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Original Article

Effects of Circuit Training Resistance Training and Combined Training on Selected Physiological and Psychological Variables among Inter Collegiate Men Players

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ABSTRACT

The purpose of the study was to determine the effect of circuit training, resistance training, and combined training on selected physiological and psychological variables among players of college level. To achieve this purpose of the study, 45 players ranging from 18 to 25 years from Tamil Nadu were randomly selected as individuals (n = 45); and divided into three equal groups of 15 players each. The study was formulated as a true random group design, consisting of a pre- and post-test. Alike the individuals (n = 45) assigned, the groups were assigned training in an equivalent manner. While Group I underwent circuit training, Groups II and III underwent resistance training and combined training, respectively. The three experimental groups participated in the training for a period of 12 weeks to find out the outcome of the training packages. Blood pressure was measured using biomonitor and anxiety was assessed using Spielberger anxiety scale. The variable to be used in the present study was collected from all individuals before they had to be treated with the concerned treatments. This was assumed as a sort of pre-test and posttest was done after the completion of treatment. Analysis of covariance (ANCOVA) was applied as the individuals were selected at random; but the groups were not equated in relation to the factors to be examined. Hence, the difference between the means of the three groups in the pretest had to be taken into account during the analysis of the posttest differences. This was made possible by the application of the ANCOVA, where the final means were adjusted for differences in the initial means, and the adjusted means were tested for significance. Whenever the adjusted posttest means were found significant, the Scheffe's *post-hoc* test was administered to find out the paired means difference. To test the obtained results on variables, level of significance 0.05 was chosen. The combined training group produced significant improvement on selected physiological and psychological variables than other two groups.

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INTRODUCTION

A change in one of the components of the shoulder girdle leads to a complete change in shoulder motion. The orientation of the scapula is predicted in the upright position mainly from the length of the trapezius and levator scapulae muscles, and to a lesser extent from the length of the rhomboids and serratus anterior muscle.[1,2] In recreational athletes same symmetry between the two shoulders in all the measured variables. As in tennis or baseball players, volleyball players also have a depressed playing shoulder. This leads to a narrowed subacromial space in the upright position.[3] Some researchers suggested that a circuit-based training consisting of endurance and resistance exercises might be preferred, rather than one focused only on a single mode of exercise.[4,5] Even if not all researchers agreed[6,7] resistance training and aerobic exercise are established approaches to help manage obesity and associated risk factors.[8,9] Both types of exercise have been prescribed to sedentary and obese individuals and resulted in improved blood pressure (BP), heart rate, body composition, biochemical markers (insulin, glucose, cholesterol, etc.), and strength.[10,11] Combination training (i.e., aerobic and resistance training combined) appears to have a greater effect on BP, arterial stiffness, body composition, and then, performing either type of exercise independently.[12,13]

METHODOLOGY

The purpose of the study was to determine the effect of circuit training, resistance training, and combined training on select physiological and psychological variables among college level players. To achieve the purpose of the present study, 45

players from Tamil Nadu were selected as individuals at random; with age ranging between 18 and 25 years. The individuals were divided into three equal groups comprising 15 players each. The study was formulated as a true random group design, consisting of a pretest and posttest. The individuals (n = 45) were then randomly assigned to the three groups, along with circuit training (CTG), resistance training (RTG), and combined group (COTG) in an equivalent manner. While Group I underwent circuit training, Groups II and III underwent resistance training and combined training, respectively. The three experimental groups participated in the training for 12 weeks to find the outcome of their training packages. BP was measured using biomonitor and anxiety was assessed using Spielberger anxiety scale. The variable used in the present study was collected from all individuals before they have to be treated with the respective treatments and was assumed as pretest. After completion of treatment, they were tested again on all variables used in the present study; and was assumed as posttest. Analysis of covariance (ANCOVA) was applied because the individuals were selected at random, but the groups were not equated in relation to the factors to be examined. Hence, the difference between means of the three groups in the pretest had to be taken into account while analyzing the posttest differences. This was achieved by applying ANCOVA, where the final means were adjusted for differences in the initial means, and the adjusted means were tested for significance. Whenever the adjusted posttest means were found significant, Scheffe's *post-hoc* test was administered to find out the paired means difference. To test the obtained results on variables, level of significance 0.05 was chosen as sufficient for the study.

RESULTS

Table 1 reveals that the indicated and the obtained "*F*" - ratio for the pretest means among the groups on systolic BP as 123.70 for experimental Group I, 123.36 for experimental Group II and 124.00 for experimental Group III. The obtained "*F*" - ratio 0.76 was lesser than table "*F*" - ratio 3.21. Hence, the pretest means "*F*" - ratio was insignificant at 0.05 level of confidence for the degree of freedom 2 and 42. The posttest means were 120.71 for experimental Group I, 120.52 for experimental Group II, and 119.93 for experimental Group III, respectively. The obtained "*F*" - ratio 56.52 was higher than the table "*F*" - ratio 3.21. Hence, the posttest means "*F*" - ratio was significant at 0.05 level of confidence for the degree of freedom 2 and 42. The adjusted posttest means were 120.72 for experimental Group I, 120.53 experimental Group II, and 119.89 for experimental Group III, respectively. The obtained "*F*" - ratio 56.47 was higher than the table "*F*" - ratio 3.22. Hence, the adjusted posttest means "*F*" - ratio was significant at 0.05 level of confidence for the degree of freedom 2 and 41. It was concluded that there was a significant mean difference among CTG, RTG, and COTG, in reducing systolic BP of the players.

Table 2 shows the *post-hoc* analysis obtained on adjusted post-test means. The mean difference required for the confidential interval to be significant was 0.55. It was observed that the COTG significantly reduced systolic BP better than other groups.

Table 3 reveals that the indicated and the obtained "*F*" - ratio for the pretest means among the groups on diastolic BP were 83.43 for experimental Group I, 83.10 for experimental Group II and 83.41 for experimental Group III, respectively. The obtained "*F*" - ratio 0.92 was lesser than table "*F*" - ratio 3.21. Hence, the pretest means "*F*" - ratio was insignificant at 0.05 level of confidence for the degree of freedom 2 and 42. The posttest means were 79.30 for experimental Group I, 79.63 for experimental Group II and 78.11 for experimental Group III, respectively. The obtained "*F*" - ratio 37.01 was higher than the table "*F*" - ratio 3.21. Hence, the posttest means "*F*" - ratio was significant at 0.05 level of confidence for the degree of freedom 2 and 42. The adjusted posttest means were 79.47 for experimental Group I, 79.28 experimental Group II and 78.11 for experimental Group III, respectively. The obtained "*F*" - ratio 36.26 was higher than the table "*F*" - ratio 3.22. Hence, the adjusted posttest means "*F*" - ratio was significant

Table 1: Computation of analysis of covariance of mean of CTG, RTG, and COTG on systolic blood pressure

Mean	CTG	RTG	COTG	Source of variance	Sum of squares	Df	Means squares	F-ratio
Pre-test means	123.70	123.36	124.00	BG	2.07	2	1.03	0.76
				WG	57.13	42	1.36	
Posttest means	120.71	120.52	119.93	BG	101.20	2	50.60	56.52*
				WG	37.60	42	0.89	
Adjusted posttest means	120.72	120.53	119.89	BG	102.06	2	51.03	56.47*
				WG	37.05	41	0.90	

CTG: Circuit training group, RTG: Resistance training group, COTG: Combined training group. *Significant at 0.05 level of confidence

Table 2: The Scheffe's test for the differences between the adjusted posttest means on systolic BP

Adjusted posttest means			Mean difference	Required CI
Circuit training	Resistance training	Combined group		
120.72	120.53	-	0.19	0.55
120.72	-	119.89	0.83*	
-	120.53	119.89	0.64*	

*Significant at 0.05 level of confidence

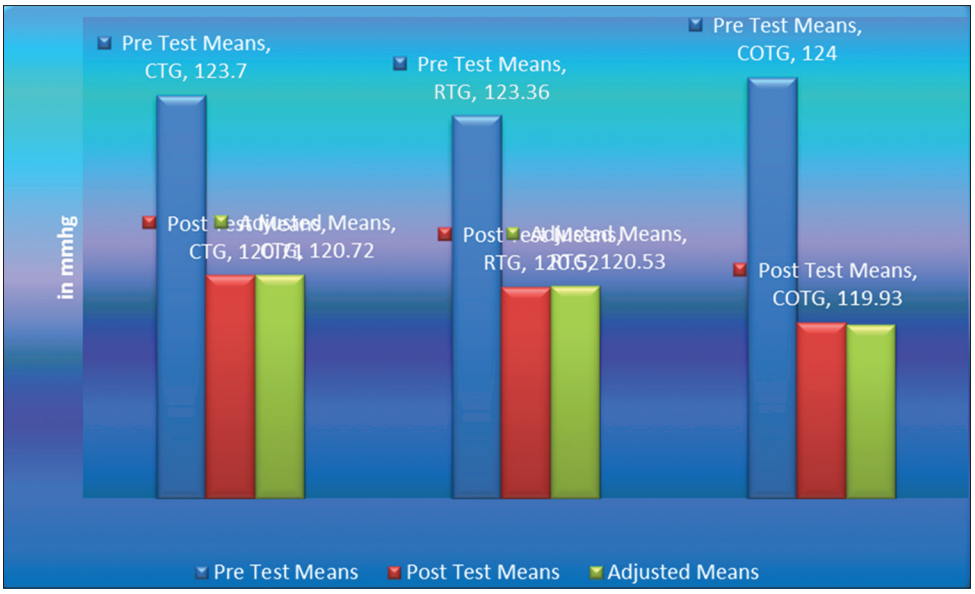

Figure 1: Adjusted posttest differences of the circuit training, resistance training, and combined training groups on systolic blood pressure

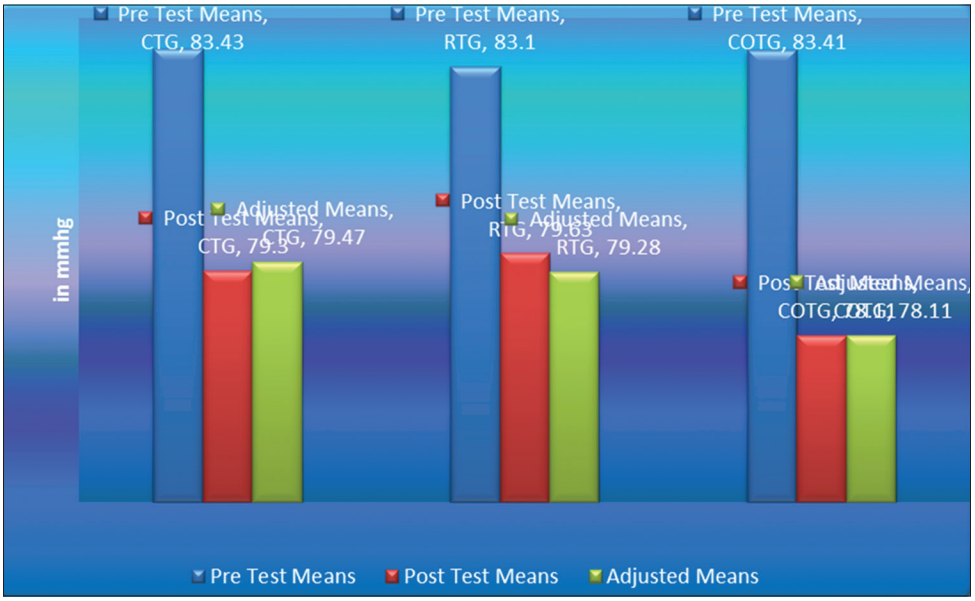

Figure 2: Adjusted posttest differences of circuit training group, resistance training group, and combined training group on diastolic blood pressure

Table 3: Computation of analysis of covariance of mean of CTG, RTG, and COTG on dribbling

Mean	CTG	RTG	COTG	Source of variance	Sum of squares	Df.	Means squares	F-ratio
Pretest means	83.43	83.10	83.41	BG	2.53	2	1.26	0.92
				WG	57.46	42	1.36	
Posttest means	79.30	79.63	78.11	BG	109.73	2	54.86	37.01*
				WG	62.26	42	1.48	
Adjusted posttest means	79.47	79.28	78.11	BG	107.79	2	53.89	36.26*
				WG	60.93	41	1.48	

CTG: Circuit training group, RTG: Resistance training group, COTG: Combined training group. *Significant at 0.05 level of confidence

at 0.05 level of confidence for the degree of freedom 2 and 41. It was concluded that there was a clear significant mean difference among CTG, RTG, and COTG, in reducing diastolic BP of the players.

Table 4 shows the *post-hoc* analysis obtained on adjusted posttest means. The mean difference required for the confidential interval to be significant was 1.01. It was ultimately observed that the COTG significantly reduced diastolic BP better than other groups.

Table 5 reveals that the indicated and the obtained "*F*" - ratio for the pretest means among the groups on anxiety were 57.24 for experimental Group I, 58.11 for experimental Group II and 57.35 for experimental Group III, respectively. The obtained "*F*" - ratio 0.88 was lesser than the table "*F*" - ratio 3.21. Hence, the pretest means "*F*" - ratio was insignificant at 0.05 level of confidence for the degree of freedom 2 and 42. The posttest means were 50.12 for experimental Group I, 51.24 for experimental Group II and 47.23 for experimental Group III, respectively. The obtained "*F*" - ratio 177.15 was higher than the table "*F*" - ratio 3.21. Hence, the posttest means "*F*" - ratio was significant at 0.05 level of confidence for the degree of freedom 2 and 42. The adjusted posttest means were 50.12 for experimental Group I, 51.22 experimental Group II and 47.21 for experimental Group III, respectively. The obtained "*F*" - ratio 154.22 was higher than the table "*F*" - ratio 3.22. Hence, the adjusted posttest means "*F*" - ratio was significant at 0.05 level of confidence for the degree of freedom 2 and 41. It was concluded that there was a significant mean difference among CTG, RTG, and COTG in reducing anxiety of the players.

Table 6 shows the *post-hoc* analysis obtained on adjusted posttest means. The mean difference required for the

Table 4: The Scheffe's test for the differences between the adjusted posttest means on diastolic BP

Adjusted posttest means			Mean difference	Required CI
Circuit training	Resistance training	Combined group		
79.47	79.28	-	0.19	1.01
79.47	-	78.11	1.36*	
-	79.28	78.11	1.11*	

*Significant at 0.05 level of confidence. BP: Blood pressure

Table 5: Computation of analysis of covariance of mean of CTG, RTG, and COTG on dribbling

Mean	CTG	RTG	COTG	Source of variance	Sum of squares	Df	Means squares	F-ratio
Pretest means	57.24	58.11	57.35	BG	0.24	2	0.12	0.88
				WG	5.71	42	0.13	
Posttest means	50.12	51.24	47.23	BG	46.65	2	23.32	177.15*
				WG	5.53	42	0.13	
Adjusted posttest means	50.12	51.22	47.21	BG	40.70	2	20.35	154.22*
				WG	5.41	41	0.13	

CTG: Circuit training group, RTG: Resistance training group, COTG: Combined training group. *Significant at 0.05 level of confidence

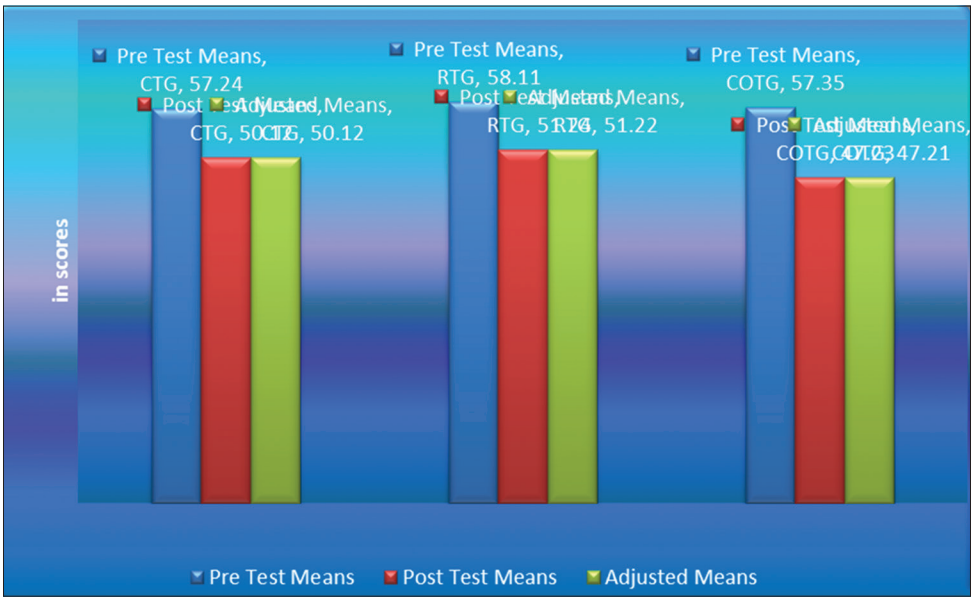

Figure 3: Adjusted posttest differences of the circuit training, resistance training, and combined groups on anxiety

Table 6: The Scheffe's test for the differences between the adjusted posttest means on anxiety

Adjusted posttest means			Mean difference	Required CI
Circuit training	Resistance training	Combined group		
50.12	51.22	-	1.10	2.45
50.12	-	47.21	2.91*	
-	51.22	47.21	4.01*	

*Significant at 0.05 level of confidence

confidential interval to be significant was 245. It was also observed that the COTG significantly reduced anxiety better than other groups.

RESULT

The COTG produced significant improvement on selected physiological and psychological variables than RTG and COTG.

REFERENCES

1. Dupuis C, Tourny-Chollet C. CETAPS increasing explosive power of shoulder in volleyball players. Strength Cond J 2003;25:7-11.
2. Chaurasia BD. Human anatomy. Strength Cond J 2004;1:79.
3. Kraemer JB, Stone MH, O'Bryant HS, Conley MS, Johnson RL. Effect of single versus multiple sets of eight training: Impact of volume, intensity and variation. J Strength Cond Res 1997;11:143-7.
4. Marzolini S, Oh PI, Brooks D. Effect of combined aerobic and resistance training versus aerobic training alone in individuals with coronary artery disease: A meta-analysis. Eur J Prev Cardiol 2012;19:81-94.
5. Paoli A, Pacelli F, Bargossi AM, Marcolin G, Guzzinati S, Neri M, *et al.* Effects of three distinct protocols of fitness training on body composition, strength and blood lactate. J Sports Med Phys Fitness 2010;50:43-51.
6. Bateman LA, Slentz CA, Willis LH, Shields AT, Piner LW, Bales CW, *et al.* Comparison of aerobic versus resistance exercise training effects on metabolic syndrome (from the studies of a targeted risk reduction intervention through defined exercise-STRRIDE-AT/RT). Am J Cardiol 2011;108:838-44.
7. Willis LH, Slentz CA, Bateman LA, Shields AT, Piner LW, Bales CW, *et al.* Effects of aerobic and/or resistance training on body mass and fat mass in overweight or obese adults. J Appl Physiol 2012;113:1831-7.
8. Church T. Exercise in obesity, metabolic syndrome, and diabetes. Prog Cardiovasc Dis 2011;53:412-8.
9. Strasser B, Schobersberger W. Evidence for resistance training as a treatment therapy in obesity. J Obes 2011;2011:482564.
10. Alkahtani SA, King NA, Hills AP, Byrne NM. Effect of interval training intensity on fat oxidation, blood lactate and the rate of perceived exertion in obese men. Springerplus 2013;2:532.
11. Lafontaine T. Resistance training for patients with hypertension. Strength Cond J 1997;19:5-9.
12. Ho SS, Dhaliwal SS, Hills AP, Pal S. The effect of 12 weeks of aerobic, resistance or combination exercise training on cardiovascular risk factors in the overweight and obese in a randomized trial. BMC Public Health 2012;12:704.
13. Ho SS, Radavelli-Bagatini S, Dhaliwal SS, Hills AP, Pal S. Resistance, aerobic, and combination training on vascular function in overweight and obese adults. J Clin Hypertens 2012;14:848-54.

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