



THE ADULT HUMAN DRY HIP BONE - A MORPHOMETRIC STUDY IN JAMMU.

Anatomy

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ABSTRACT

Introduction: Morphology of hip bone and its differences in shape are different in males and females and this makes it interesting anatomically and anthropologically. Morphometric study was conducted on 100 dry unpaired human adult hip bones in Jammu population and measurements of various parameters were done and compared with the observations of other authors. **Materials and methods:** The present study was conducted on 100 dry unpaired human adult male and female hip bones of unknown age obtained from the postgraduate department of Anatomy of government medical college Jammu. measurements of the hip bone that were performed during the period of this study included weight, length and width. Coral index was also calculated. **Results:** The data obtained was analyzed by means of descriptive statistics, viz means, standard deviations and percentages. All values were compared with series of other workers to draw the conclusions. The mean length of 16.95 ± 0.24 cms and 15.53 ± 0.13 cms, mean width of 13.55 ± 0.18 cms and 12.91 ± 0.03 cms, mean weight of 134.44 ± 1.17 gms and 91.69 ± 1.39 gms and mean coxal index of 80.01 ± 3.76 in males and 83.25 ± 4.34 in females was observed in male and female bones respectively. The differences between all male and female parameters observed in the present study were found to be statistically significant. **Conclusion:** Differences in various measured parameters were observed between male and female hip bones which also varied from those observed in other racial and ethnic groups. The differences in present study were not only observational but were statistically significant as well however this was consistent with the observations concluded by other authors in their studies as well.

KEYWORDS

hip bone width, hip bone weight, hip bone length, morphometry of hip bone, coral index.

INTRODUCTION :

The pelvic girdle is a massively constructed part of body which serves as a weight bearing and a protective structure¹. The hip bone is a large, flattened, irregularly shaped bone which is constricted in the center and expanded above and below. It articulates in front with the corresponding bone of the opposite side and the two bones form the pelvic girdles of the lower limbs. Each consists of three parts, named the ilium, the ischium, and the pubis, which are connected by a large cup-shaped articular cavity called the acetabulum².

The word Pelvis comes from the Latin for a basin shape whereas the acetabulum, is named after the small cup used to hold a popular dipping sauce at Roman dining tables. Then we have the sacrum and the word sacrum is a shortened form of os sacrum, the Latin translation of the Greek hieron osteon, or sacred bone. In times gone by the sacrum was thought to be the seat of the soul. The rest of the pelvis is sometimes called the innominate bone (one having no name) and consists of the ilium, ischium, and pubis. Pubis, the bone at the lower front part of the pelvis, simply relates to the genitals, the groin, or pubic hair and shares its root with such words as puberty and pubescence. Ilium was used in Roman times to describe such diverse concepts as the flank, the sides, and the entrails. Ischium has a less complicated background, coming simply from the Greek iskhion, for hip joint³. The distinctive morphology of the human hip bone makes it of interest from anatomical, anthropological and forensic point of view⁴. Hip bone usually displays differences in morphology independent of size due to different sexual and reproductive functions which are influenced by sex hormones. Therefore, morphology of hip bone and its differences in shape are different in males and females that make it interesting anatomically and anthropologically⁵.

MATERIALS AND METHODS:

The present study was conducted on 100 dry unpaired human adult male and female hip bones of unknown age obtained from the postgraduate department of Anatomy of government medical college Jammu. Thoroughly cleaned, dry and numbered bones were included whereas those showing degenerative changes or evidence of any previous trauma or skeletal disorders were excluded from the study.

All the measurements were taken with the help of Stainless steel sliding vernier caliper, Measuring tape, Divider, Cotton thread, Black marker pen and Weighing machine. Two readings were taken for each parameter at different times and the average was recorded. The data

obtained was entered in Microsoft excel worksheet, arranged in a tabulated form and analyzed by means of descriptive statics, viz means, standard deviations and percentages. All values were compared with series of other workers to draw the conclusions.

Various measurements of the hip bone that were performed during the period of this study included the following :

Length of hip bone

It is the maximum distance measured from the most superior point on the iliac crest to the most inferior point on the inferior surface of the ischium. It was measured with the help of a Vernier's calliper and the measurement was recorded in centimetres. The most superior point of the iliac crest was placed in contact with the fixed end of the calliper and the inferior surface of the ischium was placed against the movable arm.

Width of hip bone

It is the maximum distance measured between the anterior superior iliac spine and the posterior superior iliac spine. It was measured with the help of Vernier's calliper and the measurements were recorded in centimeters. The posterior superior spine was placed in contact with the fixed end of the calliper and the anterior superior spine was placed against the movable arm.

Weight of hip bone

Each hip bone was separately weighed using an electronic weighing machine and the weight was recorded in grams.

Coxal index

It is calculated from the observed values of length and width of the hip bones. The formula used for finding out the Coxal index is width of hip bone/length of hip bone x 100.

RESULT :

The present study involved 100 dry unpaired human adult male and female hip bones of unknown age in which various parameters were measured. Both male and female hip bones were equal in number and the mean length of male bones was found to be 16.95 ± 0.24 cms whereas it was 15.53 ± 0.13 cms in female bones (table 1) . Though the male bones were a bit longer than their female counterparts but the difference was found to be statistically significant ($p < 0.0001$). The mean width on the other hand was 13.55 ± 0.18 cms in male bones and 12.91 ± 0.03 cms in female bones where again it was more in males and

the difference was statistically significant as well. Mean weight of the male bones also was measured to be about 134.44 ± 1.17 gms which was quite heavier than the female bones which was 91.69 ± 1.39 gms and the difference was statistically significant as well. Coxal index also was calculated and was found to be 80.01 ± 3.76 in males and 83.25 ± 4.34 in females and again the difference was found to be statistically significant.

Table 1: Comparison of length, weight, width and Coxal index of Hip bone

	Gender	Mean	SD	Min - Max	p - value
Length (cms)	Male (n = 50)	16.95	± 1.07	15.00-19.00	< 0.0001
	Female (n = 50)	15.53	± 0.96	14.00-18.50	
Width (cms)	Male (n = 50)	13.55	± 0.96	11.00-15.50	< 0.0001
	Female (n = 50)	12.91	± 0.66	11.60-15.00	
Weight (gms)	Male (n = 50)	134.44	± 32.56	70.01-188.00	< 0.0001
	Female (n = 50)	91.69	± 24.94	83.25	
Coxal Index	Male (n = 50)	80.01	± 3.76	72.77-93.10	< 0.0001
	Female (n = 50)	83.25	± 4.34	68.42-90.00	

DISCUSSION:

Comparing different populations, highly variable skeletal characteristics are observed. Every population therefore needs specific morphometric and morphological standards in order to improve precision of forensic identification⁶⁷.

Length:

In present study the mean length of male hip bones was 16.95 whereas it was 15.53 cms in female hip bones. However, Maruyam et al.⁸ observed length of 22cm in male and 20cm in female hip bones respectively whereas Vernau et al.⁹ observed length of 22cm in male and 19.7cm in female hip bones. B.Pullanna et al.¹⁰ also observed length of 20.27cm and 18.31cm in male and female hip bones respectively. Garson JG¹¹, on the other hand observed the length of the hip bone in females of European population, Australian population and of Andamanese population as 20.17cm, 18.44cm and 16.70cm. respectively. Furthermore the values noted by Lander¹², were 21.4cm and 21.2cm for right and left sides respectively. In these studies the mean length of both males and females was more when compared to the present study. However, in all the studies difference between lengths of male and female hip bones were statistically significant.

Width

The mean width of hip bones in males was measured as 13.55cm and 12.99cm in females in our present study and the difference was found to be statistically significant. Similar results also were observed by Maruyam et al. and B.Pullanna et al.^{8,10}. in their studies. Maruyam et al.⁸ obtained a mean width of 13.6 cm in males and 13.1cm in females, whereas B.Pullanna et al.¹⁰ obtained a mean width of 14.38 cm in males and 13.5cm in females. Verneau et al.⁹ observed a width of 16.4 in males and 15.6 in females which was more when compared with current study however in all studies the difference between male and female width of hip bones was found to be statistically significant.

Weight:

B.Pullanna et al.¹⁰. in their study found mean weight of male hip bone as 121.72gms and 86.48gms in female hip bone. Slightly different values were found in our study wherein weight of male hip bone was 134.44gms and of female hip bone was 91.69 gm. However in both studies the difference between male and female weight was found to be statistically significant.

Coxal Index:

In present study mean coxal index also was calculated and was found to be 80.01 ± 3.76 in males and 83.25 ± 4.34 in females and the difference again was found to be statistically significant. Sudarshan Gupta et al.¹³ in their study obtained a coral index of 70.84 in males and 74.24 in females whereas in another study B Pullanna et al.¹⁰ obtained a value of 70.98 in males and 73.24 in females. Although the values were a bit higher compared to present study however the difference between males and females was statistically significant similar to what was seen in the present study. The differences observed between the values of present study and that of other studies could be attributed to ethnic and racial variations.

The present study employed smaller number of hip bones, so it is advisable to carry out similar studies on more number of hip bones for its theoretical and practical value in the coming years.

CONCLUSION:

Differences in various measured parameters were observed between male and female hip bones which also varied from those observed in other racial and ethnic groups. The differences in present study were not only observational but were statistically significant as well however this was consistent with the observations concluded by other authors in their studies as well.

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