: core stabilization training.

Clark, M.A., Fater, D. and Reuteman, P. 2000. Core (trunk) stabilization and its importance for closed kinetic chain rehabilitation. *Orthop. Phys. Ther. Clin. North Am*. 9 : 119 - 135.

Gracovetsky, S. and Farfan, H. 1986. The optimum spine. *Spine*., 11 : 543 - 573.

Jeffreys, I. 2002. Developing a progressive core stability program. *J. Strength Cond.* 24: 65 - 66.

Leetun, D.T. 2004. Core stability measures as risk factors for lower extremity injury in athletes. *Med. Sci. Sports Exerc*ise., 36 : 926 - 34.

Lewarchik, T.M., Bechtel, M.E., Bradley, D.M., Hughes, C.J. and Smith, T.D. 2003. The effects of a seven week core stabilization program on athletic performance in collegiate football players. *J. Athl. Train*., 38S : S- 81.

Panjabi, M.M. 1992. The stabilizing system of the spine. Part I: function, dysfunction, adaptation, and enhancement. *J. Spinal Disord*., 5: 383-389.

Piegaro, A.D. 2003. The Comparative Effects of Four-Week Core Stabilization & Balance Training Programs in Semidynamic & Dynamic Balance. *Master Thesis, Morgantown WV: West Virginia University*.

Sato, K. and Mokha, M. 2009. Does core strength training influence running kinetics, lower-extremity stability, and 5000-M performance in runners?. *J. Strength Cond. Res.*, 23(1) : 133 - 140.

Swaney, M.R. and Hess, R.A. 2003. The effects of core stabilization on balance and posture in female collegiate swimmers. *J. Athl. Train*. 38S: S - 95.

****