

"EFFECT OF RESISTANCE TRAINING ON SKILL-RELATED PHYSICAL FITNESS PARAMETERS: REACTION TIME AND COORDINATION IN MALE HIGH SCHOOL KABADDI PLAYERS."

¹Mr. Sureshkumar N, and ²Dr. Prasanna Kumara M D

¹Research scholar, ²Guest lecturer,

¹Department of Physical Education and Sports, School of Education and Training, Central University of Tamil Nadu. Thiruvavur -610005

²Department of PG Studies and Research in Physical Education, Kuvempu University, Jnanasahyadri, Shankarghatta, Shivamogga, Karnataka -577451.

¹surisesuresh814750@gmail.com, ²contactprasannamd@gmail.com

ABSTRACT

Kabaddi is a high-intensity sport that demands quick reaction time and effective coordination for successful performance during offensive and defensive actions. Enhancing these skill-related fitness components is crucial for young athletes. This study aimed to investigate the effect of resistance training on reaction time and coordination, two essential components of skill-related physical fitness, in high school Kabaddi players. To achieve the purpose of the study, forty male Kabaddi players aged 14–17 years were selected and randomly divided into two groups: experimental (n=20) and control (n=20). The resistance training was given to the experimental group at an interval of three days per week (Monday, Wednesday and Friday) for the training period of eight weeks. The control group was not given any sort of training except their routine daily tasks. The reaction time and coordination of the selected subjects was assessed through standard test. Descriptive statistics Mean and Standard Deviations were calculated in the present study to understand the normalcy of data. The paired sample 't' ratio was calculated to find significant difference between the mean during pre and post-test of the experimental as well as control groups. The level of significance for the present investigation was 0.05. The resistance training and skill related physical fitness program in the present investigation have favourable effect on reaction time and coordination of high school kabaddi players. The reaction time and coordination of Experimental group significantly improved from Pre to Post-test situation. At the same time it is noted that the reaction time and coordination of control group did not significantly improve from Pre and Post-test situation.

Index terms: Resistance training, Reaction time, Coordination, Kabaddi players.

INTRODUCTION

Resistance training, which includes methods such as weight lifting, calisthenics, isometrics, and plyometrics, is a key component of physical conditioning aimed at improving muscular strength and endurance. When properly implemented, it enhances musculoskeletal health, joint stability, metabolic function, and cardiovascular efficiency (Riebe et al., 2018). In the context of sports, resistance training is essential for developing strength, power, agility, and neuromuscular coordination attributes crucial for

athletic performance. Techniques like heavy-resistance training and plyometrics help athletes meet the biomechanical and physiological demands of their sport. Despite its recognized benefits, there remains a gap in sport-specific resistance training research, underscoring the need for further investigation into its effects on athletic fitness and performance.

Resistance training, commonly referred to as strength or weight training, involves exercises that cause muscles to contract against an external resistance, thereby enhancing muscular strength, endurance, and size (Riebe et al., 2018). It plays a vital role in improving overall physical fitness, including bone density, joint stability, and muscular function. Alongside aerobic and flexibility exercises, resistance training is essential for balanced physical development and injury prevention. In parallel, traditional sports like kabaddi demand high levels of physical and mental fitness. Kabaddi is a contact team sport characterized by alternating roles of offense and defense, where individual skill and team coordination are equally vital. The raider, representing the attacking side, attempts to tag defenders (called "antis") and return to their half without being captured, all while holding their breath and chanting "kabaddi" (Rao, 2002). Kabaddi uniquely blends anaerobic endurance, muscular strength, agility, and tactical intelligence, making it an ideal sport to study the physical impacts of resistance training.

Resistance training, also known as strength or weight training, involves working muscles against a form of resistance like dumbbells, barbells, or resistance bands. It helps improve muscle strength, bone density, and reduces body fat. This type of training supports joint health, enhances tendon and ligament strength, and increases lean muscle mass. As muscle mass grows, the body's resting metabolic rate also rises, aiding long-term fat loss. Additionally, high-intensity resistance workouts can boost metabolism for hours after exercise, further supporting weight management (De Mello & Gomes, 2004).

Skill-related physical fitness refers to the components of fitness that enhance athletic performance, including speed, agility, coordination, power, balance and reaction time. These attributes enable athletes to perform sport-specific skills efficiently and effectively. Maintaining high levels of skill-related fitness improves execution under pressure, supports quick decision-making, and reduces the risk of injury. A well-structured training program that integrates strength, speed, and coordination drills, along with proper nutrition, rest, and psychological care, is essential for optimal athletic performance (Bompa & Buzzichelli, 2018).

Importance of Reaction time and Coordination in Kabaddi players.

Reaction time and coordination are essential for optimal performance in Kabaddi, a sport that involves rapid offensive and defensive actions in a confined space. Quick reaction time enables players to respond swiftly to unpredictable movements by opponents, which is crucial during raids and tackles (Gabbett, 2008). Coordination, particularly hand-eye and whole-body coordination, allows players to maintain balance, execute agile maneuvers, and perform complex motor tasks with precision (Magill & Anderson, 2017). These physical attributes not only improve performance efficiency but also reduce the likelihood of injury by enhancing neuromuscular control. Therefore, structured training programs aimed at improving reaction time and coordination are vital for enhancing the skill execution and competitive readiness of Kabaddi players (Baechle & Earle, 2008).

Need of the Study

Kabaddi, as a high-intensity contact sport, demands rapid decision-making, reaction time, and coordinated movements for successful performance in both offensive and defensive situations (Sharma & Kumar, 2021). Among the various components of skill-related physical fitness, reaction time and coordination are critical for success in this sport. These abilities help players quickly respond to dynamic game situations and execute complex movements with precision.

Adolescence is considered a crucial period for developing motor skills and neuromuscular coordination. Incorporating structured resistance training during this phase may offer significant benefits

in enhancing these abilities (Faigenbaum et al., 2009). Resistance training is widely used to improve muscular strength and endurance; however, its influence on skill-related parameters such as reaction time and coordination, especially in adolescent Kabaddi players, remains under-researched (Behm et al., 2008). Most existing training programs at the school level focus on basic skill development, often overlooking scientifically designed resistance protocols that could improve athletic performance holistically.

Moreover, earlier studies have emphasized the need for sport-specific conditioning to enhance functional performance and reduce the risk of injuries in young athletes (Myer et al., 2011). Given the growing popularity of Kabaddi at school and competitive levels, there is a pressing need to examine training methods that can optimize player performance through targeted physical interventions. Thus, the present study seeks to fill this research gap by analyzing the effect of resistance training on reaction time and coordination in high school Kabaddi players, with the aim of contributing to evidence-based coaching practices.

The objective of the study

The purpose of the present investigation was to examine the effect of resistance training on skill-related physical fitness parameters: reaction time and coordination in male high school kabaddi players 2025-26.

Methodology

To achieve the purpose of the study, Forty male high school Kabaddi players (ages 14–17) were randomly divided into experimental (n=20) and control (n=20) groups. The experimental group followed an 8-week resistance training program three days a week (Monday, Wednesday, and Friday) along with regular practice, while the control group continued only regular Kabaddi training. Reaction time and coordination were assessed using standard tests before and after the intervention. Data were analyzed using mean, standard deviation, and paired t-test at a 0.05 significance level.

Test procedure (Protocol)

The reaction time (scale drop test) of the selected subjects was assessed through standard test; the participant was instructed to sit or stand upright with one arm extended forward. The tester held a standard 30-centimeter ruler vertically between the participant's thumb and index finger, which were positioned just below the zero mark, without touching the ruler. The participant was told to catch the ruler as quickly as possible after it was released. Without any verbal or visual cue, the tester suddenly released the ruler. The participant caught it as quickly as possible using only their fingers. The point at which the ruler was caught (measured in centimeters) was recorded. The test was repeated three times, and the best (shortest) reaction time was taken as the final score.

Coordination (alternative wall toss test) of the selected subjects was assessed through standardized test aiming to study the coordinated the participant stood 2 meters away from a flat wall. A tennis ball was held in one hand. On the command "Go," the participant threw the ball against the wall and caught it with the opposite hand. For example, if the participant threw the ball with the right hand, they caught it with the left, and vice versa. The participant continued to alternate hands for each throw and catch as many times as possible within 30 seconds. A stopwatch was used to record the time precisely. If the ball was dropped or not caught properly, the trial continued but that attempt was not counted. The total number of successful catches in 30 seconds was recorded as the final score. The parameters were measured at baseline and after eight weeks of implementing the experimental protocol.

The resistance training on skill-related physical fitness parameters: The practices were selected by the researcher on the basis of his insight, in consultation with Supervisor and experts in the field of kabaddi. A brief description of resistance training is provided in table 1.

Table1.Experimental protocol used for finding the effect of resistance training on skill-related physical fitness parameters: reaction time and coordination in male high school kabaddi players

Sl. No	Day	Warm-up (10 min)	Main Exercises (20 min)	Cool Down (10 min)
1.	Monday	10 Minutes	Plank, Leg Lunges, Single-Leg Squat, Skipping, Dribbling the Ball, and Balloon Toss	10 Minutes
2.	Wednesday	10 Minutes	Shuttle Run, Ladder Exercise, Tuck Jumps	10 Minutes
3.	Friday	10 Minutes	Deadlift, Squat, High Knees, Hill Sprint, Barbell Curl	10 Minutes

In the present study, descriptive statistics, including the mean and standard deviation, were computed to examine the distribution of the data. A paired-samples *t*-test was applied to evaluate the differences between pre-test and post-test mean scores within both the experimental and control groups. The significance level for statistical testing was established at 0.05.

Finding of the study

The present investigation assessed the influence of selected resistance training on reaction time and coordination in male high school Kabaddi players. For this purpose, relevant statistical methods were utilized. The outcomes of the descriptive statistics and the *t*-test, highlighting variations in reaction time and coordination of the experimental group during the pre-test phase, are displayed in Table 1.

Table1. Summary of 't' test for differences in reaction time and coordination between Control group during pre and post-test situation

Sl. No	Variables	Groups	Mean	N	t	Sig. (2-tailed)
1.	Reaction time	Control Pre	22.80±4.87	19	.400	.693
		Control Post	23.30±4.46			
2.	Coordination	Control Pre	23.00±2.38	19	-.316	.756
		Control Post	22.65±3.17			

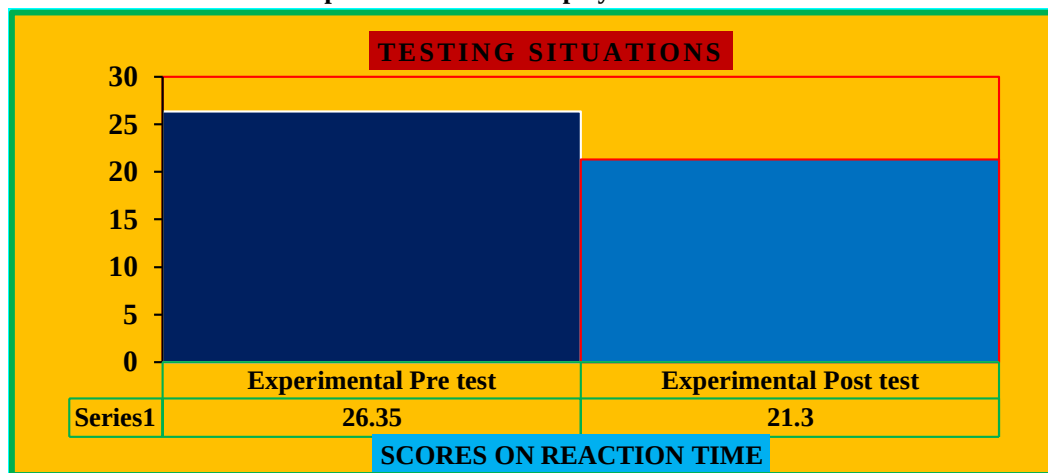
From table 1 indicates that the control group's reaction time and coordination scores were normally distributed with acceptable homogeneity. Paired-samples *t*-tests showed no significant differences between pre- and post-test scores for reaction time ($t = 0.400$) and coordination ($t = -0.316$), both below the critical value of 2.093 at the 0.05 significance level. The experimental group results are shown in Table 2.

Table1. Summary of 't' test for differences in reaction time and coordination between Experimental group during pre and post-test situation

Sl. No	Variables	Groups	Mean	N	t	Sig. (2-tailed)
1.	Reaction time	Experimental Pre	26.35±3.12	19	5.044	.000
		Experimental Post	21.30±5.83			
2.	Coordination	Experimental Pre	18.40±4.50	19	-7.388	.000
		Experimental Post	21.25±4.91			

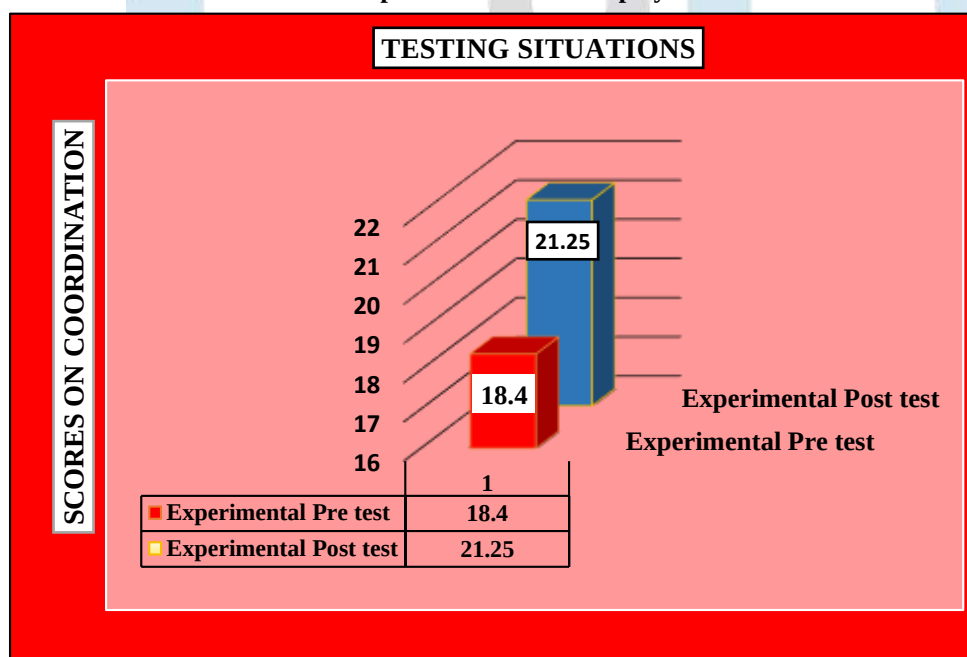
From table 2. it becomes clear that there is significant difference in Reaction time of experimental group in men section during pre-test and post-test situation. The Obtained 't' score is 5.044 which is higher than the critical value (2.093) required for significance at 0.05 levels of significance. The above information is graphically depicted in Figure 1.

Figure 1. Graphical illustration on differences in Reaction time of Experimental group between pre-test and post-test in Kabaddi players



From table 2, it becomes clear that there is significant difference in Coordination of experimental group in men section during pre-test and post-test situation. The Obtained 't' score is -7.388 which is higher than the critical value (2.093) required for significance at 0.05 levels of significance. The above information is graphically depicted in Figure 2.

Figure 2. Graphical illustration on differences in Coordination of Experimental group between pre-test and post-test in Kabaddi players



DISCUSSION ON FINDINGS

The present study was undertaken to examine the effect of resistance training on selected skill-related physical fitness components of Kabaddi players, specifically reaction time and coordination. The findings of the study showed significant improvement in most variables in the experimental group pre and post-intervention, indicating the effectiveness of resistance training in enhancing athletic performance in Kabaddi.

The present study revealed a significant improvement in reaction time among the experimental group, as measured by the Scale Drop Test, following eight weeks of resistance training. This enhancement suggests that consistent exposure to progressive overload in resistance exercises may have improved the neuromuscular efficiency and motor unit recruitment of the players, enabling faster initiation of responses during game situations. Similar improvements in reaction time due to strength-based interventions have been documented in youth and team sport athletes, highlighting the role of muscular strength and neural adaptation in reducing response latency (Behm et al., 2017). For Kabaddi players, faster reaction time is

essential for anticipating opponent movements, executing quick raids, and performing timely defensive maneuvers.

Coordination, assessed through the Ball Wall Toss Test, also showed a notable enhancement in the experimental group compared to the control group. This finding aligns with previous research indicating that resistance training can improve intermuscular coordination, proprioception, and hand-eye synchronization (Chepkorir, 2025). Improved coordination allows Kabaddi players to handle complex in-game situations that require rapid adjustments in body position, accurate limb movement, and efficient passing or tagging under time pressure. The observed improvements reinforce the importance of integrating resistance training with sport-specific drills to enhance skill-related physical fitness components critical to Kabaddi performance.

CONCLUSION

The results of this study revealed that an eight-week resistance training program led to significant improvements in reaction time (assessed using the scale drop test) and coordination (assessed using the ball wall toss test) in high school Kabaddi players. These findings indicate that resistance training effectively enhances the speed of response and the ability to coordinate complex movements—both of which are critical for successful performance in Kabaddi. The absence of improvement in the control group confirms that these gains were a direct result of the training intervention. Therefore, resistance training can be recommended as an essential component of skill-related physical fitness development in Kabaddi players.

REFERENCES

- De Mello, M. T., & Gomes, A. C. (2004). *Effects of resistance training on metabolism*. *Journal of Sports Science and Medicine*, 3(3), 234–239.
- Gabbett, T. J. (2008). Influence of fatigue on tackling technique in rugby league players. *Journal of Strength and Conditioning Research*, 22(2), 625–632.
- Bompa, T. O., & Buzzichelli, C. (2018). *Periodization: Theory and methodology of training* (6th ed.). Human Kinetics.
- Granacher, U., Lesinski, M., Büsch, D., Muehlbauer, T., Prieske, O., & Behm, D. G. (2016). Effects of resistance training in youth athletes on muscular fitness and athletic performance: A conceptual model for long-term athlete development. *Frontiers in Physiology*, 7, 164. <https://doi.org/10.3389/fphys.2016.00164>
- Behm et al., (2017) Effectiveness of traditional strength vs. power training on muscle strength, power, and speed with youth: A systematic review and meta-analysis. *Frontiers in Physiology*, 8, 423. <https://doi.org/10.3389/fphys.2017.00423>
- Kanagaraj, S., & Sethu, S. (2019). Influence of resistance training on selected motor fitness components among college men Kabaddi players. *Indian Journal of Public Health Research & Development*, 10(6), 270–273.
- Markovic, G., & Mikulic, P. (2010). Neuro-musculoskeletal and performance adaptations to lower-extremity plyometric training. *Sports Medicine*, 40(10), 859–895. <https://doi.org/10.2165/11318370-000000000-00000>
- Myer, G. D., Faigenbaum, A. D., Edwards, N. M., Clark, J. F., Best, T. M., & Sallis, R. E. (2011). Sixty minutes of what? A developing brain perspective for activating children with an integrative exercise approach. *British Journal of Sports Medicine*, 49(23), 1510–1516. <https://doi.org/10.1136/bjsports-2014-093661>
- Sharma, V., & Reddy, R. (2021). Analysis of motor fitness variables among Kabaddi and Kho-Kho players. *International Journal of Physical Education and Sports Studies*, 6(2), 45–49.
- Magill, R. A., & Anderson, D. (2017). *Motor learning and control: Concepts and applications* (11th ed.). McGraw-Hill Education.
- Baechle, T. R., & Earle, R. W. (2008). *Essentials of strength training and conditioning* (3rd ed.). Human Kinetics.
- Rao, S. (2002). *Manual of Kabaddi*. Sports Authority of India.
- Riebe, D., Ehrman, J. K., Liguori, G., & Magal, M. (2018). *ACSM's guidelines for exercise testing and prescription* (10th ed.). Wolters Kluwer.