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Influence of high intensity plyometric training program on motor fitness variables of intercollegiate male handball players

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Abstract

This study was designed to investigate the influence of high intensity plyometric training program on motor fitness variables of intercollegiate male handball players. To achieve the purpose of the study (N=30) thirty college level male handball players were randomly selected from affiliated colleges of Bharathiar University, Coimbatore as subjects. Their age ranged between 18 and 25 years. They were divided into two equal groups. The Group- I was considered as Experimental group and group- II was considered as control group. The investigator did not make any attempt equal group. The control group was not given any training and the experimental group was given high intensity plyometric training for three days per week for the period of twelve weeks. A pilot study was conducted to assess the initial capacity to the subject in order to fix the load. The following variables were chosen namely Speed (50meters dash), agility (shuttle run) and vertical jump performance (Sargent jump test). All the dependent variables were assessed before and after the training period of 12 weeks. The collected data on motor fitness variables due to effect of high intensity plyometric training analyzed by computing mean and standard deviation. In order to find out the significant improvement if any, 't' test was applied. 0.05 level of confidence was fixed to test the level of significance. The study revealed that the motor fitness parameters were significantly improved due to influence High Intensity Plyometric training

Keywords: Plyometric training, Speed, Agility and Vertical jump performance

Introduction

In Handball, players perform more often repeated short sprinting with change of direction. These players' perform 180 degrees turns over a small distance and this sport to great extent demand agility. Agility is the ability to start (or accelerate), stop (or decelerate), and change direction quickly, while maintaining proper posture. Agility requires high levels of neuromuscular efficiency to be able to maintain one's center of gravity over their base of support while changing directions at various speeds. Handball players undergo various types of training to maximize their performance.

Plyometric training involves exercises that generate quick, powerful movements involving explosive concentric muscle contraction preceded by an eccentric muscle action. These types of explosive muscular contractions can be seen in practical instances such as jump shot in handball. Researchers have shown that plyometric training, when used with a periodized strength-training program, can contribute to improvements in vertical jump performance, acceleration, leg strength, muscular power, increased joint awareness, and overall proprioception. Plyometric drills usually involve stopping, starting, and changing directions in an explosive manner. These movements are components that can assist in developing agility.

Plyometrics began being used in the late 1960s by Russian track and field athletes. The actual term plyometrics was first coined in 1975 by Fred Wilt, one of the America's more forward-thinking track and field coaches. Until the 1980s, plyometrics were strictly used by the track and field athlete. After this period of time, other sports began to apply plyometrics to their training as well.

High Intensity Plyometrics (HIP) is for the more advanced athletes and should only be conducted once you have been exposed to basic plyometrics for some time.

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It is a well-known fact that huge amounts of forces are placed on the joints, muscles and bone structure with plyometrics and even more so with HIP.

Reason for the study

Explosiveness is a vital part of an athlete's fitness. Handball players cannot ignore this in parameter their training schedule because handball is multi dimensional game. The handball players' performance short spiriting with change of direction. And to execute the jump shot high, the leg explosive power players a vital role, without Explosiveness the shot will not be successful one. Therefore we have selected the above variables in this investigation.

The hypothesis argued in this study is that intercollegiate male handball players can significantly improve the parameters of speed, agility and vertical jump performance by combining technical and tactical sessions with a high intensity plyometric training program over a consecutive 12 weeks period. Therefore, the object of this study was to investigate the changes in the parameters produced during 12 weeks of plyometric training in thirty intercollegiate male handball players.

Methods

Experimental approach to the problem

In order to address the hypothesis presented here in, we selected (N=30) intercollegiate male handball players from

affiliated colleges of Bharathiar University, Coimbatore. The subjects were randomly assigned into two equal groups namely high intensity plyometric training group (N=15) and control group (N=15). A pilot study was conducted to assess the initial capacity to the subject in order to fix the load. The high intensity plyometric training was given to the experimental group for 3 days per week (alternate days) for a period of twelve weeks. The control group was not given any sort training except their routine.

Training programme

The training programme was lasted for 45 minutes for session in a day, 3 days, in a week for a period of 12 weeks duration. These 45 minutes included 5 minutes warm up, 15 minutes of conditioning, high intensity plyometric training for 20 minutes and 5 minutes warm down. The volume of plyometric training is prescribed based on the number of sets and repetitions. The training volume ranged from 90 to 140 foot contact per session while the intensity of exercise for 10 weeks before tapering off during 11th and 12 weeks as recommended by Piper and Erdmann (1998) [14]. The plyometric exercise are classified into low, medium and high intensity based on the difficulty in performing (Ebben, 2007). The intensity of training was tapered, so that fatigue would not be a factor during post testing.

Table 1: high intensity plyometric training schedule

Training week	Volume (Foot contacts)	Drills	Sets × Reps	Intensity & Rest
I & II	90	Single leg bounding Lateral jump single leg Split pike jump	5×6 2×15 2×15	High & Two minutes between the sets
III & IV	120	Single leg bounding Lateral jump single leg Split pike jump Double leg vertical power jump	2×15 5×6 2×15 5×6	High & Two minutes between the sets
V & VI	120	Single leg bounding Lateral jump single leg Single leg vertical barrier hop Split pike jump Lateral jump over barrier	2×12 4×6 2×12 3×8 2×12	High & Two minutes between the sets
VII & VIII	140	Lateral jump single leg Single leg bounding Straight pike jump Single leg tuck jump Single leg speed jump	4×8 4×8 2×12 4×7 4×6	High & Two minutes between the sets
IX & X	140	Lateral jump single leg Single leg bounding Single leg tuck jump Single leg speed jump Box jump 18" Depth jump landing	2×7 4×7 4×7 4×7 4×7 2×7	High & Two minutes between the sets
XI & XII	120	Single leg bounding Double leg vertical power jump Box jump 18" Lateral bound single leg Depth jump landing	2×12 2×12 4×6 3×8 4×6	High & Two minutes between the sets

Statistical analysis

The collected data before and after training period of 12 weeks on the above said variables due to the influence of high intensity plyometric training was statistically analyzed

with 't' test to find out the significant improvement between pre and post test. In all cases the criterion for statistical significance was set at 0.05 level of confidence. (P < 0.05)

Table 2: computation of 't' ratio on selected motor fitness variables of inter collegiate male handball players on experimental group and control group, (Scores in numbers)

Group	Variables	Mean	N	Std. Deviation	Std. Error Mean	't' ratio	
Experimental Group	Speed	Pre test	8.09	15	1.58	0.28	3.44*
		Post test	7.14	15	0.74		
	Agility	Pre test	11.22	15	1.53	0.28	3.57*
		Post test	10.20	15	0.69		
	Vertical jump	Pre test	0.46	15	0.06	0.001	14.16*
		Post test	0.53	15	0.06		
Control group	Speed	Pre test	7.25	15	0.64	0.16	1.54
		Post test	7.50	15	0.59		
	Agility	Pre test	10.31	15	0.74	0.23	0.05
		Post test	10.30	15	0.59		
	Vertical jump	Pre test	0.48	15	0.04	0.01	1.82
		Post test	0.49	15	0.04		

*Significant at 0.05 level of confidence 1and 14 (2.14)

Table II reveals the computation of mean, standard deviation and 't' ratio on selected motor fitness parameters namely speed, agility and vertical jump performance of experimental group. The obtained 't' ratio on speed, agility and vertical jump performance were 3.44, 3.57 and 14.16 respectively. The required table value was 2.14 for the degrees of freedom 1and 14 at the 0.05 level of significance. Since the obtained 't' values were greater than the table value it was found to be statistically significant.

Further the computation of mean, standard deviation and 't' ratio on selected motor fitness parameters namely speed, agility and vertical jump performance of control group. The obtained 't' ratio on speed, agility and vertical jump were 1.54, 0.05 and 1.82 respectively. The required table value was 2.14 for the degrees of freedom 1and 14 at the 0.05 level of significance. Since the obtained 't' values were lesser than the table value, it was found to be statistically not significant.

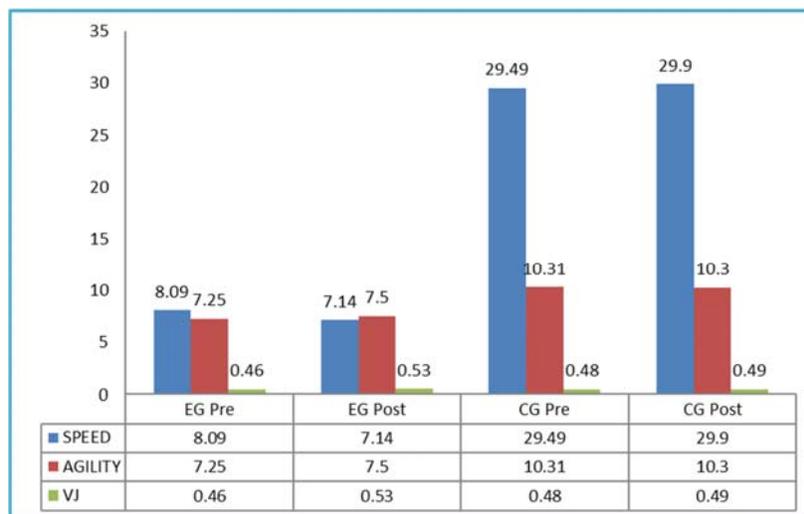


Fig 1: Bar diagram showing the mean value on selected motor fitness variables of inter collegiate male handball players on experimental group and control group

Discussion on findings

The present study experimented the investigated influence of high intensity plyometric training program on motor fitness variables of intercollegiate male handball players. The results of this study indicated that plyometric training improved speed, agility and vertical jump performance. The findings of the present study had similarity with the findings of the investigators referred in this study. Balasubranaian *et al.*, (2014) [1] Effects of speed agility quickness training and plyometric training on significantly improved due to the speed agility for men Kabaddi players. Chandrasekaran *et al.*, (2015) [8] effect of plyometric training on significantly improved the speed, agility and explosive power among college volleyball players. Devaraju. K (2014) [2] plyometric training on significant improved the selected physical fitness variables muscular endurance and speed of ball badminton players. Eskandar *et al.*, (2014) [4] Plyometric and resistance

training exercises increase agility and explosive power and reduce sprint time in football players and coaches for improving speed and performance skill. Gunnar Elling Mathisen (2014) [5] Effect of high-speed and plyometric training significant improved in both agility and in linear sprint performance in adolescent male soccer players. Hamdy Kassem Shallaby (2010) [6] the effect of plyometric exercises on significantly improved due to the vertical jump skillful performance of basketball players. Jayabal *et al.*, (2013) [18] Plyometric training with yogic practices significant improved on agility adolescent boys John *et al.*, (2009) [7] comparative analysis of plyometric training program and dynamic stretching on significantly improved due to the vertical jump and agility in male collegiate basketball players. effects of 8-week plyometric and strength training programs on significantly improved the Sprint, Agility, and Explosive Power elite kabaddi players.

Monsef Cherif *et al.*, (2012)^[11] plyometric and Speed Training Program on significant improved the jumping ability of male handball Players. Nikola *et al.*, (2012)^[12] the effects of plyometric training on significantly improved the jumping agility in volleyball players. Nisith *et al.*, (2015)^[13] aquatic and Land plyometric training on significant improved the speed, explosive power and agility selected physical fitness variables in intercollegiate male handball players. Kamaraj *et al.*, (2013)^[9] Aquatic based plyometric training on significant improved the agility, coordination, power, speed and performance of handball players. Rameshkannana *et al.*, (2014)^[15] plyometric training on significant improved the agility handball players. the effect of plyometric circuit exercises on significantly improved due to the vertical jump and speed for elite handball players. Singh *et al.*, (2015)^[17] Plyometric training on significant improved the vertical jumping ability of volleyball players. From of result of the present study, it is speculated that the observed changes on speed, agility and vertical jump performance may be due properly designed plyometric training which are suitable to intercollegiate male handball players.

Conclusions

Twelve weeks of high intensity plyometric training significantly improved the speed, agility and vertical jump performance of intercollegiate male handball players.

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