

THE EFFECTS OF RESISTANCE EXERCISES TRAINING ON UPPER AND LOWER BODY
MUSCULAR STRENGTH PERFORMANCE OF COLLEGIATE MALE HANDBALL PLAYERS



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Abstract:

The purpose of this investigation was to examine the muscular strength performance in upper and lower body muscular strength when using the resistance exercise training methods. Thirty (n=30) male Handball players volunteered to take part in this study. The subjects were randomly assigned to either a resistance exercise training group (RETG), and control group (CG). Assessments for 1RM bench press and 1RM half squat were performed before and after 8 week in season training programme. The two groups kept up their regular Handball practice; additionally all the groups performed 3 sessions per week of a respective programme. **Results:** The univariate analysis of variance showed that training induced significant ($p < 0.05$) improvement in muscular strength for the two groups: 22.48 % for RETG, and 1.01% for CG. The RETG had significantly higher averaged adjusted values than the control groups ($p < 0.05$). Training also induced significant improvements in upper and lower body muscular strength for the two groups: 22.48 % for RETG, and 1.01% for CG. The RETG had significantly higher averaged adjusted values than the control groups ($p < 0.05$). The RETG had significantly higher averaged adjusted values than the control group ($p < 0.05$). **Conclusion:** We conclude that contrast training is a useful working tool for coaches, innovative in this muscular strength training domain, equally contributing to better time efficient training. The resistance exercise and traditional method of training groups significantly improved in the 1RM bench press and 1RM half squat values. ($p < 0.05$). The resistance exercise group significantly developed in two variables better than the traditional method training groups.

Keywords: Resistance Exercise Training & Muscular Strength

Introduction:

Success in sports depends heavily upon the player's muscular strength. Power training is commonly conducted using lighter resistances that are performed explosively. To achieve the greater benefits from power training it should be performed at the beginning of an exercise session or on a separate training day (1). The best results are attained when a combination of heavy and light loads are implemented within the workout.

By performing heavy loads before light power exercises there is greater activation and preparation for maximal effort in the lighter load (2). The heavy resistance work gets the nervous system into full action so that more Type IIb fibers are available for the explosive exercise (3). The use of heavy resistance exercises and lighter resistance exercises within a session has repeatedly been referred to as "weight lifting exercise" The term "weight lifting exercise" refers to a workout that involves the use of exercises of contrasting loads that is, alternating heavy and light exercises set for set. Performing lighter resistance before the heavy resistances will be termed the "traditional training" method.

Verkhoshansky and Tatyana (5) examined if there was any significant difference in power development when manipulating the order in which exercises are conducted with in a single training session. Although intense exercise results in potentiation of power performance and this was because of increased neuromuscular activity (6), the effect of several sets of a heavy loaded exercise on power performance, as in a typical resistance session, has not been examined. The purpose of this investigation was to compare the effects of complex and contrast training methods in the improvement of power performance throughout an entire resistance session.

Methods:

Selection of Subjects

Thirty collegiate male Handball players volunteered to take part in this study. The subjects were randomly assigned to the RETG (n = 15: age 19.2 ± 0.6 years old; weight 65.4 ± 10.2 kg ; height 174.3 ± 6.4 cm ; and Handball training experience 3 ± 1.3 years) and CG (n = 15 : age 19.6 ± 0.6 years old ; weight 65.4 ± 10.8 kg ; height 176.4 ± 6.2 cm ; Handball training experience 3.2 ± 1.2 years). The subjects received all the necessary information about the study's procedure in oral and written form.

Experimental Design

Thirty Handball players were randomly divided into the experimental group I (RETG), and the control Group (CG). The experimental group I under went a resistance exercise training programme, and the control group underwent traditional method of training. The experimental lasted for 8 weeks during which 18 training sessions were conducted 3 times per 6 week.

Testing Procedures

Subjects were assessed before and after a 6 week training programme for upper and lower body muscular strength. The assessment was done in the following variables: a) upper body muscular strength, and b) lower body muscular strength. Tests followed a general warm – up that consisted of running, calisthenics, and stretching. All the tests were performed with 3 trials and all the correspondent mean values were considered for statistical analysis. There was a 20 second and a 10 second rest between trials respectively.

Training Protocol

After the initial measurements, the traditional method training group practiced resistance exercises training. The two groups trained for 6 weeks, 2 days per week. Before the initiation of the training periods, the subjects of all groups were instructed about the proper execution of all the exercises to be used during the training period for all training regimens.

Resistance Exercise Training Group

The exercise training workout comprised of 3 sets of resistance exercises. e.g.: Squats. All the subjects performed twelve repetition maximum (12RM) of the exercise before they were fatigued. The subjects in the exercise training group performed five resistance exercises: squats, bench press, barbell lunge, lat pull down and abdominal crunches. In this training programme the players completed 3 sets with 12 repetitions of weights exercise with a recovery of 60 second/set. This was followed by a 45 second rest. The resistance exercise training programme is described in the Table No- I.

Table No-I
Resistance Exercise Training (RETG) Programme

Weight lifting exercise training	1-2 weeks	3-4 weeks	5-6 weeks
Clean and jerk	‡ 3*10 (50%) 60	3*10 (60%) 60	3*8 (70%) 50
Snatch	‡ 3*10 (50%) 60	3*10 (60%) 60	3*8 (70%) 50
Dead lift	‡ 3*10 (50%) 60	3*10 (60%) 60	3*8 (70%) 50
Squat	‡ 3*10 (50%) 60	3*10 (60%) 60	3*8 (70%) 50
Lunging	‡ 3*10 (50%) 60	3*10 (60%) 60	3*8 (70%) 50
Bench Flyes	‡ 3*10 (50%) 60	3*10 (60%) 60	3*8 (70%) 50

‡ Sets*reps at (percentage of 1RM) rest time between sets RM = Repetition Maximum; Reps = Repetition
Note: 12 RM – a weight which only allows you to complete a maximum of 12 repetitions of the exercise before you are fatigued.

Statistical Analysis:

Statistical analysis followed the most important descriptive statistics, such as mean and SD. A repeated measure 't' test was used to determine the presence or absence of gains in each group. Because of the slight differences in the initial groups, analysis of covariance with the pre – test values as the covariate was used to determine significant differences between the posts – test adjusted means in the groups. The results are presented as means (SD). A significance level of 0.05 was used. All statistical analyses were conducted using SPSSv10.

Results:

The results between the pre - and post - test for muscular strength performance scores in the two groups and the results between groups at baseline and after the training programme are presented in Table No-II.

Six weeks of resistance exercise training elicited significant increases in upper body muscular strength 29.43 ± 1.5 vs $32.97 \pm .90$, and lower body muscular strength 39.73 ± 1.5 vs 43.90 ± 1.7 from pre to post test. The control group did not show any significant increase in the two variables. The resistance exercise training group

elicited significantly greater increases in upper body muscular strength 11.99 vs 0.58 % and lower body muscular strength 10.49 vs 0.43%. The resistance exercise training group significantly increased in upper body muscular strength 11.99 vs 0.58 % and lower body muscular strength 10.49 vs 0.43 % better than the control group.

Table No – II

Comparison of explosive power test results mean (± SD) between the 3 groups in pre – and post test conditions

Test		Pre	Post	Gains		Value	
				Absolute	%	‘t’*	F†
UBMS(kg)	WLETG CG	29.43 ± 1.5 29.17 ± 1.4	32.97 ± .90 29.33 ± 1.5	3.53 .17	11.99 0.58	13.12* Δ 2.09	212.81
LBMS(kg)	COMTG CG	39.73 ± 1.5 39.60 ± 1.3	43.90 ± 1.7 39.78 ± 1.2	4.17 .17	10.49 0.43	13.23* Δ 1.78	144.84

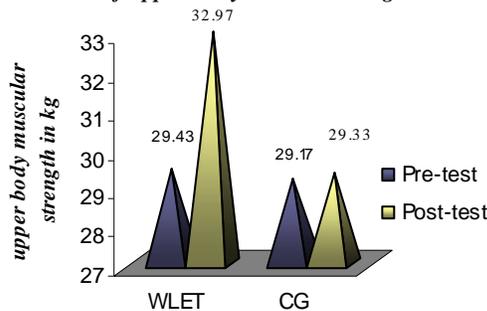
SJ = Squat Jump, CMJ = Counter Movement Jump, MBT = Medicine Ball Throw, COMTG = Complex Training Group, CONTG = Contrast Training Group, CG = Control Group.

* Significant difference from pre to post (p < 0.05)

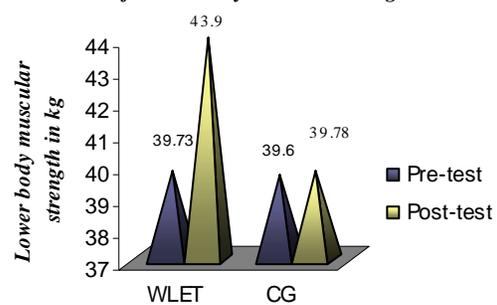
† Significant difference between groups post training (p < 0.05)

Δ Significantly better than control group

pre and post test mean values on WLET & CG of Upper body muscular strength



pre and post test mean values on WLET & CG of Lower body muscular strength



Discussion:

The purpose of this study was to determine resistance exercise training can enhance muscular strength performance, bench press and half squat. The results indicate that short term resistance exercise training is capable of improving the muscular strength.

The result of the present study are in line with previous study [Perez-Gomez J, 2008] they found that the Effects of resistance training combined with plyometric exercises on physical fitness, body composition, and knee extension velocity during kicking in football and Increased 1 repetition maximum (1 RM) of half squat (HQ) (+45.1%). In the present investigation, subjects who participated in the combined plyometric and resistance training program made significantly greater improvements in upper body power, lower body power and speed and agility than subjects who performance static stretching and resistance training. Plyometric and resistance training enhanced upper body power (as measured by the seated medicine ball toss) by 14.4% as compared to a 5.6% gain by the group that performance static stretching and resistance training. While both groups performed upper body resistance training, this difference is likely due to the upper body plyometric exercises with medicine balls that were incorporated into the combined training program. These data concur with findings from Vossen and colleagues (2000) who noted that the addition of upper body plyometrics may increase an athlete’s ability to improve upper body performance.

Conclusion:

It can be concluded that the resistance exercise training methods for strength development may lead to greater improvements in strength performance than the traditional method of training. Among the resistance exercise training methods the resistance exercises training method may be better than the control group method in improving the upper and lower extremity strength performance.

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