IJFANS INTERNATIONAL JOURNAL OF FOOD AND NUTRITIONAL SCIENCES
ISSN PRINT 2319 1775 Online 2320 7876
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Impact of Bilateral Training on Selected Strength Variables among Male Athletes

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Abstract- The aim of the present study was to examine the impact of bilateral training on selected strength variables among male athletes. To achieve the purpose of the study twenty four male athletes (jumpers & throwers) were randomly selected as subjects from Anna Stadium, Tirunelveli, Tamilnadu, India and their age were ranged from 17 to 20 years. The athletes were assigned at random into two groups of each twelve player (N=12). Group-I underwent bilateral training and Group–II acted as control group who did not attended any special training other than their daily routine works. The duration of the training period was restricted to eight week for three alternative days per week. The pre and post data were collected before and immediately after the training period. The selected strength variables such as right hand arm strength, left hand arm strength were measured by hand dynamometer and the leg strength was assessed by leg dynamometer. The collected data from the two groups prior to and after the experimental treatment on selected right hand arm strength, left hand arm strength and leg strength were statistically analyzed by using the statistical technique of dependent-'t' test and analysis of covariance (ANCOVA). In all the cases 0.05 level of confidence was fixed as a level of confidence. The result of the study indicated that experimental training group (bilateral training) had shown significantly improved on right hand arm strength, left hand arm strength and leg strength among male athletes. However the control group had not shown any significant improvement on any of the selected variables such as right hand arm strength, left hand arm strength and leg strength.

Keywords- **Right Hand Arm Strength, Left Hand Arm Strength, Leg Strength, Bilateral Training**

INTRODUCTION

Training is a systematic process of repetitive, progressive exercise or work involving learning process and acclimatization. The training load can be increased gradually or step by step is result in strong and faster adaptation process and more effective reaction from the organism [1].

Bilateral training refers to a form of physical or cognitive training that involves both sides and hemispheres of the body or brain simultaneously. This approach is often used in various fields, including sports, rehabilitation, and neuroscience, to improve coordination, strength, and cognitive function [2]. The term "bilateral" implies the involvement of both the right and left sides or halves of the body or brain simultaneously, with the goal of improving coordination, strength, and cognitive function [3]. It is a versatile approach used in various contexts, including sports, rehabilitation, and neuroscience, to promote balance and symmetry and enhance overall performance and well-being [4].

In sports and fitness, bilateral training exercises may involve movements that engage arms, legs, or sides of the body at the same time [5]. For example, a squat or a deadlift is a bilateral exercise because it recruits both legs equally. This type of training is essential for promoting balance and symmetry in the body and is commonly used to prevent muscle imbalances and reduce the risk of injuries [6].

Right hand grip strength and left hand grip strength refer to the maximum force or pressure that an individual can exert when squeezing or gripping an object using their respective dominant and non-dominant hands. [7]. Leg strength refers to the physical capability and power of the muscles in the lower extremities, primarily the thighs, hamstrings, calves, and glutes, to generate force and support various movements and activities. It is a critical component of overall muscular fitness and plays a vital role in an individual's ability to perform tasks such as walking, running, jumping, squatting, lifting, and maintaining balance [8]. The purpose of the present study was to examine the impact of bilateral training on right hand arm strength, left hand arm strength and leg strength among male athletes.

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METHODOLOGY

A. Participants

To achieve the purpose of the study twenty four male athletes (jumpers & throwers) were randomly selected as subjects from Anna Stadium, Tirunelveli, Tamilnadu, India and their age were ranged from 17 to 20 years.

B. Procedures

The athletes were assigned at random into two groups of each twelve players (n=12). Group-I underwent bilateral training and Group–II acted as control group who did not attended any special training other than their daily routine works. The duration of the training period was restricted to eight week for three alternative days per week.

C. Variables and Measurement

The pre and post data were collected before and immediately after the training period. The selected variables such as right hand arm strength, left hand arm strength and leg strength were measured by hand grip dynamometer and leg dynamometer.

D. Training Program

During the training period, the experimental group underwent their respective training programs in addition to their regular program. Group I (n=12) underwent Bilateral training for three alternative days per week for eight weeks with warming up and limbering down ,Group II (n=12) acted as a control group and they did not participate in any specific training with the experimental group. The training program was scheduled in the morning session between 6.30 am to 7.30 am. Training sessions were conducted three alternative days a week and period of each session was 40-50 minutes in regular together with 5 minutes of warming up and 5 minutes of cooling down. Exercises were executed as group training and supervised by an investigator with the help of his supervisor and coach. The training load, intensity and volume of the work were increased once in two weeks as per the sports training principles.

E. Statistical Analyses

Data analyses were performed by using dependent-'t' test and analysis of covariance (ANCOVA). In all the cases 0.05 level of confidence was fixed as a level of confidence.

ANALYSIS OF DATA

TABLE I

MEANS AND DEPENDENT 'T'-TEST FOR THE PRE AND POST TESTS ON RIGHT HAND ARM STRENGTH, LEFT HAND ARM STRENGTH AND LEG STRENGTH OF EXPERIMENTAL AND CONTROL GROUPS

Criterion Variables	Mean	Experimental Group	Control Group
Right Hand Arm Strength	Pre test	33.62	33.48
	Post test	37.19	33.54
	't'-test	**15.64***	1.21
Left Hand Arm Strength	Pre test	30.64	30.26
	Post test	34.58	30.51
	't'-test	**13.57***	1.14
Leg Strength	Pre test	67.29	66.19
	Post test	73.51	67.81
	't'-test	**10.49***	1.52

***Significant at .05 level. (Table value required for significance at .05 level for 't'-test with df 11 is 2.20)

From the table I the dependent-'t'-test values of right hand arm strength, left hand arm strength and leg strength between the pre and post-tests means of experimental groups were greater than the table value 2.20 with df 11 at 0.05 level of confidence, it was concluded that the experimental group had significant improvement in the right hand arm strength, left hand arm strength and leg strength between while compared to control group.

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A. Computation of Analysis of Covariance

The descriptive measures and the results of analysis of covariance on the criterion measures were given in the following tables.

TABLE – II
MEANS AND DEPENDENT 'T'-TEST FOR THE PRE AND POST TESTS ON RIGHT HAND ARM STRENGTH, LEFT HAND ARM STRENGTH AND LEG STRENGTH OF EXPERIMENTAL AND CONTROL GROUPS

	Experimental Group	Control Group	Source of Variance	Sum of Squares	Df	Mean Square	F-ratio
Right Hand Arm Strength (Adjusted Post Mean)	37.64	33.49	BG	115.22	1	115.22	**29.62***
			WG	81.69	21	3.89	
Left Hand Arm Strength (Adjusted Post Mean)	34.71	30.65	BG	145.53	1	145.53	**19.43***
			WG	157.29	21	7.49	
Leg Strength (Adjusted Post Mean)	74.23	68.05	BG	231.21	1	231.21	**38.09***
			WG	127.47	21	6.07	

* Significant at 0.05 level. Table value for df 1, 21 was 4.32.

The above table indicates the adjusted mean value on right hand arm strength, left hand arm strength and leg strength of experimental training group and control group were 37.64 & 33.49, 34.17 & 30.65 and 74.23 & 68.05 respectively. The obtained F-ratio of 29.62, 19.43 and 38.09 for adjusted mean was greater than the table value 4.32 for the degrees of freedom 1 and 21 required for significance at 0.05 level of confidence. The result of the study indicates that there was a significant difference among experimental training group and control group on right hand arm strength, left hand arm strength and leg strength.

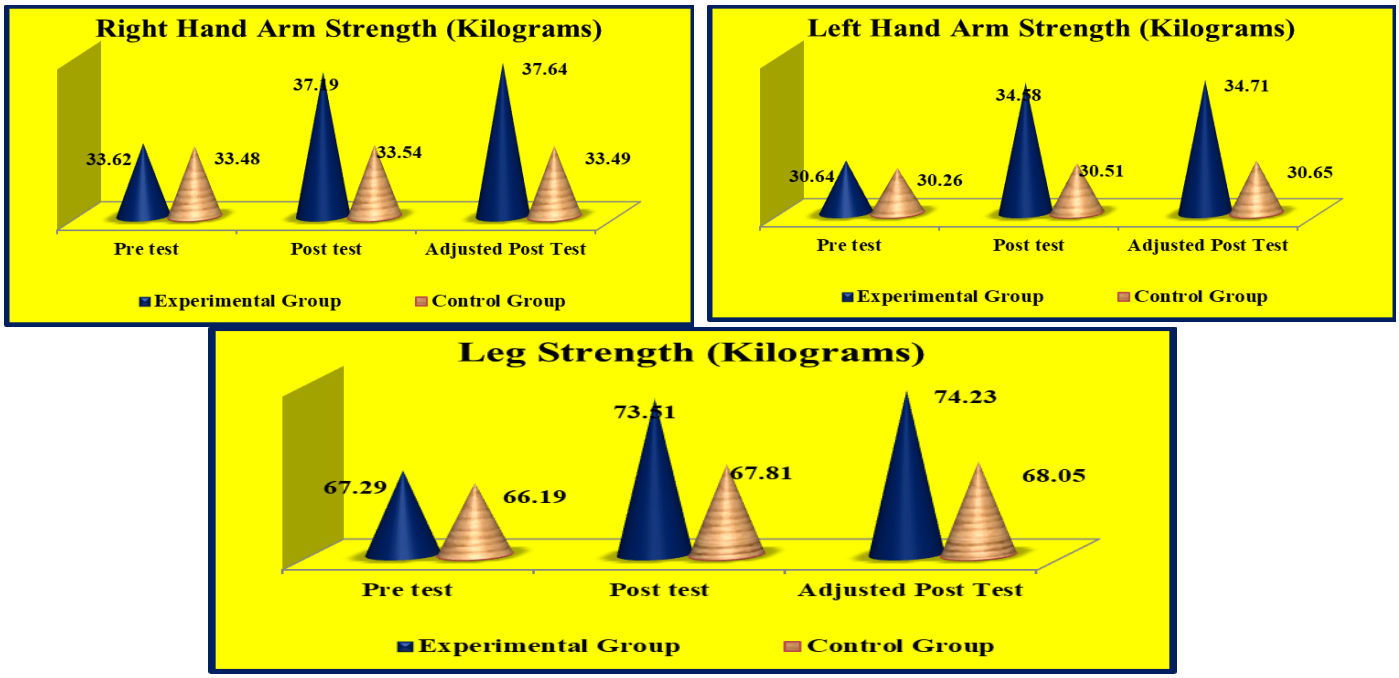

Fig. 1: Pre-test, post-test and adjusted post-test mean values of experimental group and control group on right hand arm strength, left hand arm strength and leg strength.

DISCUSSION ON FINDINGS

The findings of this study have provided valuable insights into the impact of bilateral training on right hand arm strength, left hand arm strength and leg strength among athletes. The results have demonstrated that this training approach yields positive changes in both variables, suggesting its potential

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as an effective training method for improving athletic performance and functional capabilities. This study's results indicated a significant improvement in abdominal and shoulder strength among the participants after undergoing the bilateral training regimen. The following studies were supported by our study were Van Delden, (2012) conducted the systematic review of bilateral upper limb training devices for post-stroke rehabilitation. Chan, (2009) determined the bilateral upper limb training with functional electric stimulation in patients with chronic stroke. Whitall, (2011) suggested the bilateral and unilateral arm training improve motor function through differing neuroplastic mechanisms: a single-blinded randomized controlled trial. Makaruk, (2011) conducted the study on the effects of unilateral and bilateral plyometric training on power and jumping ability in women. Ramirez-Campillo, (2018) analyzed the specific changes in young soccer player's fitness after traditional bilateral vs. unilateral combined strength and plyometric training.

CONCLUSIONS

In conclusion, research indicates that bilateral training has a positive impact on right hand arm strength, left hand arm strength and leg strength among male athletes. However, the control group had not shown any significant improvement on any of the selected variables. By incorporating these exercises into their training routines, athletes can improve core stability, enhance shoulder strength, reduce the risk of injuries, and ultimately enhance their performance in a wide range of sports. It's important for athletes to work with coaches or trainers to develop personalized training plans that address their specific needs and goals.

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ISSN PRINT 2319 1775 Online 2320 7876
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