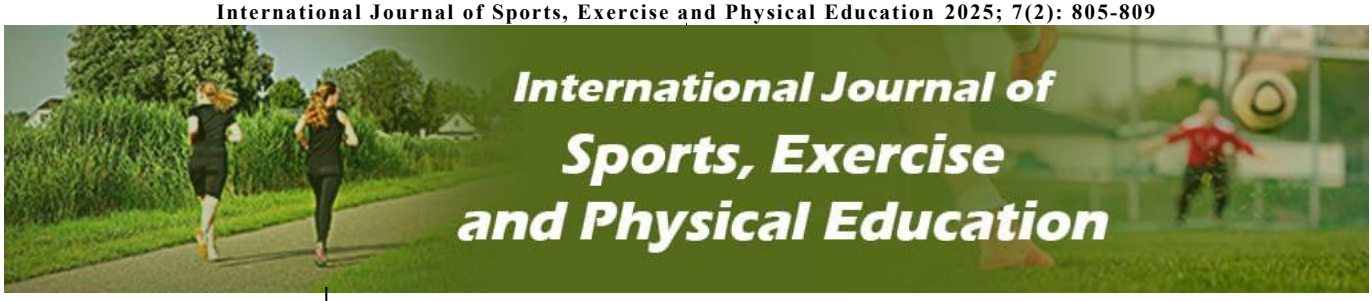

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Relationship of balance ability with performance of Mysore University intercollegiate women Kho-Kho players

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Abstract
Background: Kho-Kho is a dynamic indigenous Indian sport that demands rapid directional changes, sudden acceleration and deceleration, and precise body control. Among the coordinative abilities, balance plays a crucial role in maintaining postural stability and executing game-specific skills effectively. However, limited scientific evidence is available regarding the contribution of balance ability to performance among intercollegiate women Kho-Kho players.
Objective: The present study aimed to examine the relationship between balance ability and offensive as well as defensive performance of Mysore University intercollegiate women Kho-Kho players.
Methods: Sixty (N=60) women Kho-Kho players aged 18-25 years, who participated in the Mysore University Intercollegiate Tournament (2022-2023), were selected randomly. Balance ability was assessed using the Modified Bass Test of Dynamic Balance, while Kho-Kho performance was evaluated through a standardized performance rating scale covering offensive and defensive skills. Descriptive statistics and Pearson's Product Moment Correlation were applied, with the level of significance set at 0.05.
Results: The findings revealed a significant positive relationship between balance ability and offensive performance ($r=0.36$, $p<0.05$), as well as defensive performance ($r=0.34$, $p<0.05$). Players with higher balance ability demonstrated superior efficiency in executing both offensive and defensive skills.
Conclusion: The study concludes that balance ability is a significant determinant of Kho-Kho performance among intercollegiate women players. Incorporating balance-oriented training strategies may enhance overall playing performance and competitive effectiveness.

Keywords: Kho-Kho, balance ability, offensive and defensive performance, intercollegiate women players

Introduction
Kho-Kho is a traditional Indian team sport that requires players to perform rapid movements, sudden directional changes, quick turns around the pole, and continuous acceleration and deceleration. These dynamic actions demand a high level of physical fitness and motor control, particularly balance ability. Balance is essential for maintaining body stability during movement and while responding to external forces created by opponents, making it a key component of successful Kho-Kho performance.

Balance ability refers to the capacity of an individual to maintain the body's center of gravity within the base of support, both in static and dynamic conditions. It is closely associated with neuromuscular coordination, postural control, and proprioceptive efficiency. According to Bompa and Haff (2009) [1], balance is a fundamental biomotor ability that supports efficient movement execution and injury prevention in fast-paced sports. In games like Kho-Kho, players must frequently maintain balance while dodging, tapping, pole turning, diving, and avoiding fouls, which directly influences their effectiveness during competition.

Previous research in team and indigenous sports has highlighted the importance of balance in enhancing performance. Hirtz *et al*. (2013) [2] reported that athletes with superior balance demonstrate better movement efficiency and control during complex motor tasks. Similarly, Sharma and Kaushik (2020) [3] emphasized that balance ability significantly contributes to performance in indigenous sports where agility and rapid body adjustments are required.

These findings suggest that balance is a critical determinant of success in chase-and-escape games such as Kho-Kho.

Women's participation in Kho-Kho at the university level has increased considerably in recent years, especially in Karnataka, where Mysore University actively promotes intercollegiate competitions. Despite this growth, limited scientific studies have examined the specific role of balance ability in determining performance among women Kho-Kho players. Understanding this relationship is important for coaches and physical education professionals to design sport-specific training programmes that enhance performance and reduce injury risk.

Balance ability is commonly assessed using standardized tests such as the Stork Stand Test and Flamingo Balance Test, which provide objective measures of postural stability. These tests offer valuable insight into an athlete's ability to control body position during static and dynamic tasks (Magill & Anderson, 2017) [4]. Therefore, examining the relationship between balance ability and Kho-Kho performance may help identify key performance indicators and improve training strategies.

In view of the above considerations, the present study aims to investigate the relationship between balance ability and the performance of Mysore University intercollegiate women Kho-Kho players. The findings of this study are expected to contribute to the scientific understanding of performance determinants in Kho-Kho and provide practical guidance for coaching and training programmes.

History of Kho-Kho

Kho-Kho is one of the oldest indigenous games of India, with its roots traced back to ancient times. The game is believed to have originated from a traditional form known as *"Rathera"*, which was initially played on chariots (*rathas*) during ancient Indian civilization. Over time, the game evolved from chariot-based play to a ground-based version, making it accessible to a larger population and suitable for organized competition.

During the early 20th century, Kho-Kho underwent significant modernization. Standard rules, dimensions of the playing field, and team composition were formalized to make the game more structured and competitive. The first set of official rules was framed in Maharashtra, which played a major role in the development and popularization of Kho-Kho at the national level. The establishment of the Kho-Kho Federation of India in 1958 further contributed to the systematic promotion of the game across schools, colleges, and universities in India.

Kho-Kho has since become an integral part of physical education curricula and intercollegiate sports competitions throughout the country. The game emphasizes speed, agility, coordination, balance, and tactical intelligence, making it a valuable sport for developing overall physical fitness. In recent years, Kho-Kho has gained increased recognition through national championships, university tournaments, and professional leagues, leading to greater participation among women athletes as well (Singh & Kansal, 2018; Sharma & Kaushik, 2020) [1, 2].

Rationale for the study

Balance ability is a crucial coordinative component in Kho-Kho, as the game involves frequent dodging, quick directional changes, pole turning, and maintaining body control. Previous studies have shown that balance contributes significantly to performance in team and indigenous sports; however, limited research has focused specifically on balance ability among intercollegiate women Kho-Kho players. Therefore, the present study is needed to examine the relationship between balance ability and performance of Mysore University intercollegiate women Kho-Kho players and to provide scientific support for balance-oriented training programmes.

Objective of study

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

Hypothesis

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

Review of related literature

Balance ability is an essential coordinative component that supports postural stability and efficient movement execution in dynamic sports. Bompa and Haff (2009) [1] stated that balance plays a key role in maintaining body control during rapid movements and directional changes commonly seen in team sports.

Hirtz *et al*. (2013) [2] reported that athletes with better balance demonstrate improved movement precision and adaptability during complex motor tasks. Their findings emphasized the importance of balance in sports requiring quick body adjustments and control under competitive conditions.

Studies on indigenous sports have also highlighted the contribution of balance ability to performance. Sharma and Kaushik (2020) [3] found that balance significantly influences performance efficiency in chase-and-escape games by enhancing control during sudden movements. Similarly, Balasundar and Molanc Selvakannan (2016) [4] observed that balance ability contributes meaningfully to overall Kho-Kho performance, particularly in defensive situations.

Although previous studies support the importance of balance ability in sport performance, limited research has focused specifically on intercollegiate women Kho-Kho players. Therefore, examining the relationship between balance ability and performance among Mysore University women players is both relevant and necessary.

Methodology

Study Design

The present study employed a descriptive correlational research design to examine the relationship between balance ability and Kho-Kho performance among Mysore University intercollegiate women Kho-Kho players.

Subjects

The subjects for the present investigation 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 variables selected for the study were
- **Independent Variable:** Balance Ability
- **Dependent Variable:** Kho-Kho Performance

The following standardized tests and tools were used for data collection.

Table 1: Selection of tests and tools

Variable	Test / Tool	Unit
Balance Ability	Modified Bass Test of Dynamic Balance	Score
Kho-Kho Performance	Kho-Kho Performance Rating Scale	Points

Administration of the modified bass test of dynamic balance
Balance ability was assessed using the Modified Bass Test of Dynamic Balance. The test required the subject to leap from one marked position to another in a prescribed pattern while alternating feet. Upon landing on each marker, the subject was instructed to maintain balance on the ball of the foot for a maximum of 5 seconds. Each successful landing earned 5 points, and an additional 1 point per second was awarded for maintaining balance, with a maximum of 10 points per marker. The total possible score for the test was 100 points. Penalties were applied for improper landing and balance errors as per standardized testing procedures.

Assessment of Kho-Kho Performance
Kho-Kho performance was evaluated using a standardized performance rating scale during actual match play. Three expert Kho-Kho coaches independently rated each player's offensive and defensive skills on a 100-point scale. The scores awarded by the experts were averaged to obtain the final performance score for each subject, ensuring objectivity and consistency in assessment.

Collection of Data
Data were collected at the venue of the Mysore University intercollegiate women's Kho-Kho competition during the academic year 2022-2023. The subjects were briefed about the test procedures prior to data collection. Balance ability testing was conducted under standardized conditions during non-competition hours, while performance ratings were recorded during competition.

Statistical Techniques
The collected data were analyzed using descriptive statistics (mean and standard deviation). Pearson's Product Moment Correlation was employed to determine the relationship between balance ability and Kho-Kho performance. The level of significance was set at 0.05.

Results
Table 2 presents the descriptive statistical values of balance ability scores among Mysore University intercollegiate women Kho-Kho players. The balance scores ranged from a minimum of 9.00 points to a maximum of 78.00 points, indicating considerable variation in balance ability within the sample. The mean score (42.97 points) was close to the median value (42.00 points), suggesting a relatively symmetrical distribution of balance ability scores.

Table 2: Descriptive statistics of balance ability scores of Mysore university intercollegiate women Kho-Kho players

Minimum	1st Quartile	Median	Mean	3rd Quartile	Maximum
9.00	30.50	42.00	42.97	55.00	78.00

The first quartile value (30.50 points) indicates that 25% of the players demonstrated lower balance ability, while the third quartile value (55.00 points) shows that 75% of the players achieved scores within this range. These results suggest that the majority of the players possessed a moderate level of balance ability, which is essential for executing dynamic movements and maintaining postural control during Kho-Kho performance.

Table 3: 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 3 presents the descriptive statistical values of offensive skill performance among Mysore University intercollegiate women Kho-Kho players. The offensive performance scores ranged from a minimum of 8.00 points to a maximum of 100.00 points, indicating a wide range of performance levels within the sample. The mean score of 53.00 points was higher than the median score of 48.00 points, suggesting a slight positive skew in offensive performance.
The first quartile value (32.50 points) indicates that one-fourth of the players scored below this level, whereas the third quartile value (79.25 points) shows that the majority of players achieved relatively higher offensive scores. These findings reflect variability in offensive skills such as giving Kho, tapping, pole turning, and surprise attacking. Overall, the results indicate that while some players demonstrated high offensive efficiency, most exhibited a moderate level of offensive performance, highlighting scope for further improvement through skill-specific training.

Table 4: 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 4 presents the descriptive statistical values of defensive skill performance among Mysore University intercollegiate women Kho-Kho players. The defensive performance scores ranged from a minimum of 18.00 points to a maximum of 100.00 points, indicating substantial variation in defensive efficiency within the sample. The mean score (51.35 points) was higher than the median score (41.50 points), suggesting a slight positive skew in defensive performance.
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 highlight differences in defensive skills such as chain game, ring game, avoiding post, avoiding clubbing, and tactical dodging. Overall, the

findings suggest that while some players exhibited strong defensive capabilities, many displayed moderate performance, emphasizing the need for focused defensive skill development.

Table 5: Correlation between balance ability and Kho-Kho performance of Mysore University intercollegiate women Kho-Kho players

Balance Ability (Point)	R	'T'	DF	P-Value
Offensive Skill	0.36	2.94	58.00	0.00
Defensive skill	0.34	2.77	58.00	0.01

Table 5 presents the correlation between balance ability and Kho-Kho performance components, namely offensive and defensive skills, among Mysore University intercollegiate women Kho-Kho players. The correlation coefficient between balance ability and offensive skill performance was r=0.36, with a *t* value of 2.94 and a *p* value of 0.00, which is statistically significant at the 0.05 level. This indicates a moderate positive relationship, suggesting that players with better balance ability tend to exhibit higher offensive performance.

Similarly, balance ability showed a significant positive relationship with defensive skill performance (r=0.34, T=2.77, P=0.01). This finding indicates that improved balance ability contributes meaningfully to defensive effectiveness, as defensive skills in Kho-Kho require body control, stability, and quick positional adjustments.

Overall, the results demonstrate that balance ability is significantly related to both offensive and defensive performance in Kho-Kho, highlighting its importance as a key coordinative factor influencing overall playing performance among intercollegiate women Kho-Kho players.

Discussion

The findings of the present study revealed a significant positive relationship between balance ability and both offensive and defensive performance among Mysore University intercollegiate women Kho-Kho players. Since the obtained p-values were less than the 0.05 level of significance, the null hypothesis stating that there is no significant relationship between balance ability and Kho-Kho performance was rejected.

The significant association between balance ability and offensive skills suggests that better postural control and body stability enhance the execution of skills such as giving Kho, tapping, pole turning, and surprise attacking. Similarly, the positive relationship between balance ability and defensive performance indicates that balance plays a crucial role in skills requiring quick positional adjustments and controlled movements during play.

These findings are consistent with previous studies. Bompa and Haff (2009) [1] emphasized that balance is a key biomotor ability influencing performance in dynamic sports. Hirtz *et al*. (2013) [2] reported that athletes with superior balance demonstrate better movement efficiency and adaptability. Sharma and Kaushik (2020) [3] and Balasundar and Molanc Selvakannan (2016) [4] also observed that balance ability significantly contributes to performance in indigenous sports and Kho-Kho. Thus, the present study confirms the importance of balance ability as a determinant of Kho-Kho performance among intercollegiate women players.

Conclusion

Based on the findings of the present study, it may be concluded that balance ability has a significant positive relationship with both offensive and defensive performance of Mysore University intercollegiate women Kho-Kho players. Players with better balance demonstrated greater efficiency in executing game-specific skills that require stability, control, and quick positional adjustments. The results highlight balance ability as an important coordinative component contributing to overall Kho-Kho performance. Therefore, incorporating balance-oriented training exercises into regular coaching programmes may enhance performance levels among intercollegiate women Kho-Kho players.

Recommendations

- Coaches should incorporate balance-oriented exercises such as dynamic balance drills and stability training into regular Kho-Kho practice sessions.
- Training programmes may emphasize postural control and body stability to improve both offensive and defensive performance of women Kho-Kho players.
- Physical education professionals are encouraged to assess balance ability regularly to identify performance strengths and training needs.
- Similar studies may be conducted on different age groups, competitive levels, and genders to generalize the findings.
- Future research may include additional coordinative abilities alongside balance to gain a broader understanding of performance determinants in Kho-Kho.

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