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Comparing Physical Attribute Distinctions in Male Kho-Kho Positions

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Abstract

Background. Kho-Kho, a traditional Indian sport, has separate roles for runners and chasers, each requiring unique physical attributes. Research on the specific physical and anthropometric characteristics of players in this position is limited, highlighting the need for this study to optimize performance at the national level.

Objectives. The study aimed to investigate the differences in physical and anthropometric parameters between national level male Kho-Kho players categorized as Runners and Chasers.

Materials and methods. A total of 200 male Kho-Kho players, aged 17 to 21 years, were selected for the study. The participants were divided into two groups: 100 Runners (average age 19.21 ± 1.15 years) and 100 Chasers (average age 19.29 ± 1.19 years). The physical attributes measured included body weight, height, BMI, arm length, sitting height, chest girth, thigh girth, calf girth, and skinfold thickness at the biceps, triceps, subscapular, and suprailiac regions. The body fat percentage was calculated using the skinfold measurement technique. Data collection tools included a weighing scale for body weight, a flexible metal tape for circumferences and arm length, and a stadiometer for height and sitting height. The mean and standard deviation were computed for each parameter, and an independent samples t-test was used to compare the two groups.

Results. The findings revealed significant differences in weight, BMI, chest, thigh, and calf circumferences, with Chasers having higher values. In contrast, Runners exhibited greater arm length and sitting height. Additionally, there was no considerable difference in height between Runners and Chasers.

Conclusions. The study concluded that Chasers tend to have higher body weight, BMI, and larger circumferences in the chest, thigh, and calf regions, which may be advantageous for their role. Conversely, Runners benefit from longer arm lengths and greater sitting height, which may aid in evading Chasers. These findings suggest that role-specific physical attributes should be considered in training and player selection to enhance performance in Kho-Kho.

Keywords: anthropometry, body composition, chasers, Kho-Kho, physical attributes, runners.

Introduction

Kho-Kho, one of India's oldest traditional team sports, has a rich history rooted in the country's cultural heritage, continues to attract youth even today, maintaining its popularity across the country (Suradkar, 2012; Jacob et al., 2023). It is a dynamic, high-energy game that demands significant physical and mental stamina. The sport is structured around running and chasing, with each team comprising twelve players, of which nine take the field initially. The objective is straightforward: chasers aim to tag the runners of the opposing team, who in turn, strive to evade being caught. The strategic elements of the game are complex, as runners, also known as defenders, must use agility and tactical thinking to avoid being tagged, while chasers must demonstrate speed, endurance, and precision (Manohar, 2015). The game's structure, which restricts chasers to moving in one direction and necessitates running around posts to switch sides, further emphasizes the importance of physical fitness and strategic maneuvering (Kamlesh, 1998).

ТМФВ
ТОВ ОВС

In recent years, there has been a growing interest in understanding the specific physical and physiological requirements necessary to excel in different playing positions in Kho-Kho. This interest stems from the recognition that different roles within the game—chasers and runners—may require distinct physical attributes. For instance, chasers might benefit more from enhanced speed, strength, and endurance, while runners might rely heavily on agility, flexibility, and quick reflexes (Thirumangal, 2013). The identification of these role-specific attributes is crucial not only for optimizing individual performance but also for refining training methods and selection criteria (Kansal et al., 1986; Malhotra et al., 1972).

Adequate hand size, including measurements like shape and length, is essential for strength, precision, and overall athletic performance in court sports (Rahman & Sharma, 2024a) Morphological characteristics are particularly significant in this context because they are largely determined by genetic factors, and a well-established relationship exists between an athlete's morphology and their performance in sports (Norton & Olds 2001). Different body types—whether in terms of size, shape, or proportions—are known to offer advantages in various physical activities. Physical index and body proportions based on anthropometric measurements are vital for assessing player performance in team sports, where specific physical traits are essential for different positions to achieve optimal results (Rahman & Sharma, 2024b). Recent studies have further confirmed that specific anthropometric and somatotype characteristics can provide a competitive edge in sports like Kho-Kho, where the interplay between speed, agility, and endurance is critical (Phukon et al., 2023 and Deepak et al., 2022). Shelke's (2024) study identifies distinct anthropometric traits in elite Kabaddi players, with raiders being taller and defenders having higher mesomorphy. These insights emphasize the need for position-specific training to optimize player development based on their physical profiles. Researcher Thirumangal (2013) emphasized that understanding these correlations can serve as a foundation for identifying the ideal physical profiles for athletes in different roles, potentially leading to more targeted training programs and improved performance outcomes.

Moreover, the evolving nature of sports science has brought to light the importance of tailored fitness regimens that cater to the unique demands of each sporting position. For Kho-Kho, this means that both chasers and runners might require different training focuses to maximize their potential. Chasers, for example, may need to prioritize explosive power and linear speed, whereas runners might benefit from agility drills and exercises aimed at enhancing reaction time and lateral movement (Kamlesh, 1998; Manohar, 2015). The impact of these tailored fitness approaches is evident in the enhanced performance levels observed in athletes who undergo specialized training programs designed to suit their specific roles within the sport.

The game of Kho-Kho demands a unique combination of physical capabilities, requiring Runners and Chasers to excel in speed, agility, strength, and strategic maneuvering. Despite these specific demands, limited research has been conducted to compare the physical and anthropometric attributes of players in these positions. Understanding these differences is crucial for optimizing performance, as tailored physical characteristics may offer a competitive edge in each role. This study aims to bridge this gap by analyzing and comparing the physical attributes of national-level male Kho-Kho players in these two roles, providing valuable insights that could enhance training, selection, and overall performance in the sport.

Material and Methods

Participants

A sample of 200 National-level male Kho-Kho players, aged 17 to 21 years, was selected. This sample included 100 Runners (average age 19.21 ± 1.15 years) and 100 Chasers (average age 19.29 ± 1.19 years). The participants were randomly chosen from active Kho-Kho training centers located in various regions of Delhi and Haryana, India. All subjects were in good physical condition and regularly participated in Kho-Kho.

Instruments and Measurement

The study employed various instruments to measure physical and anthropometric variables. These included a weighing scale for body weight, a stadiometer for measuring height and sitting height, and a flexible metal tape for measuring arm length and various girths (chest, thigh, and calf). Skinfold measurement was taken using a skinfold caliper to assess thickness at the biceps, triceps, subscapular, and suprailiac regions. The body fat percentage was calculated using these four skinfold measurements, applying the Durnin and Womersley equation (1974).All instruments, including the measuring tapes, stadiometer, weighing scale, and skinfold caliper, were calibrated to ensure accuracy.

Statistical Analysis

Descriptive statistics, specifically the mean and standard deviation, were used to describe the physical and anthropometric variables of Runners and Chasers. To compare the differences between these groups, an independent samples t-test was employed. The level of significance for the statistical tests was set at $p < 0.05$.

Results

An independent samples t-test was conducted to compare the physical attributes between runners and chasers. The results indicated that chasers had significantly higher weight, $t_{(198)} = 3.132$, $p = .002$; BMI, $t_{(198)} = 4.330$, $p = .000$; chest circumference, $t_{(198)} = 2.546$, $p = .012$; thigh circumference, $t_{(198)} = 3.545$, $p = .000$; calf circumference, $t_{(198)} = 4.882$, $p = .000$; and body fat percentage, $t_{(198)} = 2.463$, $p = .015$, compared to runners. Conversely, runners had significantly longer arm length, $t_{(198)} = 3.538$, $p = .001$, and greater sitting height, $t_{(198)} = 6.242$, $p = .000$, than chasers. There was no significant difference in height between the two groups, $t_{(198)} = 0.445$, $p = .657$ (table 1, 2; fig. 1).

Discussion

The study aimed to investigate differences in physical and anthropometric parameters between national-level

Table 1. Descriptive Statistics of Runners and Chasers

Variables	Groups	Mean	Std. Deviation	Minimum	Maximum
Age (yr)	Runner	19.21	1.15	17.00	21.00
	Chaser	19.29	1.19	17.00	21.00
Height (cm)	Runner	168.88	6.31	156.30	186.20
	Chaser	168.45	6.16	156.30	187.00
Weight (kg)	Runner	55.95	7.51	43.50	84.00
	Chaser	59.43	8.40	26.60	88.00
BMI(kg/m^2)	Runner	19.61	2.36	14.68	25.64
	Chaser	21.03	2.31	17.17	27.00
Chest Circumference (cm)	Runner	84.89	5.09	70.00	98.00
	Chaser	86.59	4.87	72.00	98.00
Arm Length (cm)	Runner	77.08	2.55	71.10	82.30
	Chaser	75.91	2.14	71.10	80.90
Sitting Height (cm)	Runner	92.89	3.47	85.97	102.41
	Chaser	89.77	3.58	82.97	99.41
Thigh Circumference (cm)	Runner	48.02	4.76	39.50	65.50
	Chaser	50.45	4.71	41.40	67.40
Calf Circumference (cm)	Runner	32.46	2.73	22.60	41.20
	Chaser	34.32	2.73	24.50	43.10
Body Fat (%)	Runner	10.92	1.86	6.35	14.22
	Chaser	11.55	1.76	7.24	14.70

Table 2. Independent t-test comparing physical attributes between runners and chasers

Variable	Groups	n	Mean	MD	df	t	Sig.
Height	Runner	100	168.88	0.39	198	0.445	0.657
	Chaser	100	168.45				
Weight	Runner	100	55.95	3.51	198	3.132	.002*
	Chaser	100	59.43				
BMI	Runner	100	19.61	1.42	198	4.330	.000*
	Chaser	100	21.03				
Chest Circumference	Runner	100	84.89	1.77	198	2.546	.012*
	Chaser	100	86.59				
Arm Length	Runner	100	77.08	1.74	198	3.538	.001*
	Chaser	100	75.91				
Sitting Height	Runner	100	92.89	3.09	198	6.242	.000*
	Chaser	100	89.77				
Thigh Circumference	Runner	100	48.02	2.37	198	3.545	.000*
	Chaser	100	50.45				
Calf Circumference	Runner	100	32.46	1.88	198	4.882	.000*
	Chaser	100	34.32				
Body Fat	Runner	100	10.92	0.631	198	2.463	.015*
	Chaser	100	11.55				

*Significant at 0.05 level

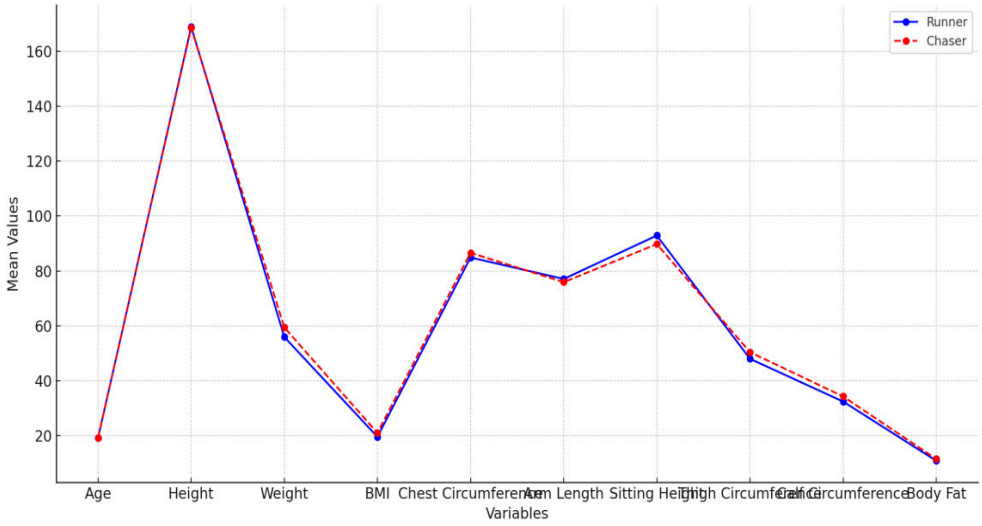

Fig. 1. Comparison of Physical Characteristics between Runners and Chasers

male Kho-Kho players categorized as Runners and Chasers. Results indicated that Chasers had significantly higher weight, BMI, chest circumference, thigh circumference, calf circumference, and body fat percentage compared to Runners. Conversely, Runners had longer arm lengths and greater sitting heights, though height differences were not significant. These findings highlight that physical attributes such as body composition and limb measurements are crucial for performance in Kho-Kho, reflecting the importance of specific biomotor abilities like speed, agility, and power (Kumar and Arumugam, 2018).

Consistent with Kumar and Arumugam (2018), the study emphasizes the importance of speed, agility, and power in Kho-Kho performance, highlighting these biomotor abilities as crucial for success in the sport. The comparison with Rickta et al. (2024), shows that Kho-Kho players possess slightly longer leg lengths and lower body fat percentages compared to football players, suggesting a potential physical advantage that could influence their performance. Furthermore, Jaiswal (2014) supports these observations by noting that Kho-Kho players exhibit greater height and lean body mass, contributing to their enhanced athleticism. The findings underline the lean and muscular physique of Kho-Kho players, which may be pivotal for their effectiveness in the sport.

Research by Bhati et al. (2023) and Mahapatra and Abhinandan (2023) emphasizes the importance of fluid intake, sleep quality, and lean body mass as critical factors in optimizing Kho-Kho performance, with fluid intake enhancing speed and sleep and lean mass supporting agility and power. These findings highlight the value of training programs that integrate hydration, nutrition, and sleep quality to improve athletic outcomes. Consistent with Taye et al. (2024), this research reinforces the importance of nutrition education, advocating for balanced fat intake and addressing nutritional deficiencies, which can promote both immediate performance gains and long-term health benefits for athletes. The moderate correlation between speed and agility, with a stronger relationship observed in boys, suggests that while these attributes are essential for Kho-Kho, their impact may vary by gender. The studies by Mahapatra and Abhinandan (2023), along with Mola and Shaw (2024a, 2024b), provide a comprehensive framework for talent development and identification in athletic practice. Mahapatra and Abhinandan (2023) highlight a moderate correlation between speed and agility, crucial for distinguishing performance roles between Runners and Chasers. Meanwhile, Mola and Shaw (2024a) emphasize long-term development, quality preparation, and a supportive environment, while Mola and Shaw (2024b) propose a multi-dimensional approach to talent identification, focusing on anthropometric, sociological, physiological, psychological, and technical predictors. Together, these studies offer valuable insights that support targeted training and effective talent identification to enhance Kho-Kho players performance.

Conclusions

The study identified significant physical differences between Runners and Chasers in National-level Kho-Kho players. Chasers tend to have higher weight, BMI, and larger chest, thigh, and calf circumferences, along with greater body fat, indicating greater mass and stability. Runners, however, have longer arm lengths and greater sitting height, quick reflexes skills. The lack of difference in height suggests it is not a key factor in role performance. Based on these findings, it is recommended that training and selection be tailored to the specific physical demands of each role to optimize team performance.

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Conflicts of Interest

The authors declare no conflicts of interest.

References

Suradkar, S.R. (2012). *A study of emotional intelligence and enthusiasm of state and national level Kho-Kho players.*

Jacob, M., Nandini, B., & Sharma, N. (2023). Indigenous Sports of India: Connecting Past to the Present. *Artha Journal of Social Sciences, 22*(1), 1-23. https://doi.org/10.12724/ajss.64.1

Manohar, L. (2015). Body composition and somatotype of Kho-Kho players in relation to their performance. *Research Journal of Physical Education Sciences , 3*(8), 5-8

Kamlesh, M. L. (1998). P*rinciple and History of Physical Education.* New Delhi: KhelSahitya Kendra

Thirumagal, A. (2013). *Research Publications in Anthropometric Measurements of Sports. In S. Thanuskodi* (Ed.), Challenges of Academic Library Management in Developing Countries (pp. 285-294). IGI Global. https://doi.org/10.4018/978-1-4666-4070-2.ch020

Kansal, D. K. (1986).A study of intrasport differences in the physique of Indian University football players. Perspectives in Kinanthropometry.

Malhotra, M. S., Joseph, N. T., & Gupta, J. S. (1972).Body composition and endurance capacity of Indian hockey players. *The Journal of sports medicine and physical fitness, 14*(4), 272-277.

Rahman, M. H., & Sharma, J. P. (2024a). Investigation of hand index, digit finger ratio (2D:4D), and grip strength among court sports. *Anthropological Review, 87*(3), 33-45, https://doi.org/10.18778/1898-6773.87.3.03

Norton, K., & Olds, T. (2001). Morphological evolution of athletes over the 20th century: causes and consequences. *Sports medicine,* 31, 763-783. https://doi.org/0112-1642/01/0011-0763/$22.00/0

Rahman, M. H., & Sharma, J. P. (2024b). An analysis of indices and ratios in anthropometric body measurements among team sports athletes. *International Journal of Scientific Reports, 10*(4), 111–119. https://doi.org/10.18203/issn.2454-2156.IntJSciRep20240714

Phukon, A.J., Farooque, Sm, & Dhar, K. (2023). Somatotypes of East-Zone Indian Inter-University Kho-Kho Players. *Physical Education Theory and Methodology, 23*(6), 925-931. https://doi.org/10.17309/tmfv.2023.6.15

Deepak, N. K., Yadav, A., & Sagre, S. (2022). Relationship between motor ability and anthropometric components of Kho-Kho and Kabaddi players. *International Journal of Physiology, Nutrition and Physical Education, 7*(2), 200-203.

Shelke, A., Bawari, B., Adhikari, R., Kamath, S., Nahak, R. K., Warrington, C. R., & Pullinger, S. A. (2024). Anthropometric characteristics and Somatotypes in Elite Pro Kabaddi League Players. *International Journal of Kinanthropometry, 4*(2), 57-66. https://doi.org/10.34256/ijk2426

Durnin, J. V., &Womersley, J. (1974). Body fat assessed from total body density and its estimation from skinfold thickness: measurements on 481 men and women aged from 16 to 72 years. *The British journal of nutrition, 32*(1), 77-97. https://doi.org/10.1079/bjn19740060

Kumar, V., & Arumugam, S. (2018).Analysis of selected Bio motor qualities between Kabaddi and Kho-Kho players. *Journal of Emerging Technology Innovation Research,* 5, 296-299.

Rickta, J. F., Arafat, M. Y., Johora Mukta, F. T., & Islam, M. R. (2024). Anthropometry and Physical Features of Bangladeshi Women National Level Kho-Kho and Football Players: A Frank Comparison. *International Journal of Kinanthropometry, 4*(1), 44-49. https://doi.org/10.34256/ijk2416

Jaiswal, A. (2014) Anthropometric and Somatotyping Study among the Female Kho-Kho Players of Pondicherry: A Comparative Analysis. *Journal of Global Economics,* 2: 122. https://doi.org/10.4172/2375-4389.1000122

Bhati, P., Anand, P., Das, J., Kommi, K., Sen, S., Hussain, M. E., & Khanna, G. L. (2023). Predictors of physical performance in national level male KhoKho players: a cross-sectional analysis. *Sport Sciences for Health, 19*(2), 589-596. https://doi.org/10.1007/s11332-022-00923-2

Mahapatra, C., & Abhinandan, A. (2023).Correlation between speed and agility with an influence of gender in adolescent Kho-Kho players—an observational study. *Bulletin of Faculty of Physical Therapy, 28*(1), 41. https://doi.org/10.1186/s43161-023-00148-5

Taye, A.G., Mola, D.W., & Rahman, M.H. (2024). Analyzing the Nutritional Awareness, Dietary Practices, Attitudes, and Performance of U-17 Football Players in Ethiopia. *Physical Education Theory and Methodology, 24*(1), 110-117. https://doi.org/10.17309/tmfv.2024.1.14

Mola, D. W., & Shaw, D. (2024a). Significance of Managerial Skills for Talent Development in Ethiopian Athletes. *International Journal of Kinesiology and Sports Science, 12*(2), 21-29. https://doi.org/10.7575/aiac.ijkss.v.12n.2p.2

Mola, D. W., & Shaw, D. (2024c). Analyzing The Reliability And Validity Of Talent Identification Practices For Athletes: An Adaptation Study. *Educational Administration: Theory and Practice, 30*(5), 12277-12284. https://doi.org/10.53555/kuey.v30i5.4248

Порівняльний аналіз відмінностей фізичних характеристик чоловіків-гравців у Кхо-Кхо щодо позицій гри

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Авторський вклад: A – дизайн дослідження; B – збір даних; C – статаналіз; D – підготовка рукопису; E – збір коштів

Реферат. Стаття: 6 с., 2 табл., 1 рис., 22 джерела.

Історія питання. Кхо-Кхо – традиційний індійський вид спорту, що складається з виконання окремих функцій для бігунів та ловців, кожна з яких вимагає від гравців наявності унікальних фізичних якостей. Наукові праці щодо специфічних фізичних та антропометричних характеристик гравців зазначеної позиції мають обмежений характер, що підкреслює необхідність проведення таких досліджень задля оптимізації результативності на національному рівні.

Мета дослідження. Дослідження мало на меті вивчити відмінності у фізичних та антропометричних параметрах між чоловіками-гравцями у Кхо-Кхо національного рівня, які поділяються на категорії «бігунів» та «ловців».

Матеріали та методи. З метою проведення дослідження було відібрано 200 гравців чоловічої статі, віком від 17 до 21 року. Учасників було розподілено на дві групи: 100 бігунів (середній вік 19,21 ± 1,15 року) та 100 ловців (середній вік 19,29 ± 1,19 року). Фізичні показники, що вимірювалися, включали масу тіла, зріст, ІМТ, довжину рук, зріст у положенні сидячи, обхват грудної клітки, обхват стегон, обхват литок і товщину шкірної складки на біцепсі, трицепсі, підлопатковій і надклубовій ділянках. Розрахунок відсоткового вмісту жиру в організмі проводився за допомогою методу вимірювання товщини шкірної складки. Інструменти збору даних включали ваги для вимірювання маси тіла, гнучку металеву стрічку для визначення окружності та довжини рук, а також ростомір для вимірювання зросту та показників зросту в положенні сидячи. За кожним параметром розраховували середнє значення та стандартне відхилення, а з метою порівняльного аналізу двох груп — використовували t-критерій для незалежних вибірок.

Результати. За результатами дослідження встановлено значні відмінності у показниках ваги, ІМТ, окружності грудної клітки, стегон та литок, зокрема, вищі показники спостерігалися у ловців. Натомість бігуни мали більші показники довжини рук і зросту у положенні сидячи. Крім того, не спостерігалося суттєвої різниці у показниках зросту між бігунами та ловцями.

Висновки. Згідно з результатами дослідження було визначено, що ловці, як правило, мають більшу масу тіла, ІМТ та вищі показники окружностей ділянок грудної клітки, стегон та литок, що може бути перевагою для виконання їхньої функції у грі. Натомість бігуни отримують перевагу від більшої довжини рук і вищих показників зросту в положенні сидячи, що може сприяти уникненню ловців. Отримані дані свідчать про необхідність врахування специфічних для певної функції фізичних характеристик під час тренувань та відбору гравців з метою підвищення результативності гри Кхо-Кхо.

Ключові слова: антропометрія, композиція тіла, ловці, Кхо-Кхо, фізичні характеристики, бігуни.

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