Original Article

A Morphometric Study of Bicipital Tuberosity of Radius and its Clinical Importance.

Zisa RS[1], Kabir A[2].

1. **Dr. Rezwana Sharmin Zisa, Assistant professor, Department of Anatomy, President Abdul Hamid Medical College.*

2. *Dr. Anamul Kabir, Associate professor, Department of Anatomy, Jahurul Islam Medical College.*

**** For Correspondence***

Abstract

This present study was carried out to construct a morphometric data regarding the bicipital tuberosity with an attempt to grow interest among the researchers for future study. Samples were selected through purposive sampling for this cross-sectional descriptive study which was carried out in the Department of Anatomy, Mymensingh Medical College during the period of January 2016 to December 2016. Any damaged, incompletely ossified and fractured bones were excluded to contrive a standard measurement. Data were tabulated and statistically analyzed using Microsoft excel and SPSS software. The results of present study would be an important tool in the field of anatomy and also useful for orthopedic surgery department during distal tendon repair.

Key words: *Morphometry, Distal Biceps Tendon, Tendon Rupture, Tendon Repair, Bicipital Tuberosity.*

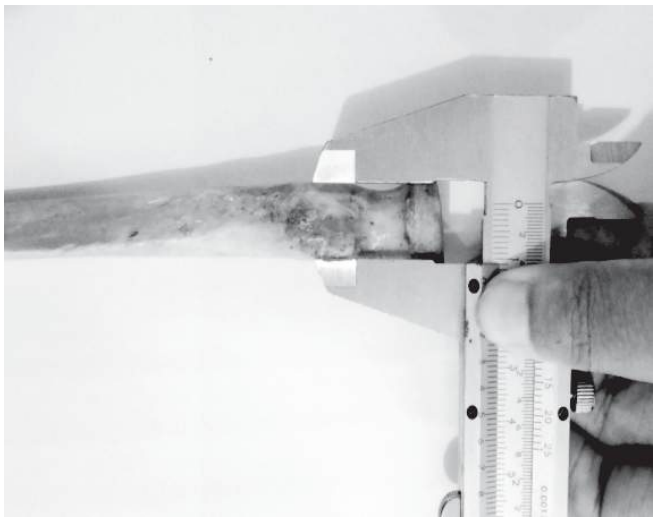
Introduction

Morphometrics (from Greek "morphé", meaning 'shape' or 'form' and "metria" meaning 'measurements') or morphometry refers to the quantitative analysis of form, a concept that encompasses size and shape[1]. Morphometric study of radius will be done with the primary aim to increase knowledge about the different parameters of radius which will helpful in surgical purposes. Distal tendon of biceps brachii is attached to the rough posterior part of radial tuberosity; a bursa separates the tendon from smooth anterior part of tuberosity. Distal tendon rupture is not so common and occurs in middle aged male due to force contraction. But a more recent retrospective study identified the incidence to be 1.2 per 100,000[2]. The anatomy of the distal biceps tendon and bicipital tuberosity is related to tendon rupture and repair. Morphometric study of the dimensions of bicipital tuberosity and its angular relationship to radial head is important in pathophysiology of biceps tendon rupture as well as to enrich surgical procedures like reconstruction of biceps tendon, radial head prosthesis and implantation and reconstruction of proximal head trauma of radius[2].

Methods

This study was carried out in the Department of Anatomy, Mymensingh Medical College (MMC), Mymensingh from January 2016 to December 2016. The study was cross sectional descriptive type. The samples were selected through purposive sampling. A total number of 190 fully ossified dry human radius were selected. The length of radial tuberosity was taken as the distance between the superior edge and inferior edge of radial tuberosity by vernier caliper3 and width of radial tuberosity was measured as the maximum diameter of radial tuberosity by vernier caliper[3,5]. Circumference of radial tuberosity was taken at the maximum convexity of radial tuberosity and this was measured with the help of measuring tape [3,4]. The various types of radius tuberosity were observed by presence or absence of ridge on radial tuberosity[5].

(a)



(b)

Figure.1: Procedure of measurement of (a) length and (b) width of radial tuberosity by vernier caliper.

(c)

Figure.2: Procedure of measurement of circumference of radial tuberosity by measuring tape.

(I)

(II)

(III)

Figure.3: Photograph showing different morphological types of radial tuberosity (I) smooth type (II) bifid ridge type and (III) single ridge type.

Results

Present study showed that the mean value of length of radial tuberosity of right and left radius was 1.99 ±0.32 cm and 2.00 ±0.30 cm. Also the mean width of radial tuberosity of right and left radius was 1.22 ±0.13 cm and 1.22 ±0.19 cm. Again in the current study 54% show no ridge (smooth) in tuberosity, 43% show single ridge and 2% show double ridge in case of right radius.

In left radius 54% show no ridge (smooth), 38% show single ridge and 6% show double ridge.

Table I: Linear measurements in both radius

Variable		Measurement (cm)	
		Range	Mean ±SD
Length of radial tuberosity	Right	0.71-2.84	1.99 ±0.32
	Left	0.72-2.71	2.00 ±0.30
Width of radial tuberosity	Right	0.93-1.60	1.22 ±0.13
	left	0.40-1.79	1.22 ±0.19

Table II: Circumferential measurements in both radius

Variable		Measurement (cm)	
		Range	Mean ± SD
Circumference of radial tuberosity	Right	5.0-6.8	5.84 ±0.40
	left	1.08-7.40	5.77 ±0.95

More than 80% of the samples of 98 radius of right side length of radial tuberosity were measured from 1.50 cm to 2.50 cm. In case of 92 radius of left side, more than 75% of the samples were measured from 1.75 cm to 2.70 cm.

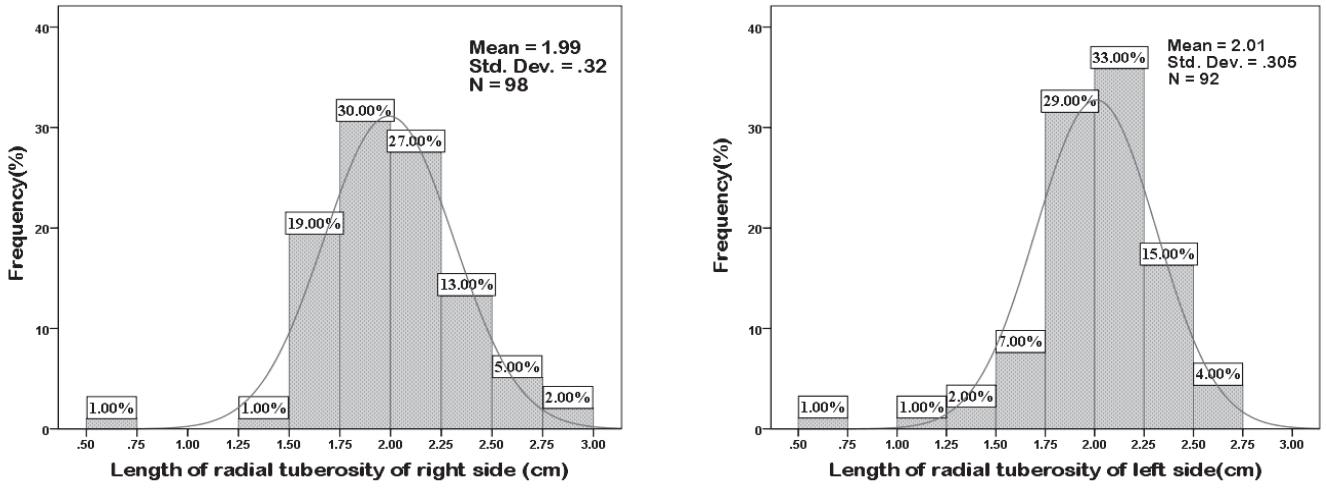


Figure. 4: The frequency distribution of length of radial tuberosity of right and left radius.

More than 80% of the samples of 98 radius of right side the width of bicipital tuberosity were measured from 1.00 cm to 1.40 cm. In case of 92 radius of left side, more than 90% of the samples were measured from 0.88 cm to 1.54 cm.

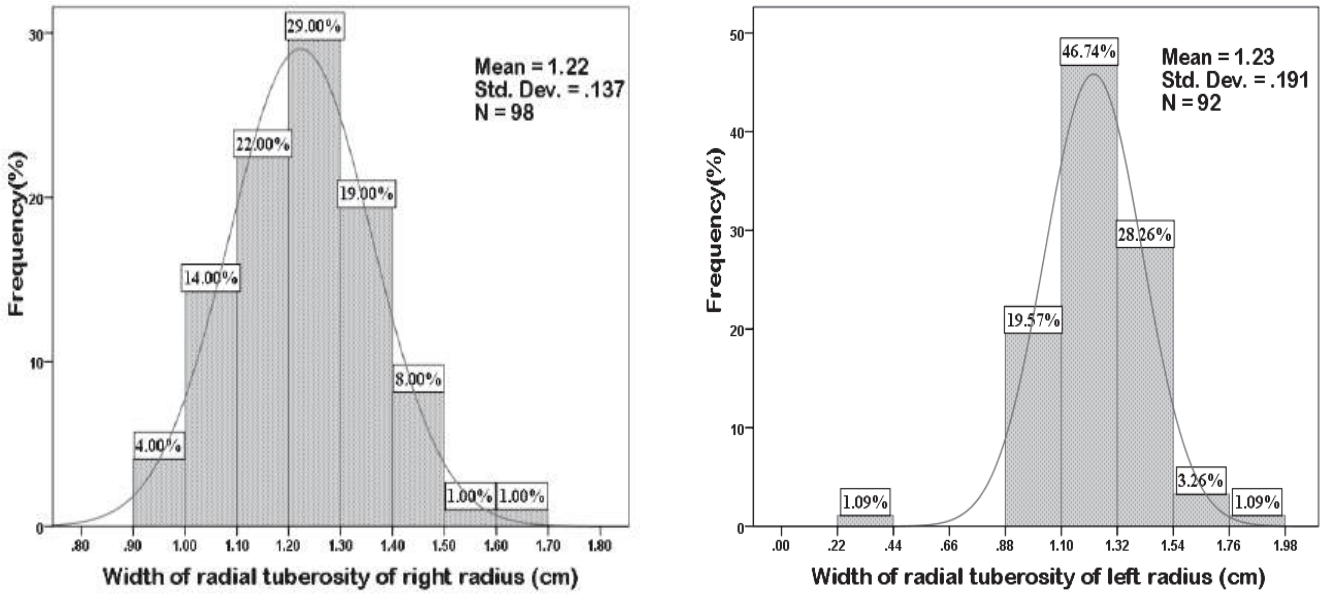


Figure. 5: The frequency distribution of width of radial tuberosity of right and left radius.

For the circumference of radial tuberosity of 98 radius of right side more than 80% of the samples were measured from 5.25 cm to 6.25 cm. In case of 92 radius of left side, 87% of the samples were measured from 5 cm to 7 cm.

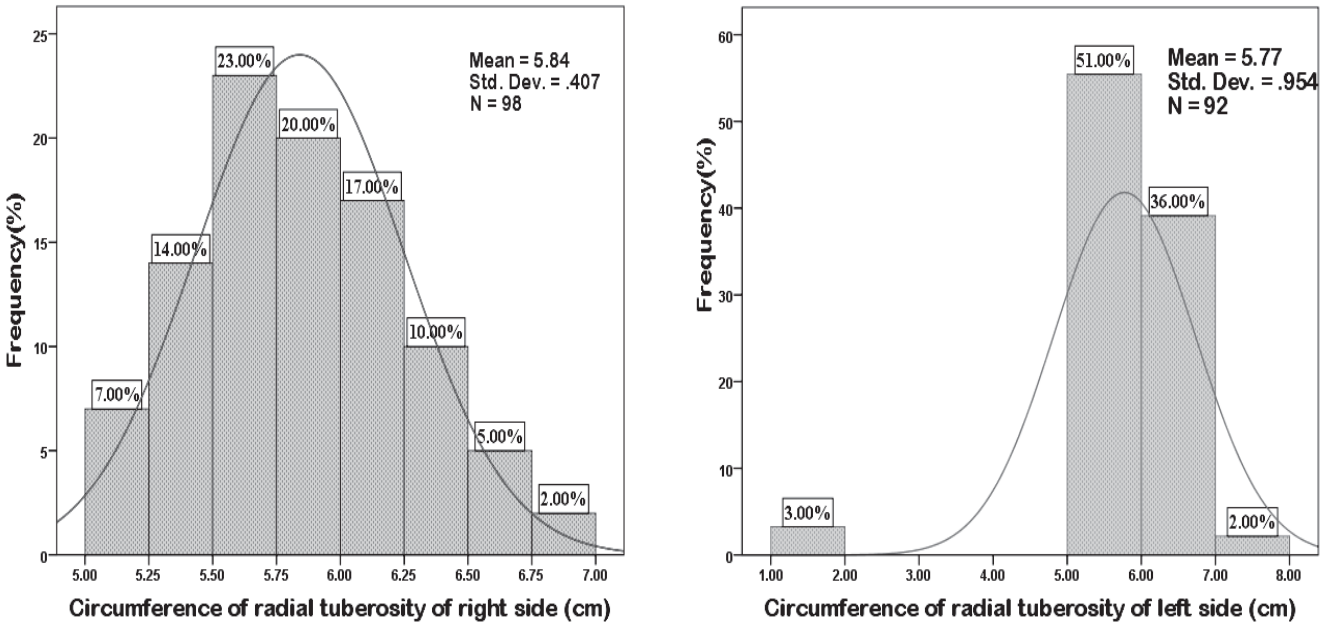


Figure. 6: The frequency distribution of circumference of radial tuberosity of right and left radius.

Among 98 right radius 54% show no ridge (smooth) in tuberosity, 43% show single ridge and 2% show double ridge. In case of 92 left radius 54% show no ridge (smooth), 38% show single ridge and 6% show double ridge.

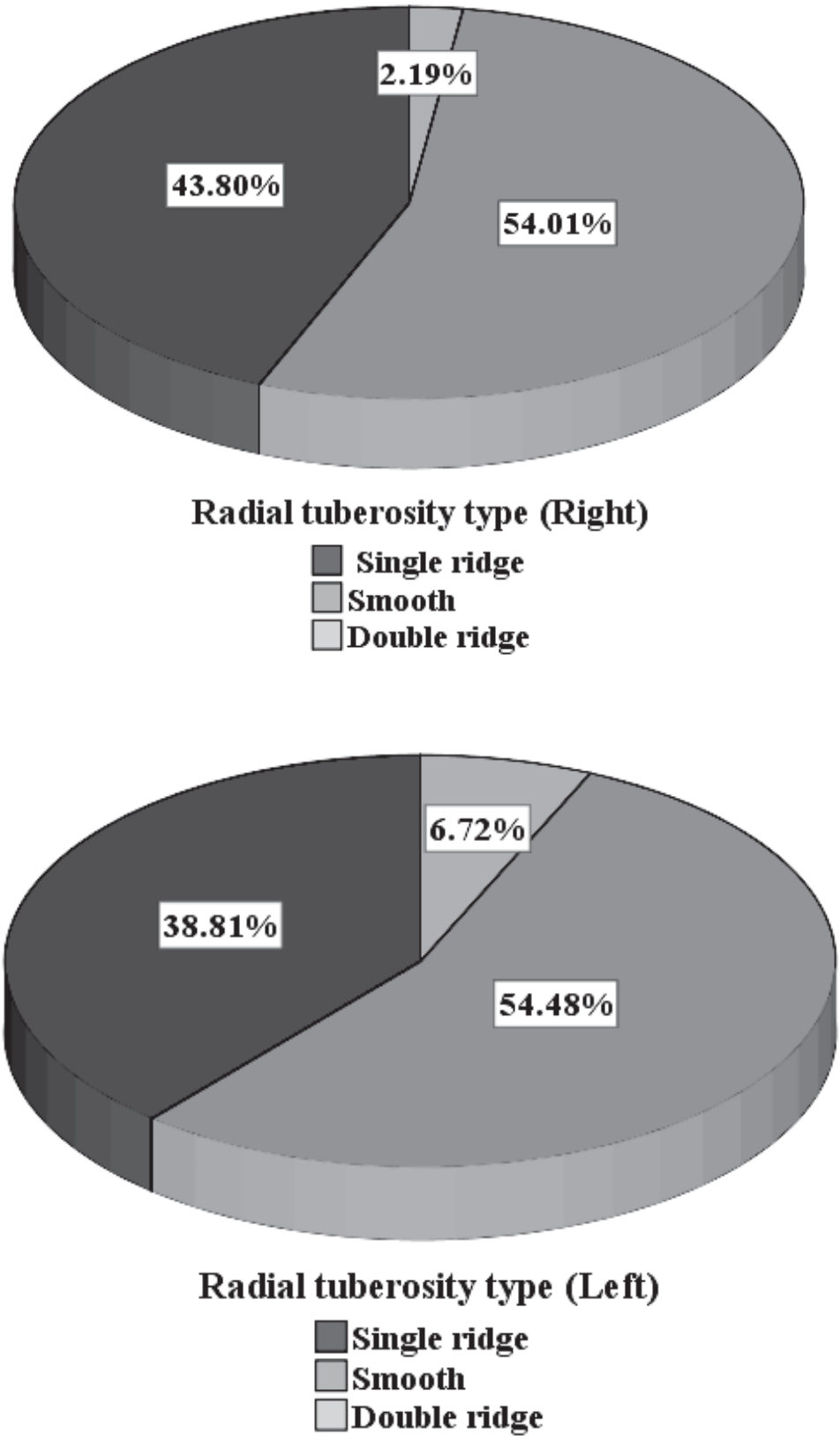


Figure. 7: The frequency distribution of different morphological types of radial tuberosity of right (n=98) and left radius (n=92).

Discussion

In present study, for right radius, the mean length of radial tuberosity of right radius was 1.99(±0.32) cm. But mean value of left radial tuberosity was 2(±0.30) cm. Mazzoca et al. mentioned the mean (±SD) length of radial tuberosity as 22(±3) mm which was higher than present study[5]. But they did not mention the side of radius. Gupta et al. found the mean (±SD) values of length of radial tuberosity of right and left sides as 2.02(±0.29) cm and 1.92(±0.35) cm respectively[3]. Regarding right radius this value was higher but on the left radius the value was lower than present study. According to the present study the mean width of radial tuberosity was 1.22(±0.13) cm for right radius and 1.22(±0.19) cm for left radius. Gupta et al. operated a study on 50 intact Indian radius and found the mean (±SD) value of width of radial tuberosity of right and left side 1.25(±0.15) cm and 1.21(±0.19) cm respectively which were more or less similar to the mean value of present study[3]. Mazzoca et al. described the mean (±SD) width of radial tuberosity as 17(±2) mm irrespective of side determination of radius which was greater than present study[5]. From the present study it was found that the mean circumference of radial tuberosity was 5.84(±0.40) cm in right radius and 5.77(±0.95) cm for left side. Gupta et al. found the mean (±SD) value of circumference of radial tuberosity of right and left radius 4.65(±0.45) cm and 4.45(±0.48) cm respectively which was lower than present study[3]. According to present study 54% of radial tuberosity show no ridge or smooth, 43% show single ridge and 2% show double ridge in case of right radius. For left radius 54% show no ridge or smooth type, 38% show single ridge and 6% show double ridge. Mazzoca et al. found single ridged type; smooth type and bifid ridged type of radial tuberosity were present in 88%, 6% and 6% specimens respectively. This study was dissimilar to present study[5].

Conclusion

Distal tendon rupture affects the elbow flexion and forearm supination strength. That's why anatomical repair of a ruptured tendon is necessary for restoration of power and terminal forearm rotation. Mean values of measurements of bicipital tuberosity were comparable with different studies. This study will help to determine radial tuberosity morphometry of Bangladeshi population.

References

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