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INFLUENCE OF CONTRAST SET TRAINING ON SELECTED PHYSIOLOGICAL VARIABLES AMONG WEIGHTLIFTERS

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Abstract

The purpose of the study was to find out the impact of contrast set training on selected vital capacity, forced vital capacity, slow vital capacity, and maximum voluntary ventilation among weightlifters. To achieve the purpose of the study thirty male weightlifters have been randomly selected from various colleges in the state of Tamil Nadu, India. The age ranged between 18 and 25 years. The subjects had past experience of at least three years in weightlifting and only who those represented their respective college teams were taken as subjects. A series of physiological measurement was carried out on each participant. These included vital capacity, forced vital capacity, slow vital capacity, maximum voluntary ventilation assessed by spirometer. The subjects were randomly assigned into two groups of fifteen each, such as experimental and control groups. The Experimental group participated in the contrast set training for 3 alternative days per week for eight weeks. Duration of training session in all days with one session was one hour approximately which including warming up and limbering down. 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 statistically analyzed through analysis of covariance (ANCOVA) to find out the significance difference, if any between the groups. In all case the criterion for statistical significant would set as 0.05 level of confidence. The results of the study showed that there was significant differences exist between contrast set training group and control group and also contrast set training group showed significant improvement on vital capacity, forced vital capacity, slow vital capacity and maximum voluntary ventilation compared to control group.

Key words: contrast training, vital capacity, forced vital capacity, slow vital capacity

Introduction

Contrast training is an incredible tool for enhancing raw strength, power and overall athletic performance, but it seems relatively underappreciated and unknown in gyms up and down the country. Contrast training can be described as a set of heavy resistance repetitions followed immediately by an unloaded, explosive exercise utilising the same movement pattern. The concept of contrast training isn't a new one, in fact research investigations have been on-going since the 1960s, with specialist coaches utilising this training method to achieve phenomenal results from their athletes. It has been known for world class sprinters to utilise dumbbells to perform squatting movements immediately prior to 100 metre events, in order to evoke the effects of contrast training in their subsequent sprinting performance. Contrast training is much useful for athletes to prepare for their competition. According to Owen Anderson Contrast training enhances power workout quality – but only if you're already quite strong. When athletes carry out strength training workouts designed to improve their power, they often choose to work with relatively light resistances, which permit more explosive movements. However, they often alternate light loads with heavy ones, because heavy resistance seems to create a greater activation and preparation for maximal effort in subsequent explosive movements. Some exercise experts have claimed that the power gains associated with programmes combining heavy and light resistance can be as much as three times greater than with conventional programmes using either light or heavy resistance. Rajamohan et al (2010). Baker (1994) opined that the acute supercompensation effect can be achieved for the subsequent explosive exercise by performing contrast preloading exercises consisting of biomechanically similar movements with a heavier load. Baker (1994) found that 40-kg loaded countermovement jumps (LCMJs) for lower-body explosive power and found a significant improvement in average power output in the set performed after a set of 60-kg LCMJs. effect of olympic style weightlifting exercises compared to plyometric training. They found that the olympic lifts were more effective at improving squat jump, 10m sprint and vertical jump. The subjects in this study were all physical education students who underwent 3 months of lower body specific training prior to the study and all were experienced weight trainers Tricoli et al (2005). FunkRoberts (2015) found that contrast training improves neuromuscular efficiency with a post-activation potentiation (PAP) effect in which the muscle force is greater after performing the initial strength exercise because the signal from the central nervous system to the muscle has been optimally activated. Contrast training can be a valuable method of helping to take athletes to the next level of developing physical superiority. Stanley (2014) opined that contrast training is superior to maximal strength training at enhancing straight punching force and increasing muscular strength in male amateur boxers.

Methods

The purpose of the study was to find out the impact of contrast set training on selected vital capacity, forced vital capacity, slow vital capacity, and maximum voluntary ventilation among weightlifters. To achieve the purpose of the study thirty male weightlifters have been randomly selected from various colleges in the state of Tamil Nadu, India. The age ranged between 18 and 25 years. The subjects had past experience of at least three years in weightlifting and only who those represented their respective college teams were taken as subjects. A series of physiological measurement was carried out on each participant. These included vital capacity, forced vital capacity, slow vital capacity, maximum voluntary ventilation assessed by spirometer. The subjects were randomly assigned into two groups of fifteen each, such as experimental and control groups. The Experimental group participated in the contrast set training for 3 alternative days per week for eight weeks. Duration of training session in all days with one session was one hour approximately which including warming up and limbering down. 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 statistically analyzed through analysis of covariance (ANCOVA) to find out the significance difference, if any between the groups. In all case the criterion for statistical significant would set as 0.05 level of confidence.

Table-II
Criterion measures

S.No	Criterion measure	Test items	Unit of measurement
1	Vital capacity	Spirometer	In litres
2	Forced vital capacity		In litres
3	Slow vital capacity		In litres
4	Maximum voluntary ventilation		In litres

Contrast set training program

Contrast set training group consisted of a 10-minute warm-up. Contrast set training group performed the following exercise by Vertical Push / Pull: deadlift, squat jumps, vertical jumps , weighted pull, medicine ball slams, standing press, medicine ball overhead throws. Horizontal Push/Pull: bench press, plyometric push, rear Leg elevated split squat and split jump Squats.

Weeks	Number of repetition	Duration of repeat	Recovery time between repetition	Recovery time between exercise	Total workout time
1-2	3	20-25s	30s	4min	33-35min
3-4	4	20-25s	30s	4min	33-35min
5-6	5	20-25s	30s	5min	33-35min
7-8	6	20-25s	30s	5min	33-35min

Training procedures

The subjects were randomly assigned into two groups of fifteen each, such as control and experimental groups. The experimental group participated in the contrast set training 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.

TABLE – III
Descriptive analysis of selected physiological variables among control and experimental groups

S.No	Variables	Group	Pre-Test Mean	SD (±)	Post – Test Mean	SD (±)	Adjusted Mean
1	Vital capacity	CG	2.78	0.03	2.82	0.08	2.82
		CT	2.80	0.07	2.94	0.05	2.94
2	Forced vital capacity	CG	3.68	0.02	3.72	0.01	3.72
		CT	3.69	0.02	3.77	0.08	3.78
3	Slow vital capacity	CG	2.827	0.01	2.89	0.03	2.86
		CT	2.85	0.05	2.87	0.03	2.89
4	Maximum voluntary ventilation	CG	112.65	1.64	117.91	1.50	117.86
		CT	111.94	1.45	120.05	1.38	120.10

CG= Control group CT= Contrast set training

The tables-III the pre, post-test means, adjusted means and standard deviations on physiological variables of Weightlifters were numerical presented. The analysis of covariance on selected variables of Contrast set training group and control group is presented in table – III

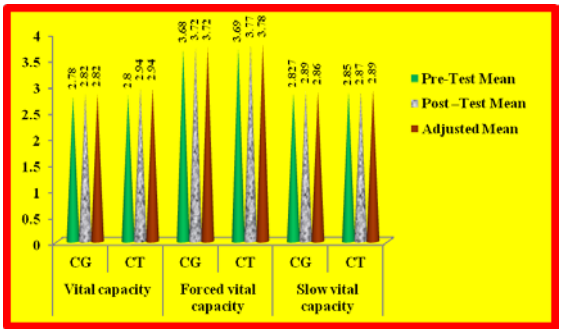

Figure-I The pre, post and adjusted mean values of vital capacity, forced vital capacity, slow vital capacity and maximum voluntary ventilation of both control and experimental groups are graphically represented in the figure-I

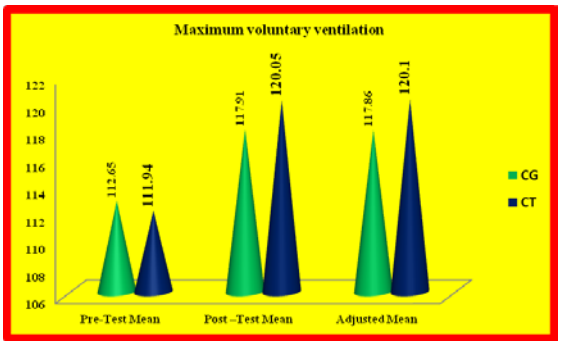

Figure-II The pre, post and adjusted mean values maximum voluntary ventilation of both control and experimental groups are graphically represented in the figure-II

TABLE – III
Computation of analysis of covariance on physiological variables among weightlifters

S.NO	variables	Test	Sum of variance	Sum of squares	df	Mean square	F ratio
1	Vital capacity	Pre test	B.G	0.002	1	0.002	0.55
			W.G	0.092	28	0.003	
		Post test	B.G	0.104	1	0.104	22.27*
			W.G	0.131	28	0.005	
		Adjusted post test	B.S	0.101	1	0.101	20.80*
			W.S	0.131	27	0.005	
2	Forced vital capacity	Pre test	B.G	0.001	1	0.001	0.81
			W.G	0.017	28	0.001	
		Post test	B.G	0.021	1	0.021	6.03*
			W.G	0.097	28	0.003	
		Adjusted post test	B.S	0.025	1	0.025	7.45*
			W.S	0.090	27	0.003	
3	Slow vital capacity	Pre test	B.G	0.004	1	0.004	2.42
			W.G	0.052	28	0.002	
		Post test	B.G	0.010	1	0.010	8.04*
			W.G	0.036	28	0.001	
		Adjusted post test	B.S	0.009	1	0.009	6.58*
			W.S	0.036	27	0.001	
4	Maximum voluntary ventilation	Pre test	B.G	3.763	1	3.76	1.55
			W.G	67.727	28	2.41	
		Post test	B.G	34.29	1	34.29	16.40*
			W.G	58.53	28	2.09	
		Adjusted post test	B.S	35.63	1	35.63	16.83*
			W.S	57.154	27	2.11	

*Significant at 0.05level of confidences

(The table values required for significance at 0.05 level of confidence for 1 & 28 and 1 & 27 are 4.20 and 4.21 respectively).

In the table the results of analysis of covariance on vital capacity, forced vital capacity, slow vital capacity, and maximum voluntary ventilation. The obtained 'F' ratio of 0.55, 0.81, 2.42 and 1.55 for Pre-test means was less than the table value of 4.20 for df 1 and 28 required for significance at 0.05 level of confidence on vital capacity, forced vital capacity, slow vital capacity, and maximum voluntary ventilation. The obtained 'F' ratio of 22.27, 6.03, 8.04 and 16.40 for post-test means was greater than the table value of 4.30 for df 1 and 28 required for significance at 0.05 level of confidence on on vital capacity, forced vital capacity, slow vital capacity, and maximum voluntary ventilation. The obtained 'F' ratio of 20.80, 7.45, 6.58 and 16.83 for adjusted post-test means was greater than the table value of 4.33 for df 1 and 27 required for significance at 0.05 level of on vital capacity, forced vital capacity, slow vital capacity, and maximum voluntary ventilation. The result of the study indicated that there was a significant difference among the adjusted post test means of Contrast set training group and control group on vital capacity, forced vital capacity, slow vital capacity, and maximum voluntary ventilation and also Contrast

set training group showed significant improvement on vital capacity, forced vital capacity, slow vital capacity, and maximum voluntary ventilation compared to control group.

Discussion of findings

The results of the study indicate that the experimental group which underwent Contrast training had showed significant improved in the selected variables namely such as of vital capacity, forced vital capacity, slow vital capacity and maximum voluntary ventilation when compared to the control group. The control did not show significant improvement in any of the selected variables. The past studies on selected physiological variables reveals of Nagarajan and Kalidasan (2013) found that contrast training had showed significant improved in the selected variables namely such as vital capacity, forced vital capacity, slow vital capacity, maximum voluntary ventilation. Duthie et al (2002) found that significant difference in performance changes between the higher and lower strength groups, with the higher strength group having a greater improvement in performance using the contrast training method compared with the traditional method. It was concluded that contrast training is advantageous for increasing power output but only for athletes with relatively high strength levels. Argus et al (2012) suggest that improvements in jump performance can be made in team sport athletes during the competitive season when athletes are exposed to higher volume-load stimuli which includes one heavy lifting session each week.

Conclusions

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

1. The Contrast set training group weightlifters showed significant improvement in all the performance variables such vital capacity, forced vital capacity, slow vital capacity and maximum voluntary ventilation.
2. The control group weightlifters did not show significant improvement in any of selected variables.

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