

## Original Article

## Morphological study of squatting facets on the neck of the talus in Indian population

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### ABSTRACT

**Introduction:** Squatting facet at the neck of the talus is the morphological alteration due to habitual squatting position occupied by certain populations.

**Aims:** Present study was aimed to investigate the squatting facet of the neck of the talus for the purpose of determining the race of the unidentified bone.

**Material and Method:** Present study was conducted on 221 dry adult human talus for the duration of two years. The bones were obtained from the dead bodies donated to the Department of Anatomy, M P Shah Medical College, Jamnagar.

**Results:** It was found in the study that the incidence of lateral squatting facet in the Indian population of present study is higher as compared to European, Egyptian and Byzantine era population, while it is lower as compared to Australian population. Incidence of medial squatting facet in the Indian population of present study is higher as compared to European, Australian and Byzantine era population. Incidence of combined (lateral and medial) squatting facet in the Indian population of present study is higher as compared to Australian and Byzantine era population.

**Conclusion:** These differences in the squatting facets in various populations may be due to habitual squatting position and/or may be due to inheritance and/or may be due to migration of the certain population.

**Key words:** lateral squatting facet, medial squatting facet, combined (lateral and medial) squatting facet

### INTRODUCTION

Having erect posture, human foot has to play its role in weight bearing and locomotion. Because of that, it is much more specialized. In the human foot, seven tarsal bones occupy the proximal half of the foot. The tarsal bones of the foot and the carpal bones of the hand are homologous, but the tarsal elements are larger, reflecting their role in supporting and distributing body weight [1]. Talus is the key tarsal bone of the human foot. It is unique in the sense that it has no muscular or tendinous attachments [2]. It is the second largest tarsal bone after calcaneus [3]. Talus (the tarsal bone of the foot) is homologous with the scaphoid (the carpal bone of the hand) [4].

Various stresses on the bones of the lower limb, like bipedal gait, erect posture, squatting position etc, can result in morphological variations in the bones. These features are population specific and show racial variations also. Squatting facet over the neck of the talus is one of those features. Various researchers have presented their work on the squatting facet on the neck of the talus i.e. Thomson [5], Charles [6], Pfizner [7], Sewell [8], Wood [9], Barnett [10], Das [11], Singh [12], Pandey et al [13], Oygucu et al [14], Jones [15], Dixit et al [16]. With this in mind, squatting facet of the talus was investigated in this study for the purpose of determining the race of the unidentified bone.

### MATERIAL AND METHOD

Present study was conducted on 221 dry adult human talus bones. The bones were obtained from the dead bodies donated to the Department of Anatomy, M P Shah Medical College, Jamnagar for the time duration of two years. Of the total 221 talus, 127 were of male and 94 were of female. Of the total 221 talus, 101 were of right side and 120 were of left side. Pathological, fractured or talus of unknown sex were excluded from the study. Only fully ossified, adult and talus of known sex were included in the study.

Lateral squatting facet is present over the dorsal aspect of the neck of the talus on lateral side (shown in photograph 1). Medial squatting facet is present over the dorsal aspect of the neck of the talus on medial side (shown in photograph2). Combined (lateral and medial) squatting facets are also present (shown in photograph 3).

**Photograph – 1**



**Photograph – 2**



**Photograph – 3**



**RESULTS**

Observations found in this study are shown in table-1 and table-2.

As shown in table 1, Out of 127 male talus, 76 (59.84%) were found to bear lateral squatting facet, 2 (1.58%) bearing medial squatting facet and 17 (13.39%) bearing combined (medial and lateral) squatting facet. Total of 32 (25.19%) of tali were found to bear no squatting facet over it.

**Table 1: Talus having different squatting facet according to the sex**

	MALE (127)	FEMALE (94)	Total (221)
<b>LATERAL SQUATTING FACET</b>	76 (59.84%)	38 (40.43%)	114 (51.58%)
<b>MEDIAL SQUATTING FACET</b>	2 (1.58%)	4 (4.26%)	6 (2.72%)
<b>COMBINED (LATERAL+ MEDIAL) SQUATTING FACET</b>	17 (13.39%)	17 (18.09%)	34 (15.39%)
<b>NO FACET</b>	32 (25.19%)	35 (37.23%)	67 (30.31%)

Further, out of 94 female talus, 38(40.43%) having lateral squatting facet, 4(4.26%) having medial squatting facet and 17(18.09%) having combined (medial and lateral) squatting facet. Total of 35(37.23%) of tali were found to bear no squatting facet over it.

Incidence of lateral squatting facet in male talus is much higher as compared to female talus, while incidences of medial and combined (medial and lateral) squatting facet are higher in female talus as compared to male talus.

**Table 2: talus having different squatting facet according to the side (right/left) of the talus**

	RIGHT (101)	LEFT (120)	Total (221)
<b>LATERAL SQUATTING FACET</b>	51 (50.5%)	63 (52.5%)	114 (51.58%)
<b>MEDIAL SQUATTING FACET</b>	3 (2.97%)	3 (2.5%)	6 (2.72%)
<b>COMBINED (LATERAL+MEDIAL) SQUATTING FACET</b>	17 (16.83%)	17 (14.17%)	34 (15.39%)
<b>NO FACET</b>	30 (29.7%)	37 (30.83%)	67 (30.31%)

As shown in table 2, out of 101 right talus, 51(50.5%) having lateral squatting facet, 3(2.97%) having medial squatting facet and 17(16.83%) having combined (medial and lateral) squatting facet. 30 (29.70%) tali were not having any facets over it.

Further, out of 120 left talus, 63(52.5%) having lateral squatting facet, 3(2.5%) having medial squatting facet and 17(14.17%) having combined (medial and lateral) squatting facet. 37 (30.83%) tali were found to bear no facet. After studying table 2, we can say that incidences of lateral, medial and combined (medial and lateral) squatting facets in right and left side of talus are merely same.

Out of total 221 talus, 114(51.58%) having lateral squatting facet, 6(2.72%) having medial squatting facet and 34(15.39%) having combined (medial and lateral) squatting facet. Incidence of only lateral squatting facet is very high as compared to incidence of only medial squatting facet, while the incidence of combined (medial and lateral) squatting facet is intermediate one.

Presence of these facets in the Indian population may be due to their habitual squatting position and/or may be due to inheritance.

**Table 3: showing comparison of results of present study with those of other researchers**

AUTHORS	POPULATION	TOTAL No. OF TALUS STUDIED	LATERAL SQUATTING FACET PRESENT	MEDIAL SQUATTING FACET PRESENT	COMBINED (MED+LAT) SQUATTING FACET PRESENT
Thomson (1889)	Andaman	24	12(50%)	-	-
Thomson (1889)	Australian	11	7(63.64%)	-	-
Thomson (1889)	European	25	1(4%)	-	-
Charles (1894)	Punjabi(Indian)	53	34(64%)	-	-
Pfitzner (1896)	European	840	1(0.12%)	-	-
Sewell (1905)	Egyptian	1006	86(8.55%)	-	-
Wood (1920)	European	118	20(17%)	2(1.7%)	-
Wood (1920)	Australian	236	190(80.6%)	2(0.85%)	3(1.27%)
Barnett (1954)	European	100	2(2%)	0(0%)	-
Das (1959)	UP (Indian)	200	82(41%)	8(4%)	6(3%)
Singh (1959)	Indian	300	86(28.6%)	0(0%)	-
Pandey et al (1990)	UP & Bihar (Indian)	262	218(83.2%)	46(17.6%)	31(11.8%)
Oygucu et al(1998)	Byzantine	175	66(37.7%)	1(0.6%)	1(0.6%)
Jones (2007)	Indian	44	5(11%)	14(32%)	-
Dixit et al (2012)	North Indian	147	97(65.9%)	12(8.2%)	3(2.04%)
Present study (2014)	Indian	221	114(51.58%)	6(2.72%)	34(15.39%)

**DISCUSSION**

Observations of present study are compared with the findings of other researchers in the table 3.

As shown in table 3, in the present study, we found presence of lateral squatting facet in 114 talus out of 221; incidence is 51.58%. Pfitzner [7] found presence of lateral squatting facet in 1 talus out of 840; incidence is only 0.12%. Pandey et al [13] found presence of lateral squatting facet in 218 talus out of 262; incidence is 83.2%, which is quite high as

compared to other researchers. In the present study, we found presence of medial squatting facet in 6 talus out of 221; incidence is 2.72%. Neither Barnett [10] nor Singh [12] found presence of any medial squatting facet in the talus they had studied. Jones [15] found presence of medial squatting facet in 14 talus out of 44; incidence is 32%, which is quite high as compared to other researchers. Further he found medial squatting facet (32%) more as compared to lateral squatting facet (11%). In the present study, we found presence of combined (lateral and medial) squatting facet in 34 talus out of 221; incidence is 15.39%,

which is higher as compared to the findings of other researchers. Oygucu et al [14] found presence of combined (lateral and medial) squatting facet in 1 talus out of 175; incidence is only 0.6%. Pandey et al [13] found presence of combined (lateral and medial) squatting facet in 31 talus out of 262; incidence is 11.8%, which is higher as compared to the findings of other researchers but lower than the findings of the present study.

After studying table 3 thoroughly, we can say that incidence of lateral squatting facet in the Indian population of present study is higher as compared to European, Egyptian and Byzantine era population, while it is lower as compared to Australian population. Incidence of medial squatting facet in the Indian population of present study is higher as compared to European, Australian and Byzantine era population. Incidence of combined (lateral and medial) squatting facet in the Indian population of present study is higher as compared to Australian and Byzantine era population.

## CONCLUSION

Variations in the presence of squatting facets in different population can reveal certain habitual activities that an individual in that population engaged in. These differences may be due to habitual squatting position in certain population and/or may be due to inheritance and/or may be due to migration of the certain population. These findings can be helpful in determining the race of the unidentified bones. Further the data of the present study can be utilized by the forensic experts, anthropologist and others while dealing with the unidentified bone.

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