American Journal of Sports Science
2023; 11(2): 46-49
http://www.sciencepublishinggroup.com/j/ajss
doi: 10.11648/j.ajss.20231102.12
ISSN: 2330-8559 (Print); ISSN: 2330-8540 (Online)

Anthropometric Characteristics in Bangladeshi Elite Female Gymnasts

Md. Yeasir Arafat[1, *], Jannatul Ferdaus Rickta[2], Fatima Tus Johora Mukta[3], Md. Rezaul Islam[4], Md. Asif Iqbal[5]

[1]Department of Physical Education, Chittagong University of Engineering & Technology, Chittagong, Bangladesh

[2]Department of Physical Education and Sports Science, Jashore University of Science and Technology, Jashore, Bangladesh

[3]Department of Physical Education and Sports Science, Daffodil International University, Dhaka, Bangladesh

[4]Department of Physical Education, Bangabandhu Textile Engineering College, Tangial, Bangladesh

[5]Department of Physical Education and Sports Science, Daffodil International University, Dhaka, Bangladesh

Email address:

arafat4232@cuet.ac.bd (Md. Yeasir Arafat), jannat121216@gmail.com (Jannatul Ferdaus Rickta), fatima.pess@diu.edu.bd (Fatima Tus Johora Mukta), asif.pess@diu.edu.bd (Md. Asif Iqbal)

[*]Corresponding author

To cite this article:

Md. Yeasir Arafat, Jannatul Ferdaus Rickta, Fatima Tus Johora Mukta, Md. Rezaul Islam, Md. Asif Iqbal. Anthropometric Characteristics in Bangladeshi Elite Female Gymnasts. *American Journal of Sports Science*. Vol. 11, No. 2, 2023, pp. 46-49. doi: 10.11648/j.ajss.20231102.12

Received: April 2, 2023; **Accepted**: April 21, 2023; **Published**: May 18, 2023

Abstract: *Background:* Gymnastics is a world popular oldest game which star in the ancient Olympic Games. Human body is the most research topic nowadays. An Anthropometric profile is a scientific and systematic study of human body size, shape, and propositions. *Objective:* The Purpose of the study is to help to know about Bangladeshi elite female gymnast anthropometric characteristic and compare with the Olympic level gymnast. The research knowledge also help to develop training methods that enhance their performance. *Method*: A total of twenty female gymnastic players as the subject for this present study, all gymnast participates both national and international level competition. All the subjects lived in Bangladesh Krira Shikkha Protishtan (BKSP), Dhaka and their training age were between two to six years. The anthropometric profile was assessed by measuring height, weight, arm length, leg length, shoulder width, hip circumference, and sitting height. The collecting data were analyzed using the standard statistical measure (Such as mean value, Standard Deviation, *t* value and *p* value also). *Result:* There is a considerable anthropometric difference between Bangladeshi and Olympic-level gymnasts and Bangladeshi gymnast because of they have behind the performance than the international level gymnast all over the world. *Conclusion:* Bangladeshi female elite gymnast have low anthropometric level than world level female gymnast.

Keywords: Gymnastic, Anthropometric Profile, Olympic-Level Gymnasts, Training Facility

1. Introduction

Gymnastics is a skillful sport that was developed under the philosophic idea of 'Menssana in corporeal" which supposes a harmonized body and soul [1]. Gymnastics involves exercises that demand strength, flexibility, balance, agility, endurance and control [2] Competitive artistic gymnastics is the best known of the gymnastics events [3]. It includes the four women's events (vault, uneven bars, balance beam and floor exercise) and six male's events (floor exercise, pommel horse, still rings, vault, parallel bars and horizontal bar) [4].

The human body is the most studied object of science [5]. Anthropometry is the most commonly used method of assessing body composition and body composition in the sports population [6]. 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 [7].

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 middle-distance, long-distance, and ultra-marathon runners [8-9]. Significant running performances are correlated with body height and weight [11], cranial limb circumference [8], different skin folds, and caudal limb circumferences [9], different sums of skin folds [11-12].

Anthropometry represents the typical and traditional tools of human biology, physical anthropology and Axiology [13]. Physical educationists, nowadays, consider the human body as manifested from an individual's total health in general and organic health in particular [14-17]. Therefore, physique plays an important role to understand and analyze sports performance. Physical educationists, nowadays, consider the human body as manifested from an individual's total health in general and organic health in particular. Recently it has taken a strong bonded relationship with physical education and sports sciences [18]. The morphological typology for anthropometric measurements, somatotype, body composition and proportionality has been studied in gymnastics disciplines of the International Federation of Gymnastics, such as Men's and Women's Artistic Gymnastics and Rhythmic Gymnastics [19-22]. Bangladesh is a developing country in South Asia. There are five types of gymnastics in the world but only artistic gymnastic competition in Bangladesh. In this research, all subjects are artistic gymnasts. The present study designs an Anthropometrical Aspects of Bangladeshi Female Gymnasts.

2. Methodology

For this study, a total of twenty international level female gymnasts were chosen as participants. All of the gymnasts were international-level female gymnast players. All the subjects lived in Bangladesh Krira Shikkha Protishtan (BKSP), Dhaka and their training age were between two to six years. The anthropometric profile was assessed by measuring height, weight, arm length, leg length, shoulder width, hip circumference and sitting height. Some instruments were used for collecting data in the present study such as (a) anthropometric tape for measuring length, (b) digital weighing machine for measuring weight, and (c) studio meter used for measuring standing height.

Procedure of Analysis Data

Using standard procedure to scan the data and the data were normal distribution. The collected data was analyzed using descriptive statistics, mean, and standard deviation (SD). An inferential statistics-paired and independent *t*-test and *p*-test was applied to check the level of significance.

The mean is calculated as a measure of central tendency by using the formula:

$$\overline{X} = \frac{\sum X}{N}$$

The standard deviation (SD) is calculated as the measure of variability by using the formula:

$$\text{SD } (\sigma) = \sqrt{\frac{(X-\overline{X})^2}{N}}$$

The formula used for t-test

$$t = \frac{\overline{x}_1 - \overline{x}_2}{\sqrt{\frac{{\sigma_1}^2}{N_1} + \frac{{\sigma_2}^2}{N_2}}}$$

Table 1. *Mean and Stander Deviation of different anthropometric measurement in Bangladeshi female gymnast.*

	Mean	Stander Deviation	'*t*' Value	'*p*' Value	Remarks
Height	150.56cm	±6.44	2.66	.008	Significant
Weight	42.35kg	±7.51	3.23	.002	Significant
Arm Length	66.25cm	±3.46	2.27	.018	Significant
Leg Length	81.55cm	±3.30	3.33	.002	Significant
Sitting Height	77.05cm	±3.54	24.25	.00001	Significant
Shoulder Width	33.45cm	±1.65	3.91	.0005	Significant
Hip Circumference	82.8cm	±7.13	1.07	.149	Not Significant

Table 1: It shows that the mean value of all parameters of anthropometric profile in Bangladeshi female gymnasts height is 150.56 cm, weight 42.35kg, Arm Length 66.25cm, Leg Length 81.55cm, Sitting Height 77.05cm, Shoulder Width 33.45cm, Hip Circumference 82.8cm. Stander deviation of all parameters of anthropometric profile in Bangladeshi female gymnast height is ±6.44, weight ±7.51, Arm Length ±3.46, Leg Length ±3.30, Sitting Height ±3.54, Shoulder Width ±1.65, Hip Circumference ±7.13.

Table 2. *Mean and Stander Deviation of height and weight in female gymnast different Summer Olympic Games.*

Summer Olympic Games	Number	Height				Weight			
		Mean	SD	Skew	Kurt	Mean	SD	Skew	Kurt
2016	97	154.64	±7.42	-.65	.23	48.18	±6.70	-.40	.14
2012	96	155.39	±6.14	-.46	-.33	47.86	±6.31	-.31	.01
2008	98	153.85	±7.51	-.02	-.51	45.61	±6.66	-.08	-.81
2004	97	153.24	±6.83	.14	-.12	44.90	±6.70	.07	-.58
2000	94	153.03	±6.51	-.01	-.01	44.44	±6.46	-.20	.12
1996	92	151.76	±6.71	.05	-.29	42.41	±5.08	.30	-.02

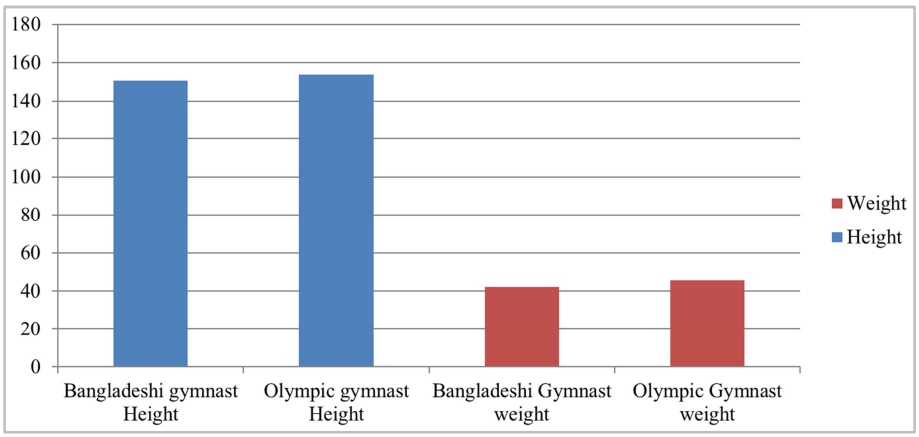

Figure 1. *Graphical presentation of different between Bangladeshi and Olympic level female gymnast.*

3. Result

On the basis of analysis data, we clearly shown from tables 1, 2 and Figure 1 mean height of Bangladeshi female gymnast is 150.56cm but the Olympic level female gymnast height is 153.65cm. The mean weight of Bangladeshi female gymnast is 42.35kg but the Olympic level female gymnast weight is 45.57kg. Another anthropometric parameters measurement means value of Bangladeshi female gymnast is leg length 81.55cm, sitting height 77.05cm, shoulder width 33.45cm, and hip circumference 82.8cm. The stander deviation of all parameters of anthropometric profile in Bangladeshi female gymnast height is ±6.44, weight ±7.51, Arm Length ±3.46, Leg Length ±3.30, Sitting Height ±3.54, Shoulder Width ±1.65, Hip Circumference ±7.13.

4. Discussion

Bangladeshi gymnasts participate in famous worldwide competitions like Olympic Games, world gymnastics competitions etc. but there is considerable anthropometric difference between them and all gymnasts from other countries. Selection of talent is also critical, as anthropometric profile has a significant effect. Talent selection is also important as somatotype plays an important role here [23].

Mean body height of the selected group was 150.56cm, on the contrary average height of Czech Republic 161.0 cm (± 5.34) [24] and American Olympic team (2nd in World ranking) was only 153 cm in 2008 (± 7) [25] and finally Olympic level female gymnast mean height is 153.65cm [25]. The mean body weight of Bangladeshi female gymnasts was 42.35kg on the contrary Czech Republic gymnast 55.3 kg (± 5.46) [24] and American gymnasts only 47.5 kg (±5.7) [22] and finally Olympic level female gymnast mean height is 45.57kg [25].

These results similarly support the finding of [13, 10 & 27]. We clearly showed a large amount of difference between Bangladeshi female gymnasts and Olympic-level female gymnasts. It is clear that this differentiation is affected by a number of factors, including selection and training. Because of this Bangladeshi female gymnasts cannot bring any success in the international competition. Since intense physical activity should not have any effect on body length development [28], we believe that the similar length measurement of a better gymnast is due mainly to a process of selection.

Dr. Kevin Thomson, who wrote about the physical qualities of gymnasts for the BBC, noted that «being small» helps with rotational skills (for example, somersaults with multiple rotations). For the same reason, gymnasts also tend to have short arms and legs [29]. Dr. Malina, suggested most gymnasts are short because they have short parents, rather than because over-training stunted their growth. However, the fact that gymnasts are small can't all be credited to self-selection [29-30].

Bangladesh has a little facility for female gymnastic training and trainers. Even in the few that these centers face lack of qualified junior trainers. The largest issue is squandered potential in smaller communities where effective training is difficult to come by. These findings show that a gifted individual with corresponding anthropometric parameters ends his career too soon, despite having more potential than competitors who are guided by qualified trainers, because their anthropometric predispositions prevent them from competing against the best world gymnasts.

5. Conclusion

We clearly show there is a considerable anthropometric difference between Bangladeshi and Olympic-level gymnasts.

Bangladeshi female elite gymnast has low anthropometric level than world level female gymnast.

Competing Interests

There are no competing interests declared by the authors.

Acknowledgements

The researchers are grateful to the soccer players who have

participated in this study on a voluntary basis and the Bangladesh Institute of Sports (BKSP) authorities for providing time to collect data.

References

[1] Cuk, I, Pecek M B, Jakse B, Pajek J, PecekM (2012). Morphologic bilateral differences of toplevel gymnasts. IntJ of Morphology. 30 (1): 110-114.

[2] Alcala AP, Zawosnik BD (2014). Differencesbetween somatotype, body composition andenergy availability in Mexican pre-competitive female gymnasts. Food andnutrition sciences. 5: 533-540.

[3] Kaur K, Koley S (2019). Anthropometric determinants of competitive performance in gymnastics: a systematic review. Int J Health Sci Res. 9 (7): 249-256.

[4] Leslie J, Thomas CD, René K Exhibition Gymnastics. New York: Association Press. 1969. 17.

[5] Harris, R. S., Petersen-Mahrt, S. K., & Neuberger, M. S. (2002). RNA editing enzyme APOBEC1 and some of its homologs can act as DNA mutators. *Molecular cell*, *10* (5), 1247-1253.

[6] Pavlović, R., Vrcić, M., Simeonov, A., Radulović, N., & Gutić, U. (September 2021). Anthropometric characteristics and body composition of Uroš Gutić, runner at 5000m. Journal of Physical Education Research, Volume 8, Issue III, 01-10.

[7] Molla, H. G. (2017). Review of anthropometric characteristics of runners. Journal of Tourism, Hospitality and Sport, 25, 26-31.

[8] Knechtle, B., Knechtle, P., Schulze, I., & Kohler, G. (2008). Upper arm circumference is associated with race performance in ultra-endurance runners. British Journal of Sports Medicine, 42 (4), 295-299.

[9] Arrese, A. L., & Ostariz, E. S. (2006). Skinfold thickness associated with distance running performance in highly trained runners. Journal of Sports Sciences, 24 (1), 69-76.

[10] Maldonado-Martin, S., Mujika, I., & Padilla, S. (2004). Physiological variables to use in the gender comparison in highly trained runners. Journal Sports Medicine and Physical Fitness, 44, 8-14.

[11] Kong, W. P., & de Heer, H. (2008). Anthropometric, gait and strength characteristics of Kenyan distance runners. Journal of Sports Science and Medicine, 7 (4), 499-504.

[12] Legaz Arrese, A., & Eston, R. (2005). Changes in performance, skin fold thicknesses and fat patterning after three years of intense athletic conditioning in high level runners. British Journal of Sports Medicine, 39 (11), 851-856.

[13] Bauli. s & Mridha. S (2018). A Study on Anthropometric Profile of International and National level Gymnasts in India. Int J Phy Edu & Spo Sci. 13 (8): 13-16.

[14] Sodhi, H. S. (1991). Sport Anthropometry: A kin anthropometric approach. Anova publication: Mohali.

[15] JF Rickta, MY Arafat, FTJ Mukta (2021). A study on correlation among physique, motor fitness and performance of soccer player. Int J Phy Edu Sports M Y Science. 11 (1): 28-33.

[16] Arafat, Y., Rickta, J. F., Mukta, F. T. J., & Islam, R. Physical and Motor Fitness Level of Secondary School-Going Boys.

[17] Rickta, J. F., Arafat, M. Y., & Mukta, F. T. J. (2021). A study on correlation among physique, motor fitness and performance of soccer player. International Journal of Physical Education Sports Management and Yogic Sciences, 11 (1), 28-33.

[18] Bester A, Coetzee B. (2010a). The anthropometric floor-item achievement determinants of young gymnasts. S Afr JRes Sport Phys Educ Recreation, 32 (2): 13-30.

[19] Bester A, Coetzee B. (2010). The anthropometric floor-item achievement determinants of young gymnasts. S Afr JRes Sport Phys Educ Recreation, 32 (2): 13-30.

[20] Joao A, Fernandes Filho J. (2002). Olympic Gymnastics: identification of the genetic profile, somatotype and psychology of female Brazilian athletes of highly qualified Olympic gymnasts. Fit Perf J; 1 (2): 12-20.

[21] Massidda M, Toselli S, Brasili P, Caló CM. (2013). Somatotype of elite Italian gymnasts. Coll Antropol, 37 (3): 853-857.

[22] Malina, R. M. Et al. (1997). Growth and maturation elite female gymnast: is training a factor? In: Johnston, F. E. & Zemel, B. editors. Human growth and development. Philadelphia USA: Proceedings of the 8th Int Congr Auxology.

[23] Hedbávný, P., Cacek, J., & Svobodová, L. (2014). Anthropometric characteristics in Czech elite female gymnasts. Journal of Human Sport and Exercise, 9 (1), S481-S489.

[24] Atikovic, A. (2020). Anthropometric Characteristics of Olympic Female and Male Artistic Gymnasts from 1996 to 2016. International Journal of Morphology, 38 (4).

[25] Sands, W. A., Slater, C., McNeal, J. R., Murray, S. R., & Stone, M. H. (2012). Historical trends in the size of US Olympic female artistic gymnasts. International Journal of Sports Physiology and Performance, 7 (4), pp. 350-356.

[26] Poliszczuk T, Broda D, Poliszczuk D. (2012). Changes in somatic parameters and dynamic balance in female rhythmic gymnasts over a space of two years. Pol J Sport Tourism. 19: 240-245.

[27] Broekhoff J (1986). The effect of physical activity on physical growth and development-in-Stull GA & Eckert HM (Eds) effect of physical activity on children (American academy of physical education papers n° 19. Pp 75-87 Human kinetics, Champing, III.

[28] Thomson, K. Are you a born gymnast? Academy, 2016.

[29] Tanner, J. M. (1983). Assessement of Skeletal Maturity and Predicting of Adult Height (TW2 Method). Prediction of adult height, 22-37.

[30] Moss, G. (2016). Why Are Gymnasts So Short? Whether Gymnastics Stunts Growth, Explained.