

Impact of circular strength training with tapering on selected physical and performance variables Among handball players

S. Rameshkumar* & Dr.R. Jayachandran**

*Ph.D. Research Scholar, Department of Physical Education, Poompuhar College, Melaiyur, Nagapattinam -639 107

**Director of Physical Education Poompuhar College Melaiyur, Nagapattinam- 639 107

Abstract: The purpose of the study was to find out the impact of circular strength training with tapering on selected physical and performance variables namely grip strength, maximum strength, core strength, Explosive power, Flexibility among male handball players. To achieve the purpose of the study twenty eight male handball players have been randomly selected from various colleges in the state of Tamil Nadu, India. The age of subjects were ranged from 18 to 25 years. The subjects had past experience of at least three years in handball and only who those represented their respective college teams were taken as subjects. A series of physical tests was carried out on each participant. grip strength assessed by grip dynamometer, maximum strength assessed by 1RM test, core strength assessed by plank test, Explosive power assessed by Seated Medicine Ball Throw, flexibility assessed by sit and reach and performance variables assessed by judges rating. The subjects were randomly assigned into two groups of fourteen each, such as experimental and control groups. The experimental group participated in the circular strength training with tapering for 3 days a week, one session per day and for 8 weeks each session lasted 45 minutes. The control group maintained their daily routine activities and no special training was given. The subjects of the two groups were tested on selected variables prior and immediately after the training period. The collected data were analyzed statistically through analysis of covariance (ANCOVA) to find out the significance difference, if any between the groups. The 0.05 level of confidence was fixed to test the level of significance difference, if any between groups. The results of the study showed that there was significant differences exist between circular strength training with tapering group and control group. And also circular strength training with tapering group showed significant improvement on grip strength, maximum strength, core strength, explosive power, flexibility and performance compared to control group.

Key words: Grip strength, Maximum strength, Core strength, Explosive power.

Introduction

Handball is an ideal synthesis of the three fundamental athletic disciplines of running, jumping and throwing. Therefore it is not only a purely competitive sport but also a fine sport to be taken-up with advantage by many for purposes of training and health. In sports training, strength is

having a vital role, sports scientist and trainers day by day searching and inventing, innovative strength training, towards the enhancement of sports performance. Strength training is just what our body needs to fight the loss of muscle, bone mass and strength that comes with age. Everyone, no matter how young or old, should be doing some kind of regular strength training. This could be at the gym, or at home using very little equipment. Resistance bands and balls, small hand weights, water and even our own body weight can be used as resistance when designing a strength training program (Mueller). Muscle strength one of the dynamic factors of motor performance and importance lies in that it greatly influential on the speed of motor performance and motor skill proficiency required and is an important cause of progress performance Mufti (1998). Aweys, (2000) explain that muscle strength is a physical attributes that contribute to a prominent role in the mastery and development of tactical skill and performance and have a significant role in highlighting the emergence of some other physical attributes. Mohammed (1992) & Abul Ela(1984) indicated that muscle strength is one of the physical attributes important for sports and special games friction such as football and develop longer need to access the individual with a high level and muscle strength is not only a physical attributes but are the most important physical attributes upon which to develop other qualities such as speeding, endurance, agility and flexibility.

One of the methods which used to improve the muscular endurance is circular strength training (CST) which pioneered by Scott Sonnon, and further developed by his elite Faculty Coaching Staff, CST is the cutting edge of health, fitness and sports performance enhancement. It's unique among fitness systems in offering a complete "health first" approach. Other systems place function (attributes like strength, endurance or speed) first, valuing those things over and often at the expense of health. Circular Strength Training is made up of three "wings" or sub-disciplines. Though they can and are practiced independently, the three wings of CST integrate seamlessly into a stand-alone health and fitness system. Intu-Flow is an incrementally progressive system of dynamic

joint mobility exercises designed to feed and lubricate your joints and connective tissues and restore all of your joints to their full, healthy range of motion. Beginning CST athletes start with the Intu -Flow, and long term athletes use it to release stored tension, speed recovery from training, and to maintain the health and longevity of their bodies.

Prasara yoga takes the range of motion and coordination that you recovered with the Intu -Flow to the next level. It transforms physical performance by teaching one how to re-integrate the breath, movement and structure—the key to accessing flow state in any activity. Prasara specifically focuses on the releasing of chains of tension throughout the body. Tension caused by fear, anxiety, trauma, habit, and even exercise are pulped and released through the practice of Prasara yoga. Prasara works in the opposite and teaches you to release this habitual tension. Paired with the Intu-Flow, Prasara will give the ability to strut around the stage and contort yourself in a freakish display of athleticism while holding a note and making it look easy.

Clubbell Athletics is the third weighted wing of CST. Unlike machines, free weights, and Kettlebells, the Clubbell was specifically designed to be moved in three dimensions, just as people move in the real world. Clubbell allow one to develop the rotary and angular strength of the prime movers (translating directly to athletic performance in any activity), to develop selective tension (the ability to apply exactly the right amount of force for the task at hand, rather than the “full on/full off” approach of traditional strength training), and to develop incredible grip strength and stamina. Clubbell Athletics is simply the most sophisticated, fun and creative vehicle for strength and conditioning ever conceived. (Ryan, 2011). A segment of time when the amount of training load are reduced before a competition in an attempt to peak performance at a target time (Thomas and Busso, 2005). The final preparation for competition is both an art and a science, requiring an understanding of the physiological changes that are occurring and the skills to manage the psychological and emotional state of an athlete as they near the culmination of a hard year of training. Tapering phase are often associate with performance-enhancing psychological changes such as reduced perception of effort, reduced global mood disturbance, reduced perception of fatigue, and increased vigour (Hooper et al. 1999).

A progressive, nonlinear reduction of the training load during a variables amount of time that is intended to reduce the physiological and psychological stress of daily training and optimize sport performance (Mujika and Padilla 2000). Circular strength training provides a technique to cover every factor of an individual's remedial, fitness, and sports performance. According to the above, and from believe of the researcher that, strong muscles should carry on strong bone. Hence, the purpose of this study was to investigate the impact of circular strength training with tapering on physical and performance variables among handball players.

Methodology

To achieve the purpose of the study twenty eight male handball players have been randomly selected from various colleges in the state of Tamil Nadu, India. The age of subjects were ranged from 18 to 25 years. The subjects had past experience of at least three years in handball and only who those represented their respective college teams were taken as subjects. A series of physical tests was carried out on each participant. Grip strength assessed by grip dynamometer, maximum strength assessed by 1RM test, core strength assessed by plank test, Explosive power assessed by Seated Medicine Ball Throw, flexibility assessed by sit and reach and performance variables assessed by judges rating. The subjects were randomly assigned into two groups of fourteen each, such as experimental and control groups. The experimental group participated in the circular strength training with tapering for 3 days a week, one session per day and for 8 weeks each session lasted 45 minutes. The control group maintained their daily routine activities and no special training was given. The subjects of the two groups were tested on selected variables prior and immediately after the training period. The collected data were analyzed statistically through analysis of covariance (ANCOVA) to find out the significance difference, if any between the groups. The 0.05 level of confidence was fixed to test the level of significance difference, if any between groups.

**TABLE-I
CRITERION MEASURES**

S.No	Variables	Tests /Tools Administered	Unit of Measurement
1	Grip strength	Grip dynamometer	In kg
2	Maximum strength	1 RM test	In kg
3	Core strength	Plank test	In seconds (1/100)
4	Explosive power	Seated Medicine Ball Throw	In centimetres
5	Flexibility	Sit and reach	in centimetres
6	Performance	Judges rating	Ten point scale

**TABLE – II
DESCRIPTIVE ANALYSIS OF PHYSICAL AND PERFORMANCE VARIABLES AMONG
CONTROL AND EXPERIMENTAL GROUPS**

S.No	Variables	Group	Pre-Test Mean	SD (±)	Post –Test Mean	SD (±)	Adjusted Mean
1	Grip strength	CG	56.30	0.22	58.66	0.71	58.67
		CSTWTG	56.47	0.30	59.50	0.27	59.50
2	Maximum strength	CG	45.41	0.24	49.65	0.97	49.65
		CSTWTG	45.47	0.30	50.60	0.28	50.60
3	Core strength	CG	130.49	0.29	151.77	2.64	151.77
		CSTWTG	130.54	0.25	155.94	0.56	155.94
4	Explosive power	CG	4.34	0.04	4.83	0.09	4.83
		CSTWTG	4.35	0.03	4.91	0.06	4.91
5	Flexibility	CG	23.28	0.12	23.94	0.37	23.94
		CSTWTG	23.24	0.15	24.26	0.13	24.26
6	Performance	CG	5.73	0.16	6.03	0.11	6.03
		CSTWTG	5.74	0.12	6.21	0.15	6.21

CG= Control group

CSTWTG = Circular strength training with tapering group

The tables-II the pre, post-test means, standard deviations and adjusted means on physical and performance of male handball players were numerical presented. The analysis of covariance on selected variables of control group and Circular strength training with tapering group is presented in table – III.

**TABLE – III
COMPUTATION OF ANALYSIS OF COVARIANCE ON PHYSICAL AND PERFORMANCE
VARIABLES AMONG HANDBALL PLAYERS**

S.No	variables	Test	Sum of variance	Sum of squares	Df	Mean square	F ratio
1	Grip strength	Pre-test	Between groups	0.21	1	0.21	2.89
			Within groups	1.89	26	0.07	
		Post-test	Between groups	4.99	1	4.99	16.95*
			Within groups	7.65	26	0.29	

		Adjusted means	Between sets	4.32	1	4.32	14.15*
			Within sets	7.63	25	0.30	
2	Maximum strength	Pre-test	Between groups	0.02	1	0.02	0.26
			Within groups	2.02	26	0.07	
		Post-test	Between groups	6.31	1	6.31	12.30
			Within groups	13.33	26	0.51	
		Adjusted means	Between sets	6.18	1	6.18	11.61*
			Within sets	13.31	25	0.53	
3	Core strength	Pre-test	Between groups	0.01	1	0.01	0.17
			Within groups	2.01	26	0.07	
		Post-test	Between groups	122.04	1	122.04	33.38*
			Within groups	95.03	26	3.65	
		Adjusted means	Between sets	121.26	1	121.26	31.89*
			Within sets	95.03	25	3.80	
4	Explosive power	Pre-test	Between groups	0.001	1	0.001	0.45
			Within groups	0.03	26	0.001	
		Post-test	Between groups	0.04	1	0.04	6.04*
			Within groups	0.17	26	0.007	
		Adjusted means	Between sets	0.04	1	0.04	6.71*
			Within sets	0.16	25	0.007	
5	Muscular flexibility	Pre-test	Between groups	0.01	1	0.01	0.72
			Within groups	0.53	26	0.02	
		Post-test	Between groups	0.74	1	0.74	9.37*
			Within groups	2.06	26	0.07	
		Adjusted means	Between sets	0.72	1	0.72	8.78*
			Within sets	2.06	25	0.08	
6	Performance	Pre-test	Between groups	0.001	1	0.001	0.04
			Within groups	0.54	26	0.02	
		Post-test	Between groups	0.22	1	0.22	11.80*
			Within groups	0.50	26	0.01	
		Adjusted means	Between sets	0.22	1	0.22	11.29*
			Within sets	0.50	25	0.02	

*Significant at 0.05 level of confidences

(The table values required for significance at 0.05 level of confidence for 1 & 26 and 1 & 25 are 4.23 and 4.24 respectively).

In the table the results of analysis of covariance on grip strength, maximum strength, core strength, explosive power, flexibility and performance. The obtained 'F' ratio of 2.89, 0.26, 0.17, 0.45, 0.72 and 0.04 for Pre-test means was less than the table value of 4.23 for df 1 and 26 required for significance at 0.05 level of confidence on grip strength, maximum strength, core strength, explosive power, flexibility and performance. The obtained 'F' ratio

of 16.95, 12.30, 33.38, 6.04, 9.37 and 11.80 for post-test means was greater than the table value of 4.23 for df 1 and 26 required for significance at 0.05 level of confidence on grip strength, maximum strength, core strength, explosive power, flexibility and performance. The obtained 'F' ratio of 14.15, 11.61, 31.89, 6.71, 8.78 and 11.29 for adjusted post-test means was greater than the table value of 4.24 for df 1 and 25 required for

significance at 0.05 level of confidence on grip strength, maximum strength, core strength, explosive power, flexibility and performance. The result of the study indicated that there was a significant difference among the adjusted post test means of Circular strength training with tapering group and control group on grip strength, maximum strength, core strength, explosive power,

flexibility and performance. And also Circular strength training with tapering group showed significant improvement on grip strength, maximum strength, core strength, explosive power, flexibility and performance compared to control group.

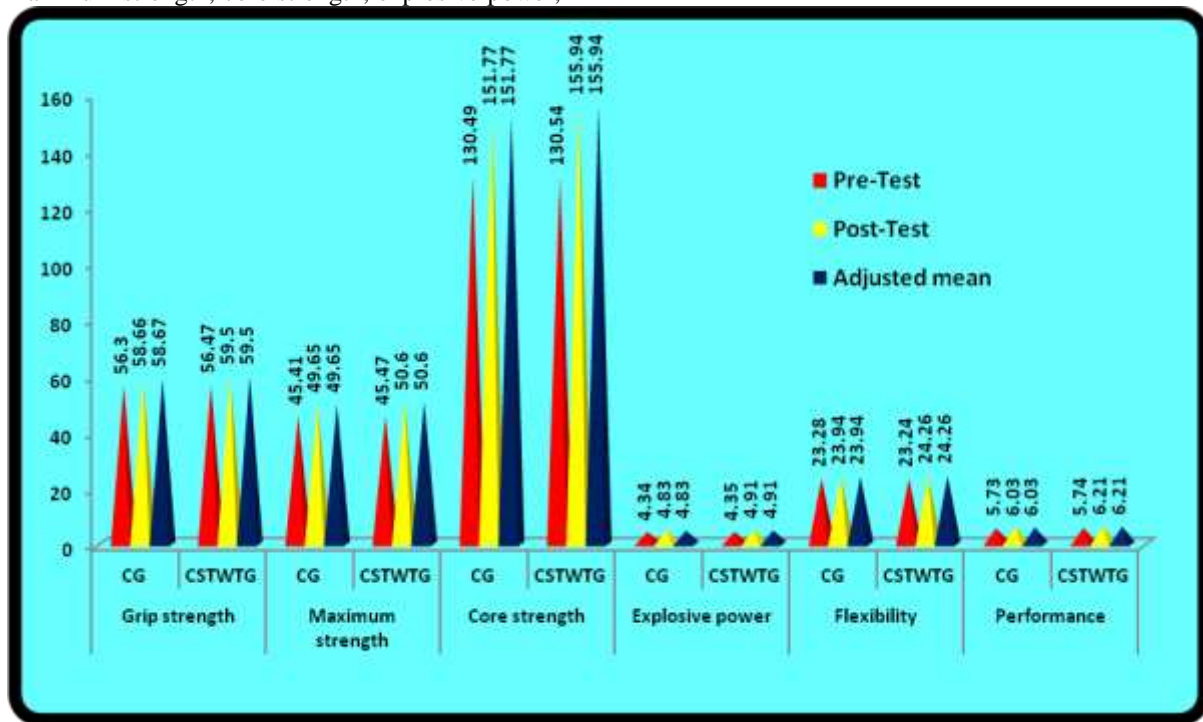


Figure-I The pre, post and adjusted mean values of grip strength, maximum strength, core strength, explosive power, flexibility and performance of both control and experimental groups are graphically represented in the figure-I

Discussion of findings

The results of the study indicate that the experimental group which underwent Circular strength training with tapering had showed significant improved in the selected variables namely such as grip strength, maximum strength, core strength, explosive power, flexibility and performance when compared to the control group. The control group did not show significant improvement in any of the selected variables. The past studies on selected physical fitness components and performance reveals of Amr hamza (2013) Found that circular strength training, for 10 weeks, resulted in significant improvement in muscle strength, muscle power and performance than the control group. Coutts et al (2007) who had found that tapering had significant improvement in vertical jump, 3-RM squat and 3-RM bench press and chin-up (max) and 10-m sprint performance. Iga , et al. (2009) opined that young male soccer players conventionally or resistance-trained showed higher values of isokinetic concentric and eccentric strength of the lower limb extensor and flexor muscles of the knee joint of the dominant and non-dominant limb than non-soccer players. Soderman ,

et al. (2000) found that young female soccer players had significantly higher concentric and eccentric peak torque of the thigh muscles than controls.

Conclusions

From the analysis of data, the following conclusions were drawn.

1. The experimental group handball players showed significant improvement in all the performance variables such grip strength, maximum strength, core strength, explosive power, flexibility and performance.
2. The control group handball players did not show significant improvement in any of selected variables.

References

- [1]. Abul Ela , A. , (1984,) Exercise physiology , Dar Al Fakr Al Araby, Cairo, pp: 35-38.(In Arabic).
- [2]. Aways, J., (2000). Athletic training "Theory and Practice ", GMS Publishing House, Cairo. .(In Arabic).
- [3]. Coutts, A., Reaburn P., Piva, T.J. (2007). Changes in selected biochemical, muscular strength, power, and endurance measures during deliberate overreaching and

tapering in rugby league players. International journals of sports medicine. 28:116-124

[4]. Hamza,A.,(2013). Effects of circular strength training system on bone mineral density and kicks performance for young soccer players, Science, Movement and Health, Vol. (8) 2

[5]. Hooper, S.L., Mackinnon L.T., Howart A, (1999). Physiological and Psychometric variables for monitoring recovery during tapering for major competition. Medical science sports exercise; 31: 741-747

[6]. Iga J, George K, Lees A, Reilly T., (2009) Crosssectional investigation of indices of isokinetic leg strength in youth soccer players and untrained individuals. Scand J Med Sci Sports;19:714-9.

[7]. Mohammad , A., (1992). Sports training, Knowledge House, edition (12), Cairo. (In Arabic).

[8]. Montgomery, D.L., (2006). Physiological profile of professional hockey players - a longitudinal comparison. Applied Physiology Nutrition Metabolism. 31: 181-185.

[9]. Mufti , H., (1998).Modern sport training (planning application- leadership). Dar Al Fekr Al Araby, Cairo, pp: 35-38.(In Arabic).

[10]. Mujika, I., Goya, A., Padilla S. (2000). Physiological responses to a 6- day taper in middle-distance runner: influence of training intensity and volume. Medicine and Science in Sports and Exercise's 32:511-517

[11]. Quinney, H.A., Dewart,R., Snydmiller,G., Warburton,D., Bell, G., (2008). A 26 year physiological description of a National Hockey League team. Applied Physiology Nutrition MetabolismH, 33: 753-760.

[12]. Ryan , M., (2011) CST Coaches and Instructors plus RMAX Gyms & Distributors, RMAX magazine,

[13]. Soderman K, Bergstrom E, Lorentzon R, Alfredson H.. (2000) Bone mass and muscle strength in young female soccer players. Calcif Tissue Int;67:297-303.

[14]. Tarter, C.,HKirisci, L., Tarter,E., Weatherbee,, S.,Jamnik, V., McGuire, J., Gledhill, N. (2009). Use of aggregate fitness indicators to predict transition into the National Hockey League.H HJournal of Strength Conditioning ResHearch. 23: 1828-1832.

[15]. Thomas L, Busso T (2005) A theoretical study of taper characteristics to optimize performance. Medicine and Science in Sports and Exercise's 37: 1615-1621