

Morphometric Study of the Length and the Breadth of the Scapula in a Bangladeshi Population

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Abstract

A cross-sectional, descriptive study was carried out in the Department of Anatomy, Mymensingh Medical College, Bangladesh, from January to December of 2019, to see the variation in length and breadth of human scapulae. We adopted a convenient sampling technique. A total of 150 fully ossified dry human scapulae (70 right sided and 80 left sided) of Bangladeshi people were collected. Any kind of damaged or broken scapulae were excluded. The length and breadth were measured using a digital Vernier slide calipers. The length of the scapula was measured by the distance between the summit of the superior angle and the inferior angle of the scapula, while the breadth was measured by the distance between the spine intersecting the medial border of the scapula and the lower point of outer border of the glenoid cavity. Scapular index was determined by dividing its breadth by its length and multiplied by 100. The mean lengths of the right and left sided scapulae were found 136.59 ± 12.04 mm and 136.37 ± 12.92 mm respectively. The mean breadths of the right and left sided scapulae were found 100.13 ± 8.19 mm and 99.9 ± 7.66 mm respectively. The mean scapular indexes were found 73.17 ± 3.66 and 73.41 ± 3.91 for the right and the left side respectively. Our findings are important racial comparison that could contribute to anthropological studies as well as in clinical settings for innovative prosthesis design for the surgeries of shoulder joint.

CBMJ 2025 July: vol. 14 no. 02 P:141-145

Keywords: Morphometry, length, breadth, scapular index, Bangladeshi people

Introduction

The scapula is a large, flat triangular bone which lies on the posterolateral aspect of the chest. Scapula, the large triangular flat bone links the axial skeleton to the appendicular skeleton of the upper limb along with clavicle.^{1,2} It shows modifications in its shape in the evolutionary process from quadrupeds to bipeds. Scapular index which indicates the relationship of breadth to the length of the bone has been used to note such modifications.^{3,4} A clear understanding of the scapula's morphology and functions is essential for healthcare specifically in physical medicine and orthopaedic specialties, when assessing and treating shoulder-related conditions. Identifying any abnormalities or dysfunctions in the scapula can guide rehabilitative interventions and enhance outcomes.³⁻⁵

Due to scarcity of data on the morphometry of the scapula in our Bangladeshi population, the urgency of the present study arises. We mainly depend on foreign data and statistics. Hence, our objective of this study is to obtain data of the scapula specifically

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the length, breadth and scapular index in Bangladeshi population for clinical application in joint replacement surgeries, glenohumeral instability, management of tearing of rotator cuff and compare it with the findings in other races across the globe.

Methods

This cross-sectional, descriptive study was carried out in the Department of Anatomy, Mymensingh Medical College, Bangladesh, from January to December of 2019. We adopted a convenient sampling technique. A total of 150 fully ossified dry human scapulae (70 right sided and 80 left sided) of Bangladeshi people were collected from medical students and the anatomy museum of Mymensingh Medical College. Any kind of damaged or broken scapulae were excluded. The length and breadth were measured using a digital Vernier slide calipers. The length of the scapula was measured by the distance between the summit of the superior angle and the inferior angle of the scapula (Fig. 1). The breadth of the scapula was measured by the distance between the spine intersecting the medial border of the scapula and the lower point of outer border of the glenoid cavity (Fig. 2). Scapular index was calculated by the following formula:

$$\text{Scapular index} = \frac{\text{Breadth of Scapula}}{\text{Length of Scapula}} \times 100$$



Fig. 1: Procedure of measurement of the length of the scapula.



Fig. 2: Procedure of measurement of the breadth of the scapula

Following data collection, data input was done. The collected data was assessed for completeness, accuracy, and consistency before analysis. Statistical analysis was carried out using Statistical Package for Social Sciences (SPSS) version 20.0 for windows. Continuous variables were expressed as mean±SD (standard deviation). The data were presented in table, graphs and figures.

Ethical approval for this study was obtained from the Institutional Review Board (IRB) of Mymensingh Medical College, Mymensingh, Bangladesh.

Results

In our study, the mean length of the right scapula was 136.59±12.04 mm (ranging between 109.6 mm and 167.3 mm) and the mean length of the left scapula was 136.37±12.92 mm (ranging between 108.1 mm and 168.1 mm) (Table-I, Fig. 3 & 4). The mean breadth of the right scapula was 100.13±8.19 mm (ranging between 84.4 mm and 119.8 mm), while the mean breadth of the left scapula was 99.9±7.66 mm (ranging between 78.9 mm and 118.9 mm) (Table-I, Fig. 5 & 6)). The scapular index were found 73.17±3.66 (ranging between 61.3 and 79.5) and 73.41±3.91 (ranging from 66.4 to 86.2) for the right and the left side respectively (Table-I, Fig. 7 & 8).

Table-I: Measurement of length, breadth of scapula and scapular index (N=150)

Variables	Side	Range		Mean± SD
		Minimum	Maximum	
Length	Right	109.6	167.3	136.59± 12.04
	Left	108.1	168.1	136.37± 12.92
Breadth	Right	84.4	119.8	100.13± 8.19
	Left	78.9	118.9	99.9± 7.66
Scapular Index	Right	61.3	79.5	73.17± 3.66
	Left	66.4	86.2	73.41± 3.91

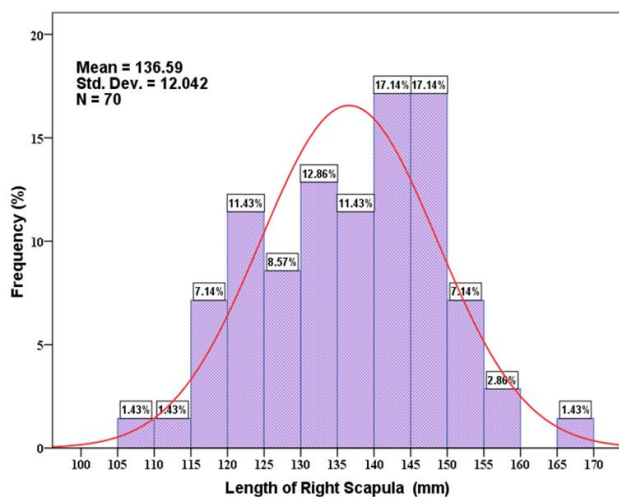


Fig. 3: Histogram showing the frequency distribution of length of right scapula.

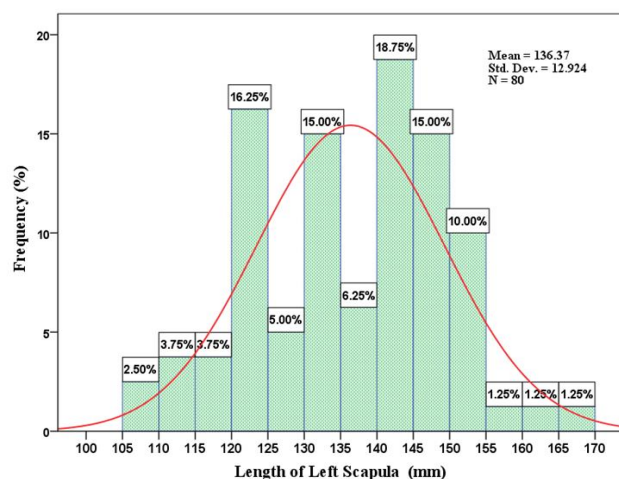


Fig. 4: Histogram showing the frequency distribution of length of left scapula

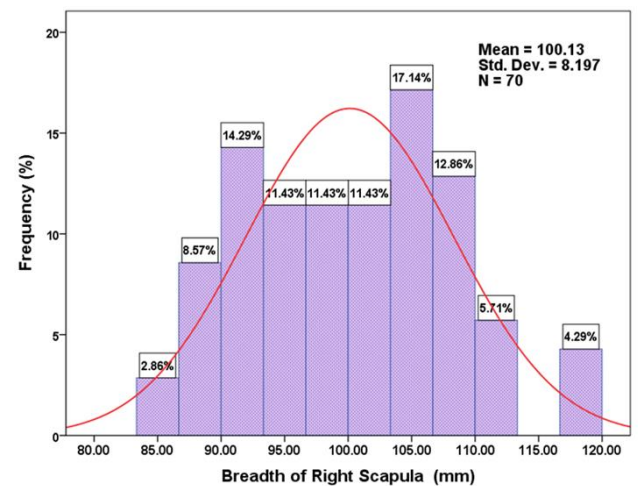


Fig. 5: Histogram showing the frequency distribution of breadth of right scapula

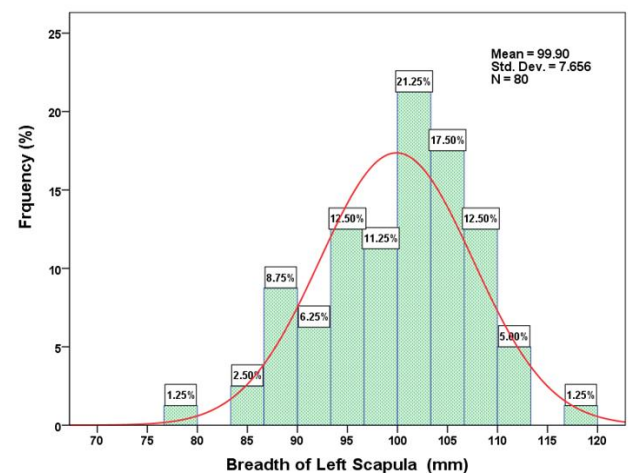


Fig. 6: Histogram showing the frequency distribution of breadth of left scapula

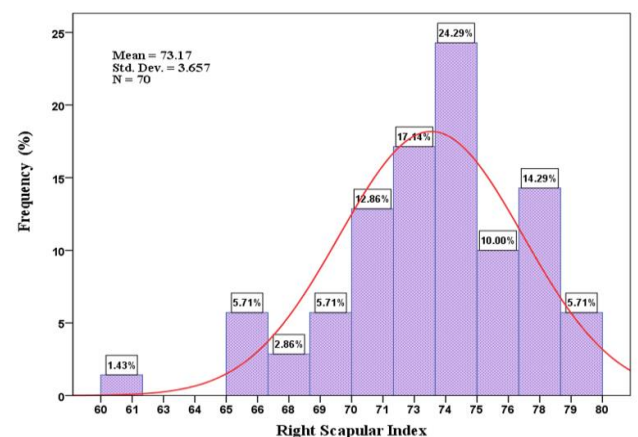


Fig. 7: Histogram showing the frequency distribution of right scapular index

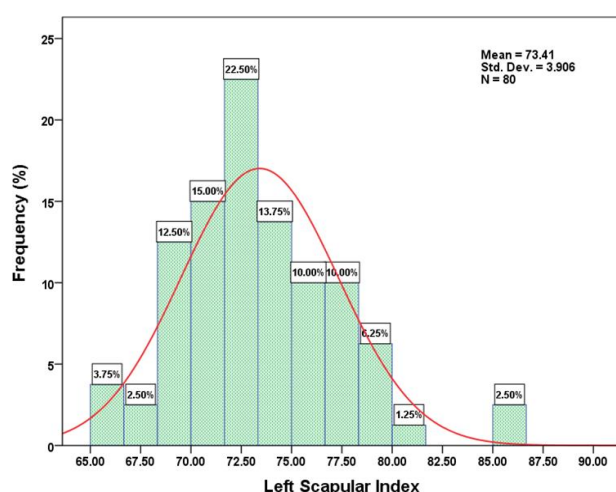


Fig. 8: Histogram showing the frequency distribution of left scapular index

Discussion

According to the present study, the mean length of the scapula were found 136.59 ± 12.04 mm and 136.37 ± 12.92 mm on the right and the left side respectively. The mean breadth of the scapula were found 100.13 ± 8.19 mm and 99.9 ± 7.66 mm on the on the right and the left side respectively. The mean scapular index was 73.17 ± 3.66 on the right and 73.41 ± 3.91 on the left side. Akhtar *et al.* observed 228 scapulae and found the mean length and breadth of the scapulae 135.07 ± 14.23 mm and 97.55 ± 9.63 mm respectively.³ Chhabra, Prakash & Mishra studied on 126 scapulae and found mean length, breadth and index of scapula 141.94 ± 12.76 mm, 103.65 ± 6.82 mm and 73.32 ± 4.80 respectively.⁴ Another study done by Singh, Pahuja, Agarwal on 129 scapulae reported the mean length of scapula 14.51 ± 1.17 mm in total samples, while 14.57 ± 1.13 mm on left side and 14.46 ± 0.76 mm on right side; they also reported the mean breadth of scapula 10.55 ± 2.58 mm in total samples while 10.65 ± 0.75 mm on left and 10.46 ± 0.77 mm on right side.⁵ El-din & Ali studied on 160 scapulae and found the mean

length, breadth and index of scapula 151.16 ± 10.32 mm, 107.22 ± 9.74 mm and 70.93 respectively.⁶ Kavita, Jaskaran & Geeta observed 129 scapulae found the mean length of scapula 145.1 ± 11.7 mm in total samples, while 145.7 ± 11.3 mm on left side and 144.6 ± 12.2 mm on right side and similarly the mean breadth of scapula 105.5 ± 7.6 mm in total samples, while 106.5 ± 7.5 mm on left & 104 ± 7.7 mm on right side.⁷ Varghese & Amma examined 50 scapulae and found the mean length 130.38 ± 11.05 mm, the mean breadth 89.68 ± 8.88 mm, and the mean index 67.72 ± 3.72 on the left side and the mean length 130.11 ± 10.96 mm, the mean breadth 90 ± 6.2 mm, and the mean index 70.01 ± 4.09 on the right side.⁸

Rajeswari & Ramalingam studied 100 scapulae and found the mean length, breadth and index of scapula 141.34 ± 8.5 mm, 103.3 ± 6.9 mm and 71.24 ± 3.1 respectively.⁹ The mean value of the length observed in the present study was nearly similar to the value described by Akhtar *et al.*,³ but lower than those of Chhabra, Prakash & Mishra,⁴ Singh, Pahuja & Agarwal,⁵ El-din & Ali,⁶ Kavita, Jaskaran & Geeta,⁷ Rajeswari & Ramalingam⁹ and higher than those of Varghese & Amma⁸. The mean value of the breadth reported in the present study regarding breadth of both sided scapulae was nearly similar to the value described by Akhtar *et al.*,³ Chhabra, Prakash & Mishra,⁴ Rajeswari & Ramalingam,⁹ but lower than those of Singh, Pahuja & Agarwal,⁵ El-din & Ali,⁶ and Kavita, Jaskaran & Geeta,⁷ and higher than those of Varghese & Amma⁸. Regarding the scapular index, the mean value we observed in the present study was nearly similar to the value reported by Chhabra, Prakash & Mishra, El-din & Ali, and Rajeswari & Ramalingam, but higher than those of Varghese & Amma.^{4,6,9,8}

Conclusion

The results of the present study of 150 scapulae revealed that the mean length, breadth and scapular index were slightly higher on the right side than that of the left. As there is a scarcity of literature about morphometric evaluation of the length, breadth and index of scapula in Bangladeshi population, our morphometric data will serve as a reference base for the clinicians and the future researchers in the field.

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