Research Paper Medical Science

Comparative Study Among Various Indices For Sex Determination of A Dry Human Sacrum

Vandana K. Punase M.B.B.S Demonstrator Department of Anatomy, N.S.C.B. Medical College Jabalpur (M.P.) 482003

ABSTRACT

Aim:. Comparative study among Various indices for sex determination of a dry human sacrum

Materials & Methods : This study was performed in Department of Anatomy of N.S.C.B. medical college Jabalpur M.P. during the period of august 2015 to January 2016. This study consists of 71 dry, undamaged human sacrum of known sex (44 male and 27 female) was used. Anatomical measurements were performed on these specimens by using vernier calipers with accuracy of 0.1 mm. To interpret the data was analyzed statistically.

Results: Sacral index was found statistically significant (p = < 0.000 , t = 9.72) for sexing the sacrum in the present study. demarking point for sacral index for male was < 92.86 mm and for female was >120.61mm.

Conclusion: among the various parameters the accuracy is less than sacral index because they are not statistically significant.

KEYWORDS : curvature index, alar index, corpora basal index, sex determination

Introduction :

Assessment of sex of the bone comes under Canopy of forensic anthropology. Establishing the Identity of human remains is one of the most important aspect in which a Forensic Medicine expert has to give his opinion for an unknown and mutilated dead body. Especially when an unknown skeleton is been supplied for its opinion regarding the identification, bones often survive the process of decay and therefore provide the major evidence of human age and sex after death. The sound knowledge of Anatomy of the bones (morphological and morphometrical data) is essential for identification of age, sex, race and region. Because morphological features of bone also depend on nutritional, geographic and occupational factors.[1]sacral bone carries much of the importance for sex determination. In this study we have chosen the bone sacrum for sex determination for its strength and contributions to pelvic girdle and associated sexual differences . Sacrum is a large triangular bone forming the poster superior wall of the pelvic cavity, wedged between the two pelvic bones. It is formed by the fusion of five sacral vertebrae and forms the caudal end of the vertebral column. The sacrum consists of trabecular bone enveloped by a shell of compact bone of varying thickness.[2]

The well known method for determination of male or female type of sacrum has always been the "Sacral Index". The Sacral Index is calculated by the following formula: Sacral Index = Width of Sacrum x 100 / Height of Sacrum.[3]

The present study was undertaken to find out similarities and differences in the metrical values of different sacral parameters in males and females and also to highlight the best parameter that could be used to study sexual dimorphism of sacrum.

Materials and method:

This study was performed in Department of Anatomy of N.S.C.B. medical college Jabalpur M.P. during the period of September 2015 to February 2016. This study consists of 71 dry, undamaged human sacrum of known sex (44 male and 27 female) was used. Anatomical measurements were performed on these specimens by using stainless steel sliding vernier calipers with accuracy of 0.1 mm and standardized flexible measuring steel tape. Sufficient care was taken and all parameters are measured accurately. The different parameter of each sacrum was studied under the following heading. To interpret the data was analyzed statistically. The accurate method for female or male type sacrum has often been the sacral index method as explained in Hrdlicka's practical Anthropometry.[3]

Methods: Procedure for measuring the following parameters of each sacrum:

1) Maximum Length of Sacrum (Mid ventral Straight Length): Measured along the midline of sacrum with the sliding calipers from the middle of the anterosuperior margin of promontory to the middle of anteroinferior margin of the last sacral vertebra.

2) The Maximum width of the Sacrum: Measured with the sliding calipers by taking two points at the upper lateral most part of Ala of Sacrum.

3) Curved length of sacrum (mid ventral curved length): It was measured by flexible measuring steel tape. from the middle of the anterosuperior margin of promontory to the middle of anteroinferior margin of the last sacral vertebra.

4) Transverse diameter of the body of first sacral vertebra (TD.S1): This was measured with the help of sliding calipers by taking a point on each side using the lateral most point on the superior surface of body of first sacral vertebra.

5) Length of ala(AL): It was measured on the both side by taking one point on the lateral most point of superior surface of body of first sacral vertebra and another point on the lateral most point of the ala.

above parameters were used for calculating the following indices-

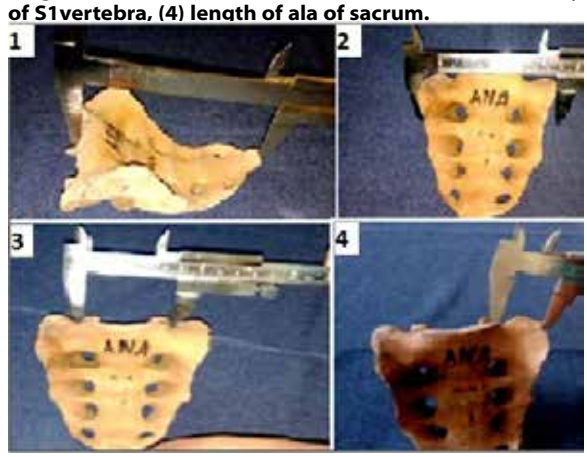
1.Sacral index = Maximum width of sacrum × 100
Maximum Straight length of sacrum

2.Alar index = $\frac{\text{Length of ala} \times 100}{\text{TD.S1}}$

3. Corpora - basal index = TD.S1 × 100
Maximum width of sacrum

4. Curvature index = Maximum length of sacrum × 100
Mid ventral curved length

Figure 1: Measurement showing the (1) max. straight length, (2) max. width, (3) transverse diameter of body of S1vertebra, (4) length of ala of sacrum.



Observation & Result :

In my study the mean value , range, SD, Mean ± 3SD, DP, T and P values for both the sexes was calculated and analyzed and tabulated [

Table No.1]

Table no. 1 Showing the values of present study n=71(-Male =44) (Female=27)

Parameters	Sex	Mean	SD	Mean ± 3SD	DP	Range	T-Value	P -Value
Sacral Index	M	96.40	8.07	72.19 - 120.61	> 92.86	76.59 - 127.03	9.72	0.000
	F	115.3	7.48	92.86 - 137.77	>120.61			
Alar Index Rt.	M	68.85	10.99	35.88 - 101.82	> 26.69	43.65 - 95.13	0.71	0.478
	F	66.77	13.36	26.69 - 106.85	> 101.82			
Alar Index Lt.	M	68.52	13.02	29.46 - 107.58	> 24.28	44.24 - 100.20	0.48	0.633
	F	66.94	14.22	24.28 - 109.6	> 107.58			
Curvature Index	M	93.57	18.90	36.87 - 150.27	> 111.75	10.96 - 107.14	0.71	0.480
	F	90.87	6.96	69.99 - 111.75	> 36.87			
Caorporo -Basal Index	M	43.56	4.45	30.21 - 56.91	> 55.97	35.16 - 54.37	0.34	0.729
	F	43.19	4.26	30.41 - 55.97	> 30.21			

Sacral index was found statistically significant ($p = < 0.000$, $t = 9.72$) for sexing the sacrum in the present study. demarking point for sacral index for male was < 92.86 mm and for female was >120.61mm.

Disscussion:

In present study I compared the sacral index with various other indices and found that sacral index was very much significant than other indices.

SACRAL INDEX : In present study the mean value for male was 96.40 and for female was 115.3. Patel et al. found the mean value for male was 96.25 and for female was 113.25 which is very similar with my study. [4] Poornima Janipati et al. found that the mean value for male was 104.08 which is higher than our value.[5] Jena et al. found that the mean value for male was 91.27 and for female 103.89 his study shows the lower value than my study.[6]

CURVATURE INDEX : In present study the mean value for male was 93.57 and for female was 90.87. Mishra et al. found the mean value for male was 95.72 and for female was 90.72 in this study the value for female is almost equal.[7] Kanika et al. found that the mean value for male was 91.59 and for female was 87.87 these value are lower than my study.[8] Jyothinath kothapalli et al. found that the mean value for male was 90.56 and for female was 88.66.[9]

ALAR INDEX : In present study the mean value for male was 68.85 and for female was 66.77.Mishra et al found the mean value for male was 62 and for female was 62, which is slightly lower than my study. Jyothinath kothapalli et al. found the mean value for male was 71.39 and for female was 71.39,which is higher than my study.[7,8]

CORPORO BASAL INDEX : In present study the mean value for male was 43.56 and for female was 43.19. Singh et al. found that the mean value for male was 44.94 and for female was 40.96.[10] Kanika et al. found that the mean value for male was 43.42 and for female was 43.84 which is very much similar with my study.[8]

Conclusion :

For determination of sex the sacral index is a very important and significant parameter than other indices among the remaining parameters the accuracy is less than sacral index because they are not statistically significant.

References:

1. Maddikunta V, Ravinder M. Morphometric study of sacrum in sex determination in Telengana region people. Int. J Res Med Sci. 2014 Feb;2(1): 164-174.
2. Standring S. Gray's Anatomy: The Anatomical Basis of Clinical Practice, 40th Ed, Elsevier Churchill Livingstone, London, 2008:724-725.
3. Stewart TD. Measurement of bones in: Hardlicka's Practical Anthroprometry: 4thedition. The Wistar Institute of Anatomy & Biology, Philadelphia. 1952pp.172.
4. Patel M M, Gupta B D, Singhal T C. Sexing of Sacrum by sacral index Kimura's basewing index. JIAFM, 2005:27(1);5-9.
5. Janipati P, Kothapalli J, Rao V S. Study of sacral index: Comparison between different regional population of India and abroad. International Journal of Anatomy And Research. 2014, vol.2(4):640-44. ISSN2321-4287.
6. Jana T K, Koly T K, Saha S B, Basu D, Basu S K. Variation and sexing of adult human sacrum. Journal of Anatomical society of India;37:pp.2-3.
7. Mishra S R, Singh P J, Agrawal A K, Gupta R N. Identification of sex of sacrum of Agra region. Anat. Soc. I nd. 2003;52(2):p7-12.
8. Kanika sachdeva et al. Role of sacrum in sexual dimorphism - A Morphometric Study.J Ind Acad Foren Med.2011;vol.33,No 3.
9. Kothapalli J, Velichety S D, Desai V, Zameer M R. Morphometric study of sexual dimorphism in adult sacra of south Indian population. Int. J Bio Med RES.2012;3(3) 2076-2081.
10. Singh H, Singh J and Bargotra R N. Sacral index as observed anthropometrically in the region of Jammu. Journal of Anatomical Society of India. 1988;37: pp.1

.