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PHYSICAL EDUCATION

ANALYSIS OF HIGH INTENSITY INTERVAL AND RESISTANCE CIRCUIT TRAINING ON SPEED AND AGILITY AMONG SPORTS CLUB BADMINTON PLAYERS

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ABSTRACT

The purpose of the study was to find out the Analysis of high intensity interval and resistance circuit training on speed and agility among sports club badminton players. In order to achieve the purpose of the study thirty men sports club badminton players were randomly selected from Puthucherry state sports clubs and they were equally divided in to three groups of ten each as experimental group-I, experimental group-II and control group. The experimental groups and control group undergone normal routine badminton practices and in addition the experimental group-I underwent high intensity interval training and experimental group-II underwent resistance circuit training for one hour in the morning sessions. The control group was not given any special training. The period of training was eight weeks in a schedule of weekly three days for alternate days. The data were collected on the selected dependent variables before and after the training period. The collected the data were statistically analyzed by using Analysis of Covariance (ANCOVA) and Scheffe's post hoc test. To test the significance .05 level of confidence was fixed. Based on the results the study it was concluded that the high intensity interval and resistance circuit training were significantly improved the speed and agility among sports clubs badminton players.

KEYWORDS: High intensity interval training, Resistance circuit training, Speed and Agility.

INTRODUCTION

As preventive and curative health measures, it has become more successful throughout the world and, millions of teenagers should have chance of enjoying sports. Sport is the way which we use our physical capacities to play. Sports is an important in other ways, when one's body works better his mind works better, his brain and his body are interrelated. Sports allows you to blow of tension, to forget your problems for a while and to go out and have a good time no matter what other pressures one may be under in his life.

Badminton is one of the game which require lot of movements on the court. The players should have agility to move on the court forward sideward and backward to do many actions with high speed. Systematic training is required to improve the qualities. Broadly speaking badminton training is similar to conditioning for the other racket sports such as tennis and squash. A simple movement analysis however, reveals a few key differences that will affect the competitive badminton players training. Badminton players also rely much more on the wrist flexors for generating power compared to tennis players. As a badminton match lasts at least 45 minutes shorts, intense periods of activity are underpinned by aerobic endurance. Speed and agility play a crucial role, and lateral movements are called upon to even greater extent than in tennis. To improve the physical fitness qualities they involved is various training programme. (www.Badminton-Information.com)

High-intensity interval training (HIIT), also called high-intensity intermittent exercise (HIIE) or sprint interval training (SIT), is a form of interval training, a cardiovascular exercise strategy alternating short periods of intense anaerobic exercise with less intense recovery periods, until too exhausted to continue. Though there is no universal HIIT session duration, these intense workouts typically last under 30 minutes, with times varying based on a participant's current fitness level. The duration of HIIT also depends on the intensity of the session. (www.Dohiit.com)

Resistance Circuit Training is designed to generate the benefits of strength training but in a much shorter period of time. It is a time efficient model which uses reduced rest periods to increase the metabolic, hormonal and cardiovascular responses to resistance training. As the name suggests, resistance circuit training is heavy weights lifted in a circuit format. Each session targets all body parts and is split into "mini-circuits" containing 3 exercises. For example, the first circuit could be bench press, seated row and leg press. After adequate warm-up, exercisers perform their 6RM for each of the exercises with minimal rest between exercises (35 second interest rest). Perform this circuit 3-5 times, followed by a 5 minute break. Each session can include at least 2 "mini-circuits" up to 5. (us.myprotein.com)

To present study was also with the aim to improve the physical fitness qualities through high

intensity interval training and resistance circuit training. With analyzing various important fitness qualities of the speed and agility were selected as criterion variables.

REVIEWS AND LITERATURE

Dupont Gregory et al., (2004) was examined the effects of in season, high-intensity interval training on professional male soccer players' running performances were investigated. Twenty two subjects participated in 2 consecutive training periods of 10 weeks. The first period was considered a control period and was compared with a period where 2 high-intensity interval training exercises were included in the usual training program. Intermittent runs consisted of 12–15 runs lasting 15 seconds at 120% of maximal aerobic speed alternated with 15 seconds of rest. Sprint repetitions consisted of 12–15 all-out 40-m runs alternated with 30 seconds of rest. Results from the high-intensity interval training have shown that maximal aerobic speed was improved (+ 8.1 ± 3.1%; $p < 0.001$) and that the time of the 40-m sprint was decreased (-3.5 ± 1.5%; $p < 0.001$), whereas no change in either parameters were observed during the control period. This study shows that improvements in physical qualities can be made during the in-season period. Results: The O_2max, HRmax, RER, maximal ventilation, and [La] obtained during the treadmill test were 60.1 ± 3.4 ml·kg^{-1}·min^{-1}, 196.5 ± 6.1 b·min^{-1}, 1.12 ± 0.04, 141.2 ± 16.0 L·min^{-1}, and 10.9 ± 1.4 mmol·L^{-1}, respectively. The anthropometric characteristics, t40m, MAS, and HRmax measured before the control period, after the control period, and after the high-intensity interval training period are presented the ANOVA revealed no significant time effect for anthropometric and HRmax measurements. A significant time effect was obtained for MAS and t40m. The Tukey post hoc test indicated that MAS (+8.1 ± 3.1%; $p < 0.001$) and t40m (-3.5 ± 1.5%; $p < 0.001$) were significantly improved after the high-intensity interval training period, whereas no changes were observed during the control period.

Chtara, M et al., (2008) was examined the purpose of this study was to examine the influence of the sequence order of high-intensity endurance training and circuit resistance training sequence on muscular strength and power development. Forty-eight physical education students (ages, 21.4 ± 1.3 years) were assigned to 1 of 5 groups: no training controls (C, $n = 9$), endurance training (E, $n = 10$), circuit training (S, $n = 9$), endurance before circuit training in the same session, (E+S, $n = 10$), and circuit before endurance training in the same session (S+E, $n = 10$). Subjects performed 2 sessions per week for 12 weeks. Resistance-type circuit training targeted strength endurance (weeks 1-6) and explosive strength and power (weeks 7-12). Endurance training sessions included 5 repetitions run at the velocity associated with $o_2$max ($o_2$max) for a duration equal to 50% of the time to exhaustion at $o_2$max; recovery was for an equal period at 60% $o_2$max. Maximal strength in the half squat, strength endurance in the 1-leg half squat and hip extension, and explosive strength and power in a 5-jump test and countermovement jump were measured pre- and post-testing. No significant differences were shown following training between the S+E and E+S groups for all exercise tests. However, both S+E and E+S groups improved less than the S group in 1 repetition maximum ($p < 0.01$), right and left 1-leg half squat ($p < 0.02$), 5-jump test ($p < 0.01$), peak jumping force ($p < 0.05$), peak jumping power ($p < 0.02$), and peak jumping height ($p < 0.05$). The intrasession sequence did not influence the adaptive response of muscular strength and explosive strength and power. Circuit training alone induced strength and power improvements that were significantly greater than when resistance and endurance training were combined, irrespective of the intrasession sequencing.

METHODOLOGY

The purpose of study was to investigate the analysis of high intensity interval and resistance circuit training on selected speed and agility among sports club badminton players. In order to achieve the purpose of the study 30 men sports club badminton players were selected randomly and they were equally divided in to three groups of 10 each as experimental group-I, experimental group-II and control group. The experimental groups and control group undergone normal routine badminton practices and in addition the experimental group-I underwent high intensity interval training and experimental group-II underwent resistance circuit training for one hour in the morning before starting the routine badminton practices. The control group was not given any special training. The period of training was 8 weeks in a schedule of weekly 3 days for alternate days. The data were collected on the variables of speed and agility before and after the training period. The collected the data were statistically analyzed by using Analysis of Covariance (ANCOVA) and Scheffe's post hoc test. To test the significance .05 level of confidence was fixed.

CRITERION MEASURES

TABLE - I

Variables	Test	Measurers in Unit
Speed	50mts Run	Seconds
Agility	4×100m Shuttle run	Seconds

RESULTS AND DISCUSSION

The analysis of covariance and scheffe's post hoc test on the data obtained on Speed and Agility of Experimental and Control groups have been analyzed and tabulated in Table-II, Table-III, Table-IV and Table-V.

TABLE - II
ANALYSIS OF COVARIANCE FOR PRE AND POST TESTS DATA ON SPEED OF EXPERIMENTAL AND CONTROL GROUPS

	Control Group	High intensity interval	Resistance circuit	Source of Variance	Sum of Squares	Df	Mean Squares	'F' Ratio
Pretest	7.93	7.82	7.99	Between	0.15	2	0.07	0.18
				Within	10.97	27	0.41	
Post test	8.23	7.38	7.36	Between	4.93	2	2.47	6.40*
				Within	10.40	27	0.39	
Adjusted Post test	8.21	7.47	7.29	Between	4.83	2	2.41	66.13*
				Within	0.94	26	0.04	

*Significance at .05 level, df 2 and 27= 3.35, 2 and 26=3.37

Table - II shows that the pretest means on speed of control, high intensity interval training and resistance circuit training groups are 7.93, 7.82 and 7.99 respectively. The obtained 'F' ratio value of 0.18 for pretest mean is less than the required table value of 3.35 for not significance at .05 level. The post-test mean on speed of control, high intensity interval training and resistance circuit training groups are 8.23, 7.38 and 7.36 respectively. The obtained 'F' ratio value of 6.40 for post-test data is greater than the required table value of 3.35 for significance at .05 level. The adjusted post-test mean on speed of control, high intensity interval training and resistance circuit training groups are 8.21, 7.47 and 7.29 respectively. The obtained 'F' ratio value of 66.13 for adjusted post-test data is greater than the required table value of 3.37 for significance at .05 level. It reveals that there is significant difference among the groups on speed as a result of high intensity interval training and resistance circuit training. The scheffe's post-hoc test was applied to find out the significant paired mean difference.

TABLE - III
ORDERED SCHEFFE'S POST HOC TEST FOR MEAN DIFFERENCE BETWEEN GROUPS ON SPEED

Mean values			Mean Difference	CI
Control	high intensity interval	resistance circuit		
8.21	7.47	-	0.75	0.21
8.21	-	7.29	0.93	0.21
-	7.47	7.29	0.18	0.21

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Table - III shows that the ordered weighted mean difference of scheffe's post-hoc test values on speed of the control group, high intensity interval training and resistance circuit training. The mean difference of speed is significant at .05 level of confidence. The difference in means between control

group and high intensity interval training and control group and resistance circuit training group on speed of the paired means didn't differ significantly.

TABLE - IV
ANALYSIS OF COVARIANCE FOR PRE AND POST TESTS DATA ON AGILITY OF EXPERIMENTAL AND CONTROL GROUPS

	Control Group	high intensity interval	resistance circuit	Source of Variance	Sum of Squares	df	Mean Squares	'F' Ratio
Pretest	12.09	11.73	12.01	Between	0.71	2	0.35	1.54
				Within	6.28	27	0.23	
Post test	12.47	11.32	11.83	Between	6.64	2	3.32	17.25*
				Within	5.20	27	0.19	
Adjusted Post test	12.35	11,50	11.77	Between	3.43	2	1.71	65.82*
				Within	0.67	26	0.03	

*Significance at .05 level, df 2 and 27= 3.35, 2 and 26=3.37

Table - IV shows that the pretest means on agility of control, high intensity interval training and resistance circuit training groups are 12.09, 11.73 and 12.01 respectively. The obtained 'F' ratio value of 1.54 for pretest mean is less than the required table value of 3.35 for not significance at .05 level. The post-test mean on agility of control, high intensity interval training and resistance circuit training groups are 12.47, 11.32 and 11.83 respectively. The obtained 'F' ratio value of 17.25 for post-test data is greater than the required table value of 3.35 for significance at .05 level.

The adjusted post-test mean on agility of control, high intensity interval training and resistance circuit training groups are 12.35, 11.50 and 11.77 respectively. The obtained 'F' ratio value of 65.82 for adjusted post-test data is greater than the required table value of 3.37 for significance at .05 level. It reveals that there is significant difference among the groups on agility as a result of high intensity interval training and resistance circuit training. The scheffe's post-hoc test was applied to find out the significant paired mean difference.

TABLE - V
ORDERED SCHEFFE'S POST HOC TEST FOR MEAN DIFFERENCE BETWEEN GROUPS ON AGILITY

Mean values			Mean Difference	CI
Control	high intensity interval	resistance circuit		
12.35	11.50	-	0.84	0.18
12.35	-	11.77	0.57	0.18
-	11.50	11.77	-0.27	0.18

Table - V shows that the ordered weighted mean difference of scheffe's post-hoc test values on agility of the control group, high intensity interval training and resistance circuit training group. The mean difference of agility is significant at .05 level of confidence. The difference in means between control group and high intensity interval training and control group and resistance circuit training group on agility.

CONCLUSIONS

From the results of the study and discussion the following conclusions were drawn.

1. There is a significant difference on speed and agility between all the groups.
2. There is a significance improvement on speed and agility due to high intensity interval training and resistance circuit training.

RECOMMENDATIONS

1. Similar study may be conducted for various age groups.
2. The same study may be extended to further time period.
3. The present study is mainly focused on males only. The same study may be done on
   females

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