



P-ISSN: 2394-1685
E-ISSN: 2394-1693
Impact Factor (RJIF): 5.38
IJPESH 2023; 10(6): 83-86
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www.kheljournal.com
Received: 06-08-2023
Accepted: 16-09-2023

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Exploring body symmetry: An anthropometric analysis of badminton players at national sports university, Manipur

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Abstract

This study aims to investigate the anthropometric analysis of body symmetry among right-handed badminton players at National Sports University, Manipur, India, to determine whether difference exist between the dominant and non-dominant side in anthropometric measurements. The research included a sample of twenty (N=20) male right-handed badminton players, aged between 20 and 25 years, randomly selected from National Sports University, Manipur. Anthropometric data were collected from each participant, focusing on two length measurements and two girth measurements on both the dominant and Non-dominant side. Length measurements included full arm length (from the acromiale process to the dactylion) and full leg length (from the trochanterion to the Tibiale Mediale Sphyrion Tibiale). Girth measurements included wrist girth of both hands (radio carpal joint) for ankle girth of both legs (Talocrural ankle joint), measured using Anthro Flex Diameter Tape (6mm × 2m NA305). Independent t-test were employed to determine the mean differences between the variables. The results of the study revealed that there were no significant differences exist between the dominant and non-dominant side in these anthropometric measurements among the right-handed badminton players at National Sports University, Manipur.

Keywords: Anthropometry, badminton, girth measurement, arm length, leg length

Introduction

Anthropometry literally means the measurement of man. It is derived from Greek words, anrhropos which means man and metron which means measure. As an early tool of physical anthropology, it has been used for identification, for the purpose of understanding human physical variation. A recent review article by (Phomsoupha & Laffaey, 2015) ^[13], stated that the most important characteristics of individual players in badminton are technical skill, physical performance capacity and anthropometrical factors. Measuring anthropometric factors sometimes revealed a correlation between body structure, bone mass, physical characteristics and sporting abilities, which suggests the possibility of assessing sports performance on the basis of physical and anthropometric characteristics (Phomsoupha & Laffaey, 2015) ^[13].

Badminton

Badminton is one of the most popular sports in the world. It is estimated that approximately 200 million people play this sport modality (CHINT *et al.*, 1995) ^[7]. The sport originated in China and England, and was first included in the 1992 Olympics (Phomsoupha & Laffaey, 2015) ^[13]. The sport has five events, men's and women's singles, men's and women's doubles and mixed doubles (Phomsoupha & Laffaey, 2015) ^[13]. It is described as a physically demanding, high intensity racket sport with fast reaction time where players try to hit the shuttle into the opponent's court, until one of them fails (Guðmundsdóttir, 2017; Phomsoupha & Laffaey, 2015) ^[1, 13].

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Highlight it is a sport modality which requires both aerobic and anaerobic energy systems and such characteristic is directly related to both short and long rallies, as well as game duration. Physical factors such as strength, stamina, power and agility are important for all the technically specialized movements in badminton, like lunges, jumps, rapid changes of direction, and quick arm movements (Abian-Vicen *et al.*, 2014; Guðmundsdóttir, 2017; Hu *et al.*, 2015; Jeyaraman & Kalidasan, 2017; Phomsoupha & Laffaey, 2015) [3, 1, 10, 11, 13].

Anthropometric Variables

1. **Bone girth (wrist):** Bone girth wrist refers to the measurement of the circumference or the thickness of the bones at the wrist joint.
2. **Bone girth (ankle):** Bone girth in the leg refers to the measurement of the circumference or the thickness of the bones at the ankle joint.
3. **Arm length:** Arm length refers to the measurement of the distance from the shoulder joint (acromion of humerus) to the dactylion when the arm is in relaxed position. It is a fundamental anthropometric measurement used to describe the physical dimensions of an individual's upper limbs.
4. **Leg length:** Leg length measurements are made between fixed bony landmarks, from the trochanterion to the Tibiale Mediale Sphyrion Tibiale.

Materials and methods

Selection of Subjects

Twenty (N=20) male badminton players (right hand) aged between 20 and 25 years were randomly selected during the study of exploring body symmetry: an anthropometric analysis of badminton players at national sports university, Manipur.

Procedure

Anthropometric measurements consisting of 2 lengths and 2 girths, were taken on the dominant and non-dominant side of each participants. In lengths, full arm length (from the acromiale process to the dactylion) & full leg length (from the trochanterion to the Tibiale Mediale Sphyrion Tibiale) is taken. In girths, wrist girth of both hands (Radio carpal joint) & ankle girth of both legs (Talocrural ankle joint) is taken from Anthro Flex Diameter Tape (Measure 6mm × 2m NA305).

Selection of variables

The following variables were chosen for the study-

1. Bone girth (wrist)
2. Bone girth (ankle)
3. Arm length
4. Leg length

Statistical techniques

To find out the mean difference between two variables independent t test was used as statistical technique in this study.

Results of Bone Girth (Wrist)

Table 1: Comparison of bone girth (wrist) between right and left hand

Bone Girth (Wrist)	Mean	SD	S.Em	MD	't' Ratio
Right Hand	15.85	1.08	0.24	0.47	1.41
Left Hand	15.38	1.03	0.23		

*Significant at 0.05 level, df=19, 't'-value = 1.729

Table 1: Shows the descriptive statistics of bone girth at the wrist for both hands. The mean of bone girth at the wrist for the right hand, 15.85 is observed to be higher than that for the left hand, 15.38. The SD of bone girth for the right hand reads 1.08 and the left hand is 1.03. The 't' value is between 1.41 and the obtained 't' value is 1.729, which is more than 't' value at 0.05 significant level. That means there is no significant difference between right & left hand bone girth (wrist) of players.

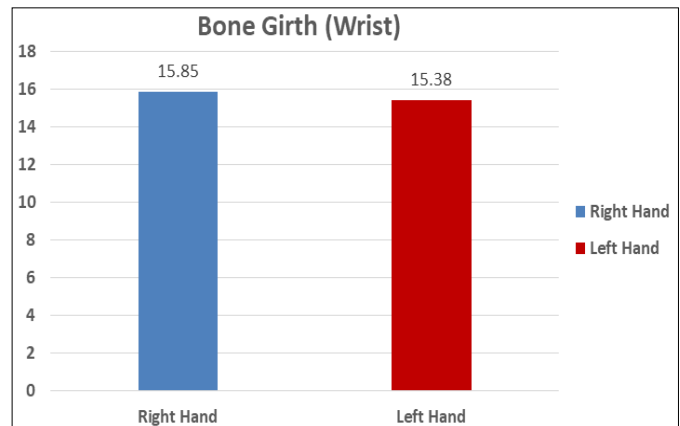


Fig 1: Graphical representation of mean value of bone girth (wrist)

As shown in figure 1, the mean value of bone girth (wrist) between right and left hand has no significant difference.

Results of Bone Girth (ankle)

Table 2: Comparison of bone girth between right and left ankle

Bone Girth (Ankle)	Mean	SD	S.Em	MD	't' Ratio
Right Ankle	21.45	1.43	0.32	0.11	0.23
Left Ankle	21.35	1.52	0.34		

*Significant at 0.05 level, df=19, 't' value=1.729

Table 2: Shows the descriptive statistics of bone girth at the leg for both legs. The mean of bone girth at the leg for the right leg, 21.45 is observed to be higher than that for the left leg, 21.35. The SD of bone girth for the right leg reads 1.43 and the left leg is 1.52. The 't' value is between 0.23 and the obtained 't' value is 1.729, which is more than 't' value at 0.05 significant level. That means there is no significant difference between right & left ankle bone girth of players.

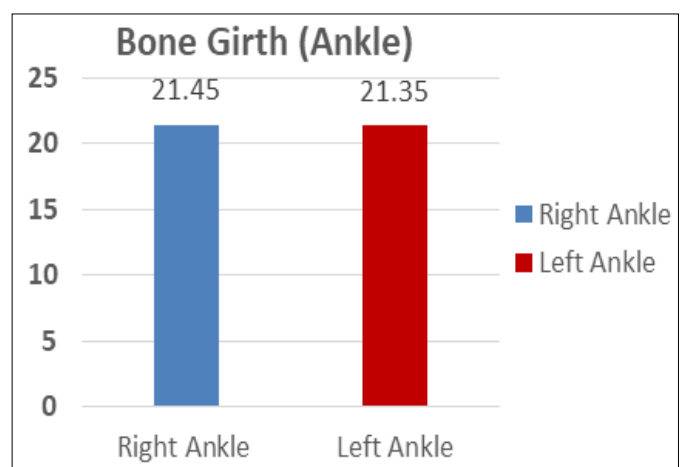


Fig 2: Graphical representation of mean value of bone girth (ankle)

As shown in figure 2, the mean value of bone girth (ankle) between right and left ankle has no significant difference.

Result of Arm Length

Table 3: Comparison of arm length between right and left arm

Arm Length	Mean	SD	S.Em	MD	't' Ratio
Right Arm	75.76	3.61	0.81	0.64	0.54
Left Arm	75.13	3.80	0.85		

*Significant at 0.05 level, df=19, 't' value=1.729

Table 3: Shows the descriptive statistics of arm length for both arm. The mean of arm length for the right arm, 75.76 is observed to be higher than that for the left arm, 75.13. The SD of arm length for the right arm reads 3.61 and the left arm is 3.80. The 't' value is between 0.54 and the obtained 't' value is 1.729, which is more than 't' value at 0.05 significant level. That means there is no significant difference between right & left arm length of players.

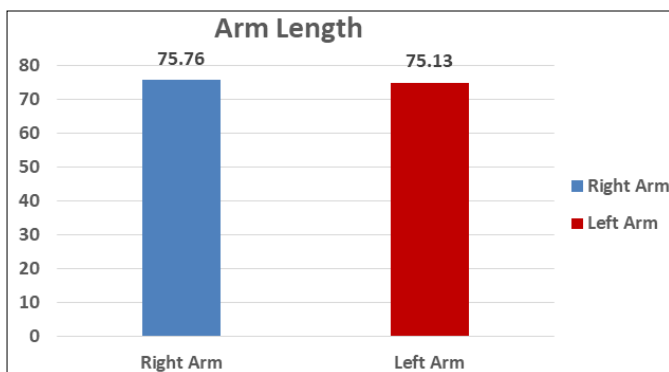


Fig 3: Graphical representation of comparison of mean value of arm length

As shown in figure 3, the mean value of arm length between right and left arm has no significant difference.

Result of Leg Length

Table 4: Comparison of Leg length between right and left leg

Leg Length	Mean	SD	S.Em	MD	't' Ratio
Right Leg	88.30	5.58	1.25	0.23	0.12
Left Leg	88.53	6.08	1.36		

*Significant at 0.05 level, df=19, 't' value=1.729

Table 4: Shows the descriptive statistics of leg length for both legs. The mean of leg length for the right leg, 88.30 is observed to be lesser than that for the left leg, 88.53. The SD of leg length for the right leg reads 5.58 and the left leg is 6.08. The 't' value is between 0.12 and the obtained 't' value is 1.729, which is more than 't' value at 0.05 significant level. That means there is no significant difference between right & left leg length of players.

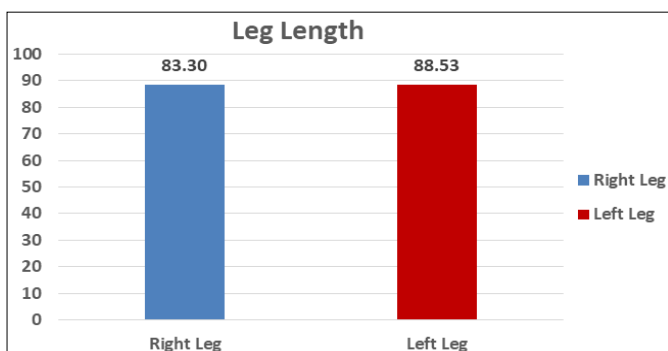


Fig 4: Graphical representation of mean value of leg length

As shown in figure 4, the mean value of leg length between left and right leg has no significant difference.

Results and Discussion

Abián, P.; Abián-Vicén, J. & Sampedro, J. have conducted a study on anthropometric analysis of body symmetry in badminton players to determine whether difference exist between the dominant and non-dominant side in anthropometric measurement in the best Spanish badminton players, and they found no differences in the skinfolds or the lengths between the dominant and non-dominant side. Similarly the present study also shows no difference between the wrist and the ankle, as well as arm length and leg length of both dominant and non-dominant side.

Conclusion

On the basis of the study the following conclusions were drawn:-

The results of the study revealed that there were no significant differences in these anthropometric measurements among the right-handed badminton players at National Sports University, Manipur.

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