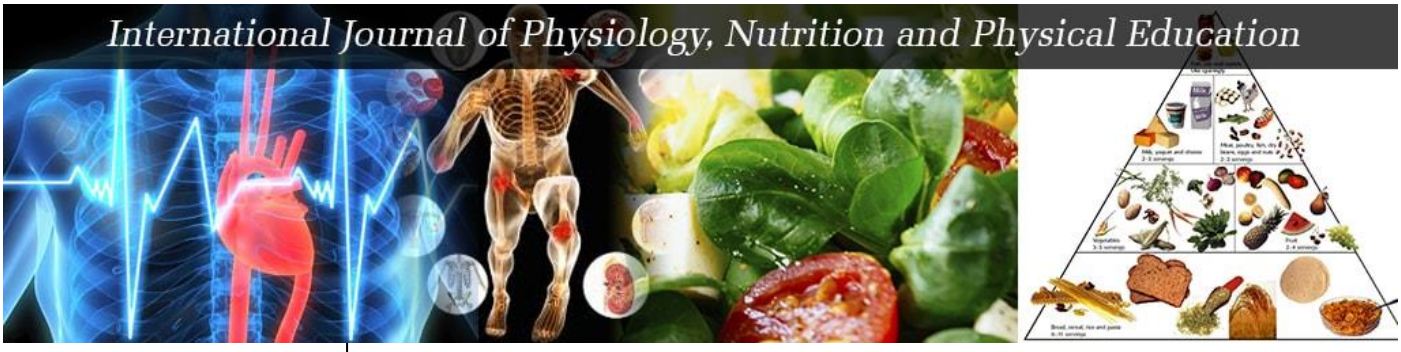

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Relative effect of explosive training, resistance training followed by speed training on selected physiological variables of Kabaddi Players

J Thomas Raja Selvam and Dr. P Kumaresan

Abstract
The present study was designed to examine the relative effect of explosive and resistance training followed by speed training on selected physiological variables among Kabaddi Players. To achieve the purpose of the study, thirty six Kabaddi players from Thoothukudi District were selected as subjects. The age of the subjects ranged from 19 to 21 years. The subjects were assigned at random into three groups of twelve each (n=12). Group I underwent explosive training followed by speed training, Group II underwent resistance training followed by speed training, and Group III acted as control who did not participate in any training during the training period other than their daily schedule in the curriculum. The duration of the training period was restricted to twelve weeks and the number of sessions per week was confined to four. The criterion variables selected for this paper were resting pulse rate and breadth holding time. The data were collected prior to and immediately after the training period. The obtained data from the experimental groups and control groups before and after the experimental period were statistically analyzed with dependent 't'-test and Analysis of Covariance (ANCOVA). Whenever the F-ratio for adjusted post-test means was found to be significant, the Scheffe's test was applied as post-hoc test to determine the paired mean differences. The level confidence was fixed at .05 level for all the cases to find out the significance. The explosive and resistance training followed by speed training groups has significant improvement on resting pulse rate and breadth holding time when compared to the control group. The resistance training followed by speed training groups has significant difference on improvement of resting pulse rate and breadth holding time when compared to the control group.

Keywords: Explosive training, resistance training, speed training, physical variables

Introduction
Sports participation and appreciation have become integral part of life. Competitive sports make tremendous demands on the physical conditioning, virtually, endurance and mental power of the participants (Lyttle D. Andrew, *et al*. 1996) [5]. The importance of resistance training to sports performance has been supported by studies which have demonstrated that resistance training in the form of weight training and more recently, plyometric training has enhanced some competitive performances. Most typically this has been reported as an improvement in vertical jumping ability. Many studies have reported that resistance training has enhanced muscular strength but failed to induce changes in dynamic sporting performance (Bloomfield *et al*., 1994) [3].

Over the past 20 years, the use of resistance training has progressed from an activity performed by relatively few strength athletes to a permanent feature of the training routines of most sportspersons. Although there is a variety of resistance training methods one can use to enhance muscular power (Bloomfield *et al*., 1994) [3].

During the past two decades, speed training programmes have been successfully developed for several sports in which running is a basic skill. More recently however, coaches who have athletes in other sports have been using similar methods to increase the speed of their performers, with very good results. Speed training, like strength, flexibility and mental skills training has now become an important ingredient in the total programme, particularly where speed of movement is essential in the sport (Baechle R. Thomas, 1994) [1].

Power and strength are apparent traits in all athletic moves. Power, on the other hand, can be defined as the speed with which one moves or jumps (Roger Marandino, 1997) [7]. Explosive training has become very popular in developing explosive power. Explosive power is seen in quick movement when body weight is propelled either upward or forward, it is characterized by one short burst of energy. It has been known for a long time that the amount of energy transformed in muscular exercise is proportional to the oxygen consumption (Siedentop, 1998) [8].

Purpose of the Study

The present study was designed to examine the relative effect of explosive and resistance training followed by speed training on selected physiological variables among Kabaddi players.

Methodology

To achieve the purpose of the study, thirty six Kabaddi players from Thoothukudi District were selected as subjects. The age of the subjects ranged from 19 to 21 years. The subjects were assigned at random into three groups of twelve each (n=12). Group I underwent explosive training followed by speed training, Group II underwent resistance training followed by speed training, and Group III acted as control who did not participate in any training during the training period other than their daily schedule in the curriculum.

The duration of the training period was restricted to twelve weeks and the number of sessions per week was confined to three. The criterion variables selected for this paper were resting pulse rate and breadth holding time. The selected criterion variables for the study were assessed by the following standardized test items: Resting pulse rate was assessed by radial artery method and breadth holding time was assessed by nostril clip method. The data were collected prior to and immediately after the training period.

The obtained data from the experimental groups and control groups before and after the experimental period were statistically analyzed with dependent 't'-test and Analysis of Covariance (ANCOVA) (Broota, K.D., 1989) [4]. Whenever the F-ratio for adjusted post test means was found to be significant, the Scheffe's test was applied as post-hoc test to determine the paired mean differences. The level confidence was fixed at .05 level for all the cases to find out the significance.

Analysis of Data

Resting pulse rate

The analysis of dependent 't'-test on the data obtained for resting pulse rate of the pre-test and post-test of explosive and resistance training followed by speed training groups and control group have been analyzed and presented in Table 1.

Table 1: The summary of mean and dependent T-test for the pre and post tests on resting pulse rate of experimental and control group.

Values	Explosive Training Group	Resistance Training Group	Control Group
Pre test (Mean ± SD)	73.50 ± 5.21	74.44 ± 5.01	73.55 ± 4.91
Post test (Mean ± SD)	70.82 ± 3.33	71.15 ± 4.02	73.50 ± 4.19
T-test Values	9.14*	8.71*	0.27

*Significant at .05 level. Table value required for significance at .05 level for 't'-test with df 11 is 2.20. Resting pulse rate scores are represented in beats per minute.

From the table 1, the dependent T-test values between the pre and post tests means of explosive and resistance training followed by speed training groups and control group were 9.14, 8.71 and 0.27 respectively. Since the obtained 't'-test value of experimental groups are greater than the table value 2.20 with df 11 at .05 level of confidence, it is concluded that explosive and resistance training followed by speed training groups had significant improvement in the performance of resting pulse rate. However, control group has no significant improvement in resting pulse rate.

The analysis of covariance on resting pulse rate of explosive and resistance training followed by speed training groups and control group have been analyzed and presented in Table 2.

Table 2: Analysis of covariance on resting pulse rate of explosive and resistance training followed by speed training groups and control group

Adjusted post test means			Source of Variance	Sum of Squares	df	Mean Squares	'F'- Ratio
Explosive Training Group	Resistance Training Group	Control Group					
70.84	71.02	73.51	Between Within	322.49 150.07	2 32	161.25 4.69	34.38*

*Significant at .05 level of confidence. TheJ table value required for significance at .05 level with df 2 and 32 is 3.29.

From the table 2, the adjusted post test mean values of resting pulse rate for explosive and resistance training followed by speed training groups and control group are 70.84, 71.02 and 73.51 respectively. The obtained F-ratio of 34.38 for adjusted post test mean is more than the table value of 3.29 for df 2 and 32 required for significance at .05 level of confidence.

The results of the study indicate that there is significant difference among the adjusted post test means of explosive and resistance training followed by speed training groups and control group on the development of resting pulse rate. To determine which of the paired means had a significant difference, the Scheffe's test was applied as post hoc test and the results are presented in Table 3.

Table 3: The Scheffe's test for the differences between the adjusted post test paired means on Resting pulse rate.

Adjusted post test means			Mean Difference	Confidence Interval
Explosive Training Group	Resistance Training Group	Control Group		
70.84	71.02	……	0.18	2.27
70.84	……	73.51	2.67*	2.27
……	71.02	73.51	2.49*	2.27

* Significant at .05 level

Table 3 shows that the adjusted post test mean difference on resting pulse rate between explosive training followed by speed training and control groups, velocity resistance training followed by speed training and control groups are 2.67 and 2.49 respectively which are greater than the confidence interval value 2.27, which shows significant difference at 0.05 level of confidence.

It may be concluded from the results of the study that there is no significant difference in resting pulse rate between the adjusted post test means of explosive and resistance training followed by speed training groups. However, the improvement of resting pulse rate was similar between explosive and resistance training followed by speed training groups.

Breadth holding time

The analysis of dependent 't'-test on the data obtained for breadth holding time of the pre-test and post-test of explosive and resistance training followed by speed training groups and control group have been analyzed and presented in Table 4.

Table 4: The summary of mean and dependent T-test for the pre and post tests on breadth holding time of experimental and control groups.

Values	Explosive Training Group	Resistance Training Group	Control Group
Pre test (Mean ± SD)	42.17 ± 4.11	43.21 ± 5.11	42.72 ± 4.73
Post test (Mean ± SD)	45.15 ± 4.31	45.85 ± 4.34	42.92 ± 4.21
T-test Values	12.14*	11.53*	0.36

*Significant at .05 level. Table value required for significance at .05 level for 't'-test with df 11 is 2.20. Breadth holding time s are represented in seconds.

From the table 4, the dependent T-test values between the pre and post tests means of explosive and resistance training followed by speed training groups and control group were 12.14, 11.53 and 0.36 respectively. Since the obtained 't'-test value of experimental groups are greater than the table value 2.20 with df 11 at .05 level of confidence, it is concluded that explosive and resistance training followed by speed training groups had significant improvement in the performance of breadth holding time. However, control group has no significant improvement in the performance of breadth holding time.

The analysis of covariance on breadth holding time of explosive and resistance training followed by speed training groups and control group have been analyzed and presented in Table 5.

Table 5: Analysis of covariance on breadth holding time of explosive and resistance training followed by speed training groups and control group.

Adjusted post-test means			Source of Variance	Sum of Squares	df	Mean Squares	'F'- Ratio
Explosive Training Group	Resistance Training Group	Control Group					
45.24	45.95	42.90	Between Within	196.25 82.35	2 32	98.13 2.57	38.18*

*Significant at .05 level of confidence. The table value required for significance at .05 level with df 2 and 32 is 3.29.

From the table 5, the adjusted post test mean values of breadth holding time for explosive and resistance training followed by speed training groups and control group are 45.24, 45.95 and 42.90 respectively. The obtained F-ratio of 38.18 for adjusted post test mean is more than the table value of 3.29 for df 2 and 32 required for significance at .05 level of confidence.

The results of the study indicate that there is significant difference among the adjusted post test means of explosive and resistance training followed by speed training groups and control group on the development of breadth holding time. To determine which of the paired means had a significant difference, the Scheffe's test was applied as post hoc test and the results are presented in Table 6.

Table 6: The Scheffe's test for the differences between the adjusted post test paired means on breadth holding time.

Adjusted post test means			Mean Difference	Confidence Interval
Explosive Training Group	Resistance Training Group	Control Group		
45.24	45.95	……	0.71	1.68
45.24	……	42.90	2.34*	1.68
……	45.95	42.90	3.05*	1.68

* Significant at .05 level

Table 6 shows that the adjusted post test mean difference on explosive power between explosive training followed by speed training and control groups, velocity resistance training followed by speed training and control groups are 2.34 and 3.05 respectively which are greater than the confidence interval value 1.68, which shows significant difference at 0.05 level of confidence.

It may be concluded from the results of the study that there is no significant difference between the adjusted post test means of explosive and resistance training followed by speed training groups on explosive power. However, the improvement of explosive power was similar between explosive and resistance training followed by speed training groups.

Discussion on Findings

The results of the study indicate that the experimental groups namely explosive and resistance training followed by speed training group had significantly improved the selected dependent variables namely resting pulse rate and breadth holding time when compared to the control group. It is also found that the improvement caused by explosive training followed by speed training was equal when compared to the effects caused by resistance training followed by speed training.

Recent studies have shown that supervised Resistance Training programs do not appear to have any adverse effects in children and adolescents (Malina, 2006) [6] and in fact may improve cardiovascular fitness, body composition, bone mineral density and blood lipid profiles (Benson, Torode & Fiatarone Singh, 2008) [2]. RT has been considered as an important training protocol for adults (U.S. Department of Health & Human Services, 2008) [9].

Conclusions

From the analysis of the data, the following conclusions were drawn.

1. The explosive training followed by speed training group has significant improvement on resting pulse rate and breadth holding time when compared to the control group.
2. The resistance training followed by speed training group has significant improvement on resting pulse rate and breadth holding time when compared to the control group.
3. Significant differences were not found between explosive and resistance training followed by speed training groups towards improving the selected criterion variables such as resting pulse rate and breadth holding time.
4. The explosive and resistance training followed by speed training groups were found to be better than control group to increase resting pulse rate and breadth holding time.

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