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Original Research Article

Sexual Dimorphism Observed In Anterior Border of Human Hip Bone

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Abstract

Biometry is the branch of statistics which is considered with applications in the biological sciences. The hip bone is considered as it provides the highest accuracy level for sex determination as it provides the highest accuracy level for sex determination. Biometry of anterior border of the human skeleton and its clear sexual dimorphism make it important step encountered by both forensic experts and archaeologists. For the present study total 100 normal dry human hip bones (64 males & 36 females) were studied. With the use of vernier calliper, stainless steel scale and osteometric board, various parameters were measured. Parameters used were distance from anterior superior iliac spine to anterior inferior iliac spine (ASIS- AIIS), the distance from the anterior superior iliac spine to symphysial surface (ASIS-SS) and index I and index II were measured. In present study significant statistical difference was seen in the mean value. These variables could be for sex determination from the human hip bone.

Keywords: Sexual dimorphism, hip bone, anterior border.

1.Introduction

Anthropometry provides scientific methods and techniques for taking various measurements and observations on the living man and the skeleton. Sex determination is an important first step in the development of a biological profile in human osteology. Without an accurate determination of sex we cannot accurately estimate age at death, as rates of growth, development and degeneration vary by sex as well as population. The hip or the innominate bone is one of the most informative bones in the skeleton for sex determination as it provides the highest accuracy level[1][9]. The distinctive morphology of human hip bone and its clear sexual dimorphism of hip bone and its clear sexual dimorphism make it interesting from anatomical, anthropological and forensic point of view[2][3]. The sexual dimorphism of hip bone is a special adaptation in the female for child bearing[6]. Therefore awareness of the average dimension of the hip bone in both sexes will also help in early detection of disputed sex by forensic experts. The best methods for determining sex from adult skeletal remains involve measurement and inspection of the hip bone that present a number of gender related anatomical differences[4]. The present study forms part of a large systematic analysis of the construction of the human hip bone. This will carry measurements and visual estimation of whole hip bone for the determination of the sex[1]. Study, on anterior border of hip bone by taking various parameters over anterior border of hip bone and do biometric analysis of it with measuring various indices of it which forms part of a larger systematic analysis of the construction of the construction of the human hip bone[5].

1.1 Aim

1. Sex determination of human hip bone, by metric analysis of its anterior border.
2. To see normal values of different parameters related with anterior border of human hip bone in male and female.
3. To see the side difference if any in values of different parameters of anterior border of human hip bone.

2. Material and Method

For the present study total 100 normal dry human hip bones (64 males & 34 females) were selected from bone bank of Department of Anatomy, Dr. S. N. Medical College, Jodhpur. They were undamaged and with no alter pathology. In this study following variables on the anterior border of hip bone were measured. The maximum width of the anterior border i.e. the distance from the anterior superior iliac spine to the superior end of the symphysial surface (ASIS-SS). The distance from the anterior superior iliac spine to the anterior inferior iliac spine (ASIS-AIIS), Index I: index of widening of anterior border= Depth*100/maximum width of the anterior border, Index II: index of widening of anterior interspinous notch= Depth*100/maximum width of the notch between the anterior superior iliac spine and the anterior inferior iliac spine. For measurement of all variables a scale, an osteometric board and distances were taken in mm by scale.

Figure 1: The maximal width of the anterior border notch, i.e. the distance from the anterior superior iliac spine to the superior end of the symphysial surface. (ASIS-SS)

Figure 2: The maximum width of the anterior inter spinous notch, i.e. the distance from the anterior superior iliac spine to the anterior inferior iliac spine. (ASIS-AIIS)

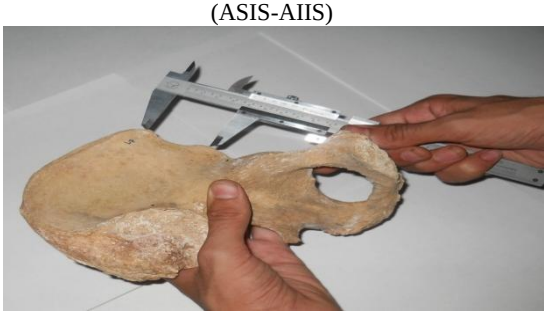
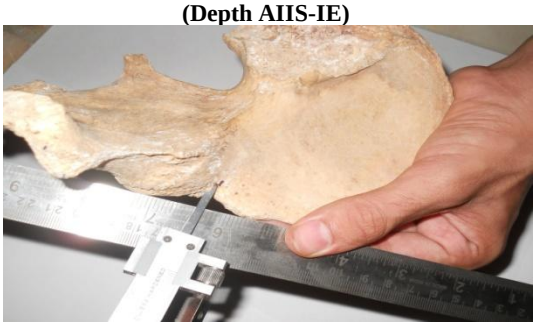


Fig.3: The depth of the anterior interspinous notch (depth AIN)

Fig.4: The depth of the notch between the anterior iliac spine and the iliopubic eminence. (Depth AIIS-IE)



3. Observation and Results

Table 1: Now for every parameters of total samples, mean, S.D. and SEM

Parameters	Sex	N	Mean	S.D.	SEM
Distance (ASIS-SS)	Male	64	124.04	8.78	0.61
	Female	36	120.13	9.79	0.96
Distance(ASIS-AIIS)	Male	64	34.94	6.46	0.45
	Female	36	34.90	5.25	0.51
Index I	Male	64	22.97	4.06	0.28
	Female	36	23.73	3.44	0.33
Index II	Male	64	20.67	5.09	0.35
	Female	36	18.88	4.52	0.44

Table 2: Leven's F test for equality of variance, T test and P value for male female.

Parameters	Levene's Test for Equality of Variances				
	F- test	P-value	t-test	df	P-value
Distance (ASIS-SS)	0.835	0.362	3.544	99	0.000
Distance(ASIS-AIIS)	3.616	0.058	0.051	99	0.959
Index I	3.920	0.049	-1.621	99	0.106
Index II	4.723	0.031	3.028	99	0.003

*S.D. – Standard Deviation, S.E.M. – Standard Error of Mean, N – Number of bones, df- degrees of freedom.

All the 100 adult hip bones were measured using 4 parameters. After all the measurements were done, the observation were statistically analysed by using unpaired t- test. These male and female hip bones were compared. The results are shown in tables 1-2 for all the variables used.

4. Discussion

Distance between the anterior superior iliac spine to superior end of symphysial surface. In the present study the mean value of the distance between the anterior superior iliac spine to symphysial surface in hip bone of male is 124.04mm and for female is 120.13mm as compared to Pellico & Camacho who found the mean value to be 135.9mm in males & 131.3mm in females[10].

Distance between the anterior superior iliac spine to anterior inferior iliac spine. In the present study the mean value of the distance between the anterior superior iliac spine to anterior inferior iliac spine in hip bone of male is 34.94mm and for female is 34.90mm as compared to Pellico & Camacho who found the mean value to be 42.63 mm in males & 43.78 mm in females[10].

Index I. In the present study the mean value in hip bone of male is 22.97mm and 23.73 in female hip bones as compared to Pellico & Camacho who found the mean value to be 24.25 mm in males & 26.60 mm in females[10].

Index II. In the present study the mean value in hip bone of male is 20.67mm and 18.88 mm in female hip bones as compared to Pellico & Camacho who found the mean value to be 16.48mmin males & 14.80 mm in females[10].

5. Conclusion

In the present study four parameters were used to measure the anterior border of hip bone. The parameters used ASIS-SS, ASIS-AIIS, Index I, Index II. After the statistically analysis of all the four parameters, significant statistical difference was seen in the mean values of these parameters of male and female hip bones. Hence these parameters are useful in identifying the sex of the human hip bone by metric analysis of its anterior border.

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