



Original Article

Morphometric Study of Acromion Process of Left Scapula among Bangladeshi Population

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Abstract


Background: The acromion is a process on the scapula of pectoral girdle and articulates the clavicle. The morphometry of the acromion process, its relation to coracoid process and supraglenoid tubercle is important to determine dimensions of the subacromial space. Variations of acromion process and subacromial space can encourage clinical conditions of subacromial impingement syndrome, rotator cuff diseases and degenerative changes. **Objective:** Aim of this study was to determine the morphometric values of acromion process and thereby help managing the related clinical conditions as well as for the anthropological studies. **Methodology:** The study was completed on 140 dry adult human left scapulae derived from 89 males and 51 females. Morphometry of the acromion process of the scapulae was measured with the help of digital Sliding Calipers and metallic wire and scale. **Results:** The average maximum length of acromion process was 53.22 (± 6.17) mm and 46.20 (± 4.99) mm, maximum (average) width of acromion process was 29.83 (± 3.05) mm and 26.25 (± 3.03) mm, acromio-coracoid distance was 36.72 (± 5.86) mm and 32.95 (± 4.09) mm, acromio-glenoid distance was 29.98 (± 3.97) mm and 27.17 (± 3.38) mm among males and females respectively. **Conclusion:** Morphometric knowledge of the study might be useful for the Orthopaedic Surgeons and the Radiologists for determination of gender and for the Anthropologists when studying the evolution of bipedal gait.

Keywords: Acromion process, Morphometry, Acromio-coracoid distance, Acromio-glenoid distance.

Received: 22 September 2021, **Manuscript ID:** 11140921OA, **Accepted:** 25 May, 2022

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How to cite this article: Sultana A, Naushaba H, Faruque ABMO, Khan LF, Akter M, Sultana K. Morphometric Study of Acromion Process of Left Scapula among Bangladeshi Population. J Monno Med Coll. 2022 Jun;8(1):10-12.

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Introduction

The scapula (shoulder blade) connects the humerus with the clavicle, is a flat triangular bone of pectoral girdle. There are three processes on the scapula- the spine, the acromion and the coracoid processes. The acromion projects forward from lateral end of spine. The medial border of acromion is short and close to its anterior end is marked by a small oval facet for acromio-clavicular joint.¹

The inferior aspect of acromion, together with coraco-acromial ligament and coracoid process, form a protective arch over the shoulder joint. The rotator cuff tendons, subacromial bursa and biceps tendon all pass beneath this arch. Any process acquired or congenital, that narrows the space may cause mechanical impingement.²

The slope and length of acromion and the height of the arch are closely associated with degenerative changes.² The knowledge regarding the shape and various distances of acromion process provides benefit to the orthopedic surgeons

during surgical repair around the shoulder joint. It is also helpful to anthropologists during their study on evolution of acromion. This study may also be helpful to the forensic experts for determination of gender.³

The morphometric study of acromion process of scapula is very important in the field of forensic anthropology and in clinical sciences. The scapula plays important roles in impingement syndrome of shoulder joint and rotator cuff diseases.⁴ This painful process is caused mainly by the friction of the inferior surface of the anterior part of acromion process.

From the above information, this study was planned to determine the morphometric values of acromion process of scapulae.

Methodology

It was a cross-sectional, analytical type of study. The study was carried out in the department of Anatomy, Sir Salimullah

Medical College (SSMC), Dhaka, Bangladesh from July, 2013 to June, 2014. Eighty-nine male and fifty-one female dry adult human left scapulae were collected from the department of Anatomy, SSMC, Dhaka National Medical College and Delta Medical College, Dhaka. International Congress of Prehistoric Anthropometry and Archeology, Geneva gives an agreement on ‘paired bilateral structures’ measurements of left sided are recommended.⁵ Hence, for this study dry adult human left scapula was the inclusion criteria.

The variables related to acromion process were measured as follows: (i) Maximum length of acromion process (MLA) - as the distance between most superior point and most inferior point on acromion process. (Figure 1) (ii) Maximum width of acromion process (MWA) - as the distance between lateral and medial borders at midpoint of acromion process. (Figure 2) (iii) Acromio-coracoid distance (Acd) - as the distance between tip of acromion process and tip of coracoid process. (Figure 3) (iv) Acromio-glenoid distance (Agd) - as the distance between tip of acromion process and supraglenoid tubercle. (Figure 4)



Figure 1: Maximum length of acromion process (MLA) measurement by metallic scale

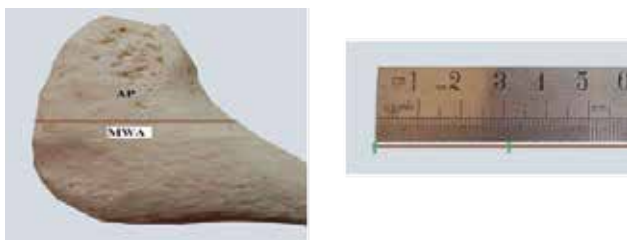


Figure 2: Maximum width of acromion process (MWA) measurement by metallic scale

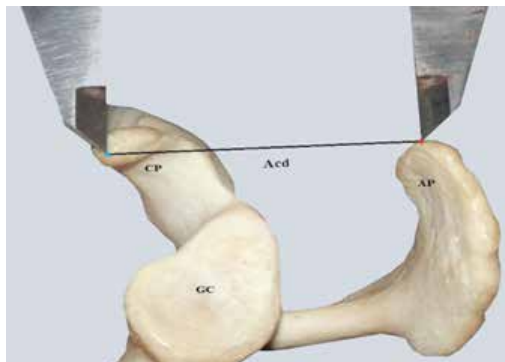


Figure 3: Acromio-coracoid distance (Acd) measurement by Slide Calipers

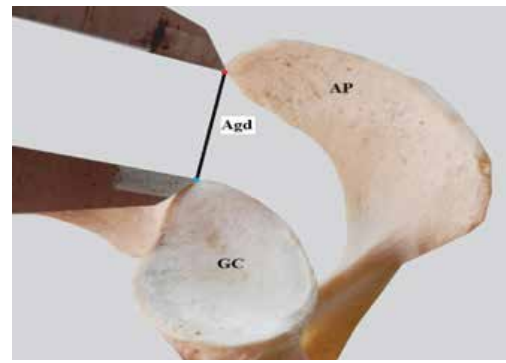


Figure 4: Acromio-glenoid distance (Agd) measurement by Slide Calipers

The variables were measured with the help of Vernier Calipers, a metallic wire and a metallic scale. The mean value of three measurements was recorded for each variable to exclude observer’s error.

An unpaired Student’s t-test was used to perform statistical analysis, p-value <0.01 was considered statistically significant. The study was approved by the Institutional Ethics Committee (IEC), SSMC, Dhaka.

Results

The mean ± SD of maximum length of acromion process among males and females was 53.22 (±6.17) mm and 46.20 (±4.99) mm, the maximum width of acromion process was 29.83 (±3.05) mm and 26.25 (±3.03) mm, the acromio-coracoid distance was 36.72 (±5.86) mm and 32.95 (±4.09) mm, the acromio-glenoid distance was 29.98 (±3.97) mm and 27.17 (±3.38) mm in male and female respectively. The variables were greater in male than in female and were statistically significant. The mean and standard deviation values of various variables were shown in Table 1 (Maximum length and width of acromion process of scapula) and Table 2 (Acromio-coracoid and acromio-glenoid distance).

Table 1: Maximum length and width of acromion process of scapulae in males and females

Sex	Maximum length of acromion process (Mean ± SD in mm)	Maximum width of acromion process (Mean ± SD in mm)
Male (n=89)	53.22 ± 6.17 (37.77-70.50)	29.83 ± 3.05 (24.16-36.64)
Female (n=51)	46.20 ± 4.99 (29.25-56.15)	26.25 ± 3.03 (20.59-35.05)
P value	0.000**	0.000**

Comparison between sex was done by unpaired Student’s ‘t’ test
 **= P value < 0.01, significant at 1% level of significance (two tailed)

Table 2: Acromio-coracoid distance and acromio-glenoid distance of scapulae in males and females

Sex	Acromio-coracoid distance	Acromio-glenoid distance
	Mean \pm SD in mm	Mean \pm SD in mm
Male (n=89)	36.72 \pm 5.86 (24.18-55.45)	29.98 \pm 3.97 (19.86-37.75)
Female (n=51)	32.95 \pm 4.09 (23.63-41.00)	27.17 \pm 3.38 (18.25-33.00)
P value	0.000**	0.000**

Comparison between sex was done by unpaired Student's 't' test
**= P value < 0.01, significant at 1% level of significance (two tailed)

Discussion

In this study, maximum length of acromion process, maximum width of acromion process, acromio-coracoid distance and acromio-glenoid distance were found higher in the males than that of females and were found statistically significant ($p < 0.01$). The result clearly indicates the difference in sex.

The maximum length and maximum width of acromion processes in the present study were found higher than those of the studies carried out by Pushpa,⁴ Paraskevas et al,⁶ and Singroha et al,⁷ who carried out their studies on Indian, Greek and North Indian populations respectively. In this study, for more accurate measurements, we placed metallic wire on the acromion process and then collected measurements from the wire. This was done to capture curvatures of the acromion process. This is why values of our reported measurements were higher than the others.

The acromio-coracoid and acromio-glenoid distances in the present study were found higher than those of the studies carried out by Paraskevas et al,⁶ and Pushpa,⁴ who carried out their studies among Greek and Indian populations respectively; but lower than that of the study carried out by Singroha et al⁷ among North Indian population. The variations might be due to different race and ethnicity. Mansur⁸ in 2012 and Burke⁹ in 2008 did not differentiate sex, rather worked on the whole population. Hence, the values of their studies have not been brought under comparison spectrum.

Limitations of the present study include small sample size,

which was small because of the scarcity of the bones. The samples were collected from the Anatomy departments of different medical colleges in Dhaka. The sources of these bones were not definite and authentic.

Conclusion

The morphometry of acromion process in the present study can help the Orthopaedic Surgeons during surgical repair around the shoulder joint. It may also help the Radiologists to successfully carry out the interpretation of images of shoulder joint. The Anthropologists may also get interest in the morphometry of scapula when studying about the evolution of the bipedal gait. This study might also be useful to forensic experts in determination of gender.

Conflict of interest: None declared

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