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Original Research Article

Appropriateness of Application of Circuit Training on Components of Fitness Related to Motor Skills among Women Kabaddi Players: An Analytical Study

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Abstract: Kabaddi is referred as the high-intensity contact Sport The performance of the player depends on the extent to which the explosive power, agility, speed, and endurance are developed through suitable training. Among the available significant training methods, circuit training plays a vital level in increasing the high level performance of the players, especially the women players in Kabaddi. When they undergo properly structured circuit training programmes, with accurate methods for a stipulated period of time, they exhibit a vast progressive difference in performance. To testify the appropriateness of the circuit training Programmes, the researcher have chosen two of them named Resistance circuit training and Plyometric circuit training. These two trainings are advisable as they consume less time but fulfill the same utility purpose as of the time consuming traditional practices. The Resistance circuit training enhances the cardiovascular fitness, balances the blood pressure and enriches the functional strength of the Kabaddi players. The Plyometric circuit training aims at the explosive and high-intensity movement of the players. Plyometric circuit training for Kabaddi players focuses on explosive, high-intensity movements to enhance jumping, lateral speed, and rapid changes of direction.

The present experimental study has been done with the main objective of analyzing the appropriateness of the application of the two different approaches of circuit training on selected motor fitness components among women Kabaddi players. The target group has been selected from a definite location and put in rigorous training for a stipulated time. The selected women Kabaddi players have been grouped into three divisions and the suitability of the training has been decided. The primary data on the motor fitness components have been collected from the groups and analyzed with the statistical tests called dependent t-test and Analysis of Covariance (ANCOVA)

The collected data on motor fitness components due to 12 weeks two different approaches of circuit training was analyzed by dependent 't' test and Analysis of Covariance (ANCOVA) Whenever the 'F' ratio for adjusted final-test mean was found to be significant, Scheffe's test were followed, as a post hoc test to determine which of the paired mean differences were significant. It is elicited that the 'F' ratio for adjusted final-test mean is found to be significant. Scheffe's test has been done, as a post hoc test to determine which of the paired mean differences are significant. To test the hypothesis, 0.05 has been fixed as the level of confidence in all the selected groups. The study reveals the fact that the selected criterion variables are significantly improved due to the impact of two different approaches of circuit training. It is also derived that there is significant improvement on selected motor fitness components of the players.

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Keywords: Resistance and Plyometric Circuit Training, Explosive Power, Cardio Respiratory Endurance, Muscular Endurance.

INTRODUCTION

In the modern hurried life of an individual, keeping up good health and physical fitness are essential. They improve the overall health, boost energy and even increase the longevity. Regular physical movements and exercise puts an end to the symptoms of depression and anxiety; cognitive function is improved; stress management becomes possible. On the whole, the mental well-being is sustained. In a healthy society, sports should play a vital role as the benefits are many and multi-folded. Involvement in sports is not to be decided by the chronological age because at any age, the player is benefitted with stronger bones, muscles, and joints. Fitness and high performance in any sports depends on a number of interrelated qualities or factors such as speed, strength, agility and power of the players. In spite of being bestowed with sufficient aptitude and capability to perform well in sports, many athletes and players fall short in achievement of their goals because of their performance at a low level. Automatically, their participation in sports is hesitant-filled and clustered with dullness.

Other than enhancing the physical health of a person, sports alone could maintain the mental health and stability because it offers opportunities for him to face unexpected challenges, failure as well as success. The variety of experiences teaches him the true meaning of endurance. A.K. Uppal and Maxwell Howell elaborate the ups and downs awaiting the players in the field of sports in their book titled Foundations of Physical Education.

Traditional sports are undergoing drastic changes in the past few decades. Many innovative techniques and strategies have been introduced. Sporta has been gaining acclaim as a part of the curriculum in educational institutions. The young people are enthuastic to take part in sports as its benefits are limitless. A player in any sportive activity is blessed to gain monetary benefits, fame, goodwill of the society and status.[1].

RECENT STUDIES AND FINDINGS IN KABADDI

Kabaddi is the most popular sport, originated from India. It is a sport, involving high intensity contact between the two teams on the opposite halves a rectangular shaped court. Having seven members on each team, the core part of the sport is shouldered by the single raider, who runs into the opposing team and tag out as many of their defenders as possible. India holds the pride of being a pioneer in introducing Kabaddi in the rural areas. Having been started as a recreational game, the sport activity has gained worldwide in the recent days. Both the offensive and the defensive players in the game have to do proper planning and perform subtle physical movements to decide their winning point. Each player, especially the raider is in significant position in the game, displaying his individual ability. The anti-raiders need both collective and individual ability. The recent researches have started exploring the advanced performance and its enhancement, including physical, physiological, psychological, and technological aspects. Studies are being done on the high anaerobic power, agility, and specific body composition of Kabaddi players. The physiological and physical profiles indicate the need for strong anaerobic capacity for high intensity raids. As far as the psychological factors of the female Kabaddi players are concerned, it is appreciable that they exhibit less anxiety during the game but sustain high task-oriented goals. This indicates the mental fortitude of the female Kabaddi players. The recent research indicates that specialized training programs designed for specific positions and improved protective equipment for preventing injury are essential to increasing performance, particularly as the game moves toward a more data-driven, strategic, and professional model.

REVIEW OF LITERATURE

In the past decades, several theoretical and experimental studies have been carried out, measuring the performance level of the Kabaddi players. Dey SK. Khanna GL, Batra M, (1993) in their experimental study have derived the fact that a noticeable amount of recuperation is possible during the rest period of the game. They also point out that Kabaddi is a

sport, combining elements of wrestling, gymnastics, judo and rugby and so it calls for a robust body as well as both anaerobic and aerobic endurance.

Koley S., et.al. (2018) in their experimental study have found out that power and skill are the most necessary attributes in increasing the performance level in Kabaddi. Their study brings forth the point that to perform offensive pushes, falls, turns, abrupt direction changes, holding, bending, jumping, leg and hand contact, and holding while breathing, kabaddi players need to be extremely physically fit.

Vallimurugan, et.al. (2022) analyse the utility purpose of circuit training as a well-known workout programme to improve general fitness. It is the quickest and the most efficient approach to squeeze exercise into a hectic day. The objective of the training is to develop lean muscular mass and reduce body fat. A circuit is made up of several exercises that are done one after the other. Once a circuit is finished, the physical steps are repeated with little to no interruption.

Senthil Kumar V (2014) has done a relevant study by exploring the benefits of circuit resistance training. With a target group, he has analyzed the resultant positive changes and improvements of on selected variables such as muscular strength and muscular endurance.

METHODS AND MATERIALS

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. Among all the trainings, circuit training is an effective and challenging type of conditioning. A good way to increase all aspects of physical fitness is through circuit training, which is an organized method of performing physical activities. It is beneficial for building coordination, strength, stamina, and flexibility. The adaptability of circuit training has created easy accession not only to the professional athletes but to the general public also. It can be utilized by athletes, both male and female, to help build a strong foundation of fitness and prime the body for more strenuous training later in the off-season.

The present study has been done with a prime objective of investigating the impact of two different approaches of circuit training on select motor fitness components among the women Kabaddi players. For this study, the researcher has selected forty-five women Kabaddi players as subjects of study randomly from among the team of players during the academic year 2021-2022 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 (RCT, n = 15); the second group with Plyometric circuit training (PCT, n = 15), and the fourth group has to act as control group, denoting their non-participation in any specific training.

After proper division of groups, based on the training they deserve, the players have undergone the pre-test to evaluate the speed and agility. The readings have been recorded meticulously in their respective unit as the pre-test score. After the conduction of the initial test, the target groups have been given the respective training for three days alternatively per week. The entire training process has continued for 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 such as speed and agility have been measured by adopting different parameters; the speed by measurement of 50 mts dash in seconds and agility by shuttle run test in seconds. Both the initial and the final readings have been taken into account for calculation. The collected data on the adoption of motor fitness components for twelve weeks through two 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. A 0.05 level of confidence has been established in each instance as the threshold for testing the hypotheses.

THE SCHEDULE OF THE TRAINING PROGRAMES

The training schedule has been planned as three days a week on alternate days; each session continues for 60 minutes over the course of twelve weeks. Within the stipulated time of 60 minutes, 10 minutes is allotted for two warm-up exercises and the next 10 minutes is considered as cool-down period. The solid 40 minutes rigorous circuit training is given to the groups as per the group of choice. The researcher could identify 10% increase in the workload intensity every four weeks. The maximum working capacity of the individuals has increased after the training period.

OBSERVATIONS AND DISCUSSIONS

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TABLE - 1

COMPUTATION OF 'T' RATIO BETWEEN INITIAL AND FINAL TEST MEAN OF EXPERIMENTAL

Experimental Groups					
Motor Fitness Components	**Initial/Final Test**	**Mean**	**Std. Deviation**	**Std. Error**	**'t' Ratio**
Speed	Initial -Test	8.12	0.56	0.05	12.60
	Final-Test	7.45	0.61		
Agility	Initial -Test	11.14	0.58	0.07	6.85
	Final-Test	10.95	0.57		

GROUP ON MOTOR FITNESS COMPONENTS

Significant at 0.05 level of confidence.

Table-1, revealed about that the Computation of 't' ratio between initial and final test mean of experimental group on motor fitness components . The 't' ratio on speed and agility are 12.60 and 6.85 respectively. The required table value was 2.14 for the degrees of freedom 14 at 0.05 level of significance. Since the obtained 't' ratio values were greater than the table value, it was found statistically significant

TABLE - II

ANALYSIS OF COVARIANCE ON SPEED OF INITIAL TEST AND FINAL-TEST SCORES OF RESISTANCE CIRCUIT TRAINING, PLYOMETRIC CIRCUIT TRAININGAND CONTROL GROUPS

Test	**Resistance Circuit Training**	**Plyometric Circuit Training**	**Control Group**	**SOV**	**Sum of Squares**	**Df**	**Mean Square**	**'F' Ratio**
Initial Test Mean	8.05	8.12	8.10	Between	2.23	2	1.12	1.65
				Within	28.45	42	0.68	
Final Test Mean	7.15	7.45	8.23	Between	3.90	2	1.95	6.50*
				Within	12.80	42	0.30	
Adjusted Final Test Mean	7.19	7.61	8.30	Between	2.80	2	1.40	9.33*
				Within	6.30	41	0.15	

Significant at .05 level of confidence. (The table values required for significance at .05 level of confidence for 2 and 42 and 2 and 41 are 3.22 and 3.23, respectively).

Table-II shows that the initial-test mean values on speed of resistance circuit training, plyometric circuit training and control groups were 8.05, 8.12 and 8.10 respectively. The obtained "F" ratio of 1.65 for initial-test scores was less than the table value of 3.22 for df 2 and 42 required for significance at 0.05 level of confidence on speed. This showed that there was no substantial difference between the experimental and control groups, indicating that the method of group of randomization of the groups was ideal while conveying the subjects to groups. The final-test mean values on speed of resistance circuit training, plyometric circuit training and control groups were 7.15, 7.45 and 8.23 respectively. The obtained "F" ratio of 6.50 for post test scores was more than the table value of 3.22 for df 2 and 42 required for significance at 0.05 level of confidence on speed. The adjusted final-test mean value on speed of resistance circuit training, plyometric circuit training and control groups were 7.19, 7.61 and 8.30 respectively. The obtained "F" ratio of 9.33 for adjusted final-test mean is more than the table value of 3.23 for df 2 and 41 required for significance at 0.05 level of confidence on speed.

The results of the study indicated that there was a significant difference between the adjusted final-test mean on speed of resistance circuit training, plyometric circuit training and control groups.

TABLE - III

SCHEFFE'S TEST FOR THE DIFFERENCE BETWEEN THE ADJUSTED POSTTEST PAIRED MEAN OF SPEED

Resistance Circuit Training	Circuit Plyometric Training	Control Group	Mean Difference	Confidence Interval
7.19	-	8.30	1.11*	0.23
7.19	7.61	-	0.42*	0.23
-	7.61	8.30	0.69*	0.23

Significant at 0.05 level of confidence

The above table – III proved that the adjusted final-test mean differences on speed of resistance circuit training and control group, between resistance circuit training and plyometric circuit training and between plyometric circuit training and control group were 1.11, 0.42 and 0.69 respectively, which was significant at 0.05 level of confidence. It was concluded from the results of the study that resistance circuit training and plyometric circuit training has increase the speed significantly. The result of the study also showed that significant difference was found between the training groups in favour of the resistance circuit training group.

THE INITIAL TEST, FINAL TEST AND ADJUSTED FINAL TEST MEAN VALUES ON SPEED OF RESISTANCE CIRCUIT TRAINING, PLYOMETRIC CIRCUIT TRAINING AND CONTROL GROUP ARE GRAPHICALLY REPRESENTED IN FIGURE – 1.

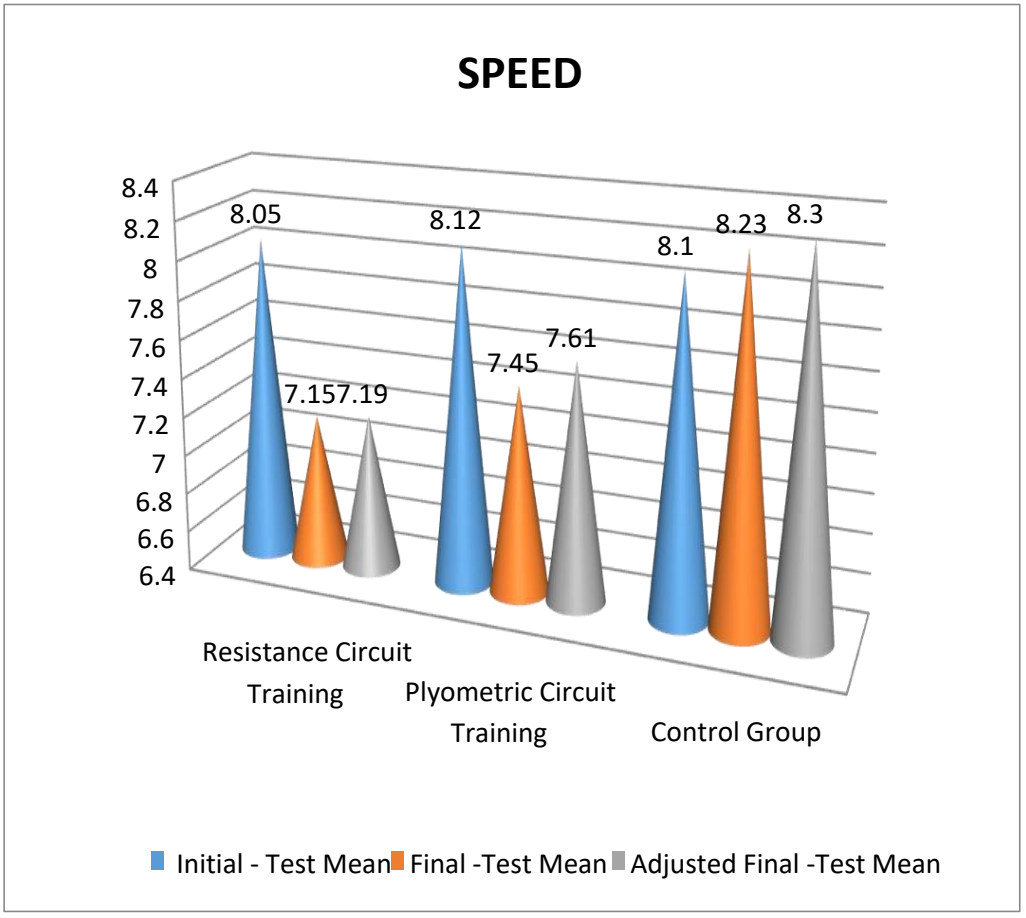


TABLE - IV

ANALYSIS OF COVARIANCE ON AGILITY OF INITIAL-TEST AND FINAL-TEST SCORES OF RESISTANCE CIRCUIT TRAINING, PLYOMETRIC CIRCUIT TRAININGAND CONTROL GROUPS

Test	Resistance Circuit Training	Plyometric Circuit Training	Control Group	SOV	Sum of Squares	Df	Mean Square	'F' Ratio
Initial Test Mean	10.32	10.25	10.40	Between Within	1.95 34.70	2 42	0.98 0.83	1.18
Final Test Mean	10.16	9.78	10.42	Between Within	32.78 29.30	2 42	16.39 0.70	23.41*
Adjusted Final Test Mean	10.18	9.89	10.45	Between Within	15.16 4.30	2 41	7.58 0.10	75.80*

Significant at .05 level of confidence. (The table values required for significance at .05 level of confidence for 2 and 42 and 2 and 41 are 3.22 and 3.23, respectively).

Table-IV shows that the initial-test mean values on agility of resistance circuit training, plyometric circuit training and control groups were 10.32, 10.25 and 10.40 respectively. The obtained "F" ratio of 1.18 for initial-test scores was less than the table value of 3.22 for df 2 and 42 required for significance at 0.05 level of confidence on agility. This showed that there was no substantial difference between the experimental and control groups, indicating that the method of group of randomization of the groups was ideal while conveying the subjects to groups. The final –test mean values on agility of resistance circuit training, plyometric circuit training and control groups were 10.16, 9.78 and 10.42 respectively. The obtained "F" ratio of 23.41 for finaltest scores was more than the table value of 3.22 for df 2 and 42 required for significance at 0.05 level of confidence on agility. The adjusted final-test mean value on agility of resistance circuit training, plyometric circuit training and control groups were 10.18, 9.89 and 10.45 respectively. The obtained "F" ratio of 75.80 for adjusted final-test means is more than the table value of 3.23 for df 2 and 41 required for significance at 0.05 level of confidence on agility. The results of the study indicated that there was a significant difference between the adjusted final-test mean on agility of resistance circuit training, plyometric circuit training and control groups.

TABLE - V

SCHEFFE'S TEST FOR THE DIFFERENCE BETWEEN THE ADJUSTED FINALTEST PAIRED MEAN OF AGILITY

Resistance Circuit Training	Circuit Plyometric Training	Control Group	Mean Difference	Confidence Interval
10.18	-	10.45	0.27*	0.18
10.18	9.89	-	0.29*	0.18
-	9.89	10.45	0.56*	0.18

Significant at 0.05 level of confidence

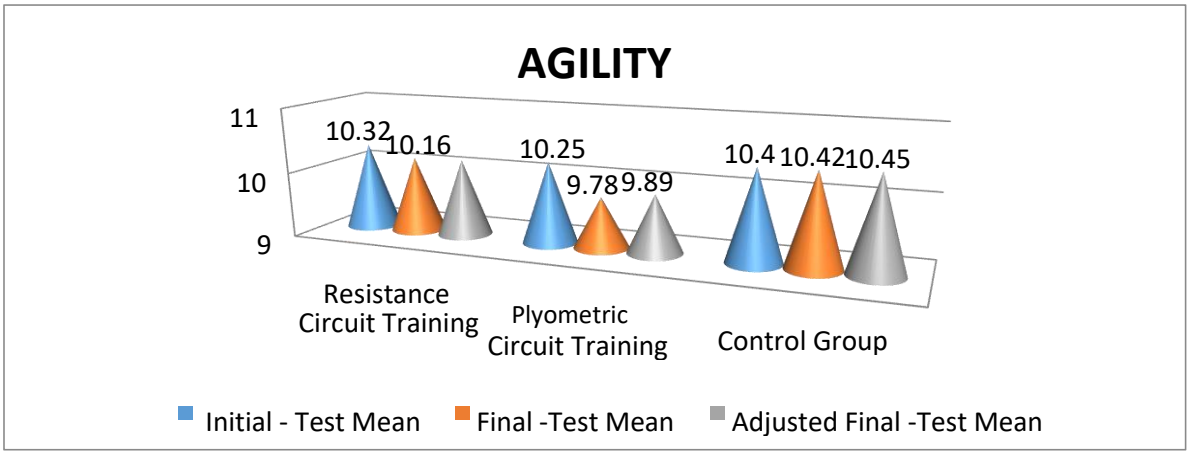
The above Table - V proved that the adjusted final-test mean on agility differences on resistance circuit training and control group, between resistance circuit training and plyometric circuit training and between plyometric circuit training and control group were 0.27, 0.29 and 0.56 respectively, which was significant at

0.05 level of confidence.

It is concluded from the results of the study that resistance circuit training and plyometric circuit training has

increase the agility significantly. The result of the study also showed that significant difference was found between the training groups in favour of the plyometric circuit training group on agility.

THE INITIAL TEST, FINAL TEST AND ADJUSTED FINAL TEST MEAN VALUES ON AGILITY OF RESISTANCE CIRCUIT TRAINING, PLYOMETRIC CIRCUIT TRAINING AND CONTROL GROUP ARE GRAPHICALLY REPRESENTED IN FIGURE – 2



DISCUSSION

The findings of the present study findings are corroborated with the earlier studies. Parsons et al., (1998) point out that Circuit training programmes three times per week is as effective as five times per week. Strength, Endurance, Agility and speed are considered as the main determinants of sports performance. This sort of improvement in physical fitness is beneficial for athletes who require quick movements while performing their sport. In the study on the performance level of the tennis players, it is proved that speed and agility are to be improved. Freitas et al., (2016) have conducted an investigative study on the effects of two different Circuit resistance training protocols on basketball players, measuring the corporeal and technical performance and rating of perceived exertion. Soloman et al., (2018) have examined the efficacy of Circuit training with and without medicine ball on selected motor-ability components and Volleyball playing ability. Gopinathan (2018) has studied the effects of the Circuit training on selected corporeal variables among the inter-collegiate men handball players. Revanna and Suthakar (2018) have investigated the effectiveness of combination of Circuit training and Sprint training on the development of flexibility and agility of the male athletes performing at the inter-collegiate level. Hermassi et al., (2017) have carried out a study to evaluate the in-season Circuit training on corporeal in male handball players. Mahesh (2017) has conducted a study on the effects of Circuit training and Plyometric training on selected corporeal variables among the male school students. Velmurugan et al., (2016) have studied the effect of Circuit training SAQ training on selected corporeal variables among the basketball and the football players.

The objective of the study is to investigate the positive outcome of the two 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 is no significant difference 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 speed and agility of the experimental groups.

CONCLUSION

The present experimental study has proved that the selected criterion variables are significantly improved due to the impact of two different approaches of circuit training. It is proved that there is a significant improvement on selected motor fitness components women Kabaddi players.

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