

A STUDY OF THE SACRAL INDEX IN WESTERN RAJASTHAN POPULATION IN COMPARISON WITH OTHER RACES

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ABSTRACT

This study had a purpose of taking various measurements and calculating sacral index in the population of western Rajasthan. A total of 74 sacra were taken for the study and they were divided into two groups as 42 male sacra and 32 female sacra. Parameters like maximum sacral length and maximum sacral breadth were measured on the sacra and sacral index calculated.

Data obtained were statistically analyzed. The results were further compared with similar studies of sacral index in other races.

KEYWORDS: Sacrum, Maximum sacral length, Maximum sacral breadth, Sacral Index.

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BACKGROUND

The human sacrum is a large, triangular bone fusion of five vertebra and forms the postero-superior wall of the pelvic cavity, wedged between the two hip bones.

The sacrum has always attracted the attention of medico-legal experts for establishing the sex. It is an integral part of the axial skeleton and contributes to the functional sex differences of the pelvic girdle between the two genders. It supports the erect spine and provides the strength and stability of the bony pelvis to transmit the body weight and also allows considerable mobility in childbearing. Authors have studied sexual dimorphism where in sacra of known sex were selected and the validity of the parameters was verified. Sacral index is the most important criteria as far as the sex determination of sacrum is concerned. JE Frazer (1965) et al [1] that sacrum presents sexual distinctions.

The female bone is broader than the male in proportion to its length and shows a different anterior curve; in the male the curve is more or less uniform from above downwards, but in the female it is sharply marked at the lower part of the bone, the upper portion being almost flat.

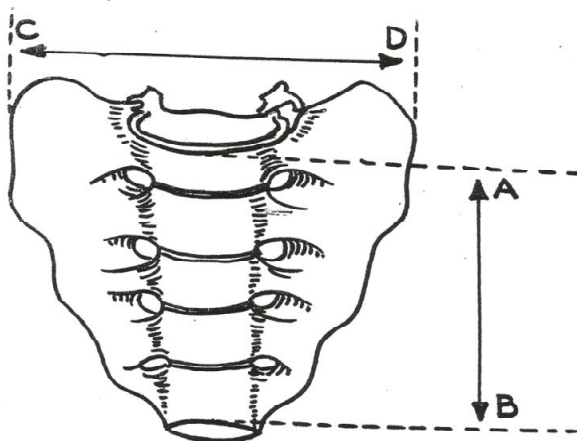
Comas J.Charles (1960) [2] et al a wide variation between the male and female sacrum in Chinese and Nigros.

The present work was planned to study sacral index in the population of western Rajasthan and a comparative study with various races.

MATERIALS AND METHODS

In the present study 42 adult male and 32 adult female of known sex were studied from different college of western Rajasthan. The sliding caliper was used for taking the measurements. The maximum length and maximum breadth were measured of sacra of known sex.

Fig. 1: Showing Points for Measurement of Maximum Length and Maximum Breadth of Sacrum.



AB: Maximum Length Measurement
 CD: Maximum Breadth Measurement

Measurement of parameters: (figure 1)

A. Maximum Length (Mid Ventral straight length AB): The Sacrum is placed on even surface with its anterior surface facing upward. The maximum length is taken in millimeters between A and B points with the help of sliding caliper. Point A is the middle point on the anterior superior margin of the promontory and point B is the middle of Antero-inferior margin of the last sacral vertebra.

B. Maximum Breadth (Most distant points on the right and left sides of ala of the sacrum CD): Maximum breadth is taken between points C and D in millimeters with the help of sliding caliper. Points C and D are the most distant points on the right and left sides of ala of the sacrum. With above measurements sacral index was calculated:

$$\text{Sacral Index} = \frac{\text{Maximum width}}{\text{Maximum Length}} \times 100$$

RESULTS AND DISCUSSION

In the present study the mean maximum length of the Sacrum is greater in males (106.70) than in females (91.91) and the sex difference of mean lengths is statically significant. On the contrary the mean maximum sacral breadth of the two sexes shows no significant difference. As a result the mean sacral index in females is greater (120.01) as compared to that in males (104.11). These observation are in agreement of those of Davivongs (1963) [3] in Australian Aborigines and Flender (1978) in American blacks. As tabulated above Flender (1978) [4] observed no such significant sex difference in American white samples.

In the present study frequency distribution of the sacral index (figure 2) reveals overlapping in 44.59% of the bones, sparing 61.90% of male and 48% of female bones on either side of the overlap thus a fair amount of accuracy is obtained for determination of sex through Sacral index alone and also same results were obtained by Davivongs (1963) in Australian Aborigines.

Table 1: Measurements in the Present Study.

Measurements/Index	Male			Female		
	No.	Mean	S.D.	No.	Mean	S.D.
MAXIMUM LENGTH OF SACRUM (in mm)						
Present Study	42	106.7	8.23	32	91.91	9.01
MAXIMUM BREADTH OF SACRUM(in mm)						
Present Study	42	110.3	8	32	109.88	8.86
SACRAL INDEX						
Present Study	42	104.11	5.86	32	120.01	8.75

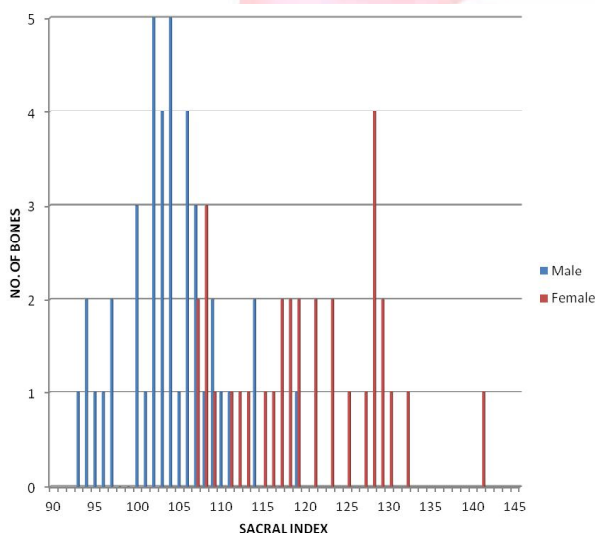
Fig. 2: Frequency Distribution and Mean Values of The Sacral Index. (Present Study)



Measurements/Index & Race	Male			Female		
	No.	Mean	S.D.	No.	Mean	S.D.
MAXIMUM LENGTH OF SACRUM (in mm)						
Australian aborigine (Davivongs 1963)	50	96.52	8.8	50	88.12	6.87
American White (Flender, L.B. 1978)	50	110.2	11.4	50	109.64	12.56
American Black (Flender, L.B. 1978)	50	105.5	11.01	50	99.98	11.24
MAXIMUM BREADTH OF SACRUM(in mm)						
Australian aborigine (Davivongs 1963)	50	99.92	5.02	50	101.24	5.12
American White (Flender, L.B. 1978)	50	116.42	7.11	50	117.62	7.08
American Black (Flender, L.B. 1978)	50	111.14	7.81	50	111.36	7.23
SACRAL INDEX						
Australian aborigine (Davivongs 1963)	50	104.16	8.93	50	115.4	10.39
American White (Flender, L.B. 1978)	50	106.49	10.4	50	108.59	13.59
American Black (Flender, L.B. 1978)	50	106.49	10.36	50	112.85	11.03

Table 2: Measurements in the Earlier Studies In Various Races.

Graph 1: Frequency Distribution of Sacral Index.



CONCLUSION

It is evident from the present study that sacral index (males 104.11, females 120.01) alone could classify 61.90% of male and 48% of female bones. The comparative analysis with other races shows a clear racial difference for the sacral index. It has been observed that sacral index in females is more than in males among different races. Hence establishing it as reliable and important criteria for sex determination of sacrum.

Conflicts of Interests: None

REFERENCES

- [1]. J.E.Frazer. Anatomy of the human skeleton 3rd Edition, 1933; P.No. 43.
- [2]. Comas J., Charles C., Manual of Physical anthropology (revised and enlarged English edition) Thomas Springfield, Illinois, USA, pp. 415-416 (1961).
- [3]. Davivongs, V. The pelvic girdle of Australian aborigine, sex differences and sex determination. Am. J. Phys. Anthropol. 1963;21:443-455.
- [4]. Krogmann W. M. In the Human Skeleton in Forensic medicine. Thomas Springfield (Illinois); 1962.
- [5]. Flender LB. Univariate and multivariate methods for sexing the sacrum. American Journal of Physical Anthropology 1978;49:103-110.
- [6]. Flender, L.B. and Corruccini, R. Shape differences in the sacral alae. Am. J. Phys. Anthropol. 1980;52:399-403.
- [7]. Vinod kumar, Longia, G.S. and Jain, P.N. Anthropometrical study of human sacrum. J.Anat. Soc. India 1984;33(1):57.
- [8]. Chand P, Mukherjee B, Sahai A. An Anthropometric study of sacrum in North Indians. J Anat Sciences 1995;14:6-8.
- [9]. Peter L William et al. Gray's Anatomy, 38th Edition, 2000;528-531:673-674.
- [10]. El Monem AH, Neven MG. A morphometrical study of the sacral hiatus zagazing University Medical Journal (ZUM) 2006; 12: 2877-86.
- [11]. Mishra, S. R., Singh, P. J., Agrawal, A. K., & Gupta, R. N. Identification of sex of sacrum of Agra region. J Anat. Soc. India 2003;52(2), 132-136.
- [12]. H.K. shrikrishna, S. Yatiraj, N. Vijya Kumari. Credibility of various indices of sacrum in identification of sex of sacrum, (spring) 2013;3(2).

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