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Anthropometry and Physical Features of Bangladeshi Women National Level Kho-Kho and Football Players: A Frank Comparison

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Resumen

Introducción: En Bangladesh, el fútbol es el juego de pelota más popular, pero el Kho-Kho no es tan popular como el fútbol. Kho-Kho es un juego popular en la India, pero día a día se está volviendo popular en Bangladesh. En estos dos juegos se utilizan grupos de músculos principales porque ambos implican correr, conducir, saltar, balancearse y movimientos de las manos. **Métodos:** En el presente estudio se estudiaron cuarenta jugadoras de fútbol de nivel nacional y cuarenta jugadoras de Kho-Kho de nivel nacional. La edad promedio es de 14 a 21 años y la edad de formación es de 2 a 6 años. Todas las medidas antropométricas y de masa corporal se realizaron con las pautas adecuadas. **Resultados:** La longitud media de las piernas de las jugadoras de Kho-Kho es de 89,14 (±4,44 cm) y la de las jugadoras de fútbol es de 86,92 (±8,91) cm. La longitud media de las piernas de las jugadoras de Kho-Kho es 2,22 cm más alta que la longitud media de las piernas de las jugadoras de fútbol, lo cual es estadísticamente significativo. También existe una diferencia significativa (p ≤0,05) cuando se compara el IMC promedio. El porcentaje de grasa promedio de las futbolistas es ligeramente mayor que el porcentaje de grasa promedio de las jugadoras de Kho-Kho, donde el porcentaje de grasa promedio de las jugadoras de fútbol es 22,09 % ±4,05 y el de las jugadoras de Kho-Kho es 22,01 ±4,01. **Conclusión:** Los bangladesíes Las jugadoras de Kho-Kho a nivel nacional tienen mejores físicos que las jugadoras de fútbol nacionales, mientras que la composición corporal de ambos grupos es muy similar.

Palabras Clave: Antropometría, Porcentaje de grasa, Comparación corporal, Jugadoras de fútbol, Jugadoras de Kho-Kho.

Abstract

Introduction: In Bangladesh Football is the most popular ball game but Kho-Kho is not that popular like Football. Kho-Kho is a popular Game in India but day by day it is becoming popular in Bangladesh. Major muscle groups are used in these two games because both games involve running, driving, jumping, swinging, and hand motions. **Methods:** Forty national-level women Football players and forty national-level women Kho-Kho players were studied in the present study. The average age is between 14 to 21 years and the training age is between 2 to 6 years. All the anthropometric measurements and body mass were carried out with proper guidelines. **Results:** The average leg length for Female Kho-Kho players is 89.14 (±4.44 cm) and that of Female Football players is 86.92 (±8.91) cm. The average leg length of women Kho-Kho players is 2.22 cm higher than the average leg length of women Football players which is statistically significant. There is also a significant difference (p ≤0.05) when average BMI is compared. The average fat percentage of Women Footballers is slightly higher than the average Fat % of women Kho-Kho players where the average fat percentage of women football players is 22.09 % ±4.05 and that of Kho-Kho players is 22.01 ±4.01. **Conclusion:** The Bangladeshi national-level women Kho-Kho players have better physiques than the national women Football players whereas the body composition of both groups is very close.

Keywords: Anthropometry, Fat percentage, Body Comparison, Women Football Players, Women Kho-Kho Players

Introducción

Bangladesh is a country in Southern Asia that is situated on the Bay of Bengal. At present Football known as Soccer is the most popular game all over world. Football is the most popular ball game in Bangladesh. The ancient Indian sport of "Kho-Kho" gained popularity in Bangladesh after the 12th South Asian game and the Asian Kho-Kho championship. Kho Kho is an extremely complicated and tactical sport (Jaiswal, 2014). Major muscle groups are used in the two games because they involve a lot of running, driving, jumping, and swinging and hand motions (Kavanashri*et al.*, 2023). Players must thus be in peak physical condition, particularly in terms of their ability to run, move quickly, and use explosive power (Shukla *et al.,* 2023).

The human body is the most studied object of science (Harris *et al.*, 2002; Arafat *et al.,* 2023). According to a recent study, sports scientists worldwide are placing greater attention on determining a player's talent, capabilities, and shortcomings as well as creating the best training plans for athletes (Hadzic*et al.,* 2012). Physiology, Biochemistry, Medicine, Biomechanics, Anthropometry, Sociology, and Psychology are the examples of recognized Sport Sciences that have been enhanced, investigated, and used in competitive sports (Weinberg &Gould, 2007). Previous research tried to find a relationship between body type and body composition and performance level (Bhatnagar *et al.*, 1984; Bayios, 2006; Artioli*et al.,* 2009; Hagberg *et al.,* 2010; Kim *et al.*, 2011). Success in sports has been associated with specific anthropometric characteristics, body composition and somatotype (Heath & Carter 1990; Duquet& Carter 2001).

The most used technique to evaluate body composition both general and among athletes is anthropometry (Pavlovic et al., 2021). Anthropometric characteristics (AC) define the dimensions of the human body and skeleton (body weight, height, measurement of skin folds, body circumference and different body diameters) allowing an individual or combined predictions of body composition, energy content, regional fat, body fat and fat mass (Molla, 2017). Anthropometry is the science of obtaining systematic measurements of the human body size, shape and proportions. Some researchers point out that some anthropometric characteristics and body composition are associated with running performance in elite sports person (Knechtle et al., 2008; Arrese et al., 2006).

In Bangladesh is a lower income country so present research helps to indicate the anthropometric characteristic of national level women football and Kho-Kho players. The research also comparison of anthropometric characteristic between football and kho-kho national level women players in Bangladesh. The knowledge of the present study helps coaches and trainers to prepare players for competition and making superior training programs.

Materials and Methods

Subjects

Only eighty football and Kho-Kho national level women players were recruited for present research. Among them forty (40) were national level women football players and rest forty (40) were national level Kho-Kho players all over Bangladesh. The data were collected in several two days in two events players in several place. The average age between 14 to 21 years and training age in between 2 to 6 years.

Anthropometric measurements

All the anthropometric measurements and body mass were carried out proper guide line. Body mass was measured using digital weighing scale, for height measurement giraffe height measuring stand (Stadiometer) was used. Sitting height was measured by back in contact with the giraffe height measuring stand (Stadiometer) at this time participant sit on an anthropometric box with the trunk raised to 90° and the hands resting on the thigh. Arm length and leg length were measured using a non- stretchable measuring tape with 0.1cm accuracy. The skinfold thicknesses at Triceps, Biceps, Subscapular and Supraspinale were measured using Skinfold calipers with 0.2 mm accuracy.

Body Composition

Only two component model (fat and fat free mass) were measure for body composition of the participants by skinfold measurements.

Calculations

a. Body Mass Index (BMI): Calculated using the equation given by Garrow& Webster, considering the body mass and height (Kavanashri et al., 2023).

b. BMI (kg/m^2) = Body mass (Kg) / Height (m^2)

c. Body Surface Area (BSA): Du Bois& Du Bois equation was used which is based on the measured values of body mass and height (Kavanashri et al., 2023).

d. BSA = 0.007186 × Body mass 0.425 × Height 0.725

e. Body density (Db) (Db) = c - m × log of sum of skinfolds (Triceps+ Biceps+ Subscapular+ Supraspinale) Where, the c and m values differ with the age and gender of the individual (Kavanashri et al., 2023).

f. Percent Body Fat (PBF) PBF = [(4.95 / Db) - 4.5] ×100, (Where Db is Body density) (Kavanashri et al., 2023).

g. The fat mass and Fat free mass (FFM) was then obtained using the following equations: Fat mass (kg) = (Body mass/100) × Percent body fat FFM (kg) = Body mass (kg) - Fat mass (kg) (Kavanashri et al., 2023).

Results

Table 1. Anthropometric Measurement of two group players

Parameters	Kho-Kho Players (N=40)	Football Players (N=40)				
	Mean & SD	Mean & SD	'T' Value	Mean difference	SE	'P' Value
Age (yr)	18.86 ±4.07	17.82 ±3.63	1.16	1.04	0.86	0.25
Height (cm)	153.90 ±4.69	153.00 ±6.05	0.74	0.9	1.21	0.46
Weight (kg)	48.59 ±3.95	48.50 ±3.67	0.11	0.09	0.85	0.92
Arm Length (cm)	69.19 ±2.83	68.94 ±2.57	0.41	0.25	0.60	0.68
Forearm Length (cm)	38.82 ±2.53	39.97 ±1.27	2.57	1.15	0.45	0.01
Leg Length (cm)	89.14 ±4.44	86.92 ±8.91	2.12	2.22	1.05	0.04
Sitting Height (cm)	79.08 ±3.61	79.92 ±2.90	1.15	0.84	0.73	0.25

**The level of significance at $P < 0.05$

Table 2. Body composition of two group players

Parameters	Kho-Kho Players (N=40)	Football Players (N=40)		
	Mean & SD	Mean & SD	'T' Value	Standard Error
BMI (kg/m^2)	20.50 ±1.75	20.70 ±1.92	0.51	0.41
BSA (kg/sqm)	1.55 ±0.05	1.55 ±0.06	0.00	0.01
Density (g/m^3)	1.01 ±0.02	1.01 ±0.03	0.00	0.006
Fat (%)	22.01 ±4.01	22.09 ±4.05	0.00	0.90
Fat (kg)	13.17 ±3.07	13.17 ±3.11	0.00	0.69
FFM (%)	77.96 ±4.02	77.96 ±4.06	0.00	0.90
FFM (kg)	46.68 ± 3.55	46.45 ± 3.92	0.00	0.84

**The level of significance at $T < 0.05$

In the table number1 average age of national level women kho-kho players is 18.86 ±4.07and football players is 17.82 ±3.63 years where mean difference is 1.04 years. In height kho-kho players is153.90 ±4.69cm and football

players is 153.00 ±6.05 cm where mean difference is 0.9 cm. Average weight for women kho-kho players is 48.59 ±3.95kg and football players is 48.50 ±3.67 kg where mean difference is 0.09 kg. In time of arm length of kho-kho players is 69.19 ±2.83 cm and football players is 68.94 ±2.57 where mean difference is 0.25cm. Average forearm length for women Kho-Kho players is 38.82 ±2.53 cm and football players is 39.97 ±1.27 cm where mean difference is 1.15 cm and football players is greater forearm length than the Kho-Kho players that is statistically significant. In leg length for Kho-Kho players is 89.14 ±4.44 cm and football players is 86.92 ±8.91cm where mean difference 2.22cm and Kho-Kho players is greater leg length than the football players that is statistically significant. Finally sitting height of Kho-Kho players is 79.08 ±3.61cm and Football players is 79.92 ±2.90 cm where mean difference is 0.84 cm.

In the Table number 2 fat percentage of football is little higher than the kho-kho players where fat percentage of football players is 22.09 ±4.05and kho-kho players is 22.01 ±4.01 that is statistically significant. At the same time fat free mass is greater in kho-kho players (46.68 ± 3.55 kg) than the football players is (46.45 ± 3.92 kg) that is statistically significant. In the table number 2, without BMI (kg/m2) all parameters are statistically significant difference in value t<0.05.

Discussion

Football or soccer and kho-kho is a game that requires motor fitness and game related performance. To succeed in elite football and Kho-Kho players require a high level of physical (motor) fitness to cope with the demands of the game and to allow for their technical and tactical skills to be used to their full throughout a match (Arafat et al., 2020). Playing additional games is thought to improve physical fitness, particularly motor fitness. More emphasis is being placed on skill practice and conditioning, as well as the use of other useful tools, to help players improve their physical fitness (Jaiswal, 2014).

Because morphological traits are mostly influenced by genetics, they are the most significant component (Norton &Olds, 2001). An athlete's morphological state, or their body composition and structure, is ascertained by their anthropometric measurements. It is commonly acknowledged that morphology and performance are generally correlated (Jaiswal, 2014). However, a few parameters, such as height, arm length, body fat percentage, and muscle mass variable, seem to indicate a different level of ability.

In the present research clearly shown that kho-kho players are taller than that of football players. A previous results show that kho-kho players were taller as compared to the controls (Jaiswal, 2014). In all age categories, Kho-Kho players are significantly taller than controls in another study, and they also tend to be more ectomorphic (Dhayanithi & Ravikumar, 2002). In this case our present result is fully supported with the pervious study. In present research also find out that total leg length of kho-kho players is greater than the football players that is statistically significant and average forearm length for women Kho-Kho players is lower forearm length than the football players that is statistically significant.

In the time of body composition fat percentage of football players is little higher than the kho-kho players that is statistically significant. At the same time fat free mass is greater in kho-kho players than the football players that is statistically significant (Parizkova, 1977; Burris, 2003). Some previous study clearly concept that body weight, body fat, body mass index, oxygen consumption, cardiac output are closely related with each other and it is major condition of good performance. A researcher concept that total leg length is grater of a Kho-Kho players than the normal or sports person (Parizkova, 1977; Burris, 2003).

In previous a study on international level or develop country female football players clearly report that height159.9 ± 6.4 cm, body mass 56.9 ± 9.6 kg and body fat percentage 22.2 ± 5.6% (Coopoo et al., 2019). The findings show that female football players competing at the international level and in developing nations had superior anthropometric traits than football players competing at the national level in Bangladesh.

In this study result indicate average height is slightly high in Kho-Kho players than the football players, in Kho-Kho players average leg length is better than the football players. But football players forearm length is better than the Kho-Kho players and total arm length in Kho-Kho players is greater than football players. In time of body composition both Kho-Kho and football players all parameters are slightly difference.

There is no financial assistance or involvement from any government or non-government organization in this study. Time and data collection instrument were limiting factor for this study. Only age, height, weight, arm length, forearm length, leg length and sitting height were selected to analyze anthropometric profile. In future research more subject and parameters will be collected for more fruitful analysis and results. In this study suggest to all players and coaches that conscious about physical condition and fitness.

Conclusion

In this study highlights that Bangladeshi nation level women kho-kho players is better physique condition than the national level women football players. Although height, weight, arm length and leg length in national level women kho-kho players is superior to the national level women football players. At the same time sitting height and forearm length of national level women football players is superior to the national level women kho-kho players in Bangladesh. At body composition national level women kho-kho players and national level women football players not highly difference in this research.

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Conflicts of Interest

The authors have no conflicts of interest to declare that they are relevant to the content of this article.

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