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Effect Of Resistance Training Combined With Specific Skill Exercises On Cardio-Respiratory Endurance Of Male Kabaddi Players

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ABSTRACT

The present investigation aims to examine the impact of resistance training combined with specific skill exercises on the cardio-respiratory endurance of male intercollegiate Kabaddi players. For this reason, a total of 40 male players from degree colleges in Bengaluru (Karnataka, India) were randomly divided into two groups: the Experimental Group (Group-A, 20 players), which underwent resistance training integrated with specific skill exercises and the Control Group (Group-B, 20 players), which followed their regular routine without additional training. Baseline (pre-test) cardio-respiratory endurance was measured for both groups using Cooper's 12-Minute Run/Walk Test (measured in meters). The experimental group participated in the resistance training and skill exercise programmes five days a week for twelve weeks, while the control group continued their usual schedule. After the training period, post-test scores were collected. Statistical analysis was performed using paired 't' test and independent sample 't' test at 0.05 and 0.01 significance levels with the help of SPSS and MS Excel. The findings revealed significant changes in cardio-respiratory endurance among Kabaddi players who underwent resistance training combined with specific skill exercises compared to the control group. This improvement might be because the resistance training helped the kabaddi players build muscle strength as well as stamina, improving their oxygen intake along with ability to perform for longer periods. Also, practicing specific Kabaddi skills along with training may have enhanced their game movements, leading to better endurance.

Keywords: Resistance Training, cardio-respiratory endurance, specific skill exercises, Kabaddi, Intercollegiate Male Players.

1. INTRODUCTION

Kabaddi, a traditional Indian sport with rich cultural origins, requires a high level of physical fitness, particularly strength, agility and cardio-respiratory endurance. The game is distinguished by short bursts of activity, continual movement and rapid recovery, putting significant strain on the player's aerobic and anaerobic systems (Kumar and Singh, 2017). With the professionalization of Kabaddi through leagues such as the Pro Kabaddi League (PKL), the sport has undergone a paradigm shift toward scientific training approaches and performance enhancement.

Cardio-respiratory endurance is an important physiological factor that influences a Kabaddi player's ability to maintain a high-intensity effort throughout the game. It depicts the heart, lungs and muscles' ability to deliver and utilize oxygen over long periods of physical activity (Rajkumar & Murugesan, 2018). Improving this component is critical for increasing in-game performance and avoiding weariness.

Resistance training, which improves muscular strength and endurance, has emerged as an important intervention in athletic conditioning. When paired with sport-specific skill training, it provides a comprehensive development plan that not only strengthens muscles but also improves neuromuscular coordination and movement efficiency (Bhattacharya & Sengupta, 2019). This comprehensive strategy can considerably improve athletes' aerobic capacity and functional endurance, particularly in intermittent, high-intensity sports like Kabaddi. Although various studies have shown the benefits of resistance and skill-based training in sports such as football and basketball, there is no empirical research on their combined effect in the context of Indian Kabaddi players.

As a result, this study seeks to close the gap by objectively investigating the effect of Resistance Training combined with Specific Skill Exercises (RTSSE) on the cardio-respiratory endurance of male Kabaddi players at the intercollegiate level in India. Although Kabaddi is popular and widely played in India, particularly with the rise of the Pro Kabaddi League, there is still a lack of scientific research on the optimal methods for player training. This study fills that gap by demonstrating how a planned and scientific training regimen can significantly improve athletes' fitness levels. The findings of this study can help coaches, trainers and sports teachers create better training programs. It also provides important information for colleges and universities to help their Kabaddi teams perform better in tournaments. Overall, the study supports modern training approaches for traditional Indian sports such as Kabaddi.

2. REVIEW OF RELATED LITERATURE

Several recent studies have investigated the impact of resistance training alone and in combination with other training methods on key performance measures important to Kabaddi and other high-intensity sports. Tamilvanan et al. (2024) found that resistance training significantly increased explosive power in both the arms and legs of intercollegiate Kabaddi players. Although their research focused on muscular strength, improvements in explosive strength are indirectly linked to improved cardio-respiratory performance, particularly during continuous and recurrent bouts of action in Kabaddi.

Sureshkumar et al. (2023) conducted additional research on the effects of mixed interval and continuous training on college-level female Kabaddi players. Their findings showed significant increases in speed, agility and key Kabaddi skills, as well as indirect improvements in cardio-respiratory endurance. Baskaran and Radhakrishnan (2023) found that male Kabaddi players improved their leg strength and speed following 12 weeks of resistance paired with SAQ (Speed, Agility, Quickness) training, implying higher cardiovascular adaptability and endurance capacity during high-intensity play.

While not solely concerned with cardio-respiratory endurance, Zhu et al. (2024) and Oliver et al. (2024) found that complicated and integrated strength training regimens greatly improved total physical performance in young athletes. These enhancements, which include aerobic capacity and endurance, are applicable to sports such as Kabaddi, which require both anaerobic bursts and aerobic recovery. Furthermore, Kumar et al. (2023) demonstrated how plyometric training could improve body composition and general physical fitness, hence increasing endurance.

Though much of the literature focuses on increasing power, speed, agility and muscular fitness, there is consistent indirect evidence that well-structured resistance training, particularly when combined with sport-specific skills or aerobic drills, improves cardio-respiratory function. These enhancements enable athletes to compete for longer periods of time while experiencing less tiredness and faster recovery, which is critical in Kabaddi.

While several studies have looked at how resistance, plyometric and agility-based training improves strength, speed and explosive power, few have looked at how these exercises enhance cardio-respiratory endurance, particularly when mixed with Kabaddi-specific skills. Most present research examines one or two types of training independently and does not consider their combined impact on physical fitness and Kabaddi performance. There are few studies that look into how integrated training, which includes resistance and skill-based exercise, improves endurance and helps players perform consistently during matches. This study addresses that gap by investigating how resistance training mixed with specialized Kabaddi skill workouts can increase players' cardio-respiratory endurance.

3. SIGNIFICANCE OF THE STUDY

This study is significant because it demonstrates how combining resistance training with Kabaddi-specific skill workouts can increase the cardio-respiratory endurance of male college-level Kabaddi players. Kabaddi is a physically demanding sport requiring strength, stamina and fast movements. Players can improve their ability to perform better and for longer periods of time by following a structured training program that incorporates both strength-building activities and skill-based practice. This type of training allows children to use oxygen more efficiently, grow stronger muscles and reduce fatigue during play.

4. STATEMENT OF THE PROBLEM

"Effect of Resistance Training Combined with Specific Skill Exercises on Cardio-Respiratory Endurance of Male Kabaddi Players."

5. AIM AND OBJECTIVES

The aim and objective of investigation is to find out the effect of resistance training combined with specific skill exercises on cardio respiratory endurance in male Kabaddi players.

6. HYPOTHESES

1. There is no significant difference in the pre-test and post-test scores of Cardio Respiratory Endurance among male Kabaddi players in the control group and the experimental group (RTSSE).
2. There is no significant difference in the Cardio Respiratory Endurance of male Kabaddi players between the control group and the experimental group (RTSSE) in the pre-test and post-test scores.

7. METHODOLOGY

This paper aspires to see the degree to which resistance training could improve cardio respiratory endurance among male intercollegiate level Kabaddi players. A total of 40 participants from degree colleges, Bengaluru (Karnataka-India), were randomly separated into 2 (two) groups: viz., Experiment Group-A (RTSSE, 20 players) received Resistance training (Squats, dead lifts, bench press, rows, pull-ups and other exercises linked to game-specific skills) with practices of specific skill exercises and the other is Group-B (CG, 20 players), was the control group. The pre test scores were obtained for equally groups utilizing the Cooper's 12 Minutes Run/Walk (In Meters) to assess the cardio respiratory endurance of the participants. Group-A involved in Resistance exercises (Squats, dead lifts, bench press, rows, pull-ups and other exercises linked to game-specific skills) with specific skill exercises for 5 (five) days a week continued for twelve weeks along with their routine, whereas the control group uphold their regular timetable. After the training period, post-test scores for cardio respiratory endurance were collected. A paired dependent 't' test and an independent samples 't' test were utilized to find out the significance in the said criterion variable scores at both 0.05 and 0.01 levels of confidence. The results examined using SPSS and MS Excel, revealed a significant change in cardio respiratory endurance among Kabaddi players who underwent resistance training with practices of specific skills exercises.

8. DATA ANALYSIS

The data composed prior to and following the investigational periods on RTSSE training on cardio respiratory endurance of Experimental Group-A (RTSSE), receiving resistance training with practices of specific skill exercises and Group-B (CG), the control group were analyzed and presented in the table-1 and table-2.

Table-1: Paired 't' test results between pre and post tests scores on Cardio respiratory Endurance of Kabaddi players of control & experimental (RTSSE) groups.

Group	Post	Number	Mean	Standard Deviation	Std. Error Mean	't' and 'P' values	Sig. Level
CG Group	Pre	20	1980.000	75.043	16.780	1.39 (P=0.180)	NS
	Post	20	2005.000	121.286	27.120		
RTSSE Group	Pre	20	1995.000	80.948	18.100	6.24 (P=0.000)	**
	Post	20	2105.000	62.618	14.001		

NS indicates no significant; ** shows significant at 0.01 level (df = 19, 2.88)

The results presented in Table-1 highlight the effect of a specific training intervention - Resistance Training with Specific Skill Exercises (RTSSE) - on the cardio-respiratory endurance of Kabaddi players, compared between a control group and an experimental group.

In the Control Group (CG), the mean cardio-respiratory endurance score increased slightly from 1980.00 meters in the pre-test to 2005.00 meters in the post-test, showing a marginal gain of 25.00 meters. Therefore, the paired 't' test yielded a value of 1.39 with a p-value of 0.180. Since this p-value is greater than 0.05, the improvement is statistically not significant. This confirms that the minor change in endurance could be attributed to natural variation or regular training routines without any specialized intervention.

In contrast, the RTSSE Group (Experimental Group) demonstrated a significant improvement in cardio-respiratory endurance. The pre-test mean score of 1995.00 meters increased substantially to 2105.00 meters in the post-test, indicating an improvement of 110.00 meters. The paired 't' value for this group was 6.24 with a p-value of 0.000, which is highly significant at the 0.01 level. This significant difference suggests that the RTSSE training had a strong and positive impact on improving the cardio-respiratory endurance of the players.

Therefore, while the control group did not show a statistically meaningful improvement, the experimental group benefited significantly from the RTSSE training program. These findings imply that incorporating resistance training along with specific skill exercises can be an effective strategy to enhance cardio-respiratory endurance in Kabaddi players.

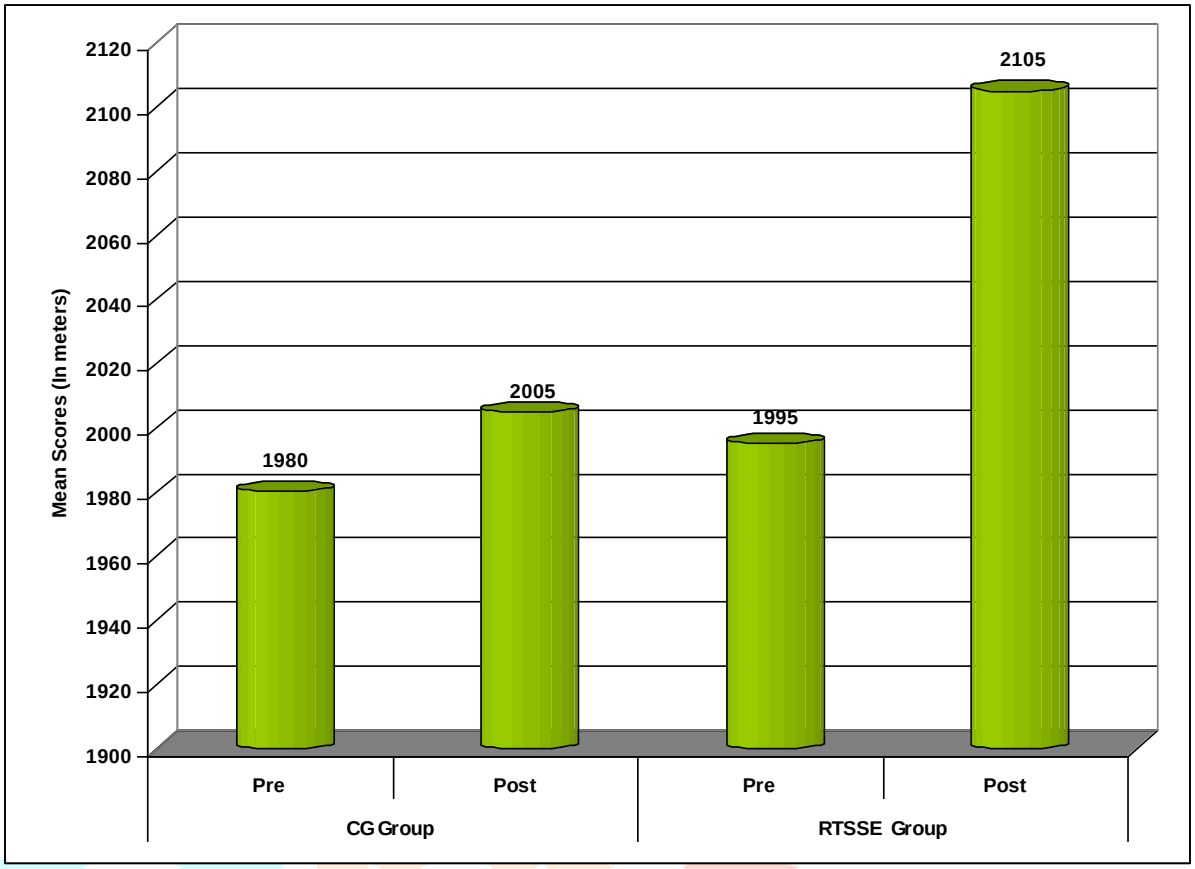

Fig.1: Estimation of Cardio Respiratory Endurance between of pre and post tests scores of Kabaddi players in control (CG) and experimental (RTSSE) groups.

Table-2: Independent sample t test outcomes in the Cardio respiratory endurance between CG and RTSSE Groups before and after the intervention (Pre and Post tests).

Test	Group	Number	Mean	Standard Deviation	Std. Error Mean	't' and 'P' values	Sig. Level
Pre	CG Group	20	1980.000	75.043	16.780	0.60 (P=0.547)	NS
	RTSSE Group	20	1995.000	80.948	18.100		
Post	CG Group	20	2005.000	121.286	27.120	3.27 (P=0.003)	**
	RTSSE Group	20	2105.000	62.618	14.001		

NS indicates no significant; **shows significant at 0.01 level for df = 38, 2.71.

Table-2 presents the independent sample 't' test results comparing the cardio-respiratory endurance of the Control Group (CG) and the RTSSE Group (Experimental Group) before and after the intervention and this analysis helps determine whether the two groups were significantly different from each other at both the pre-test and post-test stages.

In the pre-test phase, the Control Group had a mean score of 1980.00 meters, while the RTSSE Group had a slightly higher mean of 1995.00 meters. The calculated 't' value was 0.60 and the p-value was 0.547. Since this p-value is greater than 0.05, the difference between the two groups was not statistically significant. This shows that both groups started at a comparable level in terms of cardio-

respiratory endurance before the intervention, ensuring a fair baseline for evaluating the effectiveness of the training.

In the post-test phase, however, a substantial difference emerged. The Control Group's mean increased to 2005.00 meters, whereas the RTSSE Group's mean rose significantly to 2105.00 meters and the 't' value in this case was 3.27 with a p-value of 0.003, which is statistically significant at the 0.01 level. This result clearly confirms that, after the training period, the experimental group outperformed the control group in cardio-respiratory endurance to a statistically significant extent.

In conclusion, the pre-test results confirm that both groups were initially similar, while the post-test results demonstrate the effectiveness of the RTSSE training program. The significant improvement in the RTSSE group, compared to the control group, shows that resistance training combined with specific skill exercises had a meaningful impact on enhancing cardio-respiratory endurance in Kabaddi players.

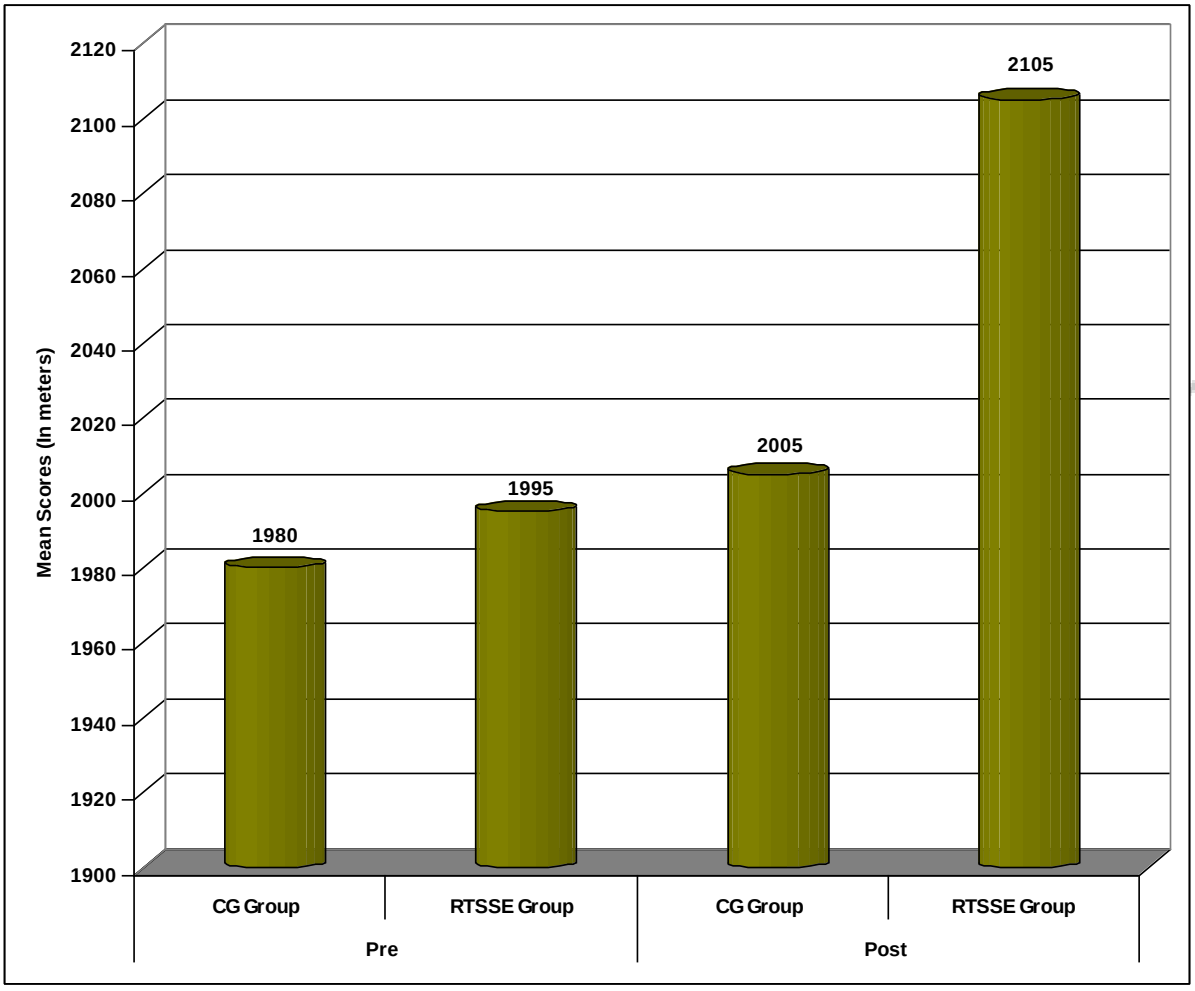

Fig.2: Estimation of pre-test and post-test scores of Cardio Respiratory Endurance of Kabaddi players between control (CG) and experimental (RTSSE) groups.

9. DISCUSSION

The present study looked at the effect of Resistance Training with Specific Skill Exercises (RTSSE) on the cardio-respiratory endurance of Kabaddi players and the experimental group that performed RTSSE showed a statistically significant improvement in cardio-respiratory endurance, but the control group, which merely practiced regularly, showed no significant change in age. The paired 't'

test results (Table-1) showed a highly significant improvement (p=0.000) in the experimental group after the intervention, demonstrating the efficacy of combining resistance training with sport-specific activities in increasing endurance. In contrast, the control group exhibited no significant change (p=0.180), showing that conventional practice alone may not be enough to produce detectable gains in cardio-respiratory capacity.

The independent sample 't' test (Table-2) found no significant difference between groups at pre-test (p=0.547), confirming baseline comparability. However, the post-test comparison revealed a significant difference (p=0.003), demonstrating the effectiveness of the RTSSE programme in improving endurance. These findings imply that the organized integration of resistance exercises with Kabaddi-specific skills is critical in developing endurance beyond what normal practice can do. These findings are congruent with Tamilvanan et al. (2024), who found that resistance training greatly improves explosive strength in Kabaddi players. While their research focused on muscular strength, the increased power and muscular efficiency is anticipated to transfer into improved oxygen usage and endurance in match-like settings. Sureshkumar et al. (2023) found that combined interval and continuous training increased female Kabaddi players' speed and agility, both of which are highly related to cardiovascular conditioning. Similarly, Baskaran and Radhakrishnan (2023) discovered that combining resistance training with SAQ drills improved leg strength and agility, implying increased cardiovascular efficiency due to the intensity and volume of training.

Although Zhu et al. (2024) and Oliver et al. (2024) did not particularly focus on endurance, their findings on enhanced overall physical performance and aerobic capacity in juvenile athletes following complicated strength training regimens provide indirect support for the current study. Their findings demonstrate how structured strength therapies, even without a direct focus on endurance, can improve performance in sports that need a combination of anaerobic and aerobic energy systems. Kumar et al. (2023) also emphasized the benefits of plyometric training in terms of enhancing body composition and fitness, which are strongly related to higher energy efficiency and recovery—both of which are key components in sustaining high cardio-respiratory performance while playing continuously.

Unlike many other studies that isolate resistance, plyometric or skill training, the current study is one of the few that systematically investigates the combined effect of resistance training and Kabaddi-specific skill exercises on cardio-respiratory endurance. This comprehensive approach is more closely aligned with the physiological and tactical demands of Kabaddi, in which players require bursts of strength, quick recovery and sustained energy throughout the game.

Overall, this study shown that combining resistance training with sport-specific drills significantly improves cardio-respiratory endurance in Kabaddi players. The findings help to address a gap in the existing literature by giving empirical evidence for how integrated training regimens can increase both fitness measures and sport-specific performance outcomes. Coaches and trainers are advised to implement RTSSE into their training programs to improve player endurance, reduce tiredness and optimize performance in competitive Kabaddi scenarios.

10. CONCLUSION

Based on the findings, it was concluded that Resistance Training with Specific Skill Exercises (RTSSE) significantly improves cardio-respiratory endurance among Kabaddi players, while the control group showed insignificant improvement through regular practice; the experimental group demonstrated a statistically and practically significant enhancement in performance. This clearly establishes RTSSE as a beneficial training strategy for improving aerobic capacity and endurance levels in competitive Kabaddi players.

11. RECOMMENDATIONS AND SUGGESTIONS

1. Coaches and coaches are urged to incorporate resistance training and skill-based drills into Kabaddi players' regular training programmes to improve their cardio-respiratory fitness.
2. Department of Physical Education and Sports Academies should alter their curricula and training modules to include resistance training with specific skills exercises training programmes.
3. Training plans should be modified to individual fitness levels in order to maximize benefits while reducing the injury or danger of overtraining.
4. Regular monitoring and assessment of cardio respiratory endurance should be conducted to track progress and adjust training intensity as needed.

12. SUGGESTIONS FOR FURTHER RESEARCH

1. Similar studies on female Kabaddi players may be conducted to investigate gender-based reactions to resistance training with specific skills exercises training.
2. Future research could look into the long-term effects of Resistance training with specific skills exercises on other physiological measures like agility, strength and body composition.
3. Comparative studies with distinct age groups (junior, senior, elite) can be conducted to establish age-specific training adaptations.
4. Research can also look into the effects of different types of resistance (for example, free weights vs. resistance bands) combined with skill-based training.
5. A multi-sport comparative research may be conducted to assess the efficiency of Resistance training with specific skills exercises on players from different team sports such as football, handball or basketball.

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