IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

FLEXIBILITY, AGILITY, AND HAND GRIP STRENGTH AMONG MALE KABADDI AND KHO-KHO PLAYERS AT THE UNIVERSITY LEVEL: A COMPARATIVE ANALYSIS

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

[1]Research scholar, Department of Physical Education and Sports, School of Education and Training, Central University of Tamil Nadu. Thiruvarur -610005

[2]Guest lecturer Department of P.G. Studies and Research in Physical Education, Kuvempu University, Jnanasahyadri Shankaraghatta, Shivamogga District, Karnataka, India

ABSTRACT

Flexibility, agility, and muscular strength are integral physical fitness components that underpin performance in indigenous Indian sports. The present study aimed to compare these three selected fitness attributes flexibility (Sit and Reach Test), agility (Illinois Agility Test), and muscular strength (Hand Grip Strength) between male Kabaddi and Kho-Kho players at Kuvempu University.

Methods: Sixty male inter-collegiate and inter-university level athletes (30 Kabaddi, 30 Kho-Kho), aged 19-28 years, were selected by purposive sampling. Flexibility was measured using the Sit and Reach Test, agility using the Illinois Agility Test (IAT), and muscular strength using a calibrated hand grip dynamometer for both hands. A paired samples t-test was applied at the 0.05 significance level.

Results: A statistically significant difference was found in flexibility in favor of Kho-Kho players (M = 135.30 cm vs. M = 110.77 cm; p = .001). No significant differences were found in agility (p = .508), right-hand grip strength (p = .561), or left-hand grip strength (p = .664) between the two groups.

Conclusions: Kho-Kho players demonstrated significantly superior flexibility, likely attributable to the sport's dynamic positional demands. Agility and grip strength were comparable between the two sport groups at this competitive level.

Keywords: Kabaddi, Kho-Kho, flexibility, agility, hand grip strength, indigenous sports, university athletes, physical fitness.

INTRODUCTION

The scientific study of physical fitness in indigenous sports has gained increasing prominence within Indian sports science over the past two decades. Traditional sports such as Kabaddi and Kho-Kho, which are practiced at every level of competition from grassroots school games to professional leagues, offer a rich domain for comparative physical fitness research. Understanding the fitness profiles that distinguish players of these two sports is of both theoretical and applied significance (Lal, 2012; Rajendran & Nagarajan, 2014).

Flexibility, defined as the range of motion available at a joint or series of joints (Wilmore et al., 2017), is a fitness component of particular relevance to Kho-Kho. The game demands frequent low dives, extreme directional changes, wide lateral movements, and sudden positional shifts that require substantial hamstring and lower back flexibility in order to be performed safely and effectively (Jadhav & More, 2016; Anand & Balasubramanian, 2019). In Kabaddi, flexibility is also required to execute the extreme trunk and limb positions encountered during physical confrontations, though the game's emphasis on contact-based strength and explosive power may relatively deprioritize systematic flexibility training.

Agility, the ability to change direction rapidly while maintaining control, balance, and speed (Johnson & Nelson, 1986; Barrow & McGee, 1979) is a shared physical demand of both Kabaddi and Kho-Kho. Both sports involve frequent and unpredictable multidirectional movement within confined court spaces, and both require players to respond instantaneously to the movements of opponents. Research has examined agility in both sports (Tamilvanan & Thiyagarajan, 2023; Singh & Dubey, 2016), though findings have been inconsistent regarding whether one sport group exhibits a measurable agility advantage over the other.

Hand grip strength is a validated and widely employed measure of overall upper body muscular strength and general physical conditioning (Mathiowetz et al., 1985; Fox et al., 2018). In Kabaddi, grip strength is directly applied during tackles and holds, where defenders must exert substantial force to restrain a raider attempting to escape. Kho-Kho does not involve direct physical contact, yet both sports require regular physical conditioning and athletic training that may develop grip strength to equivalent degrees.

While individual comparisons of flexibility or agility between Kabaddi and Kho-Kho players have been reported in the literature (Pandey et al., 2016; Jadhav & More, 2016; Tamilvanan & Thiyagarajan, 2023), a combined investigation of flexibility, agility, and grip strength in a single study among Kuvempu University players has not been undertaken. The present study addressed this gap, aiming to generate integrated comparative data on these three fitness attributes.

OBJECTIVES

The objectives of this study were: to compare the flexibility of male Kabaddi and Kho-Kho players using the Sit and Reach Test; to compare agility between the two groups using the Illinois Agility Test; and to compare muscular strength between the two groups using hand grip dynamometry.

METHODOLOGY

A descriptive comparative design was employed to examine between-group differences in selected physical fitness variables without experimental intervention. Sixty male athletes from Kuvempu University were selected using purposive sampling: 30 Kabaddi players and 30 Kho-Kho players. All participants had competed at inter-collegiate or inter-university level with a minimum of two years of training. Age ranged from 19 to 28 years. Participants with recent injuries were excluded. Written informed consent was obtained from all participants prior to data collection (The Details are given in tables 1).

Table 1. Details of selection of subjects for study

Sl. No	Age (Years)	Level of Participation	Number of Subjects
Kabaddi	19–28	Inter-Collegiate/Inter-University	30
Kho-Kho	19–28	Inter-Collegiate/Inter-University	30
Total			**60**

ASSESSMENT TOOLS AND PROTOCOL

Flexibility: Sit and Reach Test

Flexibility was assessed using the Sit and Reach Test, a widely validated measure of hamstring and lower back flexibility (Wells & Dillon, 1952). Each participant sat on the floor with both legs fully extended and feet flat against the measurement box. With hands overlapping and palms facing downward, the participant slowly reached forward along the measurement scale as far as possible without bending the knees. The farthest point reached was recorded in centimeters. Two trials were administered and the better score was retained.

Agility: Illinois Agility Test

The Illinois Agility Test was administered on a flat, non-slip surface in accordance with standardized specifications. The course measured 10 m × 5 m with four centrally placed cones. Starting from a prone position, participants completed the course involving multiple rapid direction changes upon the signal. Elapsed time was recorded in seconds to the nearest 0.01 second, and the best of two trials was retained (Getchell, 1979; Sharma & Thakur, 2017).

Muscular Strength: Hand Grip Dynamometer

Grip strength was assessed for both hands using a calibrated Smedley-type hand grip dynamometer (Mathiowetz et al., 1985). Each participant stood upright with the arm extended slightly away from the body. Three trials were administered per hand, and the highest recorded value in kilograms of force (kgf) was retained as the final score.

The assessment of selected physical fitness components- Speed, agility, and muscular strength was carried out using established test protocols, which are summarized in Table2.

Table 2. Summary of Physical Fitness Variables and Tests Used in the Present Study.

Sl. No.	Fitness Component	Test Used	Unit of Measurement
1	**Flexibility**	Sit and reach test	centimeters (cm)
2	**Agility**	Illinois Agility Test	Seconds (s)
3	**Muscular Strength**	Hand Grip Strength Test	Kilograms of Force (kgf)

For data analysis, the raw scores obtained from these tests were subjected to descriptive statistical techniques, including the calculation of mean and standard deviation, to understand the distribution and variability of the data. To compare the mean scores of different groups, a paired sample t-test was employed as the primary inferential statistical tool in the present study.

RESULT OF THE STUDY

Descriptive statistics including Mean (M) and Standard Deviation (SD) were computed for each variable across both groups. To examine whether significant between-group differences existed, the paired samples t-test was employed at the 0.05 level of significance. The degrees of freedom were set at 29, and the critical tabulated t-value was 2.045. A calculated t-value exceeding this threshold was considered indicative of a statistically significant difference between the Kabaddi and Kho-Kho groups (The results are presented in Table 3).

Table 3. Descriptive Statistics of Selected Physical Fitness Components: Flexibility (Sit and Reach), Agility (Illinois Agility Test), and Muscular Strength (Hand Grip Right and left) of Male Kabaddi and Kho-Kho Players.

Variable	Group	N	Mean	SD	Std. Error Mean
Sit and Reach (cm)	Kho-Kho	30	135.30	22.678	4.140
	Kabaddi	30	110.77	30.662	5.598
Illinois Agility Test (s)	Kho-Kho	30	19.70	0.762	0.139
	Kabaddi	30	19.82	0.855	0.156
Hand Grip Right (kgf)	Kho-Kho	30	41.04	7.078	1.292
	Kabaddi	30	42.22	7.782	1.421
Hand Grip Left (kgf)	Kho-Kho	30	40.19	6.787	1.239
	Kabaddi	30	41.02	7.127	1.301

Significant at 0.05 level

As shown in Table 2, Kho-Kho players recorded a considerably higher mean Sit and Reach score (M = 135.30 cm, SD = 22.678) compared to Kabaddi players (M = 110.77 cm, SD = 30.662). The Illinois Agility Test means were closely similar between the two groups. Hand grip strength means were also closely matched, with Kabaddi players recording marginally higher values.

The data was analysed using a t-test for further inference, with details provided in table 4.

Table 4. Summary of 't' Test Results for Flexibility (Sit and Reach) of Kabaddi and Kho-Kho Players of Kuvempu University.

Variable	Mean Difference	SD	Std. Error	df	t-value	Sig. (2-tailed)
Sit and Reach (cm)	24.533	34.765	6.347	29	3.866	**.001***

Significant at 0.05 level

Table 4 presented the paired samples 't' test results for the flexibility variable as measured by the Sit and Reach. The obtained mean difference was 24.533 cm, standard deviation was 34.765, and the standard error was 6.347 with 29 degrees of freedom. The calculated 't' value was 3.866, which exceeded the tabulated 't' value of 2.045 at the 0.05 level of significance (p = .001). Since the calculated 't' value was greater than

the tabulated 't' value, a statistically significant difference existed in flexibility between Kabaddi and Kho-Kho players. The results are further illustrated in Figure 1.

Figure 4.1. Graphical Comparison of Mean Flexibility (Sit and Reach) Scores Between Male Kabaddi and Kho-Kho Players of Kuvempu University.

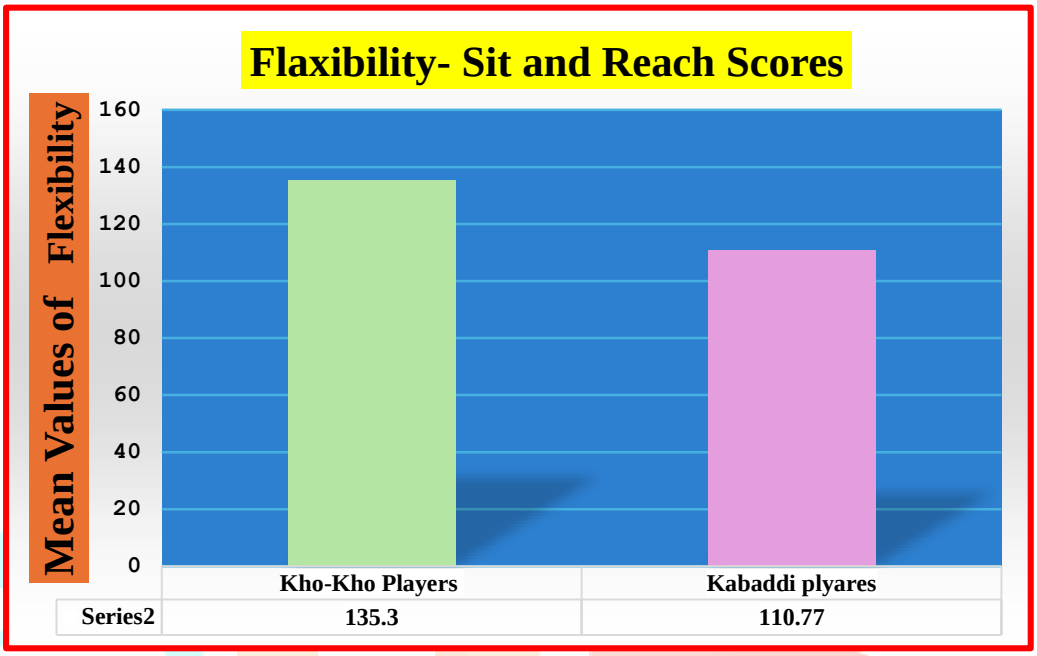

Table 5. Summary of 't' Test Results for Agility (Illinois Agility Test) and Muscular Strength (Hand Grip Strength - Right and Left) of Kabaddi and Kho-Kho Players of Kuvempu University

Variable	Mean Difference	SD	Std. Error	df	t	Sig. (2-tailed)
Illinois Agility Test (s)	-0.124	1.013	0.185	29	-0.671	**.508**
Hand Grip Right (kgf)	-1.180	10.996	2.008	29	-0.588	**.561**
Hand Grip Left (kgf)	-0.830	10.360	1.892	29	-0.439	**.664**

Significant at 0.05 level.

Table 5. presented the paired samples 't' test results for Agility and Muscular Strength variables. The calculated 't' value for Agility as measured by the Illinois Agility Test was -0.671 with 29 degrees of freedom (p = .508), for Muscular Strength of the Right Hand as measured by the Hand Grip Strength Test was -0.588 with 29 degrees of freedom (p = .561), and for Muscular Strength of the Left Hand was -0.439 with 29 degrees of freedom (p = .664). Since all three calculated 't' values were less than the tabulated 't' value of 2.045, the differences observed between Kabaddi and Kho-Kho players in these variables were not statistically significant at the 0.05 level of confidence.

DISCUSSION ON FINDINGS

The significantly superior flexibility demonstrated by Kho-Kho players constitutes the most important finding of this investigation. The structural demands of Kho-Kho provide a compelling mechanistic explanation for this result. Kho-Kho runners routinely execute extreme positional maneuvers including low-level dives, sharp lateral lunges, and wide stride patterns to evade chasers (Anand & Balasubramanian, 2019; Jadhav & More, 2016). Over time, these habitual movement patterns produce systematic adaptations in the flexibility of the hamstrings, hip flexors, and lumbar musculature, resulting in the superior sit-and-reach performance observed in the present study.

This finding was strongly consistent with prior research. Pandey et al. (2016) compared flexibility between Kabaddi and Kho-Kho male players and found significantly greater sit-and-reach performance in Kabaddi players from their institution; however, their finding differed from the present result, possibly due to differences in sample characteristics, training protocols, and institutional environments. Singh and Banerjee et al. (2017) and Avijit and Banerjee (2023), on the other hand, found significant differences in the Sit and Reach Test with Kho-Kho players demonstrating greater flexibility, corroborating the present finding. Sana and Barman (2017) similarly reported that Kho-Kho players were superior in back and hamstring flexibility compared to Kabaddi players.

The non-significant difference in agility between the two groups reinforced the argument that both sports impose structurally similar demands on multidirectional movement capacity. At the inter-collegiate and inter-university level, the training programs of both Kabaddi and Kho-Kho players typically include drills and conditioning exercises designed to improve direction-change speed and balance. This convergence of training content may explain the comparable agility profiles observed across the two sport groups (Verma & Tiwari, 2018). Haridas (2024), in a study comparing core strength and dynamic balance, similarly found no significant differences between Kabaddi and Kho-Kho players, suggesting a broader pattern of convergence in dynamic physical attributes at the university competitive level.

The absence of a significant grip strength difference between the two groups is consistent with previous reports. Jadhav and Gadhare (2024) found no significant difference in muscular strength between university-level Kabaddi and Kho-Kho players, suggesting that general athletic conditioning at this level of competition produces comparable upper extremity strength outcomes regardless of sport-specific demands. The marginally higher grip strength values in Kabaddi players observed in the present study, though not statistically significant, may nonetheless reflect the incremental contribution of the direct physical engagement and tackle-based training that characterizes Kabaddi preparation.

From a practical standpoint, the superior flexibility of Kho-Kho players suggests that flexibility training should be a more intensified component of Kabaddi conditioning programs, both for performance enhancement and injury prevention. Kabaddi players who exhibit reduced flexibility in the lower limbs and lumbar region may be at greater risk for strain injuries during the extreme positional demands of competitive play. Systematic flexibility development through static and dynamic stretching protocols tailored to the specific movement patterns of Kabaddi could improve both performance and player durability.

CONCLUSIONS

The present study established that male Kho-Kho players at Kuvempu University possessed significantly greater lower limb and lumbar flexibility than male Kabaddi players, as assessed by the Sit and Reach Test. This finding reflected the dynamic positional and movement demands inherent to the pursuit-based structure of Kho-Kho. No significant differences were found between the two groups in agility or hand grip strength, indicating that these components developed to comparable levels through the training and competitive demands of both sports. The results provide an evidence base for targeted flexibility conditioning in Kabaddi players and support the value of comparative physical fitness research in indigenous Indian sports.

REFERENCES

1. Anand, R., & Balasubramanian, S. (2019). Dynamic balance and coordination in Kho-Kho players. Indian Journal of Sports Science, 14(2), 45–52.
2. Avijit, D., & Banerjee, A. (2023). Comparative study on selected physical fitness abilities between Kabaddi and Kho-Kho players. Paripex - Indian Journal of Research, 12(3), 85–87.
3. Bompa, T. O., & Haff, G. G. (2009). Periodization: Theory and methodology of training (5th ed.). Human Kinetics.
4. Fox, E. L., Bowers, R. W., & Foss, M. L. (2018). The physiological basis of physical education and athletics (5th ed.). Saunders College Publishing.
5. Getchell, B. (1979). Physical fitness: A way of life (2nd ed.). John Wiley & Sons.
6. Haridas, M. (2024). Core strength and dynamic balance of Kabaddi and Kho-Kho players at intercollegiate level. International Journal of Sports Science, 12(1), 34–39.
7. Jadhav, S., & More, A. (2016). Flexibility and reaction time as predictors of performance in Kho-Kho. Indian Journal of Physical Education, 49(1), 101–108.
8. Jadhav, V., & Gadhare, S. P. (2024). A comparative study of selected health-related physical fitness components of Kabaddi and Kho-Kho players of Mumbai. Journal of Interdisciplinary and Multidisciplinary Research, 19(6), 294–301.
9. Johnson, B. L., & Nelson, J. K. (1986). Practical measurements for evaluation in physical education (4th ed.). Burgess Publishing.
10. Lal, B. (2012). Traditional sports of India: History, culture and scientific significance. Rajkamal Publications.
11. Mathiowetz, V., Kashman, N., Volland, G., Weber, K., Dowe, M., & Rogers, S. (1985). Grip and pinch strength: Normative data for adults. Archives of Physical Medicine and Rehabilitation, 66(2), 69–74.
12. Pandey, A. K., Sardar, S., & Yadav, M. (2016). A comparative study of flexibility between Kabaddi and Kho-Kho male players. International Journal of Physical Education, Sports and Health, 3(3), 373–374.
13. Rajendran, R., & Nagarajan, V. (2014). Selection of physical fitness variables for comparative analysis of indigenous Indian sports. Journal of Exercise Science and Physiotherapy, 10(2), 99–106.
14. Sana, K., & Barman, A. (2017). Selected physical fitness components of Kho-Kho players, Kabaddi players, physical education trainee students and untrained females. International Journal of Yogic, Human Movement and Sports Sciences, 2(2), 421–424.
15. Sharma, R., & Thakur, A. (2017). Agility and speed among Kabaddi players. Indian Journal of Applied Research, 7(4), 571–574.
16. Singh, M. K., & Dubey, S. (2016). Comparative study of physical fitness variables between Kabaddi and Kho-Kho male players. International Journal of Physical Education and Sports, 1(2), 39–42.
17. Singh, Y. K., Banerjee, A., & Pradhan, A. (2017). Comparative study on selected physical fitness abilities between Kabaddi and Kho-Kho players. International Journal of Physical Education and Sports, 2(8), 13–18.

18. Tamilvanan, A., & Thiyagarajan, R. (2023). A comparative study on selected physical fitness variables between school-level Kabaddi and Kho-Kho players. International Journal of Research and Development, 8(12), 143–145.

19. Verma, A., & Tiwari, R. (2018). Agility performance in elite Kabaddi players: Normative data and comparison with other sports. Journal of Physical Activity and Health, 15(6), 422–429.

20. Wells, K. F., & Dillon, E. K. (1952). The sit and reach: A test of back and leg flexibility. Research Quarterly, 23(1), 115–118.

21. Wilmore, J. H., Costill, D. L., & Kenney, W. L. (2017). Physiology of sport and exercise (6th ed.). Human Kinetics.