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Original Research Article

A STUDY OF SACRAL INDEX IN EASTERN RAJASTHAN POPULATION IN COMPARISON TO OTHER NORTH-WEST POPULATIONS OF INDIA

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ABSTRACT

Background: Human skeleton is an excellent source for genetic, anthropological and forensic investigations. Pelvic bones are very important for sex determination, followed by skull & the long bones. Various parameters and indices are available based on which the sex can be determined using sacrum. These parameters and indices vary region wise also. The sacrum has always attracted the attention of the medico-legal experts for establishing its gender, because of its contribution to pelvic girdle and associated functional gender differences. In present study the sacral index in Eastern Rajasthan population is calculated and compared with the study done earlier in Western Rajasthan & North Indian Population.

Objective: To study the Sacral Index in the population of Eastern Rajasthan, so that it can be compared with other studies on populations of Western Rajasthan & other regions of North India.

Materials and Methods: Study was carried out in Department of Anatomy, Jaipur National University IMSRC, Jaipur, Rajasthan. Adult, dry sacra were collected randomly from Anatomy department of different Medical colleges of Eastern Rajasthan, with the kind permission of the concerned department. 87 sacra were classified into 48 male and 39 female bones by observing the parameters like – Maximum length of sacrum, Maximum width of sacrum and Sacral index.

Results: In this present study Mean of sacral index in Males was **104.39** and that for Females was **121.02**. Mean value of Sacral Index in females was significantly higher than in males. Difference between male and female mean was statistically highly significant.

Conclusion: It was found after comparison that sacral index is more in females than males in different populations. The comparative analysis with other races showed a clear racial difference for the sacral index. Hence it is a reliable and significant criteria for sex determination of sacrum.

KEY WORDS: Sacrum, Sacral Index, Sexual dimorphism, Rajasthan.

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INTRODUCTION

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. Sacral index is the most important criteria as far as the sex determination of sacrum is concerned. JE Frazer (1965) et al that sacrum presents sexual distinctions [1]. Speaking in connection with the sex differences of the skeleton, Davivongs (1963) [2] pointed out that as a general rule male bones are more massive and heavier than female bones. In case of pelvic girdle additional sex differences are added due to different reproductive functions mainly influenced by sex hormones.

Comas J.Charles (1960) [3] et al noted a wide variation between the male and female sacrum in Chinese and Nigros.

Objective: To study the Sacral Index in the population of Eastern Rajasthan, so that it can be compared with other studies on populations of Western Rajasthan & other regions of North India.

MATERIALS AND METHODS

Study was carried out in Department of Anatomy, Jaipur National University IMSRC, Jaipur, Rajasthan. Adult, dry sacra were collected randomly from Anatomy department of different Medical colleges of Eastern Rajasthan, with the kind permission of the concerned department. 87 sacra were classified into 48 male and 39 female bones by observing the parameters like – Maximum length of sacrum, Maximum width of sacrum and Sacral index.

The sliding vernier callipers was used for taking the measurements. The maximum length and maximum breadth were measured of sacra of known sex.

Sacral Index (SI) from theses measured parameters calculated for male and female sacra. Figure 1.taken from previous study [4].

Parameters Measured & Calculated (Fig. 1)[4]

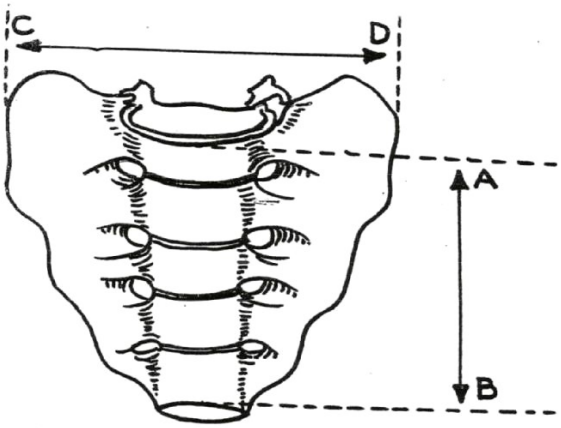
Maximum Breadth (Most distant points on the right and left sides of ala of the sacrum CD): Maximum breadth is taken between points C and D in millimeters with the help of sliding caliper. Points C and D are the most distant points on the right and left sides of ala of the sacrum. As shown in Figure 2.

Maximum Length / Mid Ventral Straight length -The Sacrum is placed on an 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 calliper. 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. As shown in Fig. 3**.**

3. Sacral Index was calculated:

(Maximum Breadth of sacrum / Maximum length of Sacrum) X 100

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



AB: Maximum Length Measurement

CD: Maximum Breadth Measurement

Fig. 2: Maximum Breadth of Sacrum.

Fig. 3: Maximum Length of Sacrum.

RESULTS AND DISCUSSION

In this present study Mean of sacral index in Males was 104.39 and that for Females was 121.02. Mean value of Sacral Index in females was significantly higher than in males. Difference between male and female mean was statistically highly significant.

We found that the mean maximum length of the Sacrum is greater in males (104.8) than in females (89.9) and the sex difference of mean lengths is statiscally significant. Whereas the mean maximum sacral breadth of the two sexes was nearly equal with no significant difference. As a result the mean sacral index in females is greater (121.02) as compared to that in males (104.39) as shown in Table 1.

It is nearly the same as was found earlier in a study done in Western Rajasthan by Sushma K Kataria et al in 2014 [4].

Davivongs (1963) [3] in Australian Aborigines and Flender (1978) in American blacks also found the same difference. Flander (1978) [5] observed no such significant sex difference in American white samples.

For determination of sex through Sacral index alone, it is indicating significant differences in male and female data. Sacral Index can be used as a significant parameter for differentiating Male and female Sacrum showing sexual dimorphism.

The mean value of Sacral index for Male sacra (104.39) in this study was higher than that Amritsar region (93.69) studied by Arora et al [6], Amritsar region (100.24) studied by Sachdeva K et al [7] Varanasi region (100.85) studied by Raju et al [8] but lesser than Flander White (106.49) Black (106.17) [5].

The mean value of Sacral index for Female sacra (121.02) in present study is more than that of Varanasi region (111.39) studied by Raju et al [8], Amritsar region (111.74) studied by Sachdeva K et al [7], Agra region (117.84) studied by Mishra et al [9] and Davivongs (115.49) [2] and Flander white (108.69) [5], but lesser than Amritsar region (125.35) studied by Arora et al [6].

All studies including present study found sacral index for sex determination statistically significant except Flander [5] study for Black population.

Table 1: Measurements in the Present Study.

	Male		Female	
	Mean	Standard Deviation	Mean	Standard Deviation
Maximum Sacral Breadth	109.4	7.8	108.8	7.23
Maximum Sacral Length	104.8	7.56	89.9	7.23
Sacral Index	104.39	6.59	121.02	7.87

CONCLUSION

The present study establishes that the Sacral Index measured is significantly more in female population than from male population in Eastern Rajasthan. (males 104.39 & females 121.02) . We have found after comparison that sacral index is more in females than males in different populations.

The comparative analysis with other races shows a clear racial difference for the sacral index. Hence it is a reliable and significant criteria for sex determination of sacrum.

Conflicts of Interests: None

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