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RESEARCH ARTICLE

EFFECT OF COMPLEX AND CONTRAST TRAINING ON SELECTED MOTOR FITNESS COMPONENTS OF UNIVERSITY PLAYERS

S. Manikandan

Department of Physical Education and Sports Sciences, Annamalai University, Chidambaram, Tamilnadu, India

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ABSTRACT

The purpose of the study was to find out the effect of complex and contrast training on selected motor fitness components of university players. To achieve this purpose, 45 male players from different disciplines studying from the various faculties of annamalai university, Chidambaram, Tamilnadu, were selected. They were divided into three equal groups and each group consisted of 15 subjects. Group-I performed complex training, group-II performed contrast training and group-III acted as control group. The training period for both the experimental groups was twelve weeks and control group who did not participate any special training apart from the regular curricular activities. The criterion variables tested were muscular strength and explosive power. The collected data from these three groups prior and after the training period were statistically examined for significant difference if any, by applying Analysis of Covariance (ANCOVA). Since three groups were involved, Scheffe S test was used as post-hoc test to find out any difference between the groups. The result of the study shows that there was significant improvement for both the training groups of complex and contrast groups on selected criterion variables.

INTRODUCTION

Complex and contrast training, is pitting muscles against a resistance such as a weight or other type of resistance, to build the strength, anaerobic endurance, and or size of skeletal muscles. A well-rounded program of physical activity includes strength training, to improve bone, joint function, bone density, muscle, tendon and ligament strength, as well as improves heart and lung fitness. These activities should work all the major muscle groups of our body (legs, hips, back, chest, abdomen, shoulders, and arms). Full range of motion is important in resistance training because muscle overload occurs only at the specific joint angles where the muscle is worked (Ormsbee *et al*., 2007). Research on the effect of resistance training on health and fitness determinants revealed that weight training, like other types of exercise, positively affects physical performance and body composition and a number of health parameters (Miller, *et al*., 1984; Stone, 1991; Toth, *et al*., 1995).

Complex training, one of the most advanced forms of sports training, integrates strength training, plyometrics, and sport-specific movement. It consists of an intense strength exercise followed by a plyometric exercise. Complex training activates and works the nervous system and fast twitch muscle fibers simultaneously. The strength exercise activates the fast twitch muscle fibers (responsible for explosive power). The plyometric movement stresses those muscle fibers that have been activated by the strength training movement. During this activated state, the muscles have a tremendous ability to adapt. This form of intense training can teach slow twitch muscle fibers to perform like fast twitch fibers. An example of the extreme ability humans possess in their twitch muscles can be amply demonstrated in recent advancements in shred guitar techniques. This type of concentrated speed playing takes the human nervous system to a higher level thus demonstrating how fast these muscles can twitch in response to training. Guitarists can attain speeds of up to 80 notes per second or more, or approximately playing 1200 BPM with 4 notes picked per beat. The math calculation is as follows: 1200 beats per minute (BPM) x 4 notes = 4800 notes per minute. 4800 divided by 60 seconds = 80 notes per second.

Contrast training refers to a type of resistance training that alternates the use of heavy and light load exercises in order to improve muscular power. To improve power through your training program, you should focus on trying to produce more force or velocity with your exercises. Contrast training accomplishes both by requiring you to perform two exercises back-to-back. The first exercise is a traditional strength exercise, and the second exercise is an explosive exercise that challenges the same muscles and movement pattern. Because the resistance in the first exercise is heavy, this will create more activation of the muscles involved in the movement.

Corresponding author:* **S. Manikandan
Department of Physical Education and Sports Sciences, Annamalai University, Chidambaram, Tamilnadu, India

Then, by following the first exercise with a more explosive, lighter load exercise set that works the same muscles, you will not only quickly resulting in improved power. An example of a contrast training that will help make your legs more powerful would be to perform a set of 1 to 5 heavy barbell squats followed immediately by a set of 8 to10 squat jumps teach your body how to activate more muscle, but how to activate that muscle or groups of muscles more

The fundamental principles of complex and contrast training are that exercise should be brief, infrequent, and intense. Exercises are performed with a high level of effort, or intensity, where it is thought that it will stimulate the body to produce an increase in muscular strength and size. Advocates of progressive resistance training believe that this method is superior for strength and size building than most other methods. As strength increases, progressive resistance training techniques will have the weight/resistance increased progressively where it is thought that it will provide the muscles with adequate overload to stimulate further improvements. There is an inverse relationship between how intensely and how long one can exercise. As a result, high intensity workouts are generally kept brief. After a progressive resistance training workout, as with any workout, the body requires time to recover and produce the responses stimulated during the workout, so there is more emphasis on rest and recovery in the progressive resistance training philosophy than in most other weight training methods. In any workout, not just progressive resistance training, training schedules should allow adequate time between workouts for recovery to adaptation (Komi, 1992).

METHODOLOGY

The purpose of the study was to find out the effect of complex training and contrast training on selected motor fitness components of university players from different disciplines. To achieve this purpose, 45 male students studying in the various faculties of annamali university, Chidambaram, Tamilnadu were selected as subjects. They were divided into three equal groups and each group consisted of 15 subjects.

Training Programme

The experimental group-I performed complex training, group-II performed contrast training and group-III acted as control group who did not participate any special training apart from the regular curricular activities. After assessing the 1 RM of experimental group subjects, the training load was fixed accordingly. Then the experimental group underwent their respective training programmes for 3 days per week for 12 weeks under the instruction and supervision of the investigator.

Statistical Technique

The data were collected on selected criterion variables such as muscular strength and explosive power were measured by using Push-ups and Sergeant jump at before and after the twelve weeks of experimental training as pre and post test. Analysis of covariance (ANCOVA) was applied to find out significant difference if any between the experimental and control group.

Analysis Of The Data

The influence of complex and contrast training on each of the selected criterion variables were analyzed and presented below.

Table 1 Analysis of Covariance and 'F' ratio for Muscular Strength and Explosive Power of Experimental Groups and Control Group

Variables Name	Group Name	Complex Training Group	Contrast Training Group	Control Group	'F' Ratio
Muscular Strength	Pre-test Mean ± S.D	9.90 ± 0.035	9.20 ± 0.321	9.13 ± 0.542	1.96
	Post-test Mean ± S.D	10.8 ± 0.91	12.7 ± 0.83	9.10 ± 0.03	16.45*
	Adj.Post-test Mean ± S.D	12.16	12.55	9.44	35.14*
Explosive Power	Pre-test Mean ± S.D	23.3 ± 1.28	23.8 ± 1.13	23.2 ± 1.45	0.328
	Post-test Mean ± S.D	25.5 ± 1.22	25.9 ± 1.43	23.5 ± 1.41	8.00*
	Adj.Post-test Mean ± S.D	25.122	25.39	23.28	11.21*

Table 1 showed that there was a significant difference among experimental and control group on muscular strength and explosive power.

Table 2 Scheffĕs Test for the difference between the Adjusted Post-Test Mean of Muscular Strength

Adjusted Post-test Mean				
Muscular Strength				
Complex Training Group	Contrast Training Group	*Control group*	Mean Difference	Confidence interval at .05 level
12.16	12.55		0.39	2.09
12.16		9.44	2.72*	2.09
	12.55	9.44	3.11*	2.09

Table 2 shows that the adjusted post-test mean difference in muscular strength between complex training group and control groups (2.72) and contrast training and control groups (3.11) were significant at .05 level of confidence. But there was no significant difference between complex and contrast training groups (0.39) on muscular strength after the training programme.

Table 3 Scheffĕs Test for the difference between the Adjusted Post-Test Mean of Explosive Power

Adjusted Post-test Mean				
Explosive Power				
Complex Training Group	Contrast Training Group	Control group	Mean Difference	Confidence interval at .05 level
25.122	25.39		0.268	1.763
25.122		23.28	1.84*	1.763
	25.39	23.28	2.11*	1.763

Table 3 shows that the adjusted post-test mean difference in explosive power between complex training and control groups (1.84) and contrast training and control groups (2.11) were significant at .05 level of confidence. But there was no significant difference between complex and contrast training group (0.268) on explosive power after the training programme.

DISCUSSION ON FINDINGS

Research on the effect of complex and contrast training on health and fitness determinants revealed that weight training, like other types of exercise, improves physical performance

and number of health parameters (Miller, *et al*., 1984; Poehlman, 1992; Stone, 1991; Toth, *et al*., 1995). Almost every study revealed an increase in muscular strength, power muscular endurance, flexibility and jumping ability due to complex and contrast training compared with other training.

Resistance training is an effective intervention to improve muscle power without adverse effects on joint laxity (Bieler & Sobol, 2014), mobility and muscle strength (Krist, Dimeo and Keil, 2013). Supervised strength training represents an efficacious intervention for improving strength with residual benefits lasting longer than previously expected (Sherk *et al*., 2012), strength and power-related measurements (Ronnestad *et al*., 2008) Hanson *et al*., (2009) suggested that changes in strength, power, and fat free mass are predictors of strength training induced improvements in functional tasks.

CONCLUSIONS

The results of the study shown that there was a significant improvement on selected motor fitness components of university players due to the effect of complex and contrast training however, no significant differences were found between the experimental groups.

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