

A study of Sexual Dimorphism of Maximum Medial condyle Length of FemurPatel MP¹, Nirvan AB², Pandya AM³, Dave RV⁴, Singel TC⁵¹Associate Professor, Department of Anatomy, M.P. Shah Medical College, Jamnagar²Associate Professor, Department of Anatomy, B.J. Medical College, Ahmedabad³Associate Professor, Department of Anatomy, P.D.U. Medical College, Rajkot⁴Assistant Professor, Department of Anatomy, B.J. Medical College, Ahmedabad⁵Professor, Department of Anatomy, Zydus Medical College, Dahod**Abstract:**

Maximum length of medial condyle of femur is the distance between the most anterior and most posterior point on the articular surface of the medial condyle. Present study aims to obtain values of medial condyle length and to evaluate its possible usefulness in determining correct sexual identification. Study sample consisted of 242 dry, human, adult femora [176 male (87 right, 89 left) and 66 female (32 right, 34 left)] from skeletal collections of Anatomy departments of M. P. Shah Medical College, Jamnagar, Gujarat & P. D. U. Govt. Medical College, Rajkot, Gujarat. Medial condyle length was measured with the help of caliper. Mean Values obtained were, 57.8 mm and 53.6 mm for right male and female, and 58.1mm and 55.4 mm for left male and female respectively. Higher value in male was statistically highly significant ($P < 0.001$) on both sides. Demarking point (D.P.) analysis of the data showed that right femora with medial condyle length more than 62.24 mm were definitely male and less than 46.37 mm were definitely female; while left femora with medial condyle length more than 67.69 mm were definitely male and less than 46.34 mm were definitely female. Medial condyle length identified 8.04% of right male femora, 6.25% of right female femora, 1.12% of left male femora and 0.00% of left female femora.

Key-words: Medial condyle length, Sexual dimorphism, Femur**Introduction**

Maximum length of medial condyle (Internal/Tibial) of femur is the distance between the most anterior and most posterior point on the articular surface of the medial condyle^[1,2]. The identification of sex from skeleton or its parts is of importance in anthropology and in medico legal cases. Visual inspection of bone morphology depends entirely on the ability and experience of an observer while morphometrical methods for sexing from bone in addition to providing simplicity also allow no individual variations and are entirely objective assessment. Sex determination is relatively easy if the entire skeleton is available, pelvis and skull are the most reliable bones for this purpose^[3]. In medico legal cases one does not always have a complete pelvis or skull, so it is important to be able to assess sex from the other parts of the skeleton also.

Medial condyle length of femur is studied by Pearson & Bell (1919) in English femora^[4] and by Chandra M (2011) in femora from South India^[5]. According to Krogman and Iscan standards of morphological and Morphometrical attributes in the skeleton may differ with the population samples involved and this is true with

reference to dimensions and indices (average and range) and as a general rule standards should be used with reference to group from which they are drawn and upon which they are based they are not interchangeable^[1].

So, present study was carried out to obtain mean values of medial condyle length of femur in femora from Gujarat region and to determine its role in sexual identification.

Material and Method

Study sample consisted of 242 dry, human, adult femora [176 male (87 right, 89 left) and 66 female (32 right, 34 left)] which included the femora from the skeletal collection of Anatomy department, M. P. Shah Medical College, Jamnagar, Gujarat [136 male (67 of right & 69 of left side) and 48 female (23 of right & 25 of left side)] & Anatomy department, P. D. U. Govt. Medical College, Rajkot, Gujarat [40 male (20 right, 20 left) & 18 female (9 right, 9 left)]. Femora showing pathological abnormality or from the persons outside Gujarat region were not included

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Table: 1 Statistical Values of Medial condyle Length (All dimensions in mm)

Statistical values	RIGHT		LEFT	
	Male (n=87)	Female (n=32)	Male (n=89)	Female (n=34)
Range	50-66	46-59	52-69	47-60
Mean	57.8	53.6	58.1	55.4
S.D.	3.81	2.88	3.90	4.09
z-value	6.45		3.32	
P value	P<0.001		P<0.001	
Calculated Range mean±3S.D.	46.37-69.25	44.95-62.24	46.34-69.80	43.10-67.69
D.P	>62.24	<46.37	>67.69	<46.34
% & no. identified	8.04%	6.25%	1.12%	0.00%
by D.P.	(no=7)	(no=2)	(no=1)	(no=0)

in the study.

It measures distance between the most anterior and most posterior point on the articular surface of the medial condyle, measured with the spreading caliper^[1,2].

Each bone was measured thrice and measurement was repeated by two independent observers, mean of these observations was taken as a final reading to nullify any intra and inter-observer error. Data collected was tabulated and analyzed statistically sidewise & sexwise by demarking point (D.P.) analysis.

Result

A) Right femur:

The medial condyle length of right male femur varied from 50.00mm to 66.00mm (average: 57.8mm & S.D.:3.81) and of right female femur varied from 46.00mm to 59.00mm (average: 53.6mm & S.D.:2.88). Mean value of medial condyle length was higher in male as compared to female. Calculated z-value and P value showed that the difference of the mean medial condyle length in male and female was statistically highly significant with P<0.001. By demarking points, definite sexual classification in male right bone (>62.24mm) was 8.04 % (no=7) and in female right bone (<46.37mm) was 6.25 % (no=2) (Chart: 1).

B) Left femur:

The medial condyle length of left male femur varied from 52.00mm to 69.00mm (average: 58.1mm & S.D.:3.90) and of left female femur varied from 47.00mm to 60.00mm (average: 55.4mm & S.D.:4.90). Mean value of

medial condyle length was higher in male as compared to female. Calculated z-value and P value showed that the difference of the mean medial condyle length in male and female was statistically highly significant with P<0.001. Definite sexual classification in male left bone (>67.69 mm) was 1.12% (no=1) and in female left bone (<46.34 mm) was 0.00%. (Chart: 1)

Discussion

Generally male bones are longer and massive, and this difference is reflected by the greater values of the mean medial condyle length in male on both sides. Calculated z-value and P value showed that the difference in the mean medial condyle length in male and female was statistically highly significant with P<0.001 on both side.

For right male bone calculated range was 46.37 mm - 69.25 mm and for right female bone calculated range was 44.95 mm - 62.24 mm. With the help of these demarking points, right femur with medial condyle length more than >62.24 mm can be correctly classified as a male and right femur with medial condyle length less than <46.37 mm can be correctly classified as a female. However if the medial condyle length of bone is between 46.37 mm and 62.24 mm, sexing was not possible due to overlapping. Demarking point analysis when applied to study group, identified sex of 7 right male bones out of 87 (8.04%) and for right female bone definitely identified a sex of 2 bone out of 32 (6.25%).

For left male bone calculated range was 46.34mm to 69.80mm and for left female bone it

Table: 2 Comparison of Medial Condyle Length

Population & Study		Medial Condyle Length (in mm)					
		Male			Female		
		Mean	S.D.	%identified	Mean	S.D.	%identified
Pearson & Bell (1919),	Rt.	62.11	1.69	-	55.56	1.58	-
English	Lt.	62.04	1.51	-	55.55	1.59	-
Chandra M (2011), South India		Mean: 52, S.D. : 3.0					
Present study (n=242)	Rt.side (119)	57.8	3.81	8.04%	53.6	2.88	6.25%
	Lt.side (123)	58.1	3.90	1.12%	55.4	4.09	0.00%

was 43.10mm - 67.69mm. With the demarking point for left male bone (>67.69mm), we can correctly identify a sex of 1 bone out of 89 (1.12%) and for left female bone (<46.34mm), demarking point will definitely identify a sex of a 0 bone out of 34 (0.00%). Mean male value of medial condyle length in present study was lower than the value reported in English^[4]. Study on South Indians^[5] did not mention sex wise mean value but mean male value of both side in present study was higher than the South India^[5].

Mean medial condyle length value of female in present study was 53.60mm (right) & 55.40 mm (left). In other studies it varied from 55.55mm to 55.56mm. Mean value of medial condyle length of female in present study was similar to English femora^[4]. Mean female value in present study was higher than South India on left side and similar to it on right side. (Table: 2)

Conclusion

Mean Values of medial condyle length of femora in study population were, 57.80 mm and 53.60 mm for right male and female, and 58.1 mm and 55.40 mm for left male and female respectively. Higher value in male was statistically significant ($P < 0.05$) on right side and insignificant on left side. Difference between mean values of right sided & left sided femora was statistically insignificant. Demarking point (D.P.) analysis of the data showed that right femora with medial condyle length more than >62.24mm were

definitely male and less than <46.37mm were definitely female; while, left femora with medial condyle length more than >67.69mm were definitely male and less than <46.34mm were definitely female. Medial condyle length identified 8.04% of right male femora, 6.25% of right female femora, 1.12% of left male femora and 0.00% of left female femora.

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