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Effect of circuit training and interval training on selected physical variable of speed endurance on college men kabaddi players

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Abstract
The present study was designed to evaluate the effect of circuit training and interval training on change of Speed endurance in men Kabaddi players in Kerala state. The investigator has to obtain a sample of selected 60 college men Kabaddi players in Kerala state for this study (two training group and one control group). The population would represent in all relevant aspects and methodology used in this research involves the choice of a specified group of subjects, selection of variable, administering of standard test, using of the relevant tool obtaining pre-determined information in the certain chosen factors and subjecting them for a statistical analysis.

Keywords: circuit training, interval training, speed endurance

Introduction
Kabaddi is essentially an Indian game, which commands huge popularity in India as well as in its hinterland. In India, Kabaddi is popular in different names. In the southern parts of India, the game is referred to as Chedugudu or Hu-Tu-Tu. In eastern India, it is fondly called Hadudu (for men) and Kit-Kit (for women). The game is known as Kabaddi in northern India. Breath control, raid, dodging and movement of hand and feet are the basic skills that one has to acquire, in order to play Kabaddi. The player has to acquire power and learn both offensive and defensive skills to excel in the game, which combines the characteristics of rugby and wrestling.
In the modern times, Kabaddi was given the national status of a game in India in 1918. Consequently, a standard set of rules and regulations for the game were formulated in the same year. However, the rules and regulations were brought to print in 1923. During the same year, an All India Tournament for Kabaddi was organized at Baroda, wherein the players strictly followed the rules and regulations formulated for the game. Since then, the game has come a long way. Its popularity increased and a number of tournaments were organized at national level, throughout the country. In 1938 the game was introduced Indian Olympic Games held at Calcutta, which fetched it international recognition.

Physical fitness
Physical Fitness is the capacity to carry out reasonably well various forms of physical activities without being unduly tired and includes qualities important to the individuals' health and well being. Physical fitness is an ability to carry out daily tasks with vigour and alertness, without undue fatigue and with ample energy to enjoy leisure time pursuits and to meet any unforeseen emergencies
Physical fitness is the basic requirement for most of the tasks to be under taken by an individual in his daily life. Physical fitness is one's richest possession; it cannot be purchased but only obtained through regular routines of physical exercises. A close relationship exists between physical fitness and sports performance. In case the standard of games and sports in the country is to be improved, adequate stress have to be given for enhancing the physical fitness status of sports persons.

Circuit training

Circuit training was developed by R. E. Morgan and G. T. Anderson in 1953 at the University of Leeds in England (Sorani, 1966). The term circuit refers to a number of carefully selected exercises arranged consecutively. In the original format, 9 to 12 stations comprised the circuit. This number may vary according to the design of the program.

Interval training

The last few decades has seen the introduction of interval training which has considerable influence on sports conditioning. Interval training involves alternating periods of work and rest during a training session. It is a program that varies the intensity within the training session by interspersing a workout of a higher intensity with a rest period of lower intensity; then another workout is completed, once again followed by a rest period, and so on through the workout.

Speed endurance

Speed endurance is the ability to cover maximum distance under the conditions of fatigue in a minimum possible time.

Experimental design

An equated group design was chosen for this study. The subjects were divided into 3 groups A, B and C. Group 'A' acted as control group 'B' was trained with circuit training and C was interval training group. The training programme was carried out thrice in a week [i.e.; Monday, Wednesday and Friday (group B) and Tuesday, Thursday and Saturday (group C) in circuit training and interval training group respectively] for 10 weeks. All subjects were treated before and after the entire training period in selected test conducted.

Table 1: The list of selected physical variable Speed endurance and respective test for the study

Sl. No.	Variable	Test
1	Speed endurance	600 Meter run

Table 2: Test selected to assess the dependent variable and the units of measurement of the study

Sl. No.	Criterion variable	Test item	Unit of measurement
1	Speed endurance	600 meter run	1/10th of a second

The criterion measures for the selected variable speed endurance used

1. Speed endurance was recorded in 1 /10lh of a second.

Table 3: Test re-test reliability coefficient on the selected test for physical variable Speed endurance for the study

Sl. No.	Variable	Coefficient correlation
1	Speed endurance	0.94*

*Significant at 0.01 level of confidence

Table value required for significance at 0.01 level of confidence is 0.77. Since the obtained 'r' value s were much higher than the required value. The data were accepted in terms of instrument, tester and subjects.

Statistical techniques used for the study

1. Percentage analysis
2. Means
3. Standard deviation
4. 'F'test (ANOVA & ANCOVA)
5. 't'-test
6. Correlation.

Administration of test in physical variable Speed endurance (600m run) Purpose

The purpose of the test was to measure the speed endurance of an individual.

Facilities and equipments

Measuring tape, stopwatches, chunnam powder and 400 meter standard marked track.

Test administration

After a short warm up period the subject takes a standing start position behind the starting line and the starter uses the commands, 'on your marks' and 'go'one trial was permitted. With the starting commands the subjects ran 600 meters as fast as they can. For this purpose digital electronic stopwatches were used.

Scoring

The time taken to run for 600 meters distance was recorded in 1/10th of a second.

Effectiveness of circuit training and interval training on selected physical variable of college men Kabaddi players.

Inorder to findout the effectiveness of the circuit training and interval training on selected physical variable such as speed endurance of college men Kabaddi players, the collected data were analysed and the details of analysis of each variable is given below:

Speed endurance

The pre-test and post-test scores among control group, circuit training group and interval training group of college men Kabaddi players in Kerala with respect to level of speed endurance in 600 meter run is given below.

Table 4: Level of speed endurance in 600 meter run of college men of different group Kabaddi players in Kerala

Test	Level	Control group		Circuit group		Interval group	
		N	%	N	%	N	%
Pre-test	Low	5	25.0	5	25.0	5	25.0
	Average	7	35.0	8	40.0*	7	35.0
	High	8	40.0*	7	35.0	8	40.0*
Post-test	Low	4	20.0	3	15.0	1	5.0
	Average	9	45.0*	11	55.0*	16	80.0*
	High	7	35.0	6	30.0	3	15.0

*indicates the level of speed endurance in 600 meter run

From the table it is clear that in the post-test the level of speed endurance in 600 meter run of college men is higher in interval group (80%) than the control and circuit group.

Effectiveness of circuit training and interval training on speed endurance in 600 meter run of college men Kabaddi players.

The pre-test and post-test scores of the control, circuit and interval groups were subjected to the statistical technique, analysis of co-variance to findout the effectiveness of circuit and interval training on speed endurance in 600 meter run of college men Kabaddi players in Kerala. The summary of analysis of variance over pre-test(x) and post-test(y) scores of players in the control, circuit and interval groups taken separately is given below

Table 5: Summary of analysis of variance of pre-test and post-test scores of speed endurance in 600 meter run among the control, circuit and interval group

Source of variance	df	SSx	SSy	MSx (Vx)	MSy (Vy)	Fx	Fy
Among group mean	2	0.039	1.555	0.019	0.778	0.198	10.602
Within group mean	57	5.601	4.181	0.098	0.073		
Total	59	5.640	5.736				

From table of F ratio, for df (2/57); F at 0.05
Level = 3. 16,
F at 0.01 level = 5.00

The F ratio for the pre-test and post-test scores was tested for significance. Fx value obtained 0.198 (Fx = 0.198). It is less than F at 0.05 level (i.e., 3.16). So it can be interpreted that the experimental groups (circuit and interval) and control group do not differ significantly with regard to pre-test in speed endurance (600 meter run). The three groups are more or less equal with regard to pre-test scores of speed endurance in 600 meter run.
The obtained value of Fy is 10.602(Fy = 10.602). It is greater than F at 0.01 level (i.e., 5.00). Hence it can be interpreted that the experimental groups (circuit and interval) and control group differ significantly with regard to post-test in speed endurance (600 meter run).
The summary of analysis of co-variance of pre-test and post-test scores of players in experimental (circuit and interval) and control groups is given below

Table 6: Summary of analysis of co-variance of pre-test and post-test scores of speed endurance in 600 meter run among players in experimental (circuit and interval) and control groups (ANCOVA)

Source of variance	df	SSx	SSy	SSxy	SSyx	MSy (Vyx)	Fyx	SDyx
Among group mean	2	0.04	1.56	-0.17	1.77	0.89	24.39	0.19
Within group mean	56	5.60	4.18	3.46	2.04	0.04		
Total	58	5.64	5.74	3.29	3.81			

From table of F ratio, For df (2/56); F at 0.05
level = 3. 16
F at 0.01 level = 5.00
F_{yx} = 24.39

The obtained value of F is 24.39(Fyx=24.39). It is greater than the table value at 0.01 level (i.e,=5.00). This shows that the final mean scores of treatment groups differ significantly after they have been adjusted for differences in the post-test scores of speed endurance in 600 meter run.
The data for adjusted means of post-test scores of players in experimental and control groups is given below

Table 6: Data for adjusted Means of post-test scores in experimental and control groups

Group	N	MX	MY	Adjusted Y Mean MYX (adj)
Control	20	1.913	1.860	1.878
Circuit training	20	1.972	1.702	1.683
Interval training	20	1.961	1.468	1.456
Group means	20	1.942	1.781	

For table t for df =56,
't at 0.05 =2.005;
't' at 0.01 =2.67

Mininmum significant difference required at 0.01 = 0.161
Minimum significant difference required at 0.05 = 0.121

The difference between adjusted means (Myx) of post-test scores of players in experimental (circuit and interval) and control groups is given below

Table 7: Difference between adjusted means (Myx) of experimental (circuit and interval) and control groups

	MYX (adj)	Difference	RM
Control	1.88	0.195	Significant
Circuit training	1.68		
Control	1.88	0.422	Significant
Interval training	1.46		
Circuit training	1.68	0.227	Significant
Interval training	1.46		

Difference between adjusted means (Myx) of control and circuit training groups =0.195 which is greater than 0.161 implies that the both the groups differ significantly at 0.01 level. Difference between adjusted means (Myx) of control and interval training groups =0.442 which is greater than 0.161 implies that the both the groups differ significantly at 0.01 level and difference between adjusted means (Myx) circuit and interval training groups =0.227 which is greater than 0.161 implies that the both the groups differ significantly at 0.01 level.
It can be interpreted that the analysis of co-variance among adjusted means of experimental and control groups revealed that there is significant difference between experimental and control groups with respect to speed endurance in 600 meter run i.e., interval training group (Myx =1.46) is significantly superior to control (Myx = 1.88) and circuit training group (Myx = 1.68) with regard to post-test scores.

Comparison of pre-test and post-test scores of speed endurance in 600 meter run among the control, circuit and interval group Kabaddi players

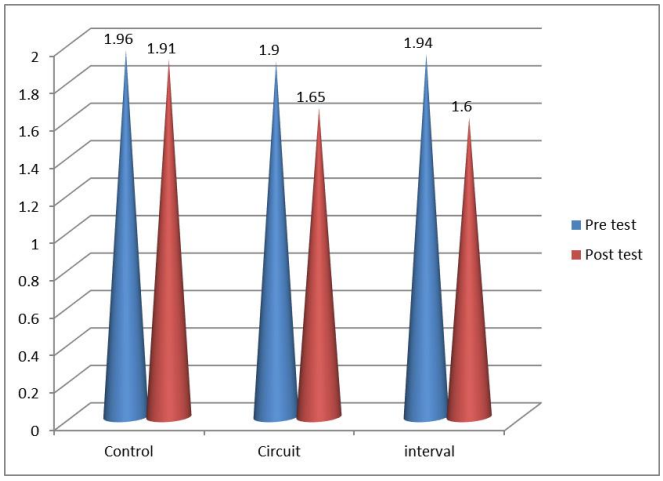
In order to find out the significance difference between pre-test and post-test means of experimental and control groups, the critical ratio of the pre-test and post-test scores were calculated. For this, the mean and standard deviation of the groups were calculated. The data and the result of the test of significance are given below

Table 8: Comparison of pre-test and post-test scores of speed endurance in 600 meter run among the control, circuit and interval group Kabaddi players

Group	Test	Mean	S.D	r Value	Calculated 't' value	P value
Control	Pre-test	1.96	0.31	0.96	2.51	0.02
	Post-test	1.91	0.32			
Circuit	Pre-test	1.90	0.33	0.84	6.02	0.00
	Post-test	1.65	0.32			
Interval	Pre-test	1.94	0.32	0.79	7.27	0.00
	Post-test	1.60	0.31			

p<0.01 indicates significant at 1% level

As the *p* value of the table is less than 0.05, there is significant difference between pre-test and post-test scores of speed endurance in 600 meter run among the control group, circuit and interval group Kabaddi men players of Kerala. From the mean value it is clear that all the groups seem to take more time in their pre-test to complete 600 meter run than that of post-test which reveals that they perform better in their post-test. This is illustrated in the figure below



Difference between pre-test and post-test scores of speed endurance in among the control, circuit and interval group Kabaddi players (based on time)

From the figure it is found that the physical variable speed endurance improved on both experimental groups, in comparison to control group after a 10 weeks training programme and the interval training group showed significant improvement in speed performance than circuit training group.

In order to find out the correlation between circuit group and interval group in speed endurance in 600 meter run, the mean and standard deviation of the data were calculated and the correlation were computed to see whether there is any relationship between them. The result and correlation coefficient are shown below

Table 10: Relationship between circuit group and interval group in speed endurance of pre-test and post-test

Test	Group	No	Mean	S.D	'r' value	'P' Value
Pre-test	Circuit	20	1.90	0.33	0.01	0.96
	Interval	20	1.94	0.32		
Post-test	Circuit	20	1.65	0.32	0.03	0.98
	Interval	20	1.60	0.31		

$p<0.01$ indicates significant at 1% level

As the r value of the table is positive, the proposed hypothesis i.e, the circuit and interval training will have a positive correlation with variable- speed endurance is accepted

Conclusions

The objectives of the study are the following:

1. To find the effectiveness of circuit and interval training on selected physical variable of the college men Kabaddi players.
2. The study found that the physical variables like speed and speed endurance improved on both experimental groups, in comparison to control group after a 10 weeks training programme and the interval training group showed significant improvement in speed performance than circuit training group
3. To compare the effectiveness of circuit training and interval training on speed endurance of the college men Kabaddi players.
4. It is hypothesized that the circuit and interval training will have a positive correlation with the selected speed endurance variable of the college men Kabaddi players.

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