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Impact of Circular Strength Training with Tapering on Selected Physiological Variables among Handball Players

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Abstract

The purpose of the study was to find out the impact of circular strength training with tapering on selected physiological and performance variables namely vital capacity, forced vital capacity, slow vital capacity, and maximum voluntary ventilation and playing ability among male handball players. To achieve the purpose of the study twenty eight male handball player 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 players and only who those represented their respective college teams were taken as subjects. A series of physiological tests was carried out on each participant. These included vital capacity, forced vital capacity, slow vital capacity and maximum voluntary ventilation assessed by spirometer and performance 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 level differences exist between circular strength training with tapering group and control group. And also circular strength training with tapering group showed significant improvement on level of vital capacity, forced vital capacity, slow vital capacity, maximum voluntary ventilation and performance compared to control group.

Keywords: Circular Training, Tapering, Vital Capacity, Maximum Voluntary Ventilation.

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).

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.

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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). 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 effects of influence of circular strength training system on strength parameters and performance variables among field hockey players.

Methodology

To achieve the purpose of the study twenty eight male handball player 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 players and only who those represented their respective college teams were taken as subjects. A series of physiological tests was carried out on each participant. These included vital capacity, forced vital capacity, slow vital capacity and maximum voluntary ventilation assessed by spirometer and performance 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	Vital capacity	Spirometer	In liters
2	Forced vital capacity	Spirometer	In liters
3	Slow vital capacity	Spirometer	In liters
4	Maximum voluntary ventilation	Spirometer	In liters
5	Performance	Judges rating	Ten point scale

Results

Table II. Descriptive analysis of physiological and performance variables among control and experimental groups

S.No	Variables	Group	Pre-Test Mean	SD (±)	Post –Test Mean	SD (±)	Adjusted Mean
1	Vital capacity	CG	2.80	0.07	3.36	0.22	3.36
		CSTG	2.81	0.09	3.05	0.31	3.05
2	Forced vital capacity	CG	3.85	0.08	4.37	0.06	4.36
		CSTG	3.82	0.09	4.10	0.27	4.11
3	Slow vital capacity	CG	2.91	0.12	3.70	0.16	3.70
		CSTG	2.87	0.12	3.37	0.41	3.37
4	Maximum voluntary	CG	131.50	9.87	145.79	2.83	145.0

	ventilation	CSTG	130.79	9.30	137.79	8.77	137.0
5	Performance	CG	5.15	0.11	6.06	0.17	6.06
		CSTG	5.23	0.15	6.20	0.10	6.21

CG= Control group CSTG= Circular strength training with tapering group

The tables-II the pre, post-test means, standard deviations and adjusted means on physiological 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 physiological and performance variables among male handball players

S.No	variables	Test	Sum of variance	Sum of squares	df	Mean square	F ratio
1	**Vital capacity**	Pre-test	Between groups	.000	1	.000	0.01
			Within groups	.191	26	.007	
		Post-test	Between groups	.648	1	.648	8.45*
			Within groups	1.992	26	.077	
		Adjusted means	Between sets	.645	1	.645	8.11*
			Within sets	1.989	25	.080	
2	**Forced vital capacity**	Pre-test	Between groups	.005	1	.005	0.65
			Within groups	.215	26	.008	
		Post-test	Between groups	.484	1	.484	12.01*
			Within groups	1.047	26	.040	
		Adjusted means	Between sets	.402	1	.402	10.75*
			Within sets	.934	25	.037	
3	**Slow vital capacity**	Pre-test	Between groups	.012	1	.012	0.75
			Within groups	.413	26	.016	
		Post-test	Between groups	.756	1	.756	7.60*
			Within groups	2.585	26	.099	
		Adjusted means	Between sets	.731	1	.731	7.06*
			Within sets	2.585	25	.103	
4	**Maximum voluntary ventilation**	Pre-test	Between groups	3.571	1	3.571	0.03
			Within groups	2393.857	26	92.071	
		Post-test	Between groups	448.000	1	448.000	10.54*
			Within groups	1104.714	26	42.489	
		Adjusted means	Between sets	452.256	1	452.256	10.31*
			Within sets	1095.670	25	43.827	
5	**Performance**	Pre-test	Between groups	.053	1	.053	2.89*
			Within groups	.473	26	.018	
		Post-test	Between groups	.125	1	.125	5.73*
			Within groups	.567	26	.022	
		Adjusted means	Between sets	.138	1	.138	6.24*
			Within sets	.553	25	.022	

**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 vital capacity, Forced vital capacity, slow vital capacity, maximum voluntary ventilation, and performance. The obtained 'F' ratio of 0.01, 0.65, 0.75, 0.03, and 2.89 and for Pre-test means was less than the table value of 4.26 for df 1 and 23 required for significance at 0.05 level of confidence vital capacity, Forced vital capacity, slow vital capacity, maximum voluntary ventilation, and performance. The obtained 'F' ratio of 8.45, 12.01, 7.60, 10.54, and 5.73 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 vital capacity, Forced vital capacity, slow vital capacity, maximum voluntary ventilation, and performance. The obtained 'F' ratio of 8.11, 10.75, 7.06, 10.31, and 6.24 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 vital capacity, Forced vital capacity, slow vital capacity, maximum voluntary ventilation, 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 vital capacity, Forced vital capacity, slow vital capacity, maximum voluntary ventilation, and performance. And also Circular strength training with tapering group showed significant improvement on vital capacity, Forced vital capacity, slow vital capacity, maximum voluntary ventilation, and performance compared to control group.

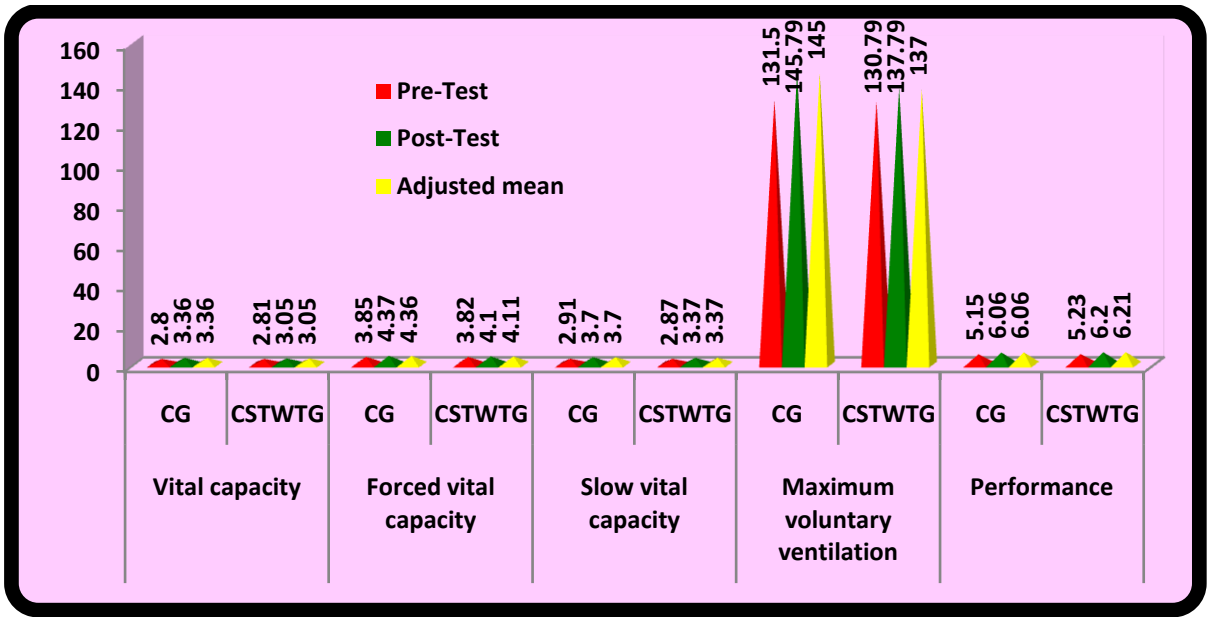

Figure I. The pre, post and adjusted mean values of vital capacity, slow vital capacity, maximum voluntary ventilation, and performance of both control and experimental groups are graphically represented in figure-I

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 vital capacity, forced vital capacity, slow vital capacity, maximum voluntary ventilation 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 physiological 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. 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 as vital capacity, forced vital

capacity, slow vital capacity, maximum voluntary ventilation and performance.
2. The control group handball players did not show significant improvement in any of selected variables.

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