



STUDY ON THE ANGLE OF HUMERAL TORSION AMONG THE POPULATION OF WEST BENGAL.

Anatomy

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ABSTRACT

The study has been carried out to determine the average mean and standard deviation of the angle of humeral torsion in West Bengal population according to side, sex, sexual dimorphism, to work out, if any, correlation between torsion angle, morphological length and mid-shaft circumference of humerus. The study was carried out on 100 dry humerus (50 of left side-25 male, 25 female, 50 right side-25 male and 25 female). It was observed that mean torsion angle of humerus in male is greater in right side than left and in female greater in left side than right. Significant sexual dimorphism exists in morphological length in both sides. No correlation is found between torsion angle, morphological length and mid-shaft circumference in male and in female in right side, mid-shaft circumference is inversely correlated with torsion angle

KEYWORDS

Angle Of Humeral Torsion, Morphological Length ,mid-shaft Circumference

Introduction:

Structural architectural studies of Humerus led to the recognition of the angle of humeral torsion. Torsion is defined as a state of longitudinal twisting or spiralling of shaft of a long bone and can be measured as the difference between the joint axis of proximal and distal ends of the bone. Anatomically, the angle of the humeral torsion can be defined as the angle formed between a plane passing through the mechanical axis of humeral head and by another plane along the distal end axis passing through the anterior surface of capitulum and trochlea. In human being, for proper functioning of upper extremities, torsion occurs between proximal and distal end of humerus, with the humeral head facing postero-medially in anatomical position. The average mean of the angle of humeral torsion has been found to vary in multiple skeletal survey across the world. This angle is important in orthopaedics in the anterior dislocation of shoulder and its surgical procedure and in arthroplasty. The present study is an attempt to evaluate the mean angle of humeral torsion among the West Bengal population according to the side and sex and to compare it with other races. Materials and Methods The study was carried out in Department of Anatomy, Medical College, Kolkata on 100 dry Humerus of unknown age and stature, according to the side and sex (determined on the basis of sex determining reference values of range of morphological length, epicondylar width and others according to Krogman¹) The samples were obtained by simple random method and a qualitative study has been performed over a period of 1 year. 50 humeri from right side ((25 male+25 female) and 50 from left side (25 male+25 female).

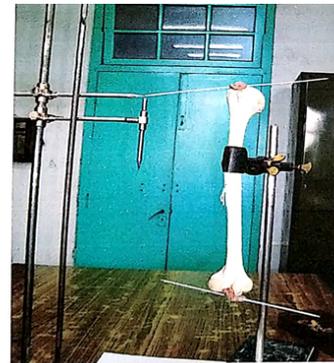
Instruments used:

- Bone hanging clamp
- Parallelograph.
- Glass horizontal surface.
- 2 metallic pins.
- Plasticine, non elastic tape, osteometric board.
- A pair of callipers
- Millimeter graph paper

Following parameters have been studied:-

- **Mechanical axis of humeral head**- as a line joining the outermost point of the head of humerus and that of greater tubercle
- **Distal end axis of humerus**- line passing through the 2 lowermost points of the trochlea
- **Angle of humeral torsion** between mechanical axis of head and distal end axis- these two axes were represented by 2 metallic pins stuck to the bone by plasticine..
- **Average value of humeral torsion angle** according to the side and sex- Torsion angle was measured with the help of parallelograph using techniques according to Wilder²
- **Mid-shaft circumference of humerus.**
- **Morphological length of humerus**

Plc:1



Showing the measurement of the humeral torsion angle with the help of a parallelograph and a bone hanging clamp

The bone was placed vertically in a bone hanging clamp. This apparatus was placed upon a large sheet of paper. The parallelograph, the function of which is to accurately delineate the position of the 2 metallic pins, projected upon the paper (diagraph) having 2 arms ending in points that can be placed, one exactly above another, so that, when upper one touches a certain point the lower one picks the paper exactly beneath it. Now, 2 points upon each metallic pin are recorded on a sheet of paper, the position of each is fixed, and their projections are drawn by connecting the points of each line by a ruler. The angle is then measured by a protractor.

Length of the humerus was determined by following morphological length with the help of osteometric board. In the board there is an inlaid metric scale with a cross piece attached at one end and a second crosspiece parallel to the first one. Bone is shut between the two and morphological length was read off on the scale.

Mid-shaft circumference was measured by non-elastic steel tape on basis of morphological length.

RESULT ANALYSIS

TABLE 1: Mean and Standard deviation of Osteometric variables (Humeri) in Male and Female

.D.-Standard deviation; M.S.C, Mid-shaft circumference

Variables	Left (male)		Right (male)		Left (female)		Right (female)	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Torsion angle	32.28	10.11	35	11.49	33.04	8.86	32.84	10.76
Length	31.57	0.97	31.24	1.22	29.42	1.15	29.26	1.15
M.S.C	6.6	0.63	6.56	0.49	6.38	0.51	6.37	0.45

Analysing the results using the Student T-test it is seen that significant sexual dimorphism exists in morphological length in both left and right sided Humeri (t-value in left humeri in respect to morphological length is 5.75 and p-value is <0.05- significant-value in right side in morphological length is 3.14 and p value is <0.05.) Unlike the other two osteometric variables.

Pearson correlation co-efficient of torsion angle with morphological length and mid-shaft circumference was used in male and female. Analysing the results no significant correlation is found between torsion angle with morphological length and mid-shaft circumference in case of male humeri. In female a significant inverse correlation is found between humeral torsion angle with mid-shaft circumference in right side, unlike in the other cases which exhibit insignificant positive trends.

Table2: Distribution showing sexual dimorphism of mean torsion angle values (degree) of left and right side

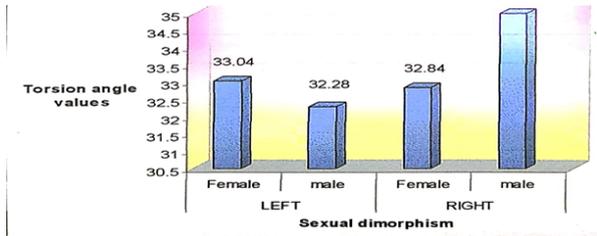
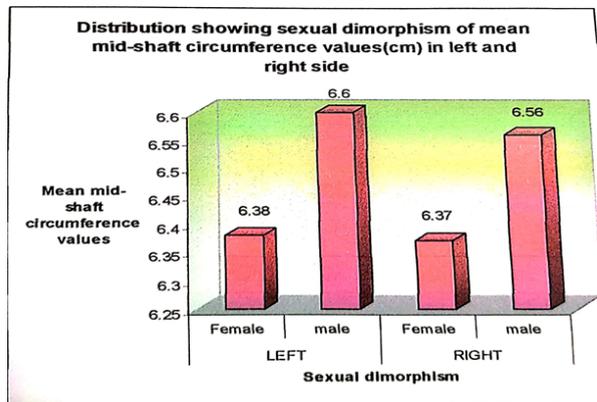


Table 3: Distribution showing sexual dimorphism of mean mid-shaft circumference values in left and right side



Discussion:

In the study it was observed that mean torsion angle in male humerus is greater in right side than left. In female it is greater in left side than right. Shah R.K, Trivedi B.D et al³ observed in their study that no statistically significant difference in torsion angle in right and left side humerus and torsion is inversely proportional to the mid-shaft circumference. It was observed that significant sexual dimorphism exists regarding morphological length in both right and left sided humerus. In the study in case of left male humerus torsion shows a negative trend with length and circumference which is not statistically significant, whereas in right male humerus, torsion shows a positive trend with the other variables, though statistically insignificant. In female, a statistically significant inverse correlation is found between torsion angle with mid-shaft circumference in right side. Angle of humeral torsion is important in sports medicine. An increase in the thickness of the shaft of humerus and altered humeral torsion was observed in professional baseball pitchers⁴. So the mid-shaft circumference is important with measurement of humeral torsion angle. It has been found that in juvenile base ball players the repetitive load of throwing motion restricts the normal processes acting to decrease the humeral torsion angle during growth period.⁵

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