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Effect Of Resistance Training And Detraining On Body Mass Index Of Inter-Collegiate Kabaddi Players

Dr. T. Ganesh kumar[1], Dr. P. Muthukumar[2], Dr. M. Mahalingam[3], Mr. D. Chandru[4], Dr.T.Ekambaram[5]

[1]Associate professor, Dr.M.G.R Educational & Research Institute (Deemed to be University) Maduravoyal, Chennai-95.

[2]Associate Professor, Dr.M.G.R Educational & Research Institute (Deemed to be University) Maduravoyal, Chennai-95.

[3]Professor & Addl Head, Dr. M. G.R Educational & Research Institute
(Deemed to be University) Maduravoyal, Chennai-95.

[4]Assistant Professor & Head Dr. M.G. R Educational & Research Institute (Deemed to be University) Maduravoyal, Chennai-95.

[5]Associate professor, Dr.M.G.R. Educational & Research Institute (Deemed to be University) Maduravoyal, Chennai – 95.

Abstract

The purpose of the study was to find out the effect of resistance training and detraining on body mass index of Kabaddi University players. To achieve the purpose of this study, thirty male Kabaddi University players volunteered to participate in the study. The selected participants were studying in Dr.M.G.R Education and Research Institute, Maduravoyal, Chennai, India during the academic year 2022-2023. Their age ranged from 18 years to 22 years. They were randomly divided into two groups and each group consisted of fifteen participants. Group – I performed resistance training and group – II acted as control who did not participate in any specific training programmes. The subjects were tested on body mass index and it was assessed by using Stadiometer and Weighing machine. The test conducted for two groups prior to and post experimentation and also during detraining (three cessation) period once in ten days for thirty days. The data collected from the two groups prior to and post experimentation were statistically analyzed by applying the analysis of covariance (ANCOVA). The data collected from the two groups prior to and detraining (three cessation) were statistically analyzed by using two way (2 x 4) factorial ANOVA with last factor repeated measures. Although training altered body mass index, all training induced gains had been abolished after thirty days of detraining.

Key words: *Resistance Training, Detraining and Body Mass Index*

INTRODUCTION

In the modern competitive sports, seriousness towards work and workouts plays important role in achieving high performance in competitions. Outstanding players have been found to be more sober, disciplined, practical, and tough-minded. Competitions now a day are so tough that only those achieve high performance who trains for long hours. Kabaddi is although game requiring high physical fitness and quick reflexes. One has to work hard and tolerate mental strain besides physical stress of training. There is no place for a tender minded person in competitive kabaddi. Self-discipline and confidence are other qualities that are required to obtain high performance in kabaddi. The kabaddi players face more man-to-man combats and hence require physical and mental toughness.

The changing nature of the game Kabaddi, demands the right type of various abilities on the part of a player. The increasing trend of professionalism and the converging demand for competitive sports have changed the complexion of the games which had been initially intended as a recreational activity of the villagers. Today with the adventure of modern scientific equipments for training and selection of the players, it has been now made possible to measure the fundamental performance characteristics which contribute to a player's success.

Resistance training has been reported to cause muscle fibre hypertrophy, associated with an increase in contractile protein, which contributes to an increase in maximal contractile force (Sale et al., 1990). Strength training also reduces mitochondrial density and suppresses oxidative enzymes activity which can cause impede endurance capacity, but has minimal impact on capillary density or in the conversion of muscle fibre types from fast twitch (type-II fibres) to slow twitch (type-I fibres) (Nelson et al., 1990; Sale et al., 1990). In contrast, endurance training usually causes little or no muscle fibre hypertrophy, but it does

induce increases in mitochondria content, citric acid enzymes, oxidative capacity and the possibility of muscle fibre conversion from fast twitch to slow twitch (Bell 1991, Nelson et al., 1990).

Detraining is equally important but that has been given considerably less attention by the athletes and the coaches and practically ignored by the research scholars in exercise and sports sciences. Detraining induces a partial or complete loss of training induced adaptations in response to insufficient training stimuli. It has been suggested by Wilmore and Costill (1994) that untrained individuals who train and produce significant improvements on speed, anaerobic power and aerobic endurance, lose some conditioning within two weeks of detraining. Baechle (1994) stated that when detraining occurs, the physiological function goes back to the normal untrained state of the individual.

The influence of detraining on body composition parameters has received little attention and not completely understood. Few studies have only assessed the longevity of changes after training on body composition parameters. Consequently, the aim of the present study was to investigate the effectiveness of resistance training and detraining impact on body mass index of kabaddi players.

METHODOLOGY

Participants and Variables

Subjects

Thirty male inter-collegiate kabaddi players volunteered to participate in the study. The selected participants were studying in various arts and science colleges affiliated to Manonmanium Sundaranar University, from kanyakumari district, India during the academic year 2016-2017. Their age ranged from 18 years to 22 years. They were randomly divided into two groups and each group consisted of fifteen participants. A written consent form was signed by all participants after they had been informed of all risks, discomforts, and benefits involved. The dependent variable selected was body mass index and it was assessed by using Stadiometer. The data were collected prior to and immediately after the twelve weeks of training and also during the detraining period once in ten days for thirty days.

Training Regimen

The experimental group performed both the resistance training programs three sessions per week on alternative days for 12 weeks. The resistance training program was a total body workout consisting of 3 sets of 6-10 repetitions on 5 exercises that trained all the major muscle groups. A percentage of each subject's one-repetition maximum for each exercise was used to determine the intensity of each week. The intensity and number of repetitions performed for each exercise was progressively increased. The subjects of the experimental group performed the following resistance training exercises namely power clean, leg press, bench press, heel raise, abdominal crunches, lat pull down, hamstring curl and deep squat respectively. After the completion of twelve weeks of resistance training the subjects of both the experimental and control groups were physically detrained for 30 days. During this period the subjects were instructed not to participate in any strenuous physical activity.

Statistical Technique

The data collected from the two groups prior to and post experimentation were statistically analyzed to find out the significant difference if any, by applying the Analysis of Covariance (ANCOVA). The data collected from the two groups on post experimentation and detraining (three cessation) were statistically analyzed by using two way (2 x 4) 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 as a follow up test. Since, two groups and four different stages of test were compared, whenever the obtained 'F' ratio value in the simple effect test was significant the Scheffe's test was applied as post hoc test to determine the paired mean differences, if any. In all the cases statistical significance was fixed at .05 level.

RESULTS

The mean and standard deviation values on body mass index of resistance training and control groups at five different stages of tests have been analyzed and presented in table-I.

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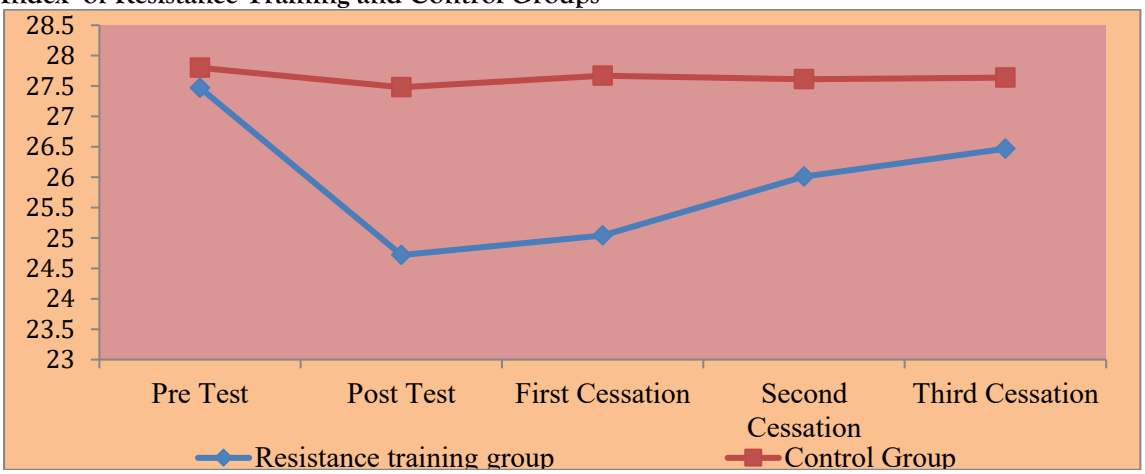
Table – I The Pre, Post Test and Three Cessations Mean and Standard Deviation on Body Mass Index of Resistance Training and Control Groups

Groups		Pre Test	Post Test	First Cessation	Second Cessation	Third Cessation
Resistance training group	Mean	27.47	24.72	25.04	26.01	26.47
	SD	1.80	1.93	1.96	1.95	1.93
Control Group	Mean	27.80	27.48	27.67	27.61	27.64
	SD	1.67	1.68	1.76	1.71	1.74

The pre test, post test, first, second and third cessation mean values of experimental and control groups on body mass index are graphically represented in the figure – I.

Figure – I Pre Test, Post Test and Three Cessation Mean Values on Body Mass Index of Resistance Training and Control Groups



The pre and post test data collected from the resistance training and control groups on body mass index were statistically analyzed by ANCOVA and the results are presented in table-II.

Table – II Analysis of Covariance on Body Mass Index of Resistance Training and Control Groups

	Resistance training group	Control Group	So V	Sum of Squares	df	Mean squares	Obtained 'F' ratio
Body Mass Index	24.85	27.34	B	45.83	1	45.83	35.99*
			W	34.38	27	1.27	

(The required table value for significance at 0.05 level of confidence with degrees of freedom 1 & 28 and 1 & 27 are 4.20 and 4.21 respectively)

*Significant at .05 level of confidence

Table – II shows that The adjusted post-test mean on body mass index of resistance training and control groups are 24.85 and 27.34 respectively. The obtained 'F' ratio value of 35.99 for adjusted post test mean on body mass index of experimental and control groups was greater than the required table value of 4.21 for the degrees of freedom 1 and 27 at 0.05 level of confidence. Hence it was concluded that due to the effect of twelve weeks of resistance training the body mass index of the subjects was significantly improved. In order to find out the detraining impact, the data collected from the two groups during post test and three cessation periods on body mass index have been analyzed by two ways factorial ANOVA (2x4) with repeated measures on last factor and the obtained results are presented in table - III.

Table – III Two Factor ANOVA on Body Mass Index of Groups at Five Different Stages of Tests

Source of Variance	Sum of Squares	df	Mean Squares	Obtained "F" ratio
A factor (Groups)	14.69	1	14.69	156.39*
Group Error	2.63	28	0.094	
B factor (Tests)	15.09	3	5.03	25.15*
AB factor (Interaction) (Groups and Tests)	10.90	3	3.63	18.15*
Error	16.85	84	0.20	

(Table values required for significance at 0.05 level with df 1 and 28, 3 and 84 are 4.20 and 2.72 respectively.)

Table – III shows that the obtained 'F' ratio for factor A (Groups) is 156.39 which is greater than the table value of 4.20 with degrees of freedom 1 and 28 required for significance at 0.05 level of confidence. The result of the study indicates that, significant differences exist among experimental and control groups irrespective of different stages of testing on body mass index.

Table – III also shows that the obtained 'F' ratio for factor B (Different stages of tests) is 25.15 which is greater than the table value of 2.72 with degrees of freedom 3 and 84 required for significance at 0.05 level of confidence. The result of the study indicates that body mass index differs significantly among different stages of testing irrespectively of groups.

Table – III also shows that the obtained 'F' ratio value of Interaction A x B (Groups x Different Tests) is 18.15 which is greater than the table value of 2.72 with degrees of freedom 3 and 84 required for significance at 0.05 level of confidence. The result of the study shows that significant differences exist between groups at each test and also between tests for each group on body mass index.

The results of the study indicate that significant differences exist in the interaction effect between rows (groups) and columns (tests) on body mass index. Since the interaction effect is significant, the simple effect test has been applied as follow up test and they are presented in table - IV.

Table – IV The Simple Effect Scores of Groups (Rows) at Five Different Stages of Tests (Columns) on Body Mass Index

Source of Variance	Sum of Squares	df	Mean Squares	Obtained "F" ratio
Groups at Post test	57.13	1	57.13	285.65*
Groups at First Cessation	37.18	1	37.18	185.90*
Groups at Second Cessation	19.36	1	19.36	96.80*
Groups at Third Cessation	10.32	1	10.32	51.60*
Tests and Group I	25.66	3	3.80	19.00*
Tests and Group II	0.33	3	0.11	0.55
Error	16.85	84	0.20	

(Table values required for significance at .05 levels with df 1 and 84, & 3 and 84 are 3.96 and 2.72 respectively.)

Table – IV shows that the obtained 'F' ratio values for groups at post test, first, second and third cessation are 285.65, 185.90, 96.80 and 51.60 respectively, which are higher than the table value of 3.96 with degrees of freedom 1 and 84 required for significance at 0.05 level of confidence. The result of the study indicates that significant difference exists between the paired means of groups at post test, first cessation, second cessation and third cessation on body mass index.

Table – IV also shows that 'F' values obtained for tests and group-I is 19.00 which is greater than the table value of 2.72 with the degrees of freedom 3 and 84 whereas, for tests and group-II is 0.55 which is

lower than the table value of 2.72 with the degrees of freedom 3 and 84 required for significant at 0.05 level of confidence. The result of the study indicates that significant difference exists between various tests of resistance training group, however no significant difference exists between various tests of control group on body mass index.

Since, the obtained 'F' ratio value in the simple effect is found to be significant, the Scheffe's test is applied as post hoc test to find out the paired mean difference, and it is presented in table – V.

Table – V Scheffe's Test for the Differences among Paired Means of Resistance Training Group with Different Tests on Body Mass Index

Post test	First cessation	Second cessation	Third cessation	Mean difference	Confidence interval
24.72	25.04			0.32	0.33
24.72		26.01		1.29*	0.33
24.72			26.47	1.75*	0.33
	25.04	26.01		0.97*	0.33
	25.04		26.47	1.43*	0.33
		26.01	26.47	0.46*	0.33

*Significant at .05 level of confidence

Table – V shows that the mean differences between post test and second cessation, post test and third cessation, first and second cessation, first cessation and third cessation, second cessation and third cessation of resistance training group are 1.29, 1.75, 0.97, 1.43 and 0.46 respectively, which are higher than the confidence interval value 0.26. However the mean difference between post test and first cessation is 0.32 respectively on body mass index which are lower than the confidence interval value of 0.26 at 0.05 level of confidence. Hence it was concluded that the increased body mass index performance of the participants were sustained only for 10 days during determining period, there after it was started incline towards the base line.

DISCUSSION

The result of the study also indicated that the body mass index of experimental group decreased significantly by underwent the twelve weeks of resistance training programme. These results are conformity with the following findings. Sillanpaa et al., (2008) observed that combined strength and endurance training is a greater value than either alone in optimizing body composition or improving physical fitness in older men. Davis et al., (2008) found decline in fat mass and percent body fat of concurrent training group. Hass et al., (2001) documented that concurrent training, resulted in significant reductions in fat mass and percentage body fat.

The results of the study also indicated that the body mass index of resistance training group increased significantly due to the detraining. But the significant increase started after the first cessation toward the base line. Hence, to maintain the body mass index one should not go for detraining more than 10 days. Even those ten days they could be engaged by light physical activity otherwise they could regain the body mass index. The finding accord with the findings of Paul and Thompson (2006) that after (cessation) men quit running, their weight, BMI, and waist and chest circumferences significantly increased in proportion to the change in running distance.

CONCLUSION

Due to twelve weeks of resistance training the selected body composition variable body mass index have significantly decreased. During detraining period no significant changes on body mass index was found up to ten days thereafter it was started increasing towards the baseline.

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