

Effectiveness of Unilateral and Bilateral Resistance Training on Muscular Strength of Teenage Football Players

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ABSTRACT

The intention of this study was to examine the effectiveness of unilateral and bilateral resistance training on muscular strength of teenage football players. The study was delimited to the football players of age between fifteen and seventeen years. Participants were randomly assigned to three different training groups (15 in each group). Group-I performed Unilateral Resistance Training [URT], Group-II performed Bilateral Resistance Training [BRT] and group-III acted as control [CG]. The experimental groups trained at the same time of day in the morning session, three days a week for 12 weeks, throughout the study. The muscular strength was assessed by leg press test. The data collected from the experimental groups on muscular strength was statistically analyzed by paired 't' test and analysis of covariance (ANCOVA). The Scheffe's post hoc test was also applied. Further, percentage of changes was calculated to find out the chances in selected dependent variables due to the impact of experimental treatment. Due to URT as well as bilateral resistance training the football player's muscular strength was greatly improved. Following 12 weeks of URT and BRT treatment, football player's muscular strength (URT=26.19%, and BRT=9.74%), enhanced greatly.

Keywords: Unilateral and bilateral resistance training, Muscular strength, Football players.

Introduction

For both elite and recreational football players, proper training optimizes game performance, but also decreases the likelihood for injury, prevents over-training and provides greater satisfaction. The importance given to training by today's elite and recreational players striving for their personal best performance has demanded research on how best to train for a given sports. Scientists of exercise physiology have responded to these needs, and numerous studies have been conducted on optimal training practices and on practices detrimental to improved performance (Roberg & Robert, 1997).

This study evaluated two distinct training regimens based on prior research with the presumption that strength serves as the cornerstone for all other athletic motions and performance. It was assumed that after completing each training session, physical performance measurements would increase, which should result in improved performance on the soccer field. In conclusion, the major goal was to compare the effects of unilateral resistance to the classic

and still widely used bilateral-dominant programme on the fitness components of football players.

Research has shown that a gain in maximum strength is typically linked to an increase in relative strength and, thus, to an increase in power capabilities (Hoff & Helgrud, 2004). More specifically, acceleration and speed may be enhanced in abilities directly related to soccer, such as turning, sprinting, and pace-changing, by boosting force in the proper muscles or muscle groups (Chelly et al., 2009). In order to score goals or prevent goals from being scored, players must be faster and stronger than their opponents (Chelly et al., 2009). Muscular power and strength are necessary for all of the aforementioned activities, which is why soccer players appreciate and frequently evaluate these physical qualities (Rampinini et al., 2007).

Aside from this lack of results agreement, the relative effects of unilateral and bilateral resistance exercises are not clear. Some have hypothesized that unilateral and bilateral resistance drills may offer higher benefits (Brown, Palmieri-Smith & McLean, 2014). To the researcher's knowledge, limited number of studies has been directed towards specifically looking at comparing a unilateral and a bilateral resistance program and their effects on muscular strength of teenage football players. Thus, the objective was to determine the effect of unilateral and bilateral resistance training on muscular strength among football players.

Methodology

The study was delimited to the soccer players of age between 15 and 17 years. Participants were randomly assigned to three different training groups (15 in each group). Group-I performed Unilateral Resistance Training [URT], Group-II performed Bilateral Resistance Training [BRT] and group-III [CG] acted as control. The selected subjects were medically examined by a qualified physician and certified that they were medically and physically fit enough to undergo the training programme. The chosen fitness component muscular strength was assessed by leg press.

Unilateral and Bilateral Resistance Training Programme

After familiarization and baseline testing, the players participated in a 12-week unilateral and bilateral resistance training program with three training sessions per week. The resistance training program was a total body workout consisting of 3 sets of 4-12 repetitions on 6 exercises that trained all the major muscle groups. The load was fixed for the experimental groups based on one repetition maximum (1 RM) of each participant in all the selected resistance exercises.

Training volume for the unilateral resistance (URT) and bilateral resistance (BRT) groups was equalized, with the BRT performing all exercises with support on both legs, while the URT group performed 50% of the exercises on each leg separately. The intensity of exercise performed for each exercise was progressively increased once in two weeks. The rest interval of 1:1 between exercises and 1:3 minutes between sets was given.

Statistical Technique

The data collected from the experimental groups on muscular strength was statistically analyzed by paired 't' test to find out the significant differences if any between the pre and post test. Further, percentage of changes was calculated to find out the chances in selected dependent variable due to the impact of experimental treatment. In order to nullify the initial mean differences the data collected from the three groups prior to and post experimentation on muscular strength was statistically analyzed to find out the significant difference if any, by applying the analysis of covariance (ANCOVA). The pre test means of the selected dependent variable was used as a covariate. Since three groups were involved, whenever the obtained 'F' ratio value was found to be significant for adjusted post test means, the Scheffe's test was applied as post hoc test to determine the paired mean differences, if any. In all the cases the level of confidence was fixed at 0.05 level for significance.

RESULT

The assessed pre and post test muscular strength scores of URT, BRT & Control group's are analyzed as in table -I.

Table – I: Paired 't' Test and % of Changes on Muscular Strength of Experimental and Control Groups

Group	Test	N	Mean	SD	DM	't' - ratio	%
Unilateral Resistance Training	Pre	15	62.73	3.55	17.40	9.40*	26.19
	Post	15	74.13	6.74			
Bilateral Resistance Training	Pre	15	60.74	2.65	6.61	13.86*	9.74
	Post	15	67.35	2.66			
Control	Pre	15	61.33	3.08	1.06	2.61	1.60
	Post	15	60.40	2.74			

Table value for *df* 14 is 2.15(*significant)

The assessed pre and post test muscular strength values of training (URT & BRT) groups differ noticeably since the 't' values of URT (9.40) as well as bilateral training (BRT=13.86)

groups were greater than the table value ($df_{14}=2.15$). Following 12 weeks of URT and BRT treatment, football player's muscular strength (URT=26.19%, and BRT=9.74%), enhanced greatly.

The chosen football player's muscular strength of three groups were analyzed through ANCOVA statistics, and put on view in table-II.

Table – II: ANCOVA Statistics Output on Muscular Strength of Experimental and Control Groups

Mean	URTG	BRT	CG	SoV	SS	df	MS	'F' ratio
Adjusted	73.27	66.89	61.65	B	1119.69	2	559.85	52.32*
				W	438.54	41	10.70	

(Table value for $df_{2 \& 41}=3.23$)*Significant(.05 level)

The ANCOVA statistics result established that the adjusted final means (URT=84.27 BRT=72.89 & CG=67.65) on muscular strength of all chosen groups differs from one another, because the derived adjusted final mean's 'F' value (52.32) is superior to requisite value ($df_{2 \& 41}=3.23$).

As the URT BRT & Control group's adjusted final means 'F' value is significant, Scheffe's Test was calculated as in table-III.

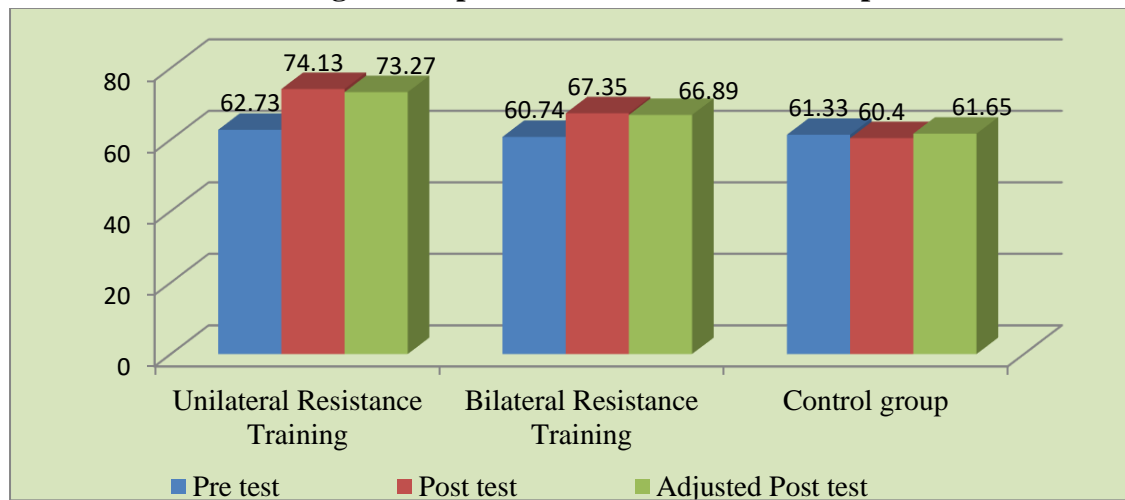
Table – III: Scheffe's Test Outcome on Muscular Strength of Experimental and Control Groups

Variable	Unilateral Resistance Training	Bilateral Resistance Training	Control	MD	CI
Muscular Strength	73.27	66.89		6.38*	6.16
	73.27		61.77	11.50*	6.16
		66.89	61.77	5.12*	6.16

*Significant (.05)

It proved that due to URT (16.64) as well as bilateral resistance training (6.24) the football player's muscular strength was greatly improved. Though, URT was much better than bilateral training since the mean difference (10.38) is higher than CI value (6.16). Chosen URT, BT & Control group's muscular strength scores are graphically displayed in diagram-I.

Figure – I: Figure Showing Soccer Player's Muscular Strength of Experimental and Control Groups



DISCUSSION

The study's findings demonstrated a noticeable increase in muscle strength as a result of unilateral and bilateral resistance training. Numerous research have looked into the impact of unilateral and bilateral resistance training on the development of muscular strength. However, compared to bilateral training, unilateral exercises were as successful in improving unilateral and bilateral leg strength and power, or even inducing noticeably longer contact durations, lower vertical ground response forces, and rates of force development (McCurdy et al., 2005). (Cappa & Behm, 2011). All of these earlier findings might imply that bilateral exercises are a more effective power training exercise for many of the reported sprint and leap activities that happen during soccer matches.

Previous research showed that strengthening exercises, both unilateral and bilateral, both improved the trained movement of the participants and were equally effective (Appleby, 2019; McCurdy, 2005; Spiers, 2016). Bilateral exercises, such as the back squat, have been shown to increase both strength and power; for this reason, they are frequently utilised as the main exercise (Spiers, 2016). The fundamental justification for using unilateral exercises is that they are more specific and have the ability to be transferred to unilateral actions found in many sports, such as sprinting, bounding, jumping, and direction-changing. In order to enhance the transfer between training and competitive performance, specificity is a critical principle in programme design.

CONCLUSION

Due to URT (16.24), UPT (30.08) as well as bilateral training (10.52) the soccer player's anaerobic power was greatly improved. Though, UPT was much better than URT (MD=13.32) and bilateral training (MD=19.56). Further, URT was much better than bilateral training (MD=6.24). Following 12 weeks of URT, UPT and BT treatment, soccer player's anaerobic power performance (URT=7.06%, UPT=12.12% and BT=3.69%), enhanced greatly. Therefore, to most effectively improve performance, it is argued that unilateral resistance and plyometric exercises must closely resemble the forces and mechanics required for the specific sport.

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