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## Physical and anthropometric characteristics of national level male runners of kho-kho game

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**Abstract**

The present study was an attempt to appraise the physical and anthropometric characteristics of the National level male Runners in the game of Kho Kho. A total of 100 players ranged between 17 to 21 years who were playing regularly as runners for a couple of years were selected randomly from Kho-Kho training centers in different areas of Delhi and Haryana. Mean and standard deviation of the measurements taken were computed. The physical features studied included body weight, height and BMI was calculated. Other anthropometric measurements taken were girth measurements of chest, thigh and calf; length measurements like Arm length, sitting height and skinfold measurements including biceps, triceps, subscapular and suprailliac skinfolds. From the measurements of skinfolds, body fat percent was calculated. Flexible metal tape was used to measure circumferences and arm length, Stadiometer was used to measure height and sitting height and weighing scale was used to measure weight. The skinfold measurements were taken using a skinfold caliper and Body Fat Percentage computed. Mean and standard deviation were used as descriptive statistics. Mean height of the respondents was  $168.88 \pm 6.31$  cm and mean weight was  $55.95 \pm 7.51$  kg. The mean BMI was  $19.61 \pm 2.35744$ . The body fat percentage was found to be  $10.9210 \pm 1.86$ . It was found that mean value of chest circumference was  $84.8889 \pm 5.08$  cm, calf circumference was  $32.46 \pm 2.73$  cm and that of thigh circumference was  $48.02 \pm 4.76$  cm. The mean values of arm length and sitting height were  $77.08 \pm 2.54$  cm and  $92.8886 \pm 3.47$  cm respectively. These measurements could be used as a reference for assortment and selection of runners in the field of Kho-Kho.

**Keywords:** Kho-Kho, runners, body weight, height, sitting height, arm length, chest circumference, calf circumference, thigh circumference, body fat percentage

**Introduction**

Kho-Kho is one of the popular traditional indigenous game played widely in India (Kamlesh, 1998) [2]. It is now-a-days being played as a competitive game as well. It is usually played by teams of twelve nominated players out of fifteen, of which nine enter the field who sit on their knees (chasing team), and 3 extra (defending team) who try to avoid being touched by members of the opposing team. Chaser is the sitting team who tries to catch the opponent team member who is running. Chaser sit-in square over cross lines with an alternative back. The players sitting in the squares are known as chasers. An attacker (active chaser) is a player who pursues the players of the opposite side (runners) with a view to tag and touch them. Runners are the player of opposition who saves himself from being caught by the chaser. The players of the side other than the chasers side are known as runners. The runners who are inside the limits for their turn of running are known as defenders. These chasers and runners require certain physical features definitely that may give them advantage to play at a specific playing position.

Anthropometric measurements have revealed correlation between body structure physical characteristics and sport capabilities of sportspersons. In all the games, height, weight, and other anthropometric variables play a vital role in the player's performance. The physical structure, especially the height and arm length, have definite and decisive advantage in many games including Kho-Kho. Similarly, segmental length of individual body parts, the arm length specifically, is of considerable advantage in selected events in athletics and in certain games (Thirumangal, 2013) [4]. A range of references have been developed that can be used as base lines and anthropometric studies have identified ideal values for the body dimensions of athletes in different sports. However, athletes deviating from these ideal measurements are

still able to do well in competitions because there are many other factors as well than physical attributes that can affect athletic performance.

The use of anthropometric techniques to the understanding and developing athletic physique could be of immense help to the coaches and trainers in identifying talent, matching right kind of sporting individuals with right sport and even right playing position in a sport. It may also help athletes to maintain body composition levels i.e. lean muscle mass and fat ratio level desired for his specific sport for better performance abilities.

Kho- Kho as the game is played with different type of fast body movements which required speed, reaction ability, body strength, explosive strength, coordinative ability and above all intelligence of thought and action during the game situation (Kamlesh, 1998) [2]. Manohar (2015) [3] assessed body Composition and Somatotype of Kho-Kho Players in relation to their performance and showed that the optimum stature and body weight play significant role in performance of Kho-Kho players. It is therefore, important to know the physical and anthropometric characteristics precisely of different playing positions in Kho-Kho game that may be advantageous in talent selection as well as in planning training programs.

### Objective of the study

The present study was carried out to assess the Physical and Anthropometric characteristics of the National level Male Kho-Kho players playing as Runners in the game.

### Methodology

The purpose of the study was to explore the physical and anthropometrical characteristics of national level Kho-Kho players playing as runners. For the purpose of the study a total of 100 National level male Kho-Kho players were selected as the subjects. The age of the subjects ranged between 17 to 21 years. The study involves random sampling procedure and all the selected subjects possessed sound physique and regular in the game of Kho-Kho for the couple of years. The active Kho-Kho training centers in different areas of Delhi and Haryana were asked for permission for the collection of data. The scholar visited the respective training centers with their volunteers and selected subjects for the study.

### Selection of the variables

The physical and anthropometric variable that have been found to be influencing the performance in Kho-Kho game were identified after reviewing the related literature were taken for the study. The physical features studied were body weight, height and BMI was calculated. Other anthropometric measurements included girth measurements of chest, thigh and calf; length measurements like Arm length, sitting height and skinfold measurements including biceps skinfold, triceps skinfold, subscapular skinfold and supra iliac skinfold. From the measurements of skinfolds, body fat percent was calculated. Before going for the data collection proper training was taken by the volunteers who were going in the field to do the measurements. To avoid the measuring errors and reducing the sampling error the different aspects of the reliability was taking into consideration. The reliability was established through the test-retest method and Karl Pearson coefficient of Correlation method was used for relative measures. The

anthropometric tools, such as, measuring tapes, stadiometer, weighing machine, skinfold caliper etc. used in this study were calibrated.

Flexible metal tape was used to measure circumferences and arm length, Stadiometer was used to measure height and sitting height and weighing scale was used to measure weight. The skinfold measurements were taken using a skinfold caliper and Body Fat Percentage from 4 Sites Skinfold measurements was computed using Durnin and Womersley equation (1974) [1]. Mean and standard deviation were used as descriptive statistics.

### Results

The study was carried out to record the physical characteristics and anthropometric profile of players of National level kho-kho players playing as runners in the game. As depicted in table 1, age of the subjects ranged between 17 to 21 years and their mean age was  $19.22 \pm 1.14529$  years. Mean height of the respondents was  $168.88 \pm 6.31$  cm and mean weight was  $55.95 \pm 7.51$  kg. The mean BMI was  $19.61 \pm 2.35744$ .

**Table 1:** Descriptive statistics of physical characteristics of male Kho-Kho runners (n = 100)

	Minimum	Maximum	Mean	Std. deviation
Age (years)	17.00	21.00	19.2121	1.14529
Height (cm)	156.30	186.20	168.8848	6.30909
Weight (kg)	43.50	84.00	55.9475	7.51216
BMI	14.68	25.64	19.6135	2.35744

Table 2 depicts the mean, standard deviation and ranges of Chest Circumference, Thigh Circumference and Calf Circumference, Arm Length and Sitting Height.

**Table 2:** Descriptive statistics of anthropometric measurements of male Kho-Kho runners (n = 100)

	Minimum	Maximum	Mean	Std. deviation
Chest circumference (cm)	70.00	98.00	84.8889	5.08678
Arm length (cm)	71.10	82.30	77.0768	2.54798
Sitting height (cm)	85.97	102.41	92.8886	3.46967
Thigh circumference (cm)	39.50	65.50	48.0228	4.76306
Calf circumference (cm)	22.60	41.20	32.4593	2.73052
Body fat %	6.35	14.22	10.9210	1.85872

### Discussion

The present study was an attempt to comprehend the physical characteristics and anthropometric profile of National level players of Kho-Kho playing as runners (n=100;  $19.22 \pm 1.15$  years). As shown in table 1, mean height of the runners in the present study was  $168.88 \pm 6.31$  cm, mean weight was  $55.95 \pm 7.51$  kg and mean BMI was  $19.61 \pm 2.357$ . Manohar (2015) [3] conducted a study on Kho-Kho players of All India Inter-University and compared medalists and non-medalists players, reported height of 168.41 cm and body weight of 57.5 kg in the medalist group. Hence, the height of the runners of present study was comparable to that of medalist players of the study done by Manohar (2015) [3]. Height is an important feature which can help players perform better (Wilmore and Costill, 1999) [5].

In the present study, body weight of runners was  $55.95 \pm 7.51$  kg which was slightly less than medalists of the reported study (57.5 kg) but more than non-medalist players (54.5 kg). Higher average body weight helps the kho kho players to give better performance in the competition (Manohar, 2015) [3].

The body fat percentage in the present study was found to be  $10.9210 \pm 1.86$ . Manohar (2015) [3] in his study found that non-medalist Kho-Kho players had higher fat percentage (11.29%) and linear physique as compared to medalist players (11.22%). Higher lean body mass and relatively lower body fat percentage is generally associated with better endurance and delayed fatigue (Wilmore and Costill, 1999) [5].

Five body sites were recognized to take the girth and length measurement including Chest Circumference, Thigh Circumference and Calf Circumference, Arm Length and Sitting Height (table 2) and it was found that mean value of chest circumference was  $84.8889 \pm 5.08$  cm, calf circumference was  $32.46 \pm 2.73$  cm and that of thigh circumference was  $48.02 \pm 4.76$  cm. The mean value of arm length was  $77.08 \pm 2.54$  cm and sitting height was  $92.8886 \pm 3.47$  cm. As these measurements were those of National level Kho-Kho players playing at the position of runners, could be used as the reference for talent selection by the coaches and trainers in the field of Kho-Kho. Such data can be utilized not only as screening tool for assessing and classifying the Kho-Kho players for different playing positions according to their physical attributes but also for designing individualized training programs suited to them.

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