



EFFECT OF RESISTANCE TRAINING AND DETRAINING ON PERCENT BODY FAT OF INTER-COLLEGIATE KABADDI PLAYERS

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ABSTRACT

The purpose of the study was to find out the effect of resistance training and detraining on percent body fat of inter-collegiate kabaddi players. To achieve the purpose of this study, 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 Manonmaniam 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. 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 percent body fat and it was assessed by using skin fold caliper. 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 percent body fat, all training induced gains had been abolished after thirty days of detraining.

Keywords: Resistance Training, Detraining and Percent body fat.

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 advent 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 percent body fat 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 Manonmaniam 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 percent body fat and it was assessed by using skin fold caliper. 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

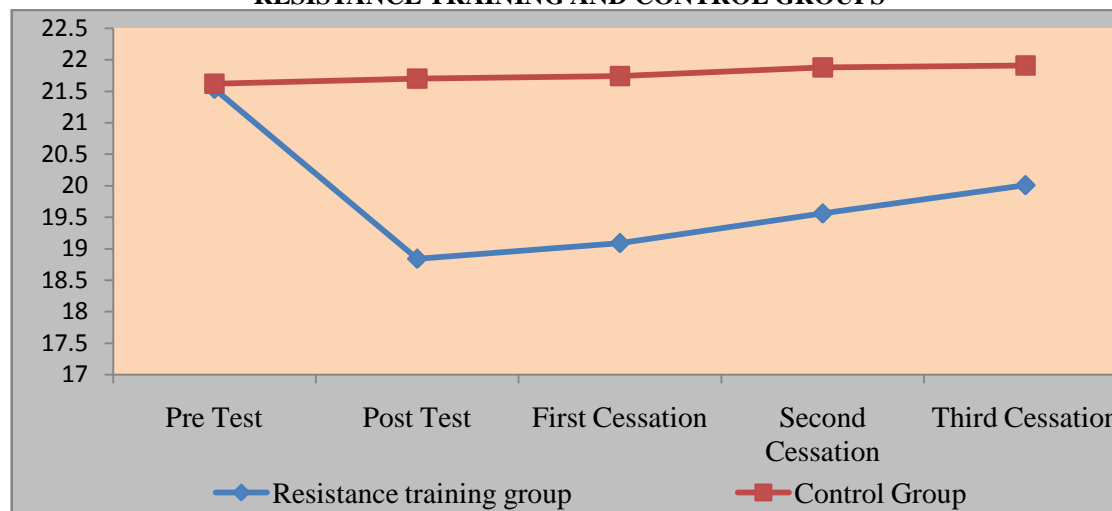
The mean and standard deviation values on percent body fat of resistance training and control groups at five different stages of tests have been analyzed and presented in table-I.

TABLE – I
THE PRE, POST TEST AND THREE CESSATIONS MEAN AND STANDARD DEVIATION ON PERCENT BODY FAT OF RESISTANCE TRAINING AND CONTROL GROUPS

| Groups | | Pre Test | Post Test | First Cessation | Second Cessation | Third Cessation |
|---------------------------|------|----------|-----------|-----------------|------------------|-----------------|
| Resistance training group | Mean | 21.54 | 18.84 | 19.09 | 19.56 | 20.01 |
| | SD | 0.56 | 0.45 | 0.41 | 0.35 | 0.39 |
| Control Group | Mean | 21.62 | 21.70 | 21.74 | 21.88 | 21.91 |
| | SD | 0.40 | 0.41 | 0.38 | 0.50 | 0.52 |

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

FIGURE – I
PRE TEST, POST TEST AND THREE CESSATIONS MEAN VALUES ON PERCENT BODY FAT OF
RESISTANCE TRAINING AND CONTROL GROUPS



The pre and post test data collected from the resistance training and control groups on percent body

fat were statistically analyzed by ANCOVA and the results are presented in table-II.

TABLE-II
ANALYSIS OF COVARIANCE ON PERCENT BODY FAT OF
RESISTANCE TRAINING AND CONTROL GROUPS

| Variable | Resistance training group | Control Group | So V | Sum of Squares | df | Mean squares | Obtained 'F' ratio |
|------------------|---------------------------|---------------|------|----------------|----|--------------|--------------------|
| Percent body fat | 18.84 | 21.69 | B | 60.78 | 1 | 60.78 | 309.73* |
| | | | W | 5.29 | 27 | 0.19 | |

(The required table value for significance at 0.05 level of confidence with degrees of freedom 1 & 27 is 4.21)

*Significant at .05 level of confidence

Table-II shows that the adjusted post-test mean on percent body fat of resistance training and control groups are 18.84 and 21.69 respectively. The obtained 'F' ratio value of 309.73 for adjusted post test mean on percent body fat 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 percent body fat of the subjects was significantly changed. In order to find out the detraining impact, the data collected from the two groups during post test and three cessation periods on percent body fat 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 PERCENT BODY FAT OF GROUPS
AT FIVE DIFFERENT STAGES OF TESTS

| Source of Variance | Sum of Squares | df | Mean Squares | Obtained "F" ratio |
|---|----------------|----|--------------|--------------------|
| A factor (Groups) | 8.47 | 1 | 8.47 | 70.03* |
| Group Error | 3.38 | 28 | 0.12 | |
| B factor (Tests) | 8.60 | 3 | 2.86 | 20.86* |
| AB factor (Interaction) (Groups and Tests) | 3.90 | 3 | 1.30 | 9.46* |
| Error | 11.54 | 84 | 0.13 | |

(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 70.03 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 percent body fat. Table-III also shows that the obtained 'F' ratio for factor B (Different stages of tests) is 20.86 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 percent body fat 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 9.46 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 percent body fat. The results of the study indicate that significant differences exist in the interaction effect between rows (groups) and columns (tests) on percent body fat. 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 PERCENT BODY FAT

| Source of Variance | Sum of Squares | df | Mean Squares | Obtained "F" ratio |
|----------------------------|----------------|----|--------------|--------------------|
| Groups at Post test | 61.34 | 1 | 61.34 | 471.84* |
| Groups at First Cessation | 52.80 | 1 | 52.80 | 406.15* |
| Groups at Second Cessation | 40.36 | 1 | 40.36 | 310.46* |
| Groups at Third Cessation | 27.26 | 1 | 27.26 | 209.69* |
| Tests and Group I | 12.01 | 3 | 4.01 | 30.84* |
| Tests and Group II | 0.49 | 3 | 0.21 | 1.61 |
| Error | 11.54 | 84 | 0.13 | |

(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 471.84, 406.15, 310.46 and 209.69 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 percent body fat. Table also shows that 'F' values obtained for tests and group-I is 30.84 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 1.61 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 percent body fat. 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 PERCENT BODY FAT

| Post test | First cessation | Second cessation | Third cessation | Mean difference | Confidence interval |
|-----------|-----------------|------------------|-----------------|-----------------|---------------------|
| 18.84 | 19.09 | | | 0.25 | 0.26 |
| 18.84 | | 19.56 | | 0.72* | 0.26 |
| 18.84 | | | 20.01 | 1.17* | 0.26 |
| | 19.09 | 19.56 | | 0.47* | 0.26 |
| | 19.09 | | 20.01 | 0.92* | 0.26 |
| | | 19.56 | 20.01 | 0.45* | 0.26 |

*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 0.72, 1.17, 0.47, 0.92 and 0.45 respectively, which are higher than the confidence interval value 0.26. However the mean difference between post test and first cessation is 0.25 respectively on percent body fat which are lower than the confidence interval value of 0.26 at 0.05 level of confidence. Hence it was concluded that the increased percent body fat 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 results of the study indicates that the percent body fat of resistance training group decreased significantly by underwent the twelve weeks of resistance training programme. These results are conformity with the following findings. Changes in body composition are typically observed after chronic resistance and or aerobic training favouring an increase in fat-free mass and a decrease in the percentage of body fat (Hakkinen et al., 2003; Williams et al., 2002; Knapik, 1997). According to Hakkinen et al., (2003) the strength and endurance training showed significant decreases in the body fat percentage throughout the experimental training period. The fat-free mass increased in groups performing resistance training regardless of endurance training inclusion (Kraemer et al., 2004). The concurrent training group significantly decreased on percent body fat from pre- to mid-training and from pre- to post-training, (Glowacki, 2004).

The results of the study also indicated that the percent body fat of resistance training group increased significantly due to the detraining. But the significant increase started after the first cessation toward the base line. This study result agreement with the findings of Witkowski et al., (2010) reported that the percentage of body fat was significantly greater after 10 days of detraining. Ormsbee & Arciero (2012) suggested that detraining after a competitive collegiate swim season adversely affects body composition, fitness, and metabolism. Hence, to control the percent body fat one should not go for detraining more than 10 days. Even those ten days can be engaged by light physical activity otherwise they could lose their fitness and regain loosed body fat.

CONCLUSION

Due to twelve weeks of resistance training the

selected body composition variable percent body fat have significantly decreased. During detraining period no significant changes on percent body fat was found up to ten days thereafter it was started increasing towards the baseline.

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