

Assessment of Performance Characteristics of Female Kho-Kho Players at National Level: A Study of Attackers and Defenders

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Abstract: The present study investigated the performance characteristics of national level kho-kho female players, particularly attackers and defenders. Purposive sampling was employed to select 40 female players (age 18-25 years), who were divided into two equal groups of 20: Group A (attackers) and Group B (defenders). The study explored the difference between the two roles by assessing speed, agility, explosive strength, endurance, flexibility, reaction time and role specific skill-performance. Data collection was performed in two sessions with structured protocols under the same environmental conditions. The data were analysed with descriptive statistics and independent samples t-tests. Statistically significant differences between groups were found. Attackers were significantly better in terms of speed, agility, explosive strength, endurance reaction time and skill performance, while attacker demonstrate significantly higher endurance performance compared to defenders. The results suggest that the physical and skill demands of the two positions are different and may require position-specific training strategies.

Keywords: Kho-Kho, Attackers, Defenders, Physical Fitness, Reaction Time, Role-Specific Skill-Performance.

Introduction

Kho-Kho is one of the oldest and culturally significant traditional sports of India having its roots thousands of years back. Kho-kho is played on a rectangular field by two teams of twelve players, nine of whom are on the field at any given time. This demands a high level of physical fitness, quick reflexes and intelligent decision making. In the game there are two basic roles, attacking (chasing) and defending (running). Teams take these roles in designated innings. The attackers have to chase and tag the defenders, and they have to do this within a certain time frame. Their success depends on explosive acceleration, the ability to anticipate and good attacking skills such as the pole dive. In contrast, defenders must use high levels of agility, endurance, zigzag running patterns and fast changes in direction to avoid the attackers. This research aims to systematically evaluate the performance of the female attackers and defenders at the national level of Kho-Kho. The goal of this study is to generate scientifically valid data on speed, agility, endurance, explosive strength, flexibility, reaction time and skill-specific performance that can directly inform coaching strategies, talent identification and player development programs.

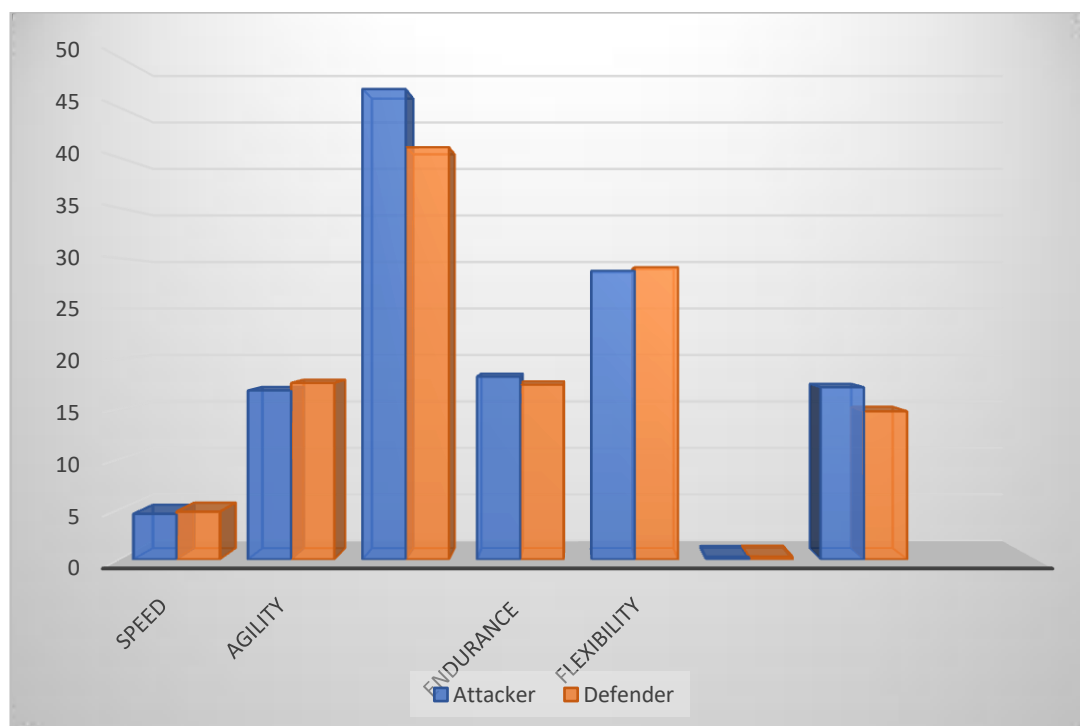
Methodology

The subjects were selected by purposive sampling technique and total 40 female national level Kho-Kho players (age 18-25 years) were selected. Participants were divided into two equal groups according to their primary playing role: Group A (Attackers) (n = 20) Group B (Defenders) (n = 20). Data collection was performed by one investigator using a structured two-session protocol under identical environmental conditions: Session 1: Anthropometric measures and physical fitness tests. Session 2: Reaction Time Test and Skill Performance Evaluation. All data collected were coded and analysed with the statistical software Jamovi (Version 2.X). All the variables in both groups were evaluated by descriptive statistics. An independent samples t-test was used to identify statistically significant differences between the attackers and defenders. Level of significance was set at $p < 0.05$ (two-tailed, $df = 38$, critical t-value = 2.024).

Discussion of Findings

The findings substantiate that attackers and defenders possess distinct physiological and technical profiles, thereby emphasizing the necessity for position-specific training and selection protocols in Kho-Kho.

Variables	Groups	N	Mean	SD	t-value	p-value
Speed (sec)	Attacker	20	4.54	0.06	-13.36	<0.001
	Defender	20	4.76	0.05		
Agility (sec)	Attacker	20	16.83	0.20	-14.12	<0.001
	Defender	20	17.58	0.13		
Explosive Strength (cm)	Attacker	20	46.85	2.27	10.02	<0.001
	Defender	20	41.05	1.27		
Endurance (score/min) YO-YO Intermittent Recovery Test	Attacker	20	18.20	0.86	3.82	<0.001
	Defender	20	17.40	0.38		
Flexibility (cm)	Attacker	20	28.75	1.61	-0.83	0.681
	Defender	20	29.10	0.96		
Reaction Time (sec)	Attacker	20	0.25	0.02	-4.00	0.49
	Defender	20	0.27	0.01		
Skill Performance (pts)	Attacker	20	17.15	1.22	7.62	<0.001
	Defender	20	14.75	0.71		



- Speed and agility:** Attackers were much faster than defenders in sprint time (4.54 vs. 4.76 s, $p < 0.001$) and agility (16.83 vs. 17.58 s, $p < 0.001$). These results are in line with the previous studies (Raj Kumar, 2019; Choudhary & Singh, 2019; Mishra, 2020) which suggest that chasing role necessitates complex strategic placement, quick changes in directions and sudden explosive accelerations.
- Explosive Strength:** Attackers had significantly higher explosive lower-limb power (46.85 cm vs. 41.05 cm, $p < 0.001$). This confirms Sharma and Patel's (2021) claim that a high plyometric capacity and power of the lower body are important for quick chasing actions.
- Endurance (YO-YO Intermittent Recovery Test):** Statistically significant differences were observed between attackers and defenders in endurance capacity (18.20 ± 0.86 vs. 17.40 ± 0.38 , $p < 0.001$). Attackers demonstrated higher endurance levels, likely due to continuous high-intensity chasing and court coverage required during offensive play. This aligns with Tripathi et al. (2024), who emphasized the high cardiovascular demand placed on active chasers.

4. **Flexibility:** Statistically significant differences for flexibility ($p = 0.6813$). Consistent with the baseline hamstring and lower-back flexibility demands remain structurally identical for both attacking and defending roles.
5. **Reaction Time:** Attackers also demonstrated significantly quicker reaction times (0.25 s vs. 0.27 s, $p = 0.0499$). This aligns with Saha (2022), indicating that the chasing role requires heightened cognitive demands, rapid perceptual-motor responses to defender movements, and anticipatory "Kho" calls.
6. **Skill-Performance:** On a comparable 20-point scale evaluating role-specific competencies (tapping success for attackers and dodging efficiency for defenders), attackers scored significantly higher (17.15 vs. 14.75, $p = 0.0003$). This supports Singh and Devi (2022), confirming that tapping accuracy and dodging efficiency represent fundamentally distinct technical demands.

Conclusion

The physiological, biomechanical and technical characteristics of attacking and defending females of Kho-Kho at national level are different. The attackers are better in speed, agility, power, response time and skill execution while attacker outperformed defenders in speed, agility, power, reaction time, endurance, and skill execution. Defenders and attackers showed equivalent levels of flexibility, indicating that lower-body flexibility is a universal physical prerequisite across both playing roles in Kho-Kho rather than a position-specific differentiator. Roles that are alike have alike features. The results will set a foundation for future research and underline the need for role-specific scientific training, selection and performance monitoring in Kho-Kho.

Recommendations

1. **Position-Specific Interventions:** Evaluate specialized training programs to determine if distinct regimens for attackers and defenders maximize performance compared to generalized training.
2. **Biomechanical Analysis:** Utilize 3D motion capture to study the mechanical efficiency of elite skills, such as the pole dive and ring game maneuvers.
3. **Cognitive and Reactive Profiling:** Measure real-time tactical decision-making, anticipatory reaction times, and spatial awareness during live match simulations.
4. **Longitudinal and Injury Tracking:** Monitor seasonal fluctuations in physical profiles and investigate position-specific injury risks unique to elite female players.
5. **Talent Identification:** Compare senior benchmarks with junior cohorts to establish data-driven pathways for early talent detection.

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