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Relationship of selected coordination ability with performance of Mysore University intercollegiate women Kho-Kho players

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Abstract
The purpose of the present study was to examine the relationship between reaction ability and Kho-Kho performance among Mysore University intercollegiate women players. Sixty (N = 60) women Kho-Kho players aged between 18 and 25 years, who participated in the intercollegiate tournaments during the academic year 2022-2023, were randomly selected as subjects. Reaction ability was assessed using the Reaction Time Test, while Kho-Kho performance was evaluated through a standardized performance rating scale covering both offensive and defensive skills, scored by expert coaches. Descriptive statistics and Pearson's Product Moment Correlation were employed to analyze the data, with the level of significance set at 0.05. The results revealed that reaction ability did not show a significant relationship with offensive skill performance. However, a statistically significant negative relationship was found between reaction ability and defensive skill performance, indicating that players with faster reaction times demonstrated better defensive efficiency. The findings suggest that reaction ability plays a crucial role in defensive aspects of Kho-Kho performance, while offensive performance is more dependent on technical and tactical factors. The study highlights the importance of incorporating reaction-based training programmes to enhance defensive performance among intercollegiate women Kho-Kho players.

Keywords: Reaction Ability, Kho-Kho Performance, Defensive Skills, Offensive Skills, Women Athletes

Introduction
Kho-Kho is one of India's most traditional and dynamic indigenous sports, demanding high levels of speed, agility, decision-making, and coordination. As a tag-and-chase game, Kho-Kho requires players to execute rapid directional changes, maintain body control, and respond instantly to opponents' movements. Such requirements make coordination ability a crucial biomotor component for successful performance (Singh & Kansal, 2018) [1]. Coordination is often defined as the ability of the neuromuscular system to perform smooth, accurate, and efficient movements, enabling athletes to link motor actions in a precise and controlled manner (Bompa & Haff, 2009) [2].

Among the various biomotor abilities, coordination plays a vital role in sports where quick reaction, spatial judgment, and motor adjustment are essential. Kho-Kho players must constantly coordinate their eyes, hands, and body movements while executing skills such as chasing, dodging, pole turning, and sudden acceleration or deceleration. Studies in team and invasion sports consistently highlight that athletes with superior coordination demonstrate better agility, faster reaction times, and greater tactical efficiency (Hirtz *et al*., 2013; Sharma & Kaushik, 2020) [3, 4].

Women's participation in Kho-Kho at the university level has increased significantly in recent years, especially in southern India, where Mysore University has been a strong hub for intercollegiate Kho-Kho competitions. Despite the growing competitive landscape, limited scientific research has examined how specific coordination abilities contribute to performance outcomes among women Kho-Kho players. Understanding this relationship is important for designing evidence-based training programmes and identifying performance predictors.

Coordination ability in sports is often measured using standardized tests such as reaction time, balance tests, or eye-hand coordination assessments. These tests provide quantifiable indicators of neural efficiency and motor control, which are directly relevant to performance in fast-paced games like Kho-Kho (Lidor & Ziv, 2015) [5].

Investigating the link between a selected coordination ability and Kho-Kho performance may therefore offer valuable insights for coaches, trainers, and sport scientists.

Given this context, the present study aims to examine the relationship between a selected coordination ability and the performance of Mysore University intercollegiate women Kho-Kho players. By identifying the strength and nature of this relationship, the study attempts to contribute to the scientific understanding of performance determinants in Kho-Kho and support the development of sport-specific training strategies.

Need for the study

Coordination plays a crucial role in Kho-Kho, especially in skills such as dodging, chasing, turning, and rapid movement. To understand how specific coordinative abilities influence performance among women players, it is important to examine their relationship scientifically. Earlier studies, such as those by Balasundar and Selvakannan [1], have reported significant links between various coordinative abilities and Kho-Kho performance in men players. However, limited research is available on women players at the intercollegiate level. Therefore, this study is needed to determine how a selected coordination ability relates to the performance of Mysore University intercollegiate women Kho-Kho players and to see whether the results support previous findings.

Objective of study

To find out whether there is any significant relationship of Reaction ability with Offensive and Defensive Skill Performance Mysore University inter collegiate women kh-kh- players.

Hypothesis

There is no significant relationship of Reaction Ability with Offensive and Defensive Skills performance in Mysore University inters collegiate women kho-kho players.

Review of Related Literature

Hirtz *et al*. (2013) [3] explained that coordinative abilities play a major role in improving how smoothly and accurately athletes move. They noted that players who possess better coordination can adjust their movements quickly, especially in sports that require frequent and rapid changes in direction. Sharma and Kaushik (2020) [4] observed that reaction time and balance significantly influence performance in indigenous sports. Their findings indicated that athletes with higher levels of coordination react faster and make better tactical choices, which are essential qualities for effective play in Kho-Kho. According to Lidor and Ziv (2015) [5], eye-hand coordination is a key factor in sports that demand quick perception and rapid skill execution. They reported that well-coordinated athletes are able to judge situations faster and perform actions more efficiently, an advantage that directly supports performance in chase-oriented games like Kho-Kho. Bompa and Haff (2009) [2] stated that regular coordination training improves neural control and movement organization. They found that enhanced coordination helps athletes maintain balance, move with agility, and execute skills with greater precision, all of which contribute to improved performance in competitive Kho-Kho.

Methodology

Subjects

The subjects for the present study were women Kho-Kho players who participated in the Mysore University intercollegiate Kho-Kho tournament during the academic year 2022-2023. The age of the subjects ranged from 18 to 25 years, and they were selected from various affiliated colleges of Mysore University.

Sample and Sample Size

To achieve the purpose of the study, a total of sixty (N = 60) women Kho-Kho players were randomly selected as the sample.

Variables of the Study

The study involved one independent variable and one dependent variable. Reaction ability was considered as the independent variable, while Kho-Kho performance was treated as the dependent variable.

Selection of Tests and Tools

Reaction ability was measured using the Reaction Time Test with the help of a reaction time apparatus. Kho-Kho performance was assessed using a standardized Kho-Kho performance rating scale developed for offensive and defensive skills. Performance scores were recorded in points.

Administration of Reaction Ability Test

The Reaction Time Test was administered to measure both simple and complex reaction speed. The subjects were seated comfortably in front of the reaction time apparatus, positioned at shoulder height to avoid visual cues from the tester. The test consisted of visual (red and green light) and auditory (tone and click) signals. Each subject performed 20 trials, including 10 visual and 10 auditory signals. The subjects were instructed to respond as quickly as possible upon receiving the signal. Reaction time for each trial was recorded, and the mean reaction time score was calculated separately for visual and auditory stimuli.

Assessment of Kho-Kho Performance

Kho-Kho performance was evaluated during actual competition using a structured performance rating scale covering both offensive and defensive skills. Three expert Kho-Kho coaches with extensive experience independently rated each player on a 100-point scale. Offensive skills included giving kho, tapping, pole turning, diving, surprise attacking, and tactical execution, while defensive skills included chain game, ring game, faking, avoiding post, avoiding clubbing, and dodging tactics. The scores awarded by the three experts were averaged to obtain the final performance score for each subject.

Statistical Techniques

Descriptive statistics such as mean and standard deviation were used to analyze the data. Pearson's Product Moment Correlation was applied to determine the relationship between reaction ability and Kho-Kho performance. The level of significance was set at 0.05.

Result

Table 1: Summary of Descriptive Statistics for Reaction Ability (SEC) of Women Kho-Kho Players

Minimum	1st Quartile	Median	Mean	3rd Quartile	Maximum
0.02500	0.09775	0.13900	0.15272	0.18725	0.98000

Table 1 illustrates the descriptive statistical values of reaction ability (SEC) among women Kho-Kho players. The reaction time scores ranged from a minimum of 0.025 seconds to a maximum of 0.980 seconds, showing noticeable variation in the players' reaction abilities. The mean reaction time (0.15272 seconds) is slightly higher than the median value (0.139 seconds), indicating a marginal positive skew in the distribution.

The first quartile value (0.09775 seconds) suggests that one-fourth of the players exhibited quicker reaction responses, while the third quartile (0.18725 seconds) reflects that most players responded within a reasonable time limit. These findings indicate that the majority of the players demonstrated adequate reaction ability, which is an important coordinative factor contributing to effective performance in Kho-Kho.

Table 2: Descriptive Statistics of Offensive Skill Performance of Mysore University Intercollegiate Women Kho-Kho Players

Minimum	1st Quartile	Median	Mean	3rd Quartile	Maximum
8.00	32.50	48.00	53.00	79.25	100.00

Table 2 presents the descriptive statistical values of offensive skill performance among women Kho-Kho players. The minimum score obtained was 8.00 points, while the maximum score reached 100.00 points, indicating a broad range of offensive performance levels within the sample. The mean score of 53.00 points and the median score of 48.00 points suggest that the overall offensive performance of the players was at a moderate level.

The first quartile value (32.50 points) indicates that 25% of the players scored below this level, whereas the third quartile (79.25 points) shows that 75% of the players achieved scores within this range. This distribution reflects noticeable variation in offensive skills such as giving kho, tapping, pole turning, and surprise attacking. Overall, the findings reveal that while a few players demonstrated high offensive efficiency, the majority exhibited average performance, highlighting scope for further skill-specific training.

Table 3: Descriptive Statistics of Defensive Skill Performance of Mysore University Intercollegiate Women Kho-Kho Players

Minimum	1st Quartile	Median	Mean	3rd Quartile	Maximum
18.00	29.75	41.50	51.35	78.25	100.00

Table 3 shows the descriptive statistical values of defensive skill performance among women Kho-Kho players. The scores ranged from a minimum of 18.00 points to a maximum of 100.00 points, indicating considerable variation in defensive efficiency within the group. The mean score (51.35 points) and the median score (41.50 points) suggest that the overall defensive performance of the players was at a moderate level. The first quartile value (29.75 points) indicates that one-fourth of the players demonstrated lower defensive proficiency, while the third quartile value (78.25 points) reflects that a majority of the players achieved relatively higher defensive scores. These results show differences in skills such as chain game, ring game, avoiding post, avoiding clubbing, and tactical dodging. Overall, the findings reveal that although some players exhibited strong defensive abilities, many showed average performance, suggesting the need for focused defensive skill training.

Table 4: Correlation between Reaction Ability (SEC) and Kho-Kho Performance of Mysore University Intercollegiate Women Kho-Kho Players

Reaction Ability (SEC)	R	't'	df	p-value
Offensive Skill	-0.1744046	-1.3489	58	0.1826
Defensive skill	-0.3571310	-2.9119	58	0.005092

Table 4 presents the correlation between reaction ability (SEC) and Kho-Kho performance components, namely offensive and defensive skills. The correlation coefficient between reaction ability and offensive skill was r = −0.174, with a *t* value of −1.3489 and a *p* value of 0.1826, which is not statistically significant at the 0.05 level. This indicates that reaction ability did not show a meaningful relationship with offensive skill performance among the players.

In contrast, the relationship between reaction ability and defensive skill was found to be statistically significant. The correlation coefficient was r = −0.357, with a *t* value of −2.9119 and a *p* value of 0.005, which is significant at the 0.05 level. The negative correlation suggests that players with faster reaction times (lower SEC values) demonstrated better defensive performance.

Overall, the findings indicate that reaction ability plays a significant role in enhancing defensive skills in Kho-Kho, while its influence on offensive skills appears to be limited among Mysore University intercollegiate women Kho-Kho players.

Discussion

The present study examined the relationship between reaction ability and Kho-Kho performance among Mysore University intercollegiate women players. The results indicated that reaction ability did not show a statistically significant relationship with offensive skills, suggesting acceptance of the null assumption for offensive performance. Offensive skills such as giving kho, tapping, pole turning, and surprise attacking mainly depend on technical proficiency, tactical awareness, and planned movement patterns rather than simple reaction speed, as reported by Singh and Kansal (2018) [1]. Hence, reaction ability alone may not be a decisive factor for offensive efficiency in Kho-Kho.

On the other hand, a statistically significant negative relationship was observed between reaction ability and defensive skill performance, leading to rejection of the null assumption for defensive performance. The negative correlation indicates that players with faster reaction times demonstrated superior defensive effectiveness. Defensive skills in Kho-Kho, including chain game, ring game, avoiding post, avoiding clubbing, and tactical dodging, require immediate perception of the attacker's movement and quick motor responses, as highlighted by Balasundar and Molanc Selvakannan (2016) [6]. Faster reaction ability enables defenders to anticipate movements and adjust positions efficiently during play.

These findings are in agreement with earlier studies. Balasundar and Molanc Selvakannan (2016) [6] reported that reaction ability showed a significant contribution to overall

Kho-Kho performance, particularly in situations involving rapid defensive responses. Similarly, Sharma and Kaushik (2020) [4] found that reaction time plays a vital role in indigenous sports characterized by chase-and-escape patterns, where quick decision-making and movement adjustments are essential. Bompa and Haff (2009) [2] also emphasized that improved neuromuscular efficiency and faster reaction speed enhance defensive performance in fast-paced team sports. The consistency between the present findings and previous studies confirms that reaction ability is a key determinant of defensive performance in women Kho-Kho players, while its influence on offensive skills remains limited.

Conclusion

Based on the findings of the present study, it may be concluded that reaction ability has a significant influence on the defensive performance of Mysore University intercollegiate women Kho-Kho players. Players with faster reaction times demonstrated better defensive efficiency in skills requiring quick perception, anticipation, and immediate response during play. However, reaction ability did not show a significant relationship with offensive performance, indicating that offensive skills in Kho-Kho are more dependent on technical proficiency and tactical awareness than on reaction speed alone. Therefore, emphasis on reaction-based training is recommended to enhance defensive effectiveness among women Kho-Kho players.

Recommendations

1. Coaches and physical education professionals should include reaction-based drills in regular Kho-Kho training programmes to improve defensive performance among women players.
2. Specific training methods such as visual and auditory reaction exercises may be emphasized to enhance quick decision-making during defensive situations.
3. Greater attention should be given to developing coordinative abilities, particularly reaction ability, at the intercollegiate level to strengthen overall defensive efficiency.
4. Similar studies may be conducted by including additional coordinative abilities such as balance, agility, and orientation to obtain a broader understanding of performance determinants in Kho-Kho.
5. Future research may involve larger samples and different competitive levels to generalize the findings more effectively.

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