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Effect of 6 weeks kettle bell and battle rope training on selected physical variables among inter collegiate volleyball players

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Abstract
The purpose of the study was to find out effect of kettle bell and battle rope training on selected physical variables among Inter collegiate volleyball players. To achieve the purpose of the study, 45 inter collegiate men players were selected from the University of Madras. The selected subjects age range from 18 to 25 years. The subjects randomly divided into three equal groups and each group consists of 15 subjects. Group-I underwent Kettlebell Training Group (KTG), Group-II underwent Battle rope Training Group (BTG) and Group-III Control Group (CG).The duration of the experimental period was six weeks; practice session for thrice a week, each section lasted 45minutes and the control group did not participate in any kind of special training programme apart from the daily physical activities. The selected physical variables such as upper body muscular strength and core strength was measured by maximum push up and plank test. The subjects of three groups were tested on selected variables prior and immediately after the training period. The collected data were analysed statistically through analyze of covariance (ANCOVA) to find the significance difference. The 0.05 level of confidence was fixed to test the level of significance difference, the result of the study showed that systematic practice of 6 weeks kettlebell and battle rope training significance differences on upper body muscular strength and core strength better than the control group in selected physical variables among inter collegiate volleyball players.

Keywords: kettlebell, battle rope training, upper body muscular strength, core strength, push up and plank

Introduction
The modern volleyball is highly specialized in almost all the major skills of Volleyball. It is a sport for young and old for men and women. The character of Volleyball game is entirely different than that of other sports discipline. Rotation system is a unique feature that differentiates Volleyball from other sports. During game the object of every player team is to sent the ball over the net in order to ground it on the opponents court and to prevent the same effort by the opponent. Now the volleyball is game of power and tactics and is played at a faster pace and this call sharper thinking, high standard of skills and technical application. There are very fast action and accuracy in performance of technique and tactics which are the demand of present game. A team can only reach top level. If planned scientific training given to the players.

Once type of exercise device that utilizes weight resistance is known as a kettlebells. Kettlebells have traditionally comprised a cast iron weight that looks much like a basketball with a suitcase - type handle attached to the top. It has been used for hundreds of years to provide weight training for the entire body, producing a high degree of strength training as well as an aerobic workout. (Donahue, 2006) [3], Kettlebell training is usefull for improving maximal and explosive strength (Lake 2012) [9], oxygen cost (Mayhew 2010) [4], vertical jump and body composition (otto 2012) [10].

A growing area within the physical fitness and exercise segment is what is referred to as "Battle Ropes". Battle Ropes are typically two segments of large diameter rope that are restrained on one end while the user oscillates their hands in an up and down fashion while holding the opposite ends of the rope in their hands. These oscillations create a sine wave in the rope with a given frequency and amplitude (Hemstreet, 2015) [7]. Using battle ropes training for develop athletics grip strength and body composition (Quednow, (2015) [11, 12], metabolic cost (Fountane 2015),

Methodology
To achieve the purpose of the study, 45 inter collegiate men players were selected from the University of Madras. The selected subjects age range from 18 to 25 years. The subjects randomly divided into three groups and each group consists of 15 subjects. Group-I underwent Kettlebell Training Group (KTG), Group-II underwent Battle rope Training Group (BTG) and Group-III Control Group (CG).The duration of the experimental period was six weeks; practice session for thrice a week, each section lasted 45minutes and the control group did not participate in any kind of special training programme apart from the daily physical activities. The selected physical variables such as upper body muscular strength and core strength was measured by maximum push up and plank test. The subjects of three groups were tested on selected variables prior and immediately after the training period. The collected data were analysed statistically through analyze of covariance (ANCOVA) to find the significance difference. The 0.05 level of confidence was fixed to test the level of significance difference.

Training Programme

During the training period the experimental group I (KTG) underwent 6 weeks of Kettlebell training programmes on Mondays, Wednesdays and Fridays and experimental group II (BTG) underwent 6 weeks of Battle rope training on Tuesdays, Thursdays and Saturdays, in addition to their daily routine activities as per the schedule. The duration of training were planned for 45 minutes that is from 7.00am to 7.45am.All the subjects involved in this study were carefully monitored throughout the training programmes, intensity of the experimental training was based on difficulty of the exercise, sets, repetitions and recovery time. Intensity effort level was exerted while performing an exercise. The intensity of workout can be changed by changing the exercise order, or increasing or decreasing the number of exercise, repetitions, weight or rest period.

Each session 45 minutes consist of 5 min warm up exercise, for Kettlebell training such as Kettlebell Good Morning, Kettlebell Arm Dead lift, Kettlebell Leg Deadlift, Kettlebell Swing Two Hands, Goblet Squat, Side Lunge and Overhead Press. Battle rope training such as battle rope slam, snakes on the floor, jump slam, rotational slam, alternative waves, rope claps, squat alternative slam, Russian twist and finally cool down and stretching exercises for recovery purpose. After completion of 6 weeks of kettlebell and battle rope training period, the participants were retested as the pre test.

Statistical Technique

The collected data were analysed statistically through analyze of covariance (ANCOVA) to find the significance difference.

Analysis of data

The data collected prior and after the experimental periods on upper body muscular strength experimental group I (KTG), experimental group II (BTG) and control group (CG) were analysed and presented in table – 1.

Table 1: Analysis of covariance for pre and post data on upper body muscular strength

Test	KTG	BTG	CG	Source of variance	Sum of Squares	df	Mean square	F
Pre-test mean	12.73	12.67	12.27	Between	1.9	2	0.96	0.34
				Within	117.2	42	2.79	
Post-test mean	17.20	17.80	12.87	Between	217.3	2	108.68	59.65*
				Within	76.5	42	1.82	
Adjusted mean	17.08	17.72	13.05	Between	189.2	2	94.61	152.1*
				Within	25.5	41	0.62	

*significant.at 0.05 level.

The obtained F value on pre test scores 0.34 was lesser than the required F value of 3.22 to be significant at 0.05 level. This proved that there was no significant difference between the groups at initial stage and the randomization at the initial stage was equal. The post test scores analysis proved that there was significant difference between the groups as the obtained F value at 59.63 was greater than the required F value at 3.22. This proved that the differences between the post test mean at the subjects were significant. Taking into consideration the pre and post test scores among the groups, adjusted mean scores were calculated and subjected to statistical treatment. The obtained F value at 152.1 was greater than the required F value at 3.22 to be significant at 0.05 level and hence it was accepted that there was significant difference among the adjusted post test means on upper body muscular strength of the subjects. Since significant differences were recorded, the results were subjected to post hoc analysis using Scheffe's Confidence Interval test. The results are presented in Table 2.

Table 2: Showing means, mean difference scheffe's confidence interval test scores on upper body muscualr strength

KTG	BTG	CG	Mean difference	Confidential interval
17.08	17.72		0.64	0.75
17.08		13.05	4.03*	
	17.72	13.05	4.67*	

significant.at 0.05 level of confidence

The post hoc analysis of obtained ordered adjusted means proved that to be significant at 0.05 level confidence the required confidence interval was 0.75.The kettlebell training group and control group (MD; 4.03) and battle rope training group and control group (MD: 4.67) were greater than the required confidence interval and were significant at 0.05 level. Kettlebell training group and battle rope training group (MD: 0.64) were less than the required confidence interval and were not significant at 0.05 level.

Discussion on findings of upper body muscular strength

The results presented in Table I proved that there was significant differences on upper body muscular strength, as the obtained F value was greater than the required table value to be significant at 0.05 level. The post hoc analysis result (Table 2) proved that comparing to control group, kettlebell and battle rope training improved upper body muscular strength of inter collegiate volleyball players. The post hoc results Table 2 further proved that comparing to control group and treatment groups, it was found that battle rope training was significantly better than the kettle bell training group and control group on upper body muscular strength among inter collegiate volleyball players.

Table 3: Analysis of covariance for pre and post data on core strength

Test	KTG	BTG	CG	Source of variance	Sum of Squares	df	Mean square	F
Pre-test mean	80.27	79.33	78.13	Between	34.3	2	17.2	0.56
				Within	1292	42	30.8	
Post-test mean	130.47	137.20	79.24	Between	30333.9	2	15167	279.75*
				Within	2277.1	42	54.2	
Adjusted mean	130.47	137.20	79.07	Between	28401.4	2	14200.7	416.12*
				Within	1399.2	41	34.13	

*significant at 0.05 level.

The obtained F value on pre test scores 0.56 was lesser than the required F value of 3.22 to be significant at 0.05 level. This proved that there was no significant difference between the groups at initial stage and the randomization at the initial stage was equal. The post test scores analysis proved that there was significant difference between the groups as the obtained F value at 279.75 was greater than the required F value at 3.22. This proved that the differences between the post test mean at the subjects were significant. Taking into consideration the pre and post test scores among the groups, adjusted mean scores were calculated and subjected to statistical treatment. The obtained F value at 416.12 was greater than the required F value at 3.22 to be significant at 0.05 level and hence it was accepted that there was significant difference among the adjusted post test means on core strength of the subjects. Since significant differences were recorded, the results were subjected to post hoc analysis using Scheffe's Confidence Interval test. The results are presented in Table 4.

Table 4: showing means, mean difference scheffe's confidence interval test scores on core strength

KTG	BTG	CG	Mean difference	Confidential interval
130.47	137.20		6.73*	5.54
130.47		79.07	51.4*	
	137.20	79.07	58.1*	

*significant at 0.05 level

The post hoc analysis of obtained ordered adjusted means proved that to be significant at 0.05 level confidence the required confidence interval was 5.54.The kettle bell training and battle rope training group (MD; 6.73), kettle bell training group and control group (MD; 51.4) and battle rope training group and control group (MD: 58.1) were greater than the required confidence interval and were significant at 0.05 level.

Discussion on findings of core strength

The results presented in Table III proved that there was significant differences on core strength, as the obtained F value was greater than the required table value to be significant at 0.05 level. The post hoc analysis result (Table 4) proved that comparing to control group, kettle bell and battle rope training improved on core strength of inter collegiate volleyball players. The post hoc results Table II further proved that comparing to control group and treatment groups, it was found that battle rope training was significantly better than the kettle bell training group and control group on core strength among inter collegiate volleyball players.

Conclusion

It was concluded that kettlebell training and battle rope training significantly improve the upper body muscular strength and core strenght among inter collegiate volleyball players compare to control group. Comparing between kettlebell and battle rope training groups there was no significant difference between the groups for improving upper body muscular strength. In core strength battle rope training was significantly better than the kettlebell training group for improving the core strength.

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