

Study of Scapular Measurements and Scapular Indices of Andhrapradesh Region

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Abstract: Scapula, the triangular flat bone links the axial skeleton to the appendicular skeleton of upper limb along with clavicle. It shows modifications in its shape in the evolutionary process from quadrupeds to bipeds. Much of the changes have taken place in the infraspinous region. In the present study scapular measurements like breadth, length and infraspinous length are taken and parameters like scapular index, infraspinous index and are calculated which may help in comparative anatomy and defining the race.

Key words: Scapula, Scapular breadth, Scapular length, Scapular index, Infraspinous index

I. Introduction

Scapula, the important flat bone of the pectoral girdle is situated on the posterior side of the rib cage, overlying ribs 2 through 7. In terms of comparative anatomy, the human scapula represents two bones that have become fused together: the (dorsal) scapula proper and the (ventral) coracoid.¹ Although, the scapula has attachment of as many as 15 muscles, the shape of the scapula is not due to the forces applied during the development but is a mammalian character.²

From the evolutionary point of view scapula has undergone modifications especially in its shape. Scapular index which indicates the relationship of breadth to the length of the bone has been used to note of such modifications. The changes in the scapular shape are more in the infraspinous region than the supra spinous region. Hence infraspinous index relating the breadth of scapula to infraspinous length also has to be taken into account.³

The study was carried out for determining the scapular index and infraspinous index by measuring the breadth, length and infraspinous length of scapulae of Andhra Pradesh region.

II. Materials And Methods

The study was carried out on the scapulae available at anatomy department of Deccan medical college and KIMS, Narketpally which were collected from dissection of cadavers of Andhra Pradesh region. A total of 50 scapulae of both right and left side were studied.

Instruments :- Osteometric board, vernier caliper, white paper, lead pencil

Method:- A white sheet was pasted to the osteometric board, the scapula was fixed so that points can be marked over it and errors in the measurement were minimized. Following points⁴ were marked on that white sheet as shown in fig 1 and 2.

A= Point of intersection of spine of scapula to the medial border (fig2)

B= Middle of the outer border of the Glenoid cavity (fig2)

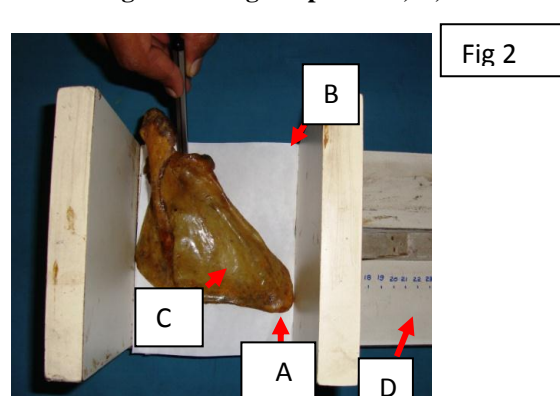
C= Summit of the superior angle (fig2)

D= Summit of the inferior angle (fig2)

Fig 1 Showing method of marking points



Fig 2 Showing the points A, B, C and D



Scapular breadth is taken as the distance between the points A and B. The Scapular length is taken as the distance between points C and D. Infraspinous length is taken as the distance between points A and D. All the measurements taken with the help of vernier caliper in millimeters.

Using these readings scapular index and infraspinous index are calculated as follows

Scapular Index= (Breadth X100)/ Length

Infraspinous Index = (Breadth X100)/ Infraspinous length

Data was analysed with Microsoft excel and results were tabulated.

III. Results

A total of 50 scapulae were studied.

Table 1 showing distribution of scapula as per its breadth

N= 50

Breadth in mm	No of Scapulae	Percentage (%)
90-95	3	6
95-100	3	6
100-105	13	26
105-110	20	40
110-115	11	22

In the present study, the breadth of scapula was ranging from 90.3 mm to 113.3mm. The mean and SD were 105.6 and 5.08 respectively. The breadth range of 105mm to 110mm had the maximum number of scapulae while the minimum number were noted in the 90 to 100 range

Table 2 showing distribution of scapula as per its length

N= 50

Length	No. of Scapulae	Percentage (%)
115-125	6	12
125-135	4	8
135-145	17	34
145-155	16	32
155-165	5	10
165-175	2	4

The mean length of the scapula and SD observed were 143.28mm and 11.44 respectively. Maximum number of scapulae was in the range of 135mm to 145mm while least number was in the 165mm to 175mm range.

Table 3 showing distribution of scapula as per scapular index [(Breadth/length) X100]

N= 50

S Index	No. of Scapulae	Percentage (%)
65-68	3	6
68-71	2	4
71-74	26	52
74-77	13	26
77-80	4	8
80-83	2	4

The correlation between breadth and length of scapula is expressed as scapular index which was in the range of 67.16mm to 80.63mm. Mean and standard deviation were 73.99mm and 4.63 respectively. Maximum number of scapula were found in the range of 71mm to 74mm (52%) followed by 74mm to 77mm (26%) followed by 77mm to 80mm (8%), followed by 65mm to 68mm (6%), while only 2 each (4%) were in the range of 68mm to 71mm and 80mm to 83mm range.

Table 4 showing distribution of scapula as per Infraspinous index [(Breadth/Infraspinouslength) X100]

N=50

Infraspinous index	No. of Scapulae	Percentage (%)
93-95	4	8
95-97	15	30
97-99	15	30
99-101	10	20
101-103	4	8
103-105	2	4

The correlation between breadth and infraspinous length of scapula is expressed as Infraspinous index which was in the range of 93.09mm to 104.28mm. Mean and standard deviation were 98.33mm and 5.86 respectively. Maximum number of scapula were found two groups i.e. in the range of 95mm to 97mm and 97mm to 99mm (30% each) followed by 99mm to 101mm (20%) followed by two groups in range of 93mm to 95mm and 101mm to 103mm (8% each) followed by 103mm to 105mm (4%)

IV. Discussion

The scapular length, breadth and indices of Nalgonda region were studied. The current study was compared with various studies carried out on other geographic populations.

Scapular breadth: Mean Scapular breadth was ranging 105.59 with standard deviation of 5.08 in present study, while Flower W H's study of European race showed mean breadth to be 101.42 which is almost correlating with our study.⁴

Scapular length: Mean Scapular length was 143.27 with standard deviation of 11.44 in present study, while Flower WH's study of European race showed mean breadth to be 155.44mm. Thus the scapular length of European region is higher than that of Nalagonda region.⁴

Infraspinous length: Mean Infraspinous length was ranging 107.71mm with standard deviation of 7.6 in present study, while Flower W H's study of European race showed mean breadth to be 113.46mm which is nearing to the present study.⁴

Scapular index: Mean scapular index observed in present study was 73.99mm with standard deviation of 4.6. In other studies, the mean scapular index ranged from a minimum of 57.3mm in Peruvian population to a maximum of 69.8mm in the Andaman region. Thus our study scapular index value is nearer to Andaman region.

Table5 showing scapular index of various populations studied by various authors

Sl.no	Authorities	No.of Scapula observed	Race/Region	Mean scapular index
1	Broca M 1878 ⁵	46	European	65.91
2	Broca M 1878 ⁵	2	Peruvian	68.02
3	Broca M 1878 ⁵	50	Negro	68.16
4	Flower WH 1879 ⁴	200	European	65.2
5	Flower WH 1879 ⁴	2	Peruvian	57.3
6	Flower WH 1879 ⁴	6	Negro	71.7
7	Flower WH 1879 ⁴	12	Australian	68.9
8	Flower WH 1879 ⁴	21	Andaman	69.8
9	Turner 1893 ⁶	25	European	64.9
10	Present study 2014	50	Nalagonda	73.99

Infraspinous index: Mean infraspinous index observed in present study was 98.33 with the standard deviation of 5.86 while this index varies from 75.1 in Peruvian race to 100.9 in Negroes. Present study infraspinous index was more corresponding with that of Negro race.

Table6 showing Infraspinous index of various populations studied by various authors

Sr.no	Authorities	No. of Scapula observed	Race/region	Mean infra spinous index
1	Broca M 1878 ⁵	46	European	87.79
2	Broca M 1878 ⁵	2	Peruvian	91.74
3	Broca M 1878 ⁵	50	Negro	93.88
4	Flower WH 1879 ⁴	200	European	89.4

5	Flower WH 1879 ⁴	2	Peruvian	75.1
6	Flower WH 1879 ⁴	6	Negro	100.9
7	Flower WH 1879 ⁴	12	Australian	92.5
8	Flower WH 1879 ⁴	21	Andaman	92.7
9	Turner 1893 ⁶	25	European	89.4
10	Present study	50	Nalagonda	98.33

V. Conclusion

The scapular measurements can be used for comparative anatomy and manufacturing of prosthetic products and surgical procedures such as prosthetic positioning. The present study showed mean scapular index to be 73.99mm (range= 67.16mm to 80.63mm) and mean Infraspinous index to be 98.23 (range= 93.69mm to 104.38mm). These two indices are nearer to studies of Andaman population.

Further in depth studies about scapular measurements, including radiological may help in determining the race just by using the indices.

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