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Original Research Article

ANTHROPOMETRIC STUDY OF ISCHIO-PUBIC PARAMETERS OF 100 HIP BONES OF NORTH INDIAN REGION

Sanjay Gupta *[1], Bhumica Dang [2], R.C. Jindal [3], S.K. Rathee [4], Vivek Malik [5].

*[1] Assistant Professor, Department of Anatomy, PGIMS, Rohtak, Haryana, India.

[2] Demonstrator, Department of Anatomy, PGIMS, Rohtak, Haryana, India.

[3] Associate Professor, Department of Orthopaedics, MMIMSR, Mullana, Haryana, India.

[4] Senior Professor and Head, Department of Anatomy, PGIMS, Rohtak, Haryana, India.

[5] Associate Professor, Department of Anatomy, PGIMS, Rohtak, Haryana, India.

ABSTRACT

Introduction: Hip bone usually displays differences in morphology in two senses due to different reproductive functions, which are influenced by sex hormones. Therefore, shapes of hip bone are different in males and females that make it interesting anatomically and anthropologically. Though non-metric methods such as visual examination of bone morphology for sex determination is entirely dependent on experience and expertise but anthropometry plays some role in creating a data which can be useful for sex determination.

Aim: Present study was done to find out sexual dimorphism in hip bones with respect to pubic and ischial lengths and their index.

Materials and Methods: For the present study, hip bones were retrieved from Department of Anatomy, PGIMS Rohtak were used. In the present study, 100 adult human hip bones of known sex were studied out of which 66 were males and 34 were females. From these two groups, bones were studied for metrical parameters of hip bone as pubic length, ischial length and ischio-pubic index.

Results: Pubic length and Ischial length are found slightly more on right side as compared to left side in males, while in females mean values of pubic and ischial length are slightly more on left side as compared to right hip bones showing slight bilateral asymmetry.

Conclusion: Sexual dimorphism as well as bilateral asymmetry of hip bones is appreciated in this study.

KEY WORDS: Sexual Dimorphism, Pubic Length, Ischial Length, Ischio-pubic Index, asymmetry of hip bones.

Address for Correspondence: Dr. Sanjay Gupta, Assistant Professor, Department of Anatomy, PGIMS, Rohtak, Haryana, India. **E-Mail:** sanjaygjgd@gmail.com

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INTRODUCTION

Hip bone usually displays differences in morphology independent of size due to different sexual and reproductive functions which are influenced by sex organs [1].

To determine the sex of an unknown individual is a challenging task in Forensic investigations when human skeletal remains are found. Here pelvic bone has a role to play in determining the sex [2]. Hip bone or innominate bone is large ,irregular and shaped like a propeller, centrally constricted bone which is expanded above and below. Above part is Ilium and in front, pubic part of bone articulates with the other side

pubic body to form pelvic girdle. The third postero- inferior part is Ischium [3].

There are certain characters of human ilium visible to the eye and important for anatomists which help in determining the sex of the bone and they can also be measured and therefore, they are statistically interesting. Results thus obtained from ilium parameters consider this part of hip bone to be of great sexual importance [4]. Hip bone is considered as an ideal bone for sex determination as it provides the highest accuracy levels for sex determination. Hence the hip bone is considered as the most reliable sex indicator in the human skeleton [5].

Subsequently researchers adopted osteometric methods to quantitatively differentiate between male and female hip bones [6]. Different studies were conducted and various ethnic and racial variations were found which determine that a sound knowledge of various parameters of the hip bone is important for anatomists, Forensic experts and anthropologists [7].

It has also been studied that sex determination of the adult pelvic bones is much easier than that of young ones that is fetuses [8].

The relevance of use of ischio-pubic index in identification of sex cannot be over emphasized; however it should be given more attention [9]. Reliable methods of sex determination involves many pelvic features which include Sciatic notch, sub pubic angle, Obturator foramen and ischio-pubic index [10].

MATERIALS AND METHODS

The study was cross sectional. Material for the study consisted of 100 dry hip bones of known gender (male hip bones were 66 and female hip bones were 34). Gender was assessed through the records maintained by department of Anatomy at PGIMS, Rohtak, Haryana, India. All the bones were fully ossified and free from any congenital or pathological defects. Deformed and malformed bones were also excluded from the study. Almost 123 bones were excluded because they were deformed, not properly ossified and not paired. The study was conducted on bones from teaching collection of department of Anatomy at PGIMS, Rohtak. These collected bones were assessed with the metrical parameters. The metric parameters taken were measurement of length of pubis and ischium. Maximum length of pubis was measured from a point taken in depression in acetabular fossa to the pubic tubercle with a sliding vernier caliper. Maximum length of ischium was measured from the bottom of ischial tuberosity to the depression in acetabular fossa. Ischio-pubic index was calculated from the above measurements. The data obtained was statistically analysed.

RESULTS

The mean and standard deviations of these measurements are shown in Table 1.

Table 1: Measurements of ischial and pubic lengths in mm.

Subjects	N		Ischial length +/- S.D. (mm)	Pubic length +/- S.D. (mm)	Ischio- pubic Index
Male	33	Right	70.24 +/- 4.58	70.76 +/- 5.88	100.72±4.53
	33	Left	69.92 +/- 4.71	70.57 +/- 5.53	100.07±5.12
Female	17	Right	65.26 +/- 3.78	73.65 +/- 5.33	113 ± 7.69
	17	Left	65.52 +/- 3.73	73.74 +/- 6.39	112.54 ±8.38

The mean ischial length of North- Indian region males were 70.24 ± 4.58 mm on right side and 69.92 ± 4.71 mm on left side. The mean pubic length on right side was 70.26 ± 5.88 mm and on left side it was found to be 70.57 ± 5.53mm. The mean ischio-pubic index on right side was 100.72 ± 4.53 mm and on left side was 100.07± 5.12 mm.

The mean ischial length of North – Indian region females were 65.26 ± 3.78 mm on right side and 65.52 ± 3.73 mm on left side. The mean pubic length on right side was 73.65 ± 5.33 mm and on left side was 73.34 ± 6.39 mm.The mean ischio-pubic index was 113 ± 7.69 mm on right side and 112.54 ± 8.38 mm on left side.

Fig. 1: Shows the measurement of pubic length (mm).

Table 2: Comparison of studies of various authors on ischiopubic lengths and indices.

S. no	Authors		Mean Pubic length	Mean Ischial Length	Mean Ischio-pubic Index
1	Oladipo G.S. et al 2014 [11]	Nigerian Males	91.99 ± 17.76	101.16 ± 18.53	90.88 ± 5.52
		Nigerian Females	103.12 ± 13.11	90.07 ± 12.19	114.87 ± 8.08
2	Okoseimiema SC and Udoaka AI 2013 [9]	South- south Nigerian males	74.99 ± 5.51	85.03 ± 7.53	88.65 ± 8.06
		South – south Nigerian females	84.48 ± 6.73	79.52 ± 5.64	106.45 ± 7.65
3	Theresa et al. 2014 [12]	Lagos males	68.7 ± 9.62	68.93 ± 10.77	101.05 ± 16.65
		Lagos females	76.6 ± 8.48	66.97 ± 8.47	115.99 ± 18.5
4	Bijaylakshmi P et al. 2012 [13]	Odisha males			85.6
		Odisha females			100.1
5	Kanika sachdeva et al 2014 [14]	Males	79.2 ± 7.1	80.7 ± 5.7	98.27 ± 7.33
		Females	85.6 ± 4.7	73.1 ± 7.8	117.97 ± 12.32
6	present study	Males Right	70.76 ± 5.88	70.24 ± 4.58	100.72 ± 4.53
		Males Left	70.57± 5.53	69.92± 4.71	100.07 ± 5.12
		Females Right	73.65 ± 5.33	65.26 ± 3.78	113 ± 7.69
		Females left	73.74 ± 6.39	65.52 ± 3.73	112.54 ± 8.38

Fig. 2: Shows the measurement of ischial length (mm).

DISCUSSION

Sexual dimorphism in the human pelvis is well-defined already based on studies of various researchers. The present study also provides useful data and information about sexual dimorphism in hip bone which is compared with other studies. Mean values of our study are found to be more in congruence with the study done by Theresa [12] on lagos males and females. It is also a fact now based on other studies that mean pubic length in females are found to be more in all studies universally while mean ischial length are found more in males in all studies. Pubic length is more in females as it is most responsive to female sex hormones (Kanika Sachdeva [14]). Also; Ischio-pubic index is universally more in females as compared to males, similar fact is also seen in present study. Further there is slight difference in the mean values of right and left side hip bones in both males and females as shown in Table 2. Pubic length and Ischial length are found slightly more on right side as compared to left side in males, while in females mean values of pubic and ischial length are slightly more on left side as compared to right hip bones showing slight bilateral asymmetry.

CONCLUSION

The present study gives valuable data reinforcing previous available data of different studies about the three statistically significant parameters supporting sexual dimorphism in hip bone. Further this study also comments on bilateral asymmetry in both males and females.

Conflicts of Interests: **None**

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