ORIGINAL RESEARCH PAPER

Volume-8 | Issue-1 | January-2019 | PRINT ISSN No 2277 - 8179

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

A MORPHOMETRIC STUDY OF DIFFERENT PARAMETERS OF GREATER SCIATIC NOTCH IN RELATION TO SEXUAL DIMORPHISM IN THE JHARKHAND POPULATION

Anatomy

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ABSTRACT

Forensic and archeological studies, may need identification of human skeletal remains. Among these remains, hip bone presents morphological differences between the two sexes because of its special adaptation in female, for child bearing. This study was carried out to determine if indices in the greater sciatic notch of hip bone can be used in sexing of the hip bone in Jharkhand population. In our study .Mean value of breadth was found as 4.12±0.52 in male while in female it was 4.34±0.41. Mean depth of the sciatic notch was found as 3.44±0.48 in male and 2.61±0.44 in female. So the sciatic notch was found to be deeper in male as compared to female. Mean value of sciatic notch index was found to be 84.49±12.98 in male while in female the mean index was 61.22± 14.79 which showed higher value of Index in case of male as compared to female.

KEYWORDS

Forensic, Sexing , Sciatic notch index

INTRODUCTION-

The distinctive morphology and sexual dimorphism of human skeleton have always been attracted experts from different fields i.e.; anatomy, forensic Science, obstetrics, radiology and anthropology to explore more and more into it. In forensic Science, medico-legal cases frequently need identification of sex from skeletal remains. Sex identification from skeletal remains, is equally important in the field of anthropology also. Hip bone if available, can be very useful for sex determination. It presents clear morphological differences between the two sexes because of special adaptation of female hip bone for the purpose of child bearing.

Verneau (1875)[1] was the first to describe the sexual differences of the great sciatic notch. He said that in the male the great sciatic notch is narrower than in the female, and that in the female it is not so deep. After Verneau's remarks the sexual dimorphism of the great sciatic notch had drawn the attention of a large number of authors including Genoves (1921), Lazorthes&Lhez (1939), Letterm an (1942), Heynes (1947), Jovanovic and Zivanovic (1963)[2], who in their reports showed the influence of sex on the great sciatic notch and its dimensions, and the importance of the notch in sex differentiation of the hip bones. But measuring the greater sciatic notch poses a great problem because of the variability or sometimes the complete absence of few morphological landmarks necessary for determining different dimensions of notch.. Indices of the greater sciatic notch are known to be highly sexually dimorphic

The pelvic girdle has always gathered importance, in anthropometry especially due to the sex differences between greater sciatic notches of the two. Moreover hip bone being comparatively robust is resistant to damage. This makes it to score even in those skeletons which are not properly preserved.

The present study is done to estimate the importance of greater sciatic notch in sexing skeletal remains from the region of Jharkhand.

MATERIALS AND METHODS

Materials for the present study consisted of dry, unpaired 33 adult human hip bones (18 males and 15 females) of known sex. These were obtained from the Department of Anatomy of RIMS. The hip bones, having fracture, pathology or any sort of wear and tear on the posterior border were excluded. Only the fully ossified bones with clear and intact posterior border were included for the study.

The three parameters used in this study were depth, width and index of the greater sciatic notch. Out of these three parameters, depth and width were measured with the help of sliding stainless steel callipers while the third parameter used was calculated with the help of these two measured parameters by using the formula (depth/width) x 100.

Maximum depth was measured as the maximum perpendicular distance between sciatic notch and the line of maximum width. Maximum width (w) was measured as the distance between the posterior inferior iliac spine (point B in Fig 1.) and the ischial spine (point A in Fig 1.)

Maximum depth (d) was measured as the maximum perpendicular distance (CD in Fig.1.) between sciatic notch and the line of maximum width Sciatic notch index (I) was calculated by the formula given by I = (CD/AB) x100



Fig 1.Picture of Hip bone showing Posterior inferior iliac spine (B), Ischial spine (A), maximum width of Greater Sciatic notch (AB) and maximum depth of Greater sciatic notch (CD)

All linear measurements were made in millimetres on the intact parts of normal bones The mean and standard error were calculated. T test was applied to determine the significance of the study.

RESULTS:

Tables below show all measurements and statistical analysis

Table I: Statistical analysis of Breadth of sciatic notch

Male	Female	Female
Mean	4.12	4.34
Range	3- 5.02	3.5-5.22
SD	0.52	0.41
SE(m)	0.12	0.10
Overall SE(m)	0.16	
t Value	-1.38 NS	
p value	0.01	

Table II: Statistical analysis of Depth of sciatic notch

	Male	Female
Mean	3.44	2.61
Range	2.58-4.32	2-3.4
SD	0.48	0.44
SE(m)	0.11	0.10
Overall SE(m)	0.16	0.16
t Value	5.19**	
p value	0.01	

Mean difference is highly significant

Table III: Statistical analysis of Index of sciatic notch

	Male	Female
Mean	84.49	61.22
Range	58.9-103.33	48.19-94.57
SD	12.98	14.79
SE(m)	3.05	3.49
Overall SE(m)	4.85	
t Value	4.80**	
p value	0.01	

Mean difference is highly significant

DISCUSSION

In our study the mean value of breadth was found to be 4.12 with a range of (3- 5.02) in case of male while in female the mean was 4.34 with a range of (2- 3.4). So mean value of female was more than male which matches the study of Shah et al. In study by Shah et al (2011)[3] the mean value of breadth was found to be 3.85± 0.459 with a range of 2.7-5.3 for male and 4.27± 481 with a range of 3.2-5.3 in female. Similar observations have been made earlier by Derry et al (1923)[4] and Sing & Potturi (1978)[5] and Patriquin et al. (2005)[6]. Patriquin et al. (2005)[6] in their study found the maximal width of the greater sciatic notch to be 43.03 mm (in whites) and 36.96 mm (in blacks). They reported that the depth of the greater sciatic notch was more in males, but less in females and that there is significant sex differences among both South African males and females and whites and blacks. Singh (2014)[7] reported lesser average values of GSN of male as compared to that of female. Raut et al (2013)[8] found width to be 25.16mm in males and 48.54mm in females.

In our study mean depth of the sciatic notch was found as 3.44±0.48 with a range of 2.58-4.32 in case of male and 2.61±0.44 with a range of 2-3.4 in case of female.

So the sciatic notch was found to be deeper in as compared to female. In study by Shah et al the range of Depth of Greater Sciatic Notch in male is 1.5-3.7 and in female is 1.4-3 with mean values are 2.414±0.3869 and 2.227±0.3541 for male and female respectively. In Shah at al Study P value of Depth was found as 0.001 which is significant. We got value as 0.01 which is highly significant. Sing &Potturi (1978)[5] found the mean value in male 2.56±0.35 and in female 2.49±0.32. These all studies showed deeper notch in male. So our study is in accordance with these all workers.

Patriquin et al (2005)[9].- found the maximal depth26.55 mm (in whites) and 22.68 mm (in blacks). They reported that the depth of the greater sciatic notch is more in males, but wider in females and that there is significant sex differences among both South African males and females and whites and blacks. Dnyanesh et al (2013)[10] , in their study showed, the mean depth of GSN of male right hip bone to be more than the right female hip bone by about1 cm where as in left male hip bone it was less than left female hip bone by 1.88mm which was statistically non-significant.

Study by Dnyanesh et al showed, the mean depth of GSN of male right hip bone to be more than the right female hip bone by about 1 cm where as in left male hip bone it wis less than left female hip bone by 1.88mm which is statistically non-significant.

Singh et al (2014)[7] showed the average values of depth of male to be lesser than female resembling to the result shown by Davivongs (1963)[11]

According to Singh et al(1978)[5] and Jovanovic & Jovanovic (1963)[2] the depth is greater in males than female so present study goes in accordance with their study.

In our study the mean value of sciatic notch index was found to be 84.49±12.98 with a range of (58.9-103.33) in case of male while in case of female the mean was 61.22± 14.79 with a range of (48.19-94.57) which showed higher value of Index in case of male as compared to female. Same result was found by Singh (2014)[7] and Shah et al. In the study by Shah et al(2011)[12] mean values of sciatic notch index was 661.98± 289.76 with a range of 205-2150 for male and mean values of sciatic notch index was 367.59± 107.52 with a range of 238.89-825 for female. Our work contradicts that done by Akpan et al (1998)[13] Found index insignificant

Conclusion-Highly significant mean difference found between greater sciatic notch index of male and female suggests, that it can be a good tool in determination of sex in Jharkhand Population.

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