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A Study of Distance Between Posterior Inferior Iliac Spine and Ischial Spine of the Dry Adult Human Hip Bone for Sex Determination in Central India Population

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Abstract---Background: Sex identification of human skeletal has great anthropological and medico legal significance. The hip bone is very useful and ideal for sex determination. It is the most trusted bone for sex determination because of its pattern of sexual dimorphism very common in human race. Present study parameters will be used for identification of sex. In present study significant difference will be observed in the distance between posterior inferior iliac spine and ischial spine which will be useful in anatomical, anthropological, archaeological and forensic studies. They always are want a reliable estimation of the sex of unknown individuals represented by only a few bones or when several bones are missing or are broken due to the effect of environmental conditions. There is the ability to determine sex from the unknown skeletal it is very important methods to do this. The various bones of the skeletal will able to tell sex of that human skeleton. From all bony structure pelvis is best indicator of sex. The Sexual dimorphism of hip bone showing it special feature in female due to child bearing property and this can be calculated by the coxal index and total pelvic height.

Keywords---human hip bone, iliac spine, ischial spine, posterior inferior, sex determination.

Introduction

Study of sexual dimorphism of bones in human population is a subject of interest not only for the anatomist, but it also very interesting for the anthropologists and forensic experts¹. They always want a reliable estimation of the sex of unknown individuals represented by only a few bones or when several bones are missing or are broken due to the effect of environmental conditions. There is the ability to determine sex from the unknown skeletal it is very important methods to do this. The various bones of the skeletal will able to tell sex of that human skeleton. From all bony structure pelvis is best indicator of sex. The Sexual dimorphism of hip bone showing it special feature in female due to child bearing property and this can be calculated by the coxal index and total pelvic height. These parameters help in determination of sex in human pelvic bone². The hip bone is the most trusted bone for sex determination because of its pattern of sexual dimorphism very common in human race³. The traditional methods for assignment of sex on the pattern of skeletal morphology do not have an explicit on scientific basis. The visual impressions of bones can seldom be as accurate because of the many pit falls on associated with subjective assessment of the observer (4).

Human hip bone has several parameters which can be helpful in determination of sex compared to other skeletal remains like sacrum, femur, clavicle, mandible etc. Non metric method for determination of sex is not so relevant. But metric methods used for sex determination of human hip bone have shown highest accuracy level (5). Superiority of objective assessment by metrical methods over simple morphological observations has been well stressed.⁶ Indices and angles of greater sciatic notch are known to be highly sexually dimorphic. Consequently they have been considered to be reliable sex discriminators. The greater sciatic notch and acetabulum are located in central portion of the hip bone; hence they are better preserved.⁷ Several studies has been done taking into consideration various parameters along the anterior border as well as posterior border of the human hip bone. The present study was undertaken since there were very few studies set out to establish the morphological pattern of distance between posterior inferior iliac spine and ischial spine of hipbone along its posterior border.

Material and Methods

Dry human hip bones were collected in the Department of Anatomy of RKDF Medical College & Hospital Bhopal Madhay Pradesh Total 175 bones of known sex were collected in which male 96 and female 79.

Inclusion criteria

- Complete bone without unbroken bone.
- Complete ossified bone.
- Bone without any deformity.

Exclusion criteria

- Broken Bone
- Not complete ossified bone
- Bone with several deformity

The measurements were taken twice and the mean value of it was taken for purpose of data analysis to avoid maximum probable errors. The mean and standard error of the distance between Posterior Inferior Iliac Spine –Ischial spine (PSIS-IS) of male & female were calculated. T test calculation was also done to establish the significance of the study. The photographs were taken by the digital camera for more clarity. The data were analysed using the Statistical Package for the Social Sciences (SPSS).



Figure 1. Method of measurement

Results

In the present study the mean distance between Posterior Inferior Iliac Spine and Ischial Spine (PIIS-IS in mm) were calculated in both the sexes. The mean distance in males was 47.75mm and the mean distance in females was 58.45mm mm. The difference in the mean distance between PIIS-IS between males and females were found to be very highly significant. The Standard Deviation (SD) is more in male i.e. 5.85mm suggesting greater variation in the distance between PIIS-IS of male along the posterior border of the hip bone in comparison to female in which the SD is 5.35mm.

Table 1
Showing mean and different ranges of posterior inferior iliac spine and ischial spine in male and female

Parameter s Sex	No.	Mean	S.D ±	Range (mm)					
				20 –35mm	%	36- 55mm	%	56- 76mm	%
Male	96	47.75 mm	5.85	11	10.56	67	64.32	12	11.52
Female	79	58.45 mm	5.35	3	2.88	55	52.85	21	20.16

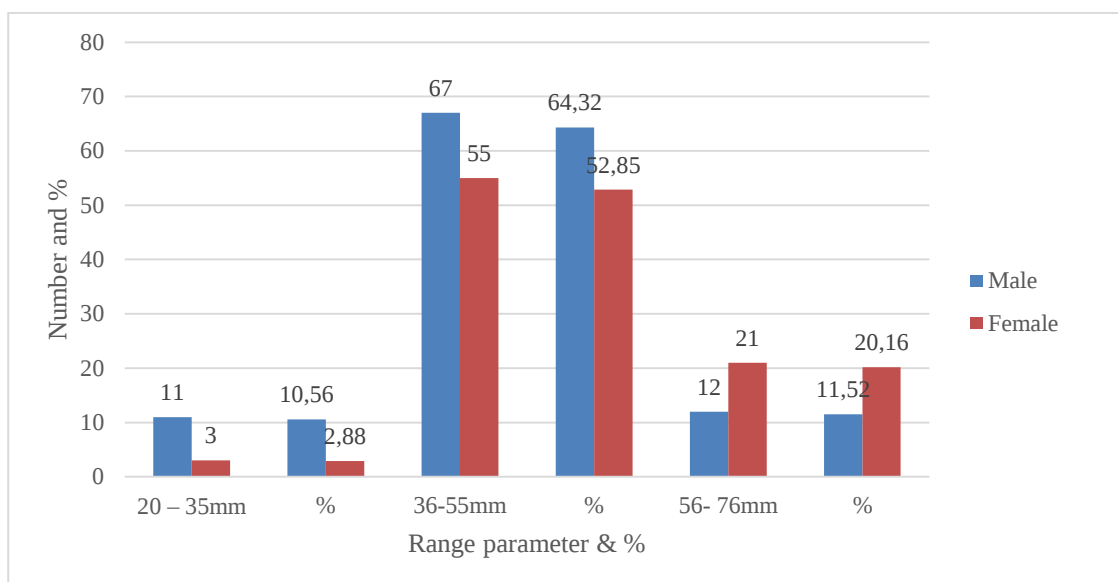


Figure 2. Showing range between the distance posterior inferior iliac spine and ischial spine in male and female

Discussion

Recently many researchers have attempted to determine the sex from various parameters of the hip bone. The posterior border of the hip bone is used in different studies considering different populations for sex determination. M. Steyna used the geometric morphometric method to study the greater sciatic notch of 115 known skeletons of South African origin, and observed that the South Africans have the typical narrow shape of the greater sciatic notch, while both black and white females have typical greater sciatic notches.⁸ Patriquin ML et al compared hip bone measurement of South African black and white males and females. They observed that mean values for white males exceeded the corresponding female measurements for total pelvic height (9).

Margam et al. studied two parameters along the posterior border of human hip bone i.e. Dist. PSIS-IT & Dist. PIIS-IT and both were found significant for sexing of human hipbone.¹⁰ Sinha et al. also studied the same parameter and the present studies parameters are similar to him (11). In the present study parameter taken for study was PIIS-IS and was found that the mean distance between posterior inferior iliac spine and ischial spine in 96 male hip bones was $47.75\text{mm} \pm 5.85\text{mm}$ and in 79 female hip bones was $58.45 \pm 5.35\text{ mm}$. In females the mean distance is apparently greater, and statistically it was found to be Significant. This shows that the mean distance between PIIS-IS in males was very less than that of females, which can be considered as an important metric parameter for identifying the sex of an individual. This makes the present study more objective as well as relevant

Conclusion

The Hip bone is the best bone for sex determination. The Anthropometric measurements of hip bone are easy with good accuracy for sex determination. Present study parameters will be used for identification of sex. In present study significant difference will be observed in the distance between posterior inferior iliac spine and ischial spine which will be useful in anatomical, anthropological, archaeological and forensic studies.

References

1. Trancho GI, Robledo B, Bueis LI, Sanchez IA. Sexual determination of femur using discriminant functions. Analysis of a Spanish population of known sex and age. *J Forensic Sci* 1997;42(2):181-5
2. Dwivedi SN. Sexing of metacarpals and comparison of some methods. *J Indian Acad Forensic sci* 1993;32(1):44-8
3. Bruzek J, Murail J. Methodology and reliability of sex determination from the skeleton. France : Humana Press; 2007. 225- 42.
4. Singh S, Singh SP. Identification of sex from the humerus. *Indian J Med Res* 1972;60:1061-7.
5. Gray's: Anatomy of the human body; 38th Edition. 1995:673-7.
6. Raju PB, Singh S. Sexual dimorphism in scapula. *J Indian Acad Forensic Sci.* 1978;17(2):23-33.
7. Isaac B. Biometry of the posterior border of the human hip bone: normal values and their use in sex determination *J Anat Soc India.* 2002;51(1):43-6.
8. M Steyna, E. Pretorius, L. Huttena. Geometric morphometric analysis of the greater sciatic notch in South Africans. *J Homo.* 2004;54:197-206.
9. M. Patriquin. Metric assessment of race from the pelvis in South Africans. *Forensic Sci Int.* 2003;127(1):104.
10. Sarita R. Margam, Megha A. Doshi, Sureka D. Jadhav, Raosaheb Patil, Manoj P. Ambali. Sex & side determination of human hip bone by metric parameters of its posterior border. *N J Clin Anat.* 2013;2(1):16-21.
11. Abhishek Prasad Sinha*, Anamika Kumari, Sadakat Ali, S. L. Jethani. Morphometric study of distance between posterior inferior iliac spine and ischial spine of the human hip bone for sex determination *International Journal of Research in Medical Sciences* Sinha AP et al. *Int J ResMed Sci.* 2014 May;2(2):718-720 www.msjonline.org