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Research Article

Impact of Selected Approaches of Circuit Training on Motor Fitness Components among Women Kabaddi Players

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ABSTRACT

To attain the high level performance in Kabaddi, especially bythe women players, well-structured circuit trainingprogramme sarenecessary and unavoidable. They are effective in enhancing themotorfitnesscomponents such as swiftness, pace and the explosive power ofthe players. The selective circuit training programmes, when appliedwith the accurate methods are sure to indicate excellent progression inperformance. The researcher has selected three circuit trainingprogrammes such as Aerobic circuit training, Resistance circuittraining, Plyometric circuit training for the experimental study.Aerobic circuit training improves cardiovascular fitness and muscularendurance. The utility purpose of Resistance circuit training is to buildmuscular strength and endurance along with cardiovascular fitness.Plyometric circuit training is a routine workout that develops thepower, speed, and agility of the players.The primary objective of the present study is to investigate thepositive effect of the three different approaches of circuit training onselected motor fitness components among women Kabaddi players.The experimental study has been carried out with the selected targetgroup, which comes under the framework for the stipulated time. Thetarget group has been divided into three divisions, depending on thetype of needed training. The primary data collected from the traineeshave been analyzed with the statistical tests called dependent t-test andAnalysis of Covariance. The study reveals a statistically significantdifference at performance level with the significant F-value. In allthcases0.05 has been fixed as the level of confidence to test thehypothesis. The results emphasize the fact that the aerobic circuittraining is a favourable choice as it stabilizes and increases theexplosive power, cardiorespiratory endurance and muscular endurancethan the other two training programmes..

.**Keywords:** Aerobic, Resistance and Plyometric Circuit TrainingExplosive Power, Cardio Respiratory Endurance, Muscular Endurance

INTRODUCTION

In the modern mundane world, sports should play a vital role as the benefits are many and multi-folded. Participation in sports not only builds physical and mental health but also enhances the life skills. The participants in sports learn the value of teamwork, discipline, positive attitude and healthy social connects. It is beneficial to the individual and the group of participants as well as the world as a whole. The only medium, which appeals invariably to all age groups, irrespective of their gender is sports. Apart from being a significant component in physical health, sports promote a wide variety of experiences and endurance by providing chances to encounter success and failure. In *Foundations of Physical Education*, A.K. Uppal and Maxwell Howell discuss the ebb and flow that one should meet in the field of sports. A player in any sportive activity is

blessed to gain monetary benefits, fame, goodwill of the society and status; at the same time, he is liable to end up in misery ans at the most death even. .

Fitness is a physical and mental state which often marks the degree at which a person can function. Ability to function depends upon the components of fitness at the physical, mental, emotional, social and spiritual level. The total fitness depends on the cumulative effect of all these levels. Fitness is a condition at which the physical body functions at the maximal, economical and efficient manner; in addition, the homeostatic functioning stabilizes the internal environment of the physical body and sustains good health in spite of the fluctuations in the external conditions. (Hardayal Singh, 1991)

The multiple methods of sports training differ from one another; they are unique in their own way; they are advantageous and beneficial to the performers in sports; yet, they carry certain drawbacks along with them. Before offering any sports training, a good trainer should have a thorough knowledge of its advantages and disadvantages. There are certain specific sports activities which need consistent and rigorous training. For instance, the competitor in Marathon race should undergo continuous training to endure the challenges.

As far as training in sports is concerned, it denotes the preparation for the performance. Proper training methods help the athlete build strength and sustain endurance. They improve skill levels and strengthen confidence level. This may seem to be a simple process; but formulating perfect training methods fulfils the goals of a sports person.

NUANCES OF KABADDI

Kabaddi is a sort of combat, played in teams. In India, Kabaddi is played in the rural areas as a recreational activity. It has met with tremendous progression by being acclaimed nationwide. The planning and execution of subtle physical movements of both the offensive and defensive players is the vital part of the game. The raider in the game plays the integral role with individual ability. He executes his offensive skills tactfully to touch and elude from his opponents. The anti-raiders are endowed with collective as well as individual ability. They execute their defensive skills to hold back the raider or elude his attack.

Kabaddi is a unique sport, as demands collective responsibility, team spirit, integrated focus and highest sensory skills. It involves a lot of tactful moves and non-verbal interactions among the players. Having been started as a regional game, Kabaddi has been emerging as a universal game by chiselling its forma and performance. To make it more appealing at the universal level, a good dynamic objectivity is looked for. More transformations and betterment are being explored, especially in the physiological adaptations of the player. The improved performance of a Kabaddi player can be judged on the basis of several variables. Jurgen Weineck suggests that the performance and attainment of an individual player in Kabaddi can be done at two levels; the working pattern and normality of the variables or components of the player at the internal and external level are crucial; the adaptability of the individual player to the conditioning environment decides the course of the game.

REVIEW OF LITERATURE

In the previous years, experimental studies on the three different approaches of circuit training applicable to players in various sports activities have been done; yet, they are limited.

Kanaka Vishnu Moorthi, et.al. (2016), in their experimental study have done an experimental study on the selected male Kabaddi players in colleges, offered them Resistance circuit training and proved that their health related physical fitness variables such as speed, muscular strength and endurance have significantly improved. As a result of their experimental study, Pablo Jorge Marcos-Pardo et. al. (2019) have proved that Progressive resistance circuit training should be given to the people in the old age group as it has the potential to improve their physical performance. Domingo Jesús, et.al. (2021) have carried out Circuit Resistance Training to the selected middle-aged and older women; by doing a systematic review and meta-analysis, they have substantiated significant improvement in their cardiorespiratory fitness, strength and optimized body composition. Senthil Kumar V (2014) has explored the benefits of Circuit resistance training and the resultant positive changes and improvements on selected variables such as muscular strength and muscular endurance

METHODS AND MATERIALS

The present study aims to investigate the impact of three different approaches of circuit training on select motor fitness components among the women Kabaddi players. The researcher has selected sixty women Kabaddi players as subjects of study randomly from among the team of players during the academic year 2024-2025 in Gandhigram Rural Institute, Gandhigram, Dindigul District, Tamil Nadu. The physiological age of the selected subjects ranges from 18 to 22 years. The subjects have been divided randomly into three experimental groups with fifteen members in each group. The first group has to undergo resistance circuit training (n=15), the second group with plyometric circuit training (n=15), the third group with aerobic circuit training (n=15), and the fourth group has to act as control group, meaning their non-participation in any specific training.

The researcher has conducted the pre-test to the selected target group to evaluate the explosive power, cardiorespiratory endurance, muscular endurance. The readings have been recorded meticulously in their respective unit as the pre-test score. After the pretest, the experimental groups have been given the respective training for three days alternatively per week. The entire training process and period has covered twelve weeks.

After the completion of the testing period, the post-test has been conducted and the readings have been recorded in their respective units as post-test score. The selected dependent variables have been measured by adopting different parameters; the explosive power by Sargent jump in in centimeters, cardiorespiratory endurance by twelve minutes cooper run and walk test in seconds and muscular endurance by Bent knee sit-ups test in numbers. The pre-test and the post-test scores have been taken for analysis.
The collected data on the adoption of motor fitness components for twelve weeks through three different approaches of circuit training have been analyzed by dependent t-test and Analysis of Covariance (ANCOVA). The 'F' ratio for adjusted post-test mean is found to be significant. As a post-hoc test, the Scheffe's test has been done to determine the significant paired mean differences. In all the cases 0.05 has been fixed as the level of confidence to test the hypothesis.

THE SCHEDULED TRAINING:

The training programme has been designed as a ninety minutes session a day, three alternative days in a week, for a period of twelve weeks. The duration of ninety minutes is inclusive of ten minutes warm up and ten minutes warm down. A concrete time slot of 60-70 minutes has been allotted for the three different approaches of circuit training programme. The intensity of the work load has been increased at the rate of 10% every four weeks. In fact, the maximum working capacity of the subjects has also been taken into consideration.

ANALYSIS OF THE DATA

Table-I shows the analysis and results of the dependent "t" test on the explosive power, cardiorespiratory endurance, muscular endurance of the three different approaches of circuit training pre-test and post-test mean and control groups.

TABLE –I
SUMMARY OF MEAN AND DEPENDENT'T' TEST FOR THE PRE AND POST TESTS ON EXPLOSIVE POWER, CARDIORESPIRATORY ENDURANCE, MUSCULAR ENDURANCEOF THREE DIFFERENT APPROACHES OF CIRCUIT TRAINING AND CONTROL GROUPS

S.N	Variable	Test	Resistance Circuit Training Group	Plyometric Circuit Training Group	Aerobic Circuit Training Group	Control Group
1.	Explosive Power	Pre-test mean	39.20	38.67	38.10	35.33
		Post-test mean	46.13	45.87	47.80	35.23
		't' test	19.45*	20.72*	22.15*	1.20
2	Cardio respiratory Endurance	Pre-test mean	2135.25	2170.60	2146.10	2171.59
		Post-test mean	2456.50	2360.50	2567.56	2171.30
		't' test	51.10*	51.96*	56.72*	1.80
3	Muscular Endurance	Pre-test mean	39.20	38.85	39.62	38.20
		Post-test mean	46.80	44.76	46.90	38.18
		't' test	11.45*	13.80*	14.60*	1.50

(Table value required for significance at .05 level for 't'-test with df 14 is 2.15)

According to Table-I, the pre-test mean values with the variables such as explosive power, cardiorespiratory endurance, muscular endurance of the circuit training groups and the control group are 39.20, 38.67, 38.10, 35.33 and 2135.25, 2170.60, 2146.10, 2171.59 and 39.20, 38.85, 39.62, 38.20 respectively,
The post-test mean values are 46.13, 45.87, 47.80, 35.23 and 2456.50, 2360.50, 2567.56, 2171.30 and 46.80, 44.76, 46.90, 38.18 respectively. The dependent t-ratio values are 19.45, 20.72, 22.15, 1.20 and 51.10, 51.96, 56.72, 1.80 and 11.45, 13.80, 14.60, 1.50 at the 0.05 level. A significant difference with df 14 requires a table value of 2.15.
It is evident that the circuit training groups have increased massively their explosive power, cardiorespiratory endurance and muscular endurance as their obtained t ratio value is higher than the critical table value. The dependent t-ratio values for pre-test and post-test means of the control group's for explosive power, cardio respiratory endurance and muscular endurance are 1.20, 1.80, and 1.50. Due to the lack of any training in

particular, the control group's "t" value is lower than the table value, indicating that they have not made a significant improvement.

The co-variance on explosive power, cardiorespiratory endurance and muscular endurance of resistance circuit training, plyometric circuit training, aerobic circuit training and control groups are analyzed and presented in Table II.

TABLE II ANALYSIS OF CO-VARIANCE OF THREE DIFFERENT APPROACHES CIRCUIT TRAINING AND CONTROL GROUPS ON EXPLOSIVE POWER, CARDIO RESPIRATORY ENDURANCE AND MUSCULAR ENDURANCE

S.No	Variable	Adjusted Post-Test Mean				Source	SS	Df	MS	F
		Resistance Circuit Training Group	Plyometric Circuit Training Group	Aerobic Circuit Training Group	Control Group					
1.	Explosive Power	45.70	44.90	46.90	37.90	B	355.78	3	118.59	2.30
						W	196.71	56	3.51	
2.	Cardio respiratory Endurance	2450.96	2342.45	2510.90	2170.56	B	78300.28	3	26100.21	29.41
						W	49700.63	56	887.51	
3.	Muscular Endurance	43.10	44.90	45.82	39.60	B	79.36	3	26.45	34.35
						W	42.60	55	0.77	

*** Significant at .05 level of confidence.**

(The table value required for significance at 0.05 level of confidence with df 3 and 56 & 55 is 2.76).

As shown in Table II, the adjusted post-test mean values with the variables such as explosive power, cardiorespiratory endurance, muscular endurance of the circuit training groups are as follows 45.70, 44.90, 46.90, 37.90 and 2450.96, 2342.45, 2510.90, 2170.56 and 43.10, 44.90, 45.82,39.60 with df 3 and 56 &55 needed for significance at the 0.05 level. The obtained F-Ratio values of explosive power, cardio-respiratory endurance and muscular endurance are 2.30, 29.41 and 34.35 respectively, which indicates a higher value than the table value of 2.76. The fact that the F-Ratio is greater than the table value suggests that there is a significant difference in explosive power, cardiorespiratory endurance and muscular endurance among the three different approaches of circuit training. This proves that there is a significant mean difference among the four selected groups of players. The obtained F-Ratio of the adjusted post-test mean is found to be significant, Scheffe's post-hoc test has been applied. The obtained paired mean differences between the trained groups and the control group and the confidence interval required for significance are presented in Table - III.

Table-III

MEAN DIFFERENCES AND CONFIDENCE INTERVAL VALUE FOR SCHEFFE'S POST HOC ON EXPLOSIVE POWER, CARDIO-RESPIRATORY ENDURANCE AND MUSCULAR ENDURANCE

Adjusted Post-Test Mean				Mean Difference	Confidence Interval
Resistance Circuit Training Group	Plyometric Circuit Training Group	Aerobic Circuit Training Group	Control Group		
Explosive Power					
45.70	44.90	-	-	0.80*	0.70
45.70	-	46.90	-	1.20*	0.70
45.70	-	-	37.90	7.80*	0.70

-	44.90	46.90		2.00*	0.70
-	44.90	-	37.90	7.00*	0.70
-	-	46.90	37.90	9.00*	0.70
Cardio Respiratory Endurance					
2450.96	2342.45	-	-	148.51	18.95
2450.96	-	2510.90	-	19.94	18.9
2450.96	-	-	2170.56	320.40	18.9
-	2342.45	2510.90	-	168.45	18.9
-	2342.45		2170.56	171.89	18.9
-	-	2510.90	2170.56	340.34	18.9
Muscular Endurance					
43.10	44.90	-	-	1.80	0.80
43.10	-	45.82	-	2.72	0.80
43.10	-	-	39.60	3.50	0.80
-	44.90	45.82	-	0.92	0.80
-	44.90	-	39.60	5.30	0.80
-	-	45.82	39.60	6.22	0.80

(*Significant at 0.05 level)

The paired mean difference values for explosive power have been obtained by pairing the groups on the basis of the circuit training given to them. Such paired groups are those who get Resistance circuit training - Plyometric circuit training, Resistance circuit training - Aerobic circuit training, Resistance circuit training - Control group, Plyometric circuit training - Aerobic circuit training, Plyometric circuit training - Control group, Aerobic Circuit training group - Control group. The paired mean difference values are 0.80, 1.20, 7.80, 2.00, 7.00, 9.00 respectively. This denotes higher confidence interval value which, in turn, points out significant difference among the Resistance circuit training group, the Plyometric circuit training group and the Aerobic circuit training group.

The paired mean difference values for cardiorespiratory endurance have been obtained by pairing the groups on the basis of the circuit training given to them. Such paired groups are those who get Resistance circuit training - Plyometric circuit training, Resistance circuit training - Aerobic circuit training, Resistance circuit training - Control group, Plyometric circuit training - Aerobic circuit training, Plyometric circuit training - Control group, Aerobic Circuit training group - Control group. The paired mean difference values are 148.51, 19.94, 320.40,168.45, 171.89, 340.34 respectively. This denotes higher confidence interval value which, in turn, points out significant difference among the Resistance circuit training group, the Plyometric circuit training group and the Aerobic circuit training group.

The paired mean difference values for muscular endurance have been obtained by pairing the groups on the basis of the circuit training given to them. Such paired groups are those who get Resistance circuit training - Plyometric circuit training, Resistance circuit training - Aerobic circuit training, Resistance circuit training - Control group, Plyometric circuit training - Aerobic circuit training, Plyometric circuit training - Control group, Aerobic Circuit training group - Control group. The paired mean difference values are 1.80, 2.72, 3.50, 0.92, 5.30, 6.22 respectively. This denotes higher confidence interval value which, in turn, points out significant difference among the Resistance circuit training group, the Plyometric circuit training group and the Aerobic circuit training group.

The results of the study point out that all the experimental groups have exhibited significant improvement in their explosive power, cardiorespiratory endurance and muscular endurance when compared to that of the control group. Among the three training groups, the Aerobic circuit training group is superior, followed by the Resistance circuit training group and the Plyometric circuit training group.

The pre-test, the post-test and the adjusted post-test mean value on explosive power, cardiorespiratory endurance and muscular endurance of the groups getting Resistance circuit training, Plyometric circuit training, Aerobic circuit training and that of the Control group are graphically represented below:

FIGURE – I

Pre-Test, Post-Test and Adjusted Post-Test Mean Value Differences on Explosive Power of Resistance Circuit Training Group, Plyometric Circuit Training Group, Aerobic Circuit Training Group and Control Group (In centimetre)

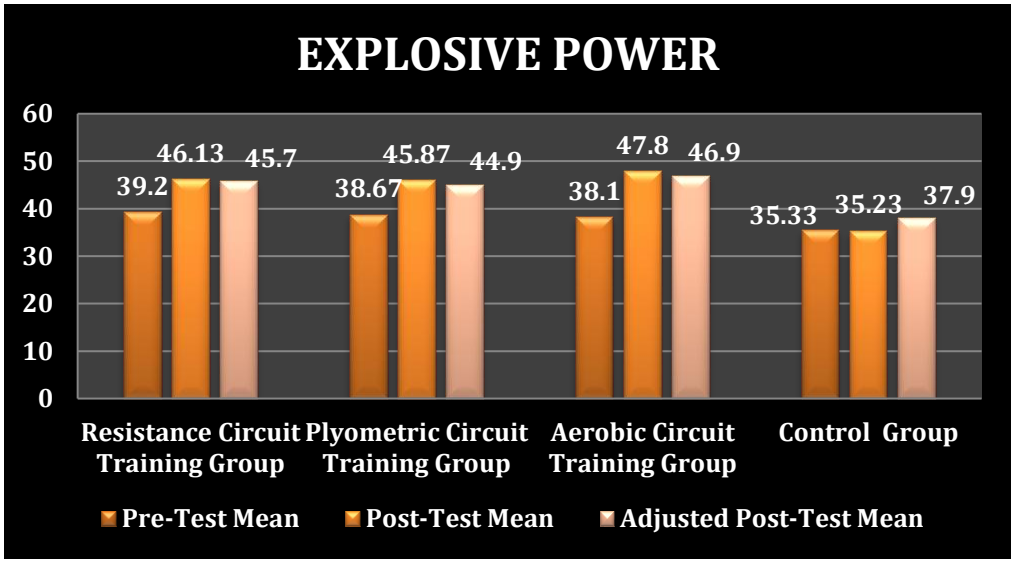


FIGURE – II

Pre-Test, Post-Test and Adjusted Post-Test Mean Value Differences on Cardio-respiratory Endurance of Resistance Circuit Training Group, Plyometric Circuit Training Group, Aerobic Circuit Training Group and Control Group (In centimetre)

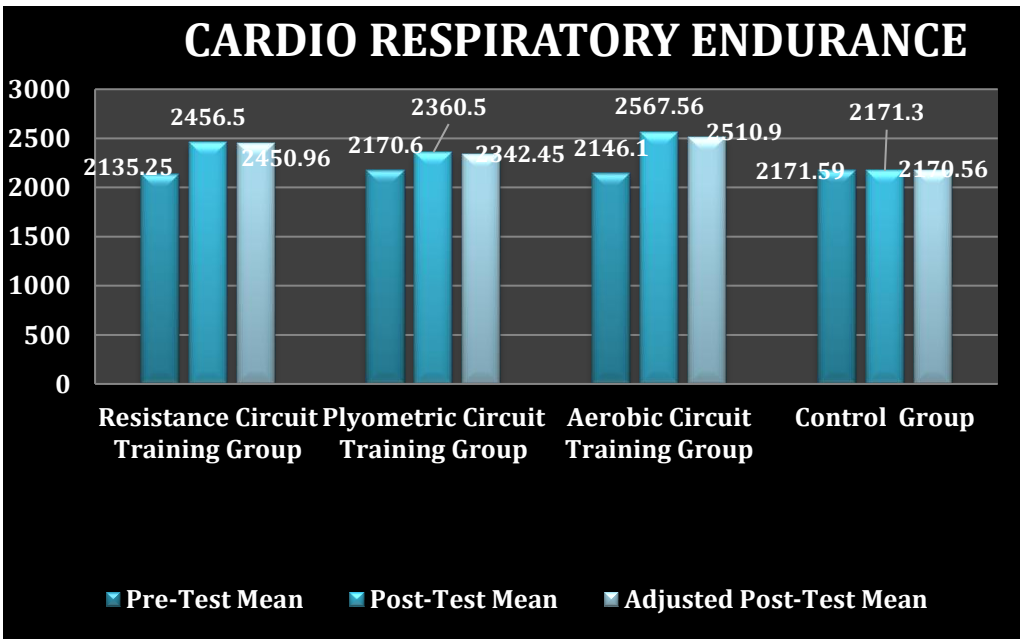
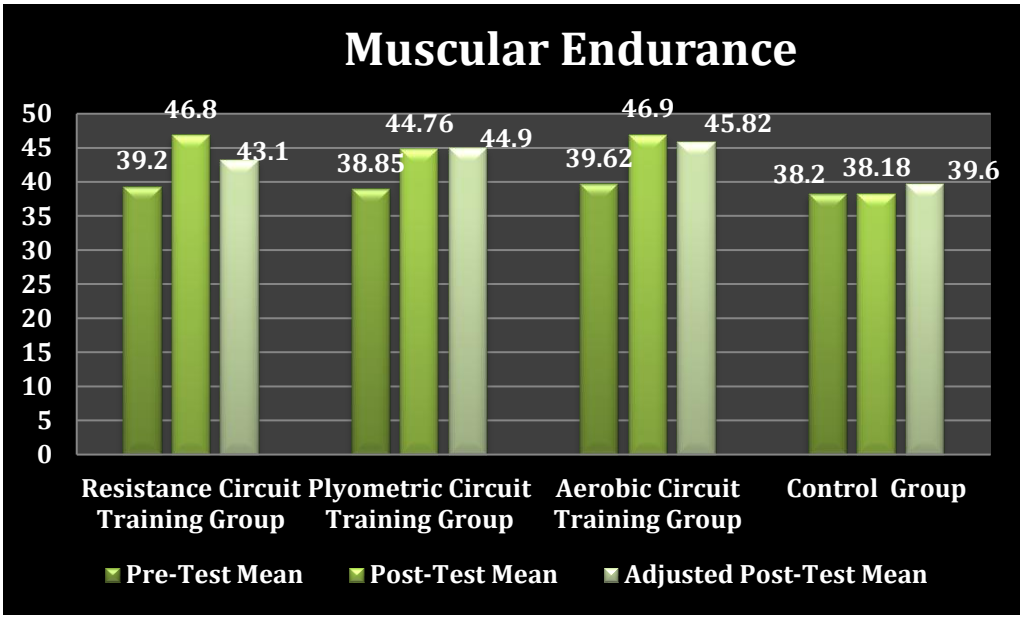


FIGURE – III

Pre-Test, Post-Test and Adjusted Post-Test Mean Value Differences on Muscular Endurance of Resistance Circuit Training Group, Plyometric Circuit Training Group, Aerobic Circuit Training Group and Control Group (In centimetre)



DISCUSSION ON FINDINGS

The objective of the study is to investigate the positive outcome of the three different approaches of circuit training with selected motor fitness components among the women Kabaddi players. It is elicited from the pre-test results that there are no significant differences between the experimental groups and the control group. The statistical analysis of the post-test results reveals the fact that there are significant mean differences, indicating the favourable development in explosive power, cardio-respiratory endurance and muscular endurance of the experimental groups.

CONCLUSION

The present experimental study has proved that the three different approaches of circuit training can definitely bring significant improvement on the motor fitness components of explosive power, cardio respiratory endurance and muscular endurance than that of the control group of women Kabaddi players. It is also concluded that the positive outcome of the aerobic circuit training on the explosive power, cardio-respiratory endurance and muscular endurance is greater than the yield out of the resistance circuit training, the plyometric circuit training of the women Kabaddi players.

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