



# International Journal of Medical Research & Health Sciences

www.ijmrhs.com

Volume 4 Issue 3

Coden: IJMRHS

Copyright ©2015

ISSN: 2319-5886

Received: 16<sup>th</sup> Mar 2015Revised: 20<sup>th</sup> Apr 2015Accepted: 9<sup>th</sup> May 2015

## Research article

### MORPHOMETRY OF THE ARTICULAR FACETS ON THE SUPERIOR, MEDIAL AND LATERAL SURFACES OF THE BODY OF TALUS AND ITS CLINICAL RELEVANCE

\*Goda Jatin B<sup>1</sup>, Patel Shailesh M<sup>2</sup>, Parmar Ajay M<sup>3</sup>, Agarwal GC<sup>4</sup>

<sup>1,3</sup>Assistant Professor, <sup>4</sup>Professor & Head, Department of Anatomy, Pacific Medical College & Hospital, Udaipur

<sup>2</sup>Professor & Head, Department of Anatomy, Government Medical College, Bhavnagar

\*Corresponding author email: drjbgoda@gmail.com

## ABSTRACT

**Background:** In the formation of Ankle joint, tibio-fibular mortice receives superior, medial and lateral articular surfaces of body of Talus. Because of very limited availability of the data on the Morphometry of the articular facets on the Body of the dry human tali, this study was undertaken. **Aims:** To prepare the database on the articular facets on the superior, medial and lateral surfaces of body of talus, to find if there is statistically significant difference between both the sides of measurements and to compare the results with the previous studies. **Methods and Material:** 40 Dry Human Tali (20 Right and 20 Left) were measured with Digital vernier caliper for the following Measurements: On the Trochlear surface: Medial length, Central length, Lateral length, Anterior width, Central width, Posterior width. On the lateral triangular articular facet: Central height, Central width. On the coma shaped medial articular facet: Central height, Central width. **Results:** Mean values of Medial, Central and Lateral lengths were 31.02, 30.39 and 29.63mm on Right side and 31.79, 30.65 and 29.45mm on Left side. Mean Anterior, Central and Posterior widths were 28.87, 28.16 and 21.59mm on right side and 29.08, 27.54 and 21.78mm on left side. On the medial articular surface, mean central height was 11.93mm on the right side and 11.29mm on the left side, Mean central width was 27.94mm on the right side and 28.29mm on the left side. On the lateral articular surface, mean central height was 22.14mm on the right side and 22.63mm on the left side. Mean central width was 18.93mm on the right side and 18.99mm on the left side. There is no significant difference between right and left sides of measurements. **Conclusion:** The trochlear articular surface is wider in front, measurements of opposite talus bone can be used as a control during talus bone replacement surgery, it may help surgeons to plan pre-operatively the complex talar fracture surgeries, to design accurate talus bone prosthesis and talus implants.

**Keywords:** Articular facets, Talus, Ankle joint, Trochlear surface, Talar implants.

## INTRODUCTION

Talus receives the whole weight of the Body and transmits it to the tarsal bones. Talus forms the connecting link between the bones of the foot and the leg. The superior surface and adjacent medial and lateral surfaces of the Body of Talus are received by the Tibio-fibular mortice and form the ankle joint <sup>[1]</sup>. The talar trochlear surfaces is convex parasagittally and gently concave transeversely, being wider in

front. The talar articular surface for medial malleolus is fairly flat, coma shaped and deeper anteriorly. The larger lateral talar articular surface is triangular and vertically concave <sup>[2]</sup>. In the studies on dead skeletal material, Talus is convenient as it is preserved better. A clear understanding of these articular surfaces has applications in designing of ankle braces to ankle implants and in total ankle replacements.

Furthermore, it can be useful in explaining talar morphology and ankle joint kinematics. Uptill now, studies have been done on talar morphological features like length, breadth, height, volume, Angles of declination and inclination, Anatomical variations of trochlear surface etc.<sup>[3,4,5]</sup>. This is one of very few studies showing Morphometry of Articulating surfaces on superior, medial and lateral surface of Body of Talus.

## MATERIAL AND METHODS

In this study, 40 Dry HumanTali (20 Right and 20 Left) obtained from the Department of Anatomy, Pacific Medical College and Hospital, Udaipur.

With the help of Digital vernier caliper the following Measurements of Talus were taken irrespective of the sex of bone:

On the Trochlear surface: Medial length, Central length, Lateral length, anterior width, Central width, Posterior width (Fig1)

On the lateral triangular articular facet: Central height, Central width (Fig 2).

On the coma shaped medial articular facet: Central height, Central width (Fig 3).

The Data was tabulated and Analysed statistically using excel worksheet. Mean values and standard deviation of each measurement were calculated. Unpaired t-test was applied to find the signifiacne of difference between Right and Left sides of measurements.



**Fig1: Measurements on the Trochlear surface of Talus. First row shows Anterior, Central and Posterior width from left to right and the second row shows Lateral, Central and Medial length from left to right.**



**Fig 2: Measurements on the triangular lateral articular facet of Talus. Central height & Central width.**



**Fig 3: Measurements on the coma shaped medial articular facet of Talus. Central height & Central width**

## RESULTS

The results found in this study are tabulated in Table 1. P values showed that there is no statistically significant difference between the right and left sides of parameters.

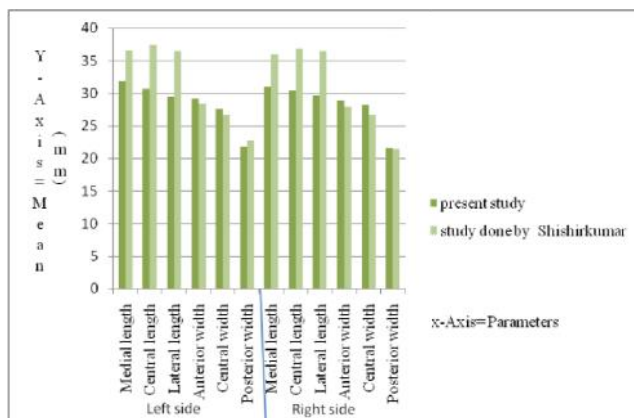
**Table1: Measurements of the articular facets on Superior, Medial and Lateral articular surfaces of body of Talus**

<b>Superior Articular Surface</b>			
Parameter	mean±SD	mean±SD	P value
	Right side(mm)	Leftside (mm)	
Medial Length	31.02±1.83	31.79±1.34	0.13
Central Length	30.39±1.63	30.65±0.91	0.53
Lateral Length	29.63±0.65	29.45±1.59	0.53
Anterior Width	28.87±1.73	29.08±2.73	0.77
Central Width	28.16±1.60	27.54±2.32	0.33
Posterior Width	21.59±1.42	21.78±1.47	0.68
<b>Medial Articular Surface</b>			
Central Height	11.93±1.44	11.29±1.17	0.13
Central Width	27.94±2.90	28.29±1.79	0.65
<b>Lateral Articular Surface</b>			
Central Height	22.14±1.71	22.63±3.24	0.55
Central Width	18.93±0.92	18.99±1.59	0.90

SD = Standard Deviation, \*If p < 0.05, the difference is significant between right and left sides.

## DISCUSSION

On the superior Articular surface, the mean values of Medial, Central and Lateral length were 31.02, 30.39 and 29.63mm on Right side and 31.79, 30.65 and 29.45mm on Left side. Mean Anterior, Central and Posterior widths were 28.87, 28.16 and 21.59mm on right side and 29.08, 27.54 and 21.78mm on left side. Mean central height on the medial articular surface was 11.93mm on the right side and 11.29mm on the left side, Mean central width on the medial articular surface was 27.94mm on the right side and 28.29mm on the left side. Mean central height on the lateral articular surface was 22.14mm on the right side and 22.63mm on the left side. Mean central width on the lateral articular surface was 18.93mm on the right side and 18.99mm on the left side. This measurements shows that trochlear articular surface is



wider in front.

### Fig 4: Comparison of mean values of present study with study of ShishirKumar.

Fig 4 shows the comparison of the measurements taken on the superior articular surface of the body of Talus between this study and the study done by shishirKumar [6]. As shown in Graph, Mean values of Medial, central and lateral lengths were higher on the Both sides where as mean value of the posterior width was higher on the left side in the study done by Dr. ShishirKumar.

Gautham K<sup>[7]</sup> found in his study the mean maximum transverse width on the body of Talus was 37.94mm on the right side and 36.80mm on the left side which was higher compared to present study. Mean Trochlear length was 30.62mm on right side and 30.44mm on the left side.

Ilhan Otag<sup>[8]</sup> found in his study that the mean values of talar width, Trochlear length and Trochlear breadth were 40.79, 33.45 and 31.69mm on right side and 43.39, 34.12 and 31.72mm on the left side

respectively which were higher compared to present study.

## CONCLUSION

The trochlear articular surface is wider in front, there is no significant difference between right and left sides of measurements. The difference in the mean values compared to other studies may be due to inherent population variations which may be because of genetic and environmental factors like climate, nutrition etc. As there is no significant difference between right and left sides of measurements, measurements of opposite talus bone can be used as a control during talus bone replacement surgery, it may help surgeons to plan pre-operatively the complex talar fracture surgeries, to design accurate talus bone prosthesis and talus implants<sup>[9]</sup>. The limitation of the study is that the mean values of the parameters may differ in various ethnic groups suggesting the need for different normograms in each group.

## ACKNOWLEDGEMENT

We are thankful to Mr. Darshan Mavadiya for his statistical assistance.

## Conflict of Interest: Nil

## REFERENCES

1. Datta AK. Essentials of Human Anatomy, Part 3, 3rd Edition, Current Books Internationals. 2004; 151-52.
2. Gray's Anatomy. The Anatomical Basis of clinical Practice. 40th Edition, Elsevier Churchill Livingstone. 2008; 4279.
3. Javia MD, Patel MM, Kubavat DM, Dixit Daksha, Singel TC. Morphometry of the Talus on the Basis of Sexual Dimorphism. Indian Journal of Research. June 2013, 3(5): 208-12.
4. Motagi MV, Kottapurath SR, Dharwadkar Kavitarati. Morphometric analyses of human dry tali of South Indian origin. International Journal of Medical Science and Public Health 2015;4(2): 237-40.
5. Khadija I, Sundus A, Shirza N. Anatomical Variations of Trochlear surface of Talus. JUMDC 2012; 3(1): 38-41.
6. Shishirkumar, Dr. Nambiar S, Dr. Arunachalam Kumar, Dr. Patil GV. Morphometric Analysis of Superior Articulating surface of Talus.

International Journal of science and research, 2014; 3(6): 2387-91.

7. Gautham K, Clarista MQ, Sheela N, Vidyashambhava P. Morphometric Analysis of The Human Tali. CIBTech Journal of Surgery, 2013; 2(2): 64-68.
8. Otag I, Cimen M. Morphometric Measures of Talus Bone in Skeleton Remains Belonging to Anatolian Geography. Indian Journal of Applied Research. 2003, 3(8), 530-31.
9. K. Islam, A. Dobbe, A. Komeili, K. Duke, M. El-Rich, S. Dhillon, S. Adeeb, N. M. Jomha. Symmetry analysis of talus bone. A Geometric morphometric approach. Bone Joint Res. May 2014; 3(5): 139-45.