

Effects of Isometric Core Training, Explosive Power Training and Their Combination on Leg Explosive Power of Collegiate Male Handball Players

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ABSTRACT:- The purpose of the study is to find out the effects of isometric core training, explosive power training and their combination on leg explosive power of collegiate male handball players. To achieve the purpose of the study, 80 male inter collegiate handball players were selected from St. Joseph college, Trichy TN, India. The selected subject's age ranged from 17-25 years and Leg Explosive power was tested by vertical jump test. Pre-test data was taken before the training and the post test data was collected after the completion of a twelve week training period. The subjects were randomly put into the four groups of 20 in each. The first group (n=20, ICTG) underwent isometric core training, the second group (n=20; EPTG) underwent explosive power training, the third group (n=20; CCEPTG) underwent combination of core and explosive power training the group IV (n=20, CG group) did not have any specific trainings. Allison et.al.,(2008) transversus abdominis are directionally specific and act asymmetrically: implications for core stability theories. Based on this study 't' ratio was applied to find out the significant difference between the pre and post tests and analysis of covariance was applied with regards to the selected variables. All the Independent variables shows the significant improvement in leg explosive power and combination of core and explosive power training shows better improvement on leg explosive power.

Keywords: ICTG- Isometric Core Training Group, EPTG- Explosive Power Training, CCEPTG- Combination of Core and Explosive Power Training.

I. INTRODUCTION

According to suthakar et.al., (2016) The silambam and karate with yogic training exercises be recommended as a part of overall physical training to maintain the functional capacity in collegiate male players. For explosive muscle performance, the underlying factors are muscle fiber type, muscle hypertrophy, enzymatic and neural adaptations. Willson, et.al.,(2005) "Core stability and its relationship to lower extremity function and injury. It is also important to investigate the impact of power-type strength training on the low back, leg muscles and joints, as well as the injury risks and adherence, and motivation for training. For being effective in improving the explosive muscle performance, training programs should be designed so as to motivate, easy to achieve, effectively concerning the time in exercises, low expenses, and they should consider the exercise history and present exercise activity, health status and musculoskeletal symptoms and diseases of the individual. Ashok Kumar et.al., (2016) states that of Volleyball Specific Resistance Training and Skill Training Packages on the Developed Leg Explosive Power School Boys. This type of training describes a power-developing workout that combines weights and Plyometric exercises. Sundar et.al., (2014) states that fartlek and Skill Based Plyometric Training developed the physical variables of agility for silambam players. About ten years ago, these workouts were greeted with great acclaim as research indicates that they could significantly enhance fast twitch muscle fiber power, therefore, produce dynamic sports performance. K. Jothi et.al., states that Concurrent Strength and Plyometric Training improved the Bio motor Abilities of college students. The logic behind this pair of exercise is that the resistance work gets the nervous system into full action so that type II b fibers are available for the explosive exercise. Kim et.al.,(2013), Deep abdominal muscle strengthening exercises on respiratory function and lumbar stability.

II. METHODOLOGY

The purpose of the study is to find out the effects of isometric core training, explosive power training and their combination on leg explosive power of collegiate male handball players. To achieve the purpose of the study, 80 male inter collegiate handball players were selected from Bharathidhasan university affiliated colleges and training program was conducted in St. Joseph college, Trichy TN, India. The selected subject's age ranged from 17-25 years and Leg Explosive power was tested by vertical jump test. Pre-test data was taken before the training and the post test data was collected after the completion of a twelve week training period. The subjects were randomly put into the four groups of 20 in each. The first group (n=20, ICTG) underwent isometric core training, the second group (n=20; EPTG) underwent explosive power training, the third group (n=20; CCEPTG) underwent combination of core and explosive power training the group IV (n=20, CG group) did not have any specific trainings. Based on this study 't' ratio was applied to find out the significant difference between the pre and post tests and analysis of covariance was applied with regards to the selected variable. Training was conducted 5 day in a week for the period of 12 weeks.

SIGNIFICANCE OF MEAN GAIN /LOSES BETWEEN PRE AND POST TEST OF ISOMETRIC CORE TRAINING ON LEG EXPLOSIVE POWER OF INTER COLLEGIATE MALE HANDBALL PLAYERS.

TABLE-1

Variable	Test	Mean	S.D	M.D	S.E.M	't' ratio
LEG EXPLOSIVE POWER (in CM)	Pre-Test	34.2000	2.26181	2.95	0.42	6.92*
	Post -Test	37.1500	2.10950			

0.05 level of Significance (2.09)

Table-1 shows the obtained 't' ratio's for pre and final test mean difference of combination of core and explosive power training in the selected variable of leg explosive power (6.92) respectively. the obtained' ratio was when compared with the table value of 2.09 for the degrees of freedom (1, 19) it was found to be statistically significant at 0.05 level of confidence.

SIGNIFICANCE OF MEAN GAIN /LOSES BETWEEN PRE AND POST TEST OF EXPLOSIVE POWER TRAINING ON LEG EXPLOSIVE POWER OF INTER COLLEGIATE MALE HANDBALL PLAYERS.

TABLE-2

Variable	Test	Mean	S.D	M.D	S.E.M	't' ratio
LEG EXPLOSIVE POWER (in CM)	Pre-Test	33.8500	2.10950	5.55	0.38	14.75*
	Post -Test	39.4000	2.45807			

0.05 level of Significance (2.09)

Table-2 shows the obtained 't' ratio's for pre and final test mean difference of explosive power training in the selected variable of leg explosive power (14.75) respectively. the obtained' ratio was when compared with the table value of 2.09 for the degrees of freedom (1, 19) it was found to be statistically significant at 0.05 level of confidence.

SIGNIFICANCE OF MEAN GAIN /LOSES BETWEEN PRE AND POST TEST OF COMBINATION OF CORE AND EXPLOSIVE POWER TRAINING ON LEG EXPLOSIVE POWER OF INTER COLLEGIATE MALE HANDBALL PLAYERS.

TABLE-3

Variable	Test	Mean	S.D	M.D	S.E.M	't' ratio
LEG EXPLOSIVE POWER (in CM)	Pre-Test	34.0500	2.41650	7.95	0.40	19.85*
	Post -Test	42.0000	2.59554			

0.05 level of Significance (2.09)

Table-3 shows the obtained 't' ratio's for pre and final test mean difference of isometric core training in the selected variable of leg explosive power (19.85) respectively. the obtained' ratio was when compared with the table value of 2.09 for the degrees of freedom (1, 19) it was found to be statistically significant at 0.05 level of confidence.

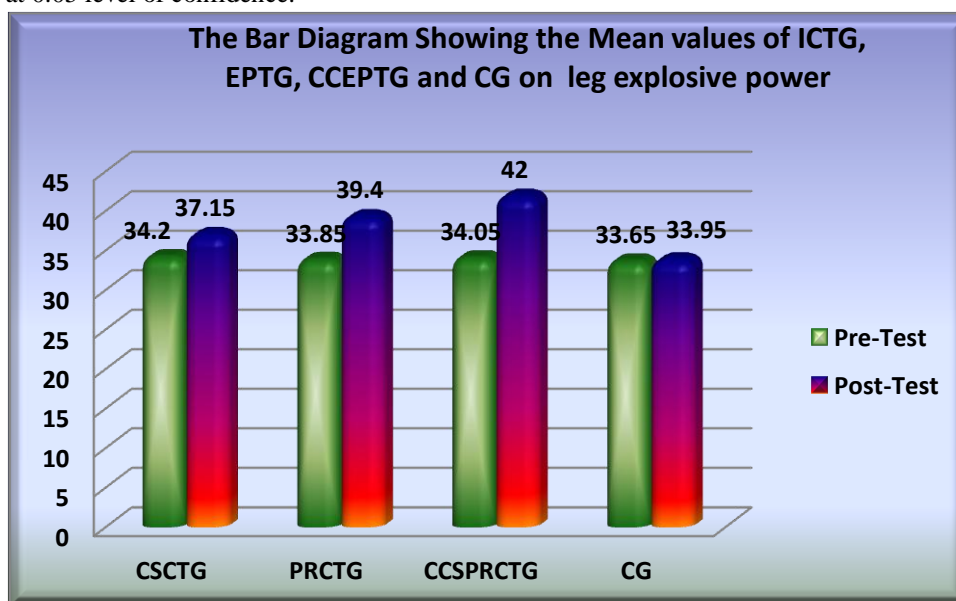
SIGNIFICANCE OF MEAN GAIN /LOSES BETWEEN PRE AND POST TEST OF CONTROL GROUP ON LEG EXPLOSIVE POWER OF INTER COLLEGIATE MALE HANDBALL PLAYERS.

TABLE-4

Variable	Test	Mean	S.D	M.D	S.E.M	't' ratio
LEG EXPLOSIVE POWER (in CM)	Pre-Test	33.6500	2.47673	0.30	0.34	0.88
	Post -Test	33.9500	2.76205			

0.05 level of Significance (2.09)

Table-4 shows the obtained 't' ratio's for pre and final test mean difference of explosive power training in the selected variable of leg explosive power (0.88) respectively. the obtained' ratio was when compared with the table value of 2.09 for the degrees of freedom (1, 19) it was found that not statistically significant at 0.05 level of confidence.



GRAPH-1

ANALYSIS OF VARIANCE ON PRE AND POST TEST MEANS AMONG ICTG, EPTG, CCEPTG AND CG ON LEG EXPLOSIVE POWER OF INTER COLLEGIATE MALE HANDBALL PLAYERS.

TABLE-5

Variables	Source of Variance	Sum of Squares	df	Mean Square	F	Sig.
LEG EXPLOSIVE POWER PRE-	Between Groups	3.438	3	1.146	.213	.887
	Within Groups	409.250	76	5.385		
LEG EXPLOSIVE POWER POST	Between Groups	700.450	3	233.483	37.57*	.000
	Within Groups	472.300	76	6.214		

0.05 level of Significance (2.73)

Table 5 reveals that the obtained 'F' value among the groups of ICTG, EPTG, CCEPTG AND CG on pre – test means of leg explosive power 0.213. The obtained 'F' ratio was lesser than the table 'F' ratio 2.73. Hence the Initial test means were found to be not significant at 0.05 level of confidence for the degree of freedom 3 and 76. The post - test means were 37.57. The obtained 'F' ratio was higher than the table 'F' ratio 2.73. Hence the post – test means were found to be significant at 0.05 level of confidence for degree of freedom 3 and 76. It was founded that the significant mean difference among the experimental groups ICTG, EPTG, CCEPTG and control group.

ANALYSIS OF VARIANCE ON PRE AND POST TEST MEANS AMONG ICTG, EPTG, CCEPTG AND CG ON LEG EXPLOSIVE POWER OF INTER COLLEGIATE MALE HANDBALL PLAYERS.

TABLE-6

Variables	Source of Variance	Sum of Squares	df	Mean Square	F	Sig.
LEG EXPLOSIVE POWER ADJUSTED	Between Groups	660.936	3	220.312	77.86*	.000
	Within Groups	212.217	75	2.830		

0.05 level of Significance (2.73)

The adjusted post – test means obtained ‘F’ ratio was 77.86 higher than the table value 2.72. Hence the adjusted final test means were found to be significant at 0.05 level of confidence for the degrees of freedom 3 and 75. It was concluded that there was a significant mean difference among the isolated core training group, explosive power training group and combination of core and explosive power training group and control group of inter collegiate male handball players.

THE SCHEFFE’S POST HOC TEST ON ADJUSTED POST TEST MEANS AMONG THE ICTG, EPTG, CCEPTG AND CG ON LEG EXPLOSIVE POWER OF INTER COLLEGIATE MALE HANDBALL PLAYERS

Table-7

ICTG	EPTG	CCEPTG	CG	MD	CI Value
36.94	39.47			2.53	1.5
36.94		41.91		4.97	1.5
36.94			34.179	2.76	1.5
	39.47	41.91		2.44	1.5
	39.47		34.179	5.29	1.5
		41.91	34.179	7.73	1.5

Table-7 shows the adjusted post hoc test mean values of ICTG, EPTG, CCEPTG AND CG. The mean difference required for the confidential interval to be significant was 1050. To Comparing the ICTG group and EPTG group, the mean differences between the two groups were 2.53. Hence EPTG group were showed better improvement on leg explosive power. To Comparing the ICTG group and CCEPTG group, the mean differences between the two groups were 4.97. Hence CCEPTG group were showed better improvement on leg explosive power. To comparing the ICTG group and CG, the mean differences between the two groups were 2.76. Hence ICTG group were showed better improvement on leg explosive power. To Comparing the EPTG group and CCEPTG group, the mean differences between the two groups were 2.44. Hence CCEPTG group were showed better improvement on leg explosive power. To comparing EPTG group and CG, the mean differences between the two groups were 5.29. Hence EPTG group showed better improvement on leg explosive power . To comparing CCEPTG group and CG, the mean differences between the two groups were 7.73. Hence CCEPTG group showed better improvement on leg explosive power. Finally CCEPTG group showed better than the EPTG group, ICTG group and CG on leg explosive power.

III. DISCUSSION AND FINDING OF THE RESULTS OF LEG EXPLOSIVE POWER

Isolated core training group, Explosive power training group, combination of core and explosive power training group significantly showed improvement in leg explosive power from pre test to post test. The leg explosive power increased in the ICTG group from pre test (34.20 ± 2.26) to post test (37.15 ± 2.10); EPTG group from pre test (33.85 ± 2.10) to post test (39.40 ± 2.45); CCEPTG group from pre test (34.05 ± 2.41) to post test (42.00 ± 2.59) and there were no change in control group from pre test (33.65 ± 2.47) to post test (33.95 ± 2.76). The leg explosive power significantly showed improvement from pre test to post test in the three Treatment groups and there was no changes in control group.

The present study demonstrated that an increase in leg explosive power of 8.62%, 16.39%, 23.35% and 0.89 % was estimated with vertical jump test for the Isolated core training group, Explosive power training group, combination of core and explosive power training group and control group respectively. The combination of core and explosive power training group significantly showed improvement in leg explosive power by 23.35 % better than the EPTG 16.39 %, ICTG 8.62 % and control group 0.89 %. The explosive power training group improved leg explosive power by 16.39 % better than the ICTG 8.62% and control group. The core training group improved leg explosive power by 8.62 % better than the control group. Previous studies state that

suthakar, s. (2016) physical growth on specific fitness training, Adams et.al., (1992) squat, plyometric and squat-plyometric training, Bauer T., et.al (1990). Comparison of training modalities for power development in the lower extremity developed explosive power.

IV. RESULT OF THE STUDY

1. The result showed that the core training group significantly improved the leg explosive power of inter collegiate male handball players.
2. The result showed that the explosive power training group significantly improved the leg explosive power of inter collegiate male handball players
3. The result showed that the combination of core and explosive power training group significantly improved the leg explosive power of inter collegiate male handball players.
4. The result showed that the combination of core and explosive power training group significantly improved the leg explosive power better than the ICTG, EPTG and CG of inter collegiate male handball players.
5. The result showed that the explosive power training group significantly improved the leg explosive power better than the ICTG and CG of inter collegiate male handball players.
6. The result showed that the core training group significantly improved the leg explosive power better than the CG of inter collegiate male handball players.

V. CONCLUSION OF THE STUDY

1. It was concluded that the core training group significantly improved the leg explosive power of inter collegiate male handball players.
2. It was concluded that the explosive power training group significantly improved the leg explosive power of inter collegiate male handball players
3. It was concluded that the combination of core and explosive power training group significantly improved the leg explosive power of inter collegiate male handball players.
4. It was concluded that the combination of core and explosive power training group significantly improved the leg explosive power better than the ICTG, EPTG and CG of inter collegiate male handball players.
5. It was concluded that the explosive power training group significantly improved the leg explosive power better than the ICTG and CG of inter collegiate male handball players.
6. It was concluded that the core training group significantly improved the leg explosive power better than the CG of inter collegiate male handball players.

REFERENCES

- [1]. Allison GT, Morris SL, Lay B: Feedforward responses of transversus abdominis are directionally specific and act asymmetrically: implications for core stability theories. *J Orthop Sports Phys Ther*, 2008, 38: 228–237.
- [2]. Suthakar, S., and A. Pushparajan. "Effects of Silambam and Karate with Yogic Training on Agility and Arm Explosive Power of Collegiate Male Students." *International Journal of Innovative Research and Development* (2014): 2278-0211.
- [3]. Willson, John D., Christopher P. Dougherty, Mary Lloyd Ireland, and Irene McClay Davis. "Core stability and its relationship to lower extremity function and injury." *JAAOS-Journal of the American Academy of Orthopaedic Surgeons* 13, no. 5 (2005): 316-325.
- [4]. Ashok Kumar, R., K. Babu, and S. Suthakar. "Effects of Volleyball Specific Resistance Training and Skill Training Packages on the Development of Leg Explosive Power and Speed on the Higher Secondary Level School Boys." *International Journal of Innovative Research and Development* 5, no. 4 (2016): 231-235.
- [5]. Sundar, K., and S. Suthakar. "Effects Of Fartlek And Plyometric Training On Agility Performance Of Collegiate Male Silambam Players." *International Journal of Health, Physical Education and Computer Science in Sports* 13 (2014).
- [6]. R. Muthu Eleckuvan K. Jothi, W. Vinu, Effect of Concurrent Strength and Plyometric Training on Selected Biomotor Abilities, *Recent Research in Science and Technology* 2010, 2(5): 124-126.
- [7]. Kim, Eunyoung, and Hanyong Lee. "The effects of deep abdominal muscle strengthening exercises on respiratory function and lumbar stability." *Journal of physical therapy science* 25, no. 6 (2013): 663-665.
- [8]. Dr.S.Suthakar Venkata chalapathi G." Analysis of physical growth on specific fitness training among tribal and non-tribal school boys." *International Journal of Physical Education, Sports and Health* 2016; 3(6): 137-142: 2394-1693.

- [9]. Adams K., O'Shea J.P., O'Shea K.I. and Climstein M. (1992). The effects of six weeks of squat, plyometric and squat-plyometric training on power production. *J Appl Sport Sci Res.* 6:36-41. Bauer T., Thayer R.E. and Baras G. (1990). Comparison of training modalities for power development in the lower extremity. *J Appl Sport Sci Res.* 4:115-121.