TRAINING AND DETRAINING EFFECTS OF INTERVAL AND CONTINUOUS RUNNING ON STRENGTH ENDURANCE

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ABSTRACT

The purpose of the study was designed to examine the training and detraining effects of interval and continuous running on strength endurance. For the purpose of the study, forty five men players studying Bachelor's degree in the Department of Physical Education and Sports Sciences, Annamalai University, Annamalai Nagar, Tamil Nadu were selected as subjects. They were divided into three equal groups. Each group consisted of the fifteen subjects. Group I underwent interval running and Group II underwent continuous running for three days per week for twelve weeks. And group III acted as control who did not undergo any special training programme apart from their regular physical education programme. The age of the subjects was ranged from 18 to 24 years. The following variable namely strength endurance was selected as criterion variables. All the subjects of three groups were tested on selected dependent variables at prior to, immediately after the training programme and for forty days as four cessations. The collected data from all the groups on selected criterion variables were statistically analysed by using 3×6 factorial ANOVA with last factor repeated measures. Whenever the obtained 'F' ratio for interaction effect was found to be significant, the simple effect test was used. Since, three groups and six different stages of tests were compared, whenever the obtained 'F' ratio value in the simple effect was significant, the Scheffe's test was applied as post hoc test to determine which of the paired mean had significant differences. The results of the study showed that there all the experimental groups namely interval running and continuous running improved strength endurance after twelve weeks of training period when compared to control group. Significant differences were noticed among the experimental groups in improving the strength endurance after twelve weeks of training period. There was no significant reduction in the performance of strength endurance during the first and second cessation of detraining period. Significant reduction in the performance of strength endurance were found during the third and fourth cessation of detraining period.

INTRODUCTION

Continuous training means the person training uses 60-80% heart rate for at least 30-60 minutes at least four or five times a week. This method suits long distance runners as well as tennis players etc, because it means that their endurance levels will increase, and it is the way which they would normally compete. Continuous training is a good way for an athlete to build up their cardio-vascular endurance levels. Continuous forms the basis for all other training methods both anaerobic and aerobic.

Interval running enables the athlete to improve the workload by interspersing heavy bouts of fast running with recovery periods of slower jogging. The athlete runs hard over any distance up to 1k and then has a period of easy jogging. During the run, lactic acid is produced and a state of oxygen debt is reached. During the interval (recovery), the heart and lungs

are still stimulated as they try to pay back the debt by supplying oxygen to help break down the lactates. The stresses put upon the body cause an adaptation including capillarisation, strengthening of the heart muscles, improved oxygen uptake and improved buffers to lactates. All this leads to improved performance.

METHODOLOGY

The purpose of the study was designed to examine the training and detraining effects of interval and continuous running on strength endurance. For the purpose of the study, forty five men players studying Bachelor's degree in the Department of Physical Education and Sports Sciences, Annamalai University, Annamalai Nagar, Tamil Nadu were selected as subjects. They were divided into three equal groups. Each group consisted of the fifteen subjects. Group I underwent interval running and Group II underwent continuous running for three days per week for twelve weeks. And group III acted as control who did not undergo any special training programme apart from their regular physical education programme. The age of the subjects was ranged from 18 to 24 years. The following

variable namely strength endurance was selected as criterion variables. All the subjects of three groups were tested on selected dependent variables at prior to, immediately after the training programme and for forty days as four cessations. The collected data from all the groups on selected criterion variables were statistically analysed by using 3×6 factorial ANOVA with last factor repeated measures. Whenever the obtained 'F' ratio for interaction effect was found to be significant, the simple effect test was used. Since, three groups and six different stages of tests were compared, whenever the obtained 'F' ratio value in the simple effect was significant, the Scheffe's test was applied as post hoc test to determine which of the paired mean had significant differences.

Strength Endurance

The mean and standard deviation values on strength endurance of interval running group, continuous running group and control group at six different stages of tests have been analysed and presented in Table I.

TABLE I

THE MEAN AND STANDARD DEVIATION VALUES ON STRENGTH ENDURANCE OF PRE TEST, POST TEST, FIRST CESSATION, SECOND CESSATION, THIRD CESSATION AND FOURTH CESSATION SCORES OF INTERVAL RUNNING, CONTINUOUS RUNNING AND CONTROL GROUPS

Groups		Pre test	Post test	First cessation	Second cessation	Third cessation	Fourth cessation
Interval Running Group	**Mean**	33.12	41.20	41.19	41.27	34.11	33.16
	S.D	1.48	1.32	1.31	1.32	1.46	1.46
Continuous Running Group	**Mean**	33.61	36.29	36.27	36.25	34.94	33.82
	S.D	1.38	1.29	1.27	1.27	1.32	1.36
Control Group	**Mean**	33.19	33.10	33.58	33.56	33.21	33.18
	S.D	1.49	1.47	1.47	1.47	1.47	1.48

TABLE I-A

THE TWO WAY ANALYSIS OF VARIANCE ON STRENGTH ENDURANCEOF INTERVAL RUNNING, CONTINUOUS RUNNING AND CONTROL GROUPS AT SIX DIFFERENT STAGES OF TESTS

Source of variance	Sum of squares	Df	Mean squares	Obtained "F" ratio
Between				
A factor (groups)	2.812	2	1.406	58.58*
Error	1.009	42	0.024	
Within				
B factor (tests)	8.292	5	1.658	376.82*
AB factor (interaction)	2.92	10	0.298	66.36*
Error	0.914	210	0.0044	

* Significant at .05 level of confidence.
(The table value required for significance at .05 level of confidence with df 2 and 42, 5 and 210 & 10 and 210 were 3.22, 2.26 and 1.88 respectively.

Table I-A shows that the obtained 'F' ratio value 58.58 for row (groups) on strength endurance which is greater than the required table value 3.22 for significance with df 2 and 42. It further shows that the obtained 'F' ratio value 376.82 for column (tests) on strength endurance which is greater than the required table value 2.26 for significance with df 5 and 210. It also shows that the obtained 'F' ratio value 66.36 for interaction effect (groups × tests) on strength endurance which is also greater than the required table value 1.88 for significance with df 10 and 210.

Since, the interaction effect was significant, the simple test was applied as follow up test and they are presented in table I-B.

TABLE I-B
THE SIMPLE EFFECT VALUES OF ALL THREE GROUPS (ROWS) AT SIX DIFFERENT STAGES OF TESTS (COLUMNS) ON STRENGTH ENDURANCE

Sources of variance	Sum of squares	Df	Mean squares	Obtained "F" ratio
Groups and Pre Test	0.02	2	0.01	2.27
Groups and Post Test	3.12	2	1.56	354.54*
Groups and First Cessation	2.91	2	1.455	330.68*
Groups and Second Cessation	1.71	2	0.855	194.32*
Groups and Third Cessation	0.017	2	0.0085	1.93
Groups and Fourth Cessation	0.016	2	0.008	1.82
Tests and Interval Running Group	4.11	5	0.822	186.82*
Tests and Continuous Running Group	3.89	5	0.778	176.82*
Tests and Control Group	0.028	5	0.0056	1.27
Error	0.914	210	0.0044	

* Significant at .05 level of confidence.

(The table value required for significance at .05 level of confidence with df 2 and 210, and 5 and 210 were 3.04 and 2.26 respectively).

The table I-B shows that the obtained "F" ratio values 354.54, 330.68, 194.32 and 1.82 for groups and post test values, groups and first cessation values, groups and second cessation values and groups on strength endurance which are greater than the required table value 3.04 for significance with df 2 and 210 at .05 level of confidence. And also the obtained "F" ratio value 186.82 and 176.82 respectively for tests and interval running group and tests and continuous running group on strength endurance which are greater than the required table value 2.26 for significance with df 5 and 210 at .05 level of confidence.

Since, three groups and six different stages of tests were compared, whenever the obtained "F" ratio value in the simple effect was significant, the Scheffe'S test was applied as post hoc test tofind out the paired mean difference, if any and it was presented in Table I-C, I-D, I-E, I-F and I-G.

TABLE I-C
THE SCHEFFE'S TEST FOR THE DIFFERENCES BETWEEN PAIRED MEANS OF GROUPS ON STRENGTH ENDURANCE (POST TEST)

Interval running group	Continuous running group	Control group	Mean difference	Confidence interval
41.20	36.29	-	4.91*	1.18
41.20	-	33.60	7.60*	1.18
	36.29	33.60	2.69*	1.18

* Significant at .05 level of confidence.

The table I-C shows that the mean difference between interval running group and continuous running group, interval running group and control group and continuous running group and control group 4.91, 7.60 and 2.60 respectively on strength endurance at post test period which are greater than the confidence interval value 1.18 at .05 level of confidence.

The results of the study showed that there was a significant difference between interval running group and continuous running group, interval running group and control group and continuous running group and control group on strength endurance at post test period.

TABLE I - D
THE SCHEFFE'S TEST FOR THE DIFFERENCES BETWEEN PAIRED MEANS OF GROUPS ON STRENGTH ENDURANCE

(FIRST CESSATION)

Interval running group	Continuous running group	Control group	Mean difference	Confidence interval
41.19	36.27	-	4.92*	1.18
41.19	-	33.58	7.61*	1.18
-	36.27	33.58	2.69*	1.18

* Significant at .05 level of confidence.

The table I-D shows that the mean difference between interval running group and continuous running group, interval running group and control group and continuous running group and control group 4.92, 7.61 and 2.69 respectively on strength endurance at first cessation which are greater than the confidence interval value 1.18 at .05 level of confidence.

The results of the study showed that there was a significant difference between interval running group and continuous running group, interval running group and control group and continuous running group and control group on strength endurance at post test period.

TABLE I-E
THE SCHEFFE'S TEST FOR THE DIFFERENCES BETWEEN PAIRED MEANS OF GROUPS ON STRENGTH ENDURANCE (SECOND CESSATION)

Interval running group	Continuous running group	Control group	Mean difference	Confidence interval
41.27	36.25	-	5.02*	1.18
41.27	-	33.56	7.71*	1.18
	36.25	33.56	2.69*	1.18

* Significant at .05 level of confidence.

The table I-E shows that the mean difference between interval running group and continuous running group, interval running group and control group and continuous running group and control group 5.02, 7.71 and 2.69 respectively on strength endurance at second cessation which are greater than the confidence interval value 1.18 at .05 level of confidence.

The results of the study showed that there was a significant difference between interval running group and continuous running group, interval running group and control group and continuous running group and control group on strength endurance at second cessation.

TABLE I-F
THE SCHEFFE'S TEST FOR THE DIFFERENCES BETWEEN PAIRED MEANS OF TESTS ON STRENGTH ENDURANCE (INTERVAL RUNNING GROUP)

Pre test	Post test	First cessation	Second cessation	Third cessation	Fourth cessation	Mean difference	Confidence interval
33.12	41.20	-	-	-	-	8.08*	0.9998
33.12	-	41.19	-	-	-	8.07*	0.9998
33.12	-	-	41.17	-	-	8.05*	0.9998
33.12	-	-	-	34.11	-	0.99	0.9998
33.12	-	-	-	-	33.16	0.04	0.9998
	41.20	41.19	-	-	-	0.01	0.9998
-	41.20		41.17	-	-	0.03	0.9998
-	41.20	-		34.11	-	7.09*	0.9998
-	41.20	-	-		33.16	8.04*	0.9998
-		41.19	41.17	-		0.02	0.9998
-		41.19	-	34.11	-	7.08*	0.9998
-	-	41.19		-	33.16	8.03*	0.9998
-	-		41.17	34.11	-	7.06*	0.9998
-	-		41.17	-	33.16	8.01*	0.9998
-	-		-	34.11	33.16	0.95	0.9998

* Significant at .05 level of confidence.

The table I-F shows that the mean difference between pre test and post test values, pre test and first cessation values, pre test and second cessation values, post test and third cessation values, post test and fourth cessation values, first cessation and third cessation values, first cessation and fourth cessation values, second cessation and third cessation values, second cessation and fourth cessation values 8.08, 8.07, 8.05, 7.09, 8.04, 7.08, 8.03, 7.06 and 8.01 respectively on strength endurance of interval running group which are greater than the confidence interval value 0.9998 at .05 level of confidence.

The results of the study showed that there was a significant difference between pre test and post test values, pre test and first cessation values, pre test and second cessation values, post test and third cessation values, post test and fourth cessation values, first cessation and third cessation values, first cessation and fourth cessation values, second cessation and third cessation values, second cessation and fourth cessation values on strength endurance of interval running group.

TABLE I-G

THE SCHEFFE'S TEST FOR THE DIFFERENCES BETWEEN PAIRED MEANS OF TESTS ON STRENGTH ENDURANCE (CONTINUOUS RUNNING GROUP)

Pre test	Post test	First cessation	Second cessation	Third cessation	Fourth cessation	Mean difference	Confidence interval
33.61	36.29	-	-	-	-	2.68*	0.9998
33.61	-	36.27	-	-	-	2.66*	0.9998
33.61	-	-	36.25	-	-	2.64*	0.9998
33.61	-	-	-	33.94	-	0.33	0.9998
33.61	-	-	-	-	33.82	0.21	0.9998
	36.29	36.27	-	-	-	0.02	0.9998
-	36.29		36.25	-	-	0.04	0.9998
-	36.29	-		33.94	-	2.35*	0.9998
-	36.29	-	-		33.82	2.47*	0.9998
-		36.27	36.25	-		0.02	0.9998
-		36.27	-	33.94	-	2.33*	0.9998
-	-	36.27		-	33.82	2.45*	0.9998
-	-		36.25	33.94	-	2.31*	0.9998
-	-		36.25	-	33.82	2.43*	0.9998
-	-	-		33.94	33.82	0.12	0.9998

* Significant at .05 level of confidence.

The table I-G shows that the mean difference between pre test and post test values, pre test and first cessation values, pre test and second cessation values, post test and third cessation values, post test and fourth cessation values, first cessation and third cessation values, first cessation and fourth cessation values, second cessation and third cessation values, second cessation and fourth cessation values 2.68, 2.66, 2.64, 2.35, 2.47, 2.33, 2.45, 2.31 and 2.43 respectively on strength endurance of continuous running group which are greater than the confidence interval value 0.9998 at .05 level of confidence.

The results of the study showed that there was a significant difference between pre test and post test values, pre test and first cessation values, pre test and second cessation values, post test and third cessation values, post test and fourth cessation values, first cessation and third cessation values, first cessation and fourth cessation values, second cessation and third cessation values, second cessation and fourth cessation values on strength endurance of continuous running group.

CONCLUSIONS

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

1) All the experimental groups namely interval running and continuous running improved strength endurance after twelve weeks of training period when compared to control group.

2) Significant differences were noticed among the experimental groups in improving the strength endurance after twelve weeks of training period.

3) There was no significant reduction in the performance of selected speed and endurance parameters namely strength endurance during the first and second cessation of detraining period.

4) Significant reduction in the performance of strength endurance were found during the third and fourth cessation of detraining period.

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