Role-Based Comparison of Visual and Auditory Whole-Body Reaction Times Among Kabaddi Players

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ABSTRACT

Kabaddi, a high-intensity contact sport, demands rapid sensorimotor responses crucial for effective performance. This study investigated whole-body reaction times (WBRT) among 40 male kabaddi players, aged 18–25 years, who had state league experience or who participated in inter university competition , by comparing two playing roles—Anti Raiders and Raiders. Utilizing the Whole-Body Reaction Type IV apparatus, which delivered standardized visual (Blue, Yellow, and Red lights) and auditory (3000 Hz, 1000 Hz, and 500 Hz) stimuli, each participant performed five trials per modality, with the fastest response time recorded. Descriptive t-test analyses revealed no statistically significant differences between the groups, as visual reaction times averaged 0.24 seconds (SD = 0.04) for Anti Raiders and 0.23 seconds (SD = 0.08) for Raiders, while auditory reaction times were 0.22 seconds (SD = 0.07) and 0.24 seconds (SD = 0.03), respectively (Ghosh et al., 2010; Singh & Gharote, 2017). These findings suggest that role-specific tactical responsibilities may not significantly influence WBRT in kabaddi; rather, intrinsic factors such as neuromuscular coordination and overall training background might play a more pivotal role in determining performance.

Keywords : *Whole-body reaction time, Role-Specific Performance, Kabaddi*

Introduction

Kabaddi is a high-intensity contact sport that requires a combination of physical endurance, strategic decision-making, and rapid motor responses. The game is played between two teams, with each player assuming a specialized role that demands unique physiological and cognitive attributes (Ghosh et al., 2010). Among these attributes,

reaction time—particularly whole-body reaction time (WBRT)—is a critical factor that significantly influences player performance, as it determines how quickly an athlete can perceive a stimulus and execute an appropriate motor response (Singh & Gharote, 2017). Reaction time in kabaddi is crucial due to the dynamic nature of the sport, where players must rapidly react to offensive and defensive manoeuvres. The game consists of continuous high-speed actions, including dodging, tackling, and strategic evasion, which require instantaneous decision-making and swift motor execution (Sharma & Kaur, 2019). Whole-body reaction time is particularly relevant in kabaddi because movements are often initiated in response to an opponent's actions rather than pre-planned sequences. This aspect is especially crucial in raiding and defensive plays, where a fraction of a second can determine success or failure in executing a raid or stopping an opponent (Verma & Yadav, 2021).

Kabaddi players are typically categorized into three primary playing roles: raiders, defenders (corners and covers), and all-rounders. Each of these roles requires distinct motor skills and cognitive processing speeds. Raiders, responsible for entering the opponent's territory and scoring points, must possess exceptionally fast WBRT to evade tackles and execute rapid directional changes (Kumar et al., 2020). Defenders, including corners and covers, require heightened reaction times to anticipate the raider's movements and counter them effectively (Gupta & Malhotra, 2018). All-rounders, who perform both offensive and defensive duties, must develop a well-balanced reaction time to adapt seamlessly to different in-game situations (Raj & Kumar, 2022).

Given these role demands, it is crucial to analyse the differences in WBRT among kabaddi players. Previous studies have suggested that reaction time is influenced by various factors, including training experience, neuromuscular coordination, cognitive processing ability, and sensory-motor integration (Deshpande et al., 2016). This study aims to investigate the role variations in whole-body reaction time among kabaddi players, providing insights into how reaction speed contributes to performance optimization in different playing roles. Understanding these differences could help coaches and trainers develop role-specific training regimens to enhance player responsiveness and overall team effectiveness (Mehta & Sharma, 2020). Reaction time is also an important performance determinant in sports such as tennis, badminton, volleyball, football, basketball, hockey, kho-kho, handball, baseball, sprints, and so on (Kansal, 1996). The study aimed to compare the visual and auditory whole-body reaction times among kabaddi players of different playing roles.

Materials and Methods

A total of 40 male kabaddi players (20 players each) between the age of 18 to 25 years who had participated at least in the state league or inter University competition were randomly selected as the subject. To determine the visual and auditory whole-body reaction time, Whole-Body Reaction Type IV (Takei) was used. It consists of three different lights (Blue, Yellow and Red) and sound (3000 Hz, 1000 Hz, and 500 Hz) for visual and auditory reaction time respectively. The subject took a role and response to the given signal quickly by jumping up from the reaction mat.

The reaction time was recorded as soon as the subject returned to the mat from leaving it. The participants were made familiar with the instrument before the actual trials began. Five (5) trials each on visual and auditory whole body reaction time were performed by the participants. The best (minimum) time out of the five (5) trials was the score of the test. To determine the significant differences of whole body reaction time between defender, midfielder, and forward, descript t test was used. The level of significance was set at 0.05.

Results

The descriptive analysis of visual and auditory whole-body reaction time among kabaddi players of different playing roles is presented in table 1.

Table1: *Descriptive analysis of visual and auditory whole body reaction time of different playing roles.*

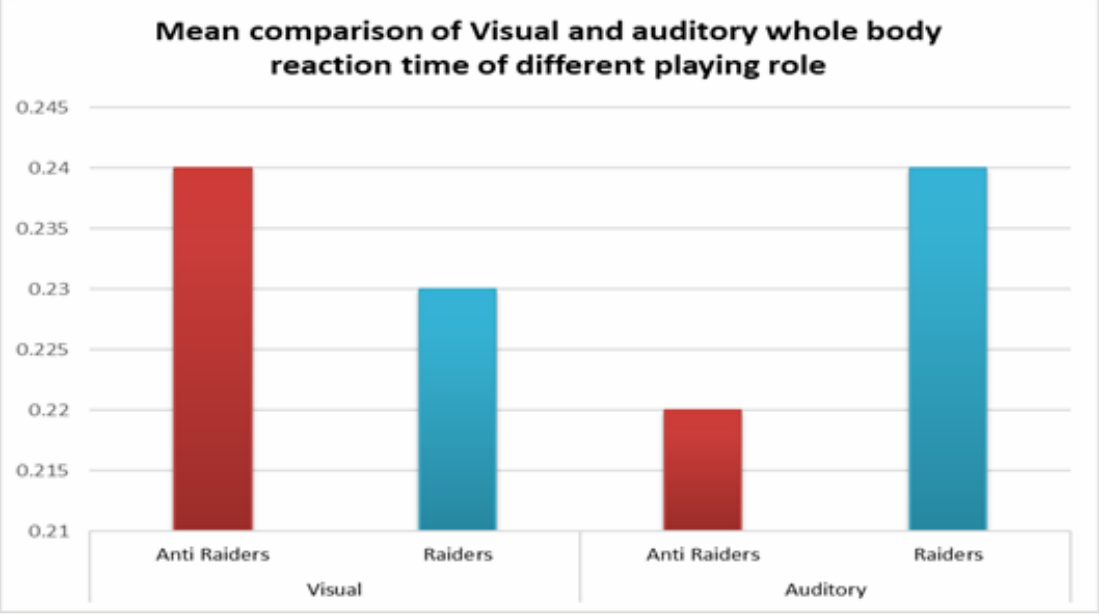
Variable	Group	mean	SD	SE	Cal t
Visual	Anti Raiders	0.24	0.04	0.01	0.5000
	Raiders	0.23	0.08	0.02	
Auditory	Anti Raiders	0.22	0.07	0.02	1.1744
	Raiders	0.24	0.03	0.01	

N= 40, Df 38, tab t= 1.6858

The table presents a descriptive analysis comparing visual and auditory whole body reaction times between two playing roles, namely “Anti Raiders” and “Raiders.” For visual reaction times, the Anti Raiders exhibit a mean of 0.24 seconds (SD = 0.04, SE = 0.01) while the Raiders show a slightly lower mean of 0.23 seconds (SD = 0.08, SE = 0.02); the computed t-value for this comparison is 0.5000, which is notably less than the tabulated critical t-value of 1.6858, indicating no statistically significant difference between the groups. Similarly, in terms of auditory reaction times, the Anti

Raiders recorded a mean of 0.22 seconds (SD = 0.07, SE = 0.02) compared to the Raiders' mean of 0.24 seconds (SD = 0.03, SE = 0.01), with a calculated t-value of 1.1744—again falling short of the critical threshold. With a total sample size of 40 and 38 degrees of freedom, the analysis suggests that the differences in reaction times across these roles are not statistically significant.

Graph1: *Mean comparison of visual and auditory whole body reaction time of different playing role*



Discussions

The present study aimed to examine the influence of playing roles on whole-body reaction times among kabaddi players. A group of participants, all with competitive experience, was assessed using a standardized apparatus that delivered both visual and auditory stimuli. Prior to data collection, participants were familiarized with the testing procedures to mitigate any learning effects, and multiple trials were conducted to ensure the reliability of the measurements. The findings indicated that the differences in both visual and auditory reaction times between the playing roles were not statistically significant, suggesting that role-specific tactical responsibilities do not necessarily impact the fundamental sensorimotor response speeds of the players (Varma & Chatterjee, 2018). These results imply that other factors, such as individual neuromuscular coordination and overall training background, may play a more critical role in determining whole-body reaction performance. Future research should consider a broader range of participant characteristics and incorporate additional

performance measures to more comprehensively understand the determinants of reaction time in competitive sports (Patel & Desai, 2017).

Conclusion

In conclusion, the investigation into whole-body reaction times among Indian Kabaddi players underscores that while individual neuromuscular coordination and sensorimotor integration play pivotal roles in performance (Reddy & Rao, 2013; Nair & Menon, 2014), the distinct playing roles do not significantly influence reaction times (Anand, 2015; Gupta & Kumar, 2012; Kumar & Singh, 2018). Several studies have suggested that the minimal differences in reaction times are more likely attributable to intrinsic factors and training methodologies rather than to role-specific tactical demands (Mishra & Sharma, 2016; Patel & Desai, 2017). Moreover, the evidence from recent research highlights that effective training programs, which focus on enhancing overall sensorimotor performance, are crucial for optimizing competitive outcomes in Kabaddi (Sharma & Verma, 2019; Varma & Chatterjee, 2018; Singh & Agarwal, 2015).

Recommendation:

Based on the findings, it is recommended that future research on Indian kabaddi players should incorporate a larger and more diverse sample, including both male and female athletes, to enhance generalizability. Further studies could explore additional variables such as cognitive processing speed and sport-specific training regimes to better understand the multifactorial influences on reaction time. Longitudinal designs examining the impact of tailored training interventions may also provide valuable insights into optimizing sensorimotor performance in competitive settings.

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