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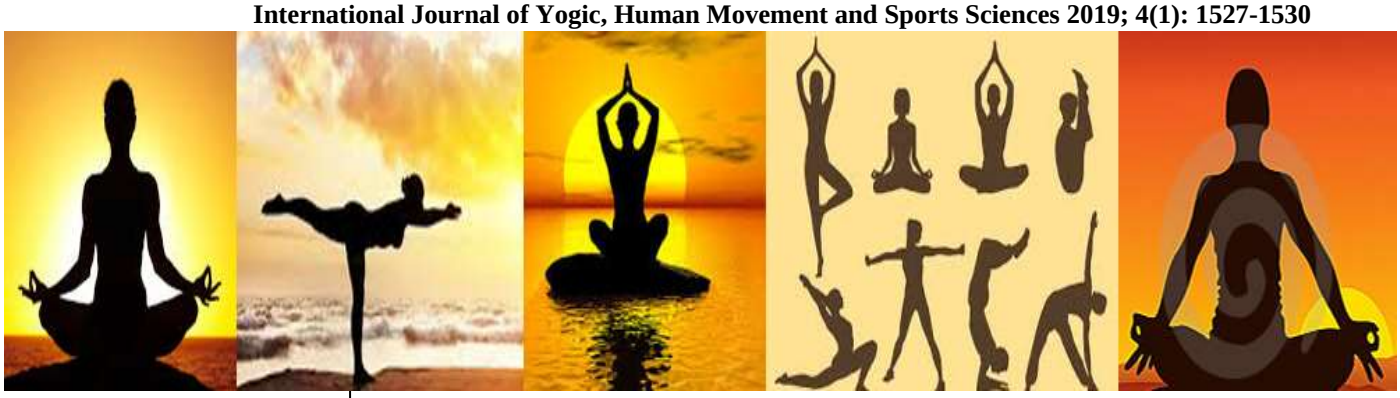

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Relative effect of explosive training, resistance training followed by speed training on selected physical variables of Kabaddi players

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Abstract
The present study was designed to examine the relative effect of explosive and resistance training followed by speed training on selected physical 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 speed and explosive power. 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 speed and explosive power when compared to the control group. The resistance training followed by speed training groups has no significant difference on improvement of speed and explosive power when compared to the control group.

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

Introduction
Sports in the present world has become extremely competitive. It is not the mere participation or practice that brings out victory to an individual. Therefore, sports life is affected by various factors, like Physiology, Biomechanics, Sports Training, Sports Medicine, Sociology and Psychology etcetera (Ghuman and Dhillon, 2000) [4]. Sports performance has dramatically progressed over the past few decades. One among the contributing factors is that sports is a challenging field, and intense motivation has encouraged long, hard hours of work. Also, coaching has become more sophisticated, partially from the assistance of sports specialists and scientists. Sports Sciences have progressed from descriptive to scientific.

Scientific training methods and application of basic principles of body mechanics in sports skill have been attributed to the higher level of performance in sports skills. Performance to a certain extent depends upon the physical and motor fitness qualities in which definite improvement can be achieved through appropriate training (Bourchers and Malina, 1999) [2]. The main components which influence the physical performance of an athlete are strength, speed, agility, endurance, power and coordinative abilities.

Resistance training is an anaerobic form of exercise. This training programme can be used to enhance the ability of the body to perform at very high force and/or power outputs for a very short period to improve the ability of the body to perform repeated bouts of maximal activity (Thomas R. Baechle, 1994) [8]. Dynamic resistance is nothing but, when the body or object provides resistance through a range of motion. In training, we can use manual resistance, free weight equipment or resistance machines to provide dynamic resistance (Thomas R. Baechle, 1994) [8].

The aim of speed training is to condition the athlete to move at high velocity, employing maximal power when needed. In order to do this, the neuromuscular system must be conditioned to very fast movements and training need to be very specific, with a very high anaerobic component. If an athlete is to reach full potential in a sport and if speed of movement is a necessary component, the speed and velocity demands of the sport must be carefully analysed (Bloomfield *et al*. 1994) [1].

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 physical 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 speed and explosive power. The selected criterion variables for the study were assessed by the following standardized test items: Speed was assessed by 50 mts run, and explosive power was assessed by vertical jump test. 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.

Analysis of Data

Speed

The analysis of dependent 't'-test on the data obtained for speed 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 speed of experimental and control group.

Values	Explosive Training Group	Resistance Training Group	Control Group
Pre test (Mean ± SD)	7.52 ± 0.13	7.48 ± 0.11	7.55 ± 0.10
Post test (Mean ± SD)	7.12 ± 0.11	7.15 ± 0.10	7.53 ± 0.09
T-test Values	7.34*****	7.19*****	0.57

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

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 7.34, 7.19 and 0.57 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 speed. However, control group has no significant improvement in speed.

The analysis of covariance on speed 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 speed 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					
7.14	7.16	7.51	Between	2.49	2	1.25	41.67*
			Within	1.07	32	0.03	

*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 2, the adjusted post test mean values of speed for explosive and resistance training followed by speed training groups and control group are 7.14, 7.16 and 7.51 respectively. The obtained F-ratio of 41.67 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 speed. 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 Speed.

Adjusted post test means			Mean Difference	Confidence Interval
Explosive Training Group	Resistance Training Group	Control Group		
7.14	7.16	……	0.02	0.18
7.14	……	7.51	0.37*	0.18
……	7.16	7.51	0.35*	0.18

* Significant at .05 level

Table 3 shows that the adjusted post test mean difference on speed between explosive training followed by speed training and control groups, velocity resistance training followed by speed training and control groups are 0.37, and 0.35 respectively which are greater than the confidence interval value 0.18, 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 speed between the adjusted post test means of explosive and resistance training followed by speed training groups. However, the improvement of speed was similar between explosive and resistance training followed by speed training groups.

Explosive Power

The analysis of dependent 't'-test on the data obtained for explosive power 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 explosive power of experimental and control group.

Values	Explosive Training Group	Resistance Training Group	Control group
Pre test (Mean ± SD)	37.13 ± 3.21	36.88 ± 3.01	37.76 ± 2.93
Post test (Mean ± SD)	42.34 ± 2.01	43.05 ± 2.10	37.83 ± 2.29
T-test Values	12.24*****	13.11*****	0.33

*Significant at .05 level. Table value required for significance at .05 level for 't'-test with df 11 is 2.20. Explosive powers are represented in centimeters

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 12.24, 13.11 and 0.33 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 explosive power. However, control group has no significant improvement in the performance of explosive power.

The analysis of covariance on explosive power 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 explosive power 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					
42.44	42.96	37.80	Between	180.71	2	90.36	38.29*
			Within	75.57	32	2.36	

*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 explosive power for explosive and resistance training followed by speed training groups and control group are 42.44, 42.96 and 37.80 respectively. The obtained F-ratio of 38.29 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 explosive power. 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 explosive power.

Adjusted post test means			Mean Difference	Confidence Interval
Explosive Training Group	Resistance Training Group	Control Group		
42.44	42.96	……	0.52	1.61
42.44	……	37.80	4.64*	1.61
……	42.96	37.80	5.16*	1.61

* 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 4.64 and 5.16 respectively which are greater than the confidence interval value 1.61, 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 speed and explosive power 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.

The most important fundamental requirement for all sports and games are speed with strength. It is also stated that resistance training combined with speed training improves the velocity and acceleration. According to Wilson (1994) [5], resistance training in the form of weight training and more

recently, explosive training are also used as the means to enhance the muscular strength and size, power, speed and muscular endurance. The development of speed through combined training is supported by the finding of Jones (1996) [6] and Schwendal (1991) [7]. Strength training with speed training improves stride frequency and speed. Delecluse *et al*., (1995) [3] examined the influence of high resistance and high velocity training on sprint performance. It was concluded that both slow and fast training improved performance and fast training showed some advantages in quantity and magnitude of training effects.

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 speed and explosive power when compared to the control group.
2. The resistance training followed by speed training group has significant improvement on speed and explosive power 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 speed and explosive power.
4. The explosive and resistance training followed by speed training groups were found to be better than control group to increase speed and explosive power.

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