

Incidence of Unusual Sacralization and Lumbarization in Southern Adult Nigerian Population

*OSUNWOKE E.A, OLOTU E.J, AFOLABI E.O, AMABIPI M, M.
Department of Anatomy, Faculty of Basic Medical Sciences,
College of Health Sciences, University of Port Harcourt.

*Author for correspondence.

ABSTRACT

A study on the incidence of unusual sacralization in adult Nigerians was carried out, using sacral bones and radiographs of lumbosacral vertebrae. The bones were obtained from three Nigerian universities which are: University of Port Harcourt, Nnamdi Azikiwe University and University of Nigeria, Enugu campus. The radiographs were gotten from: University of Port Harcourt Teaching Hospital, Braithwaite Memorial Specialist Hospital and Seiyefa Clinic, Port Harcourt. Thirty (30) available sacra were taken and observed to note the number of sacralization and lumbarization in male and female bones. Randomly selected lumbosacral radiographs of patients were collected from Radiology Department of the three Hospitals in a two year period (2006-2007). The X-ray reports were noted and observed. Results revealed that sacralization in males was higher (62.5%) than in females (37.5%) and generally the ratio of sacralization is twice in percentage to lumbarization. Therefore, it is apparent that the condition of sacralization is real, however it is a rare condition that can only be seen through radiograph and does not affect normal life expectancy.

Key words: Unusual sacralization, Adult Nigerian population, Lumbosacral.

The sacrum is a large triangular bone. It is usually composed of five fused sacral vertebrae in adults. This fusion is as a result of four ossified (bony) intervertebral discs (Robert et al 1990). The fusion usually occurs after twenty six years (26 years) of age, (Van De Graff 2000). Sacralization is the fusion of the fifth lumbar vertebrae (L5) with first sacra vertebrae (S1). Sacralization can be partly incorporated (hemi-sacralization) or completely incorporated (sacralization of L5 vertebrae) (Moore et al 2006, Meschan, 1985). Sacralization may be partial or complete and quite frequently is incomplete on one side, (Romanes 1981). Hemisacralization is a condition in which the fifth lumbar vertebrae fuses with the sacrum on one side, the fifth lumbar vertebrae or its transverse process may be fused, on one side or both sides with the sacrum (Raju et al 1981). Complete sacralization consists of a complete bony union between the abnormal transverse process and the sacrum. Incomplete sacralization shows a well defined joint line between the transverse process and the sacrum. Both forms may either be unilateral or bilateral (Bannister 1985). Sacralization is one of the lumbosacral transitional vertebrae, it has been indicated that the incidence of sacralization is much higher than lumbarization (Sinnatamby 1999).

Sacralization is documented to be between eight to eleven per cent (8-11%) of a general population, whereas lumbarization of S1 is relatively rare, between 0.7%, (Trotter and Lanier 1945). Lumbarization is the proximal sacral assumption of a lumbar vertebrae feature (Olanrewaju 1994). In a study carried out to establish a relationship between lumbosacral transitional vertebrae and low back pain, results revealed that the incidence of sacralization is higher than lumbarization. About sixty-four per cent (64%) of sacralization was seen while lumbarization was thirty-six per cent (36%), and that sacralization is commonly found in men than in women, (Eyo et al 2001). The high rate of incidence of sacralization among men has been attributed to the type of job they embark on (Eyo et al 2001). Partial sacralization, also known as Bertolotti's syndrome is defined by transitional fifth lumbar vertebrae. Of importance is that this syndrome will result in pain generating fourth lumbar disc resulting in a "sciatic" type or a pain correlating the fifth lumbar nerve root. Bertolotti's syndrome is a form of lumbago in the lumbosacral transitional vertebrae, A lumbago is a back ache in the lower lumbar and lumbosacral area of the spinal column (Fong et al 2000). The syndrome is not usually treated, as not much is known yet about these spinal

segments. The question of the responsibility for low back pain looms large in the orthopedic world at the present time. Sacralization associated with pain is as a result of the compression of the fifth lumbar nerve (Chaurasia 2003). This condition makes the vertebral column more susceptible to damage; apparently the articulations between the vertebrae at that level are asymmetric, this predisposes to ache (Ross et al 1998).

It is important that the incidence of sacralization of Nigerians be re-evaluated, its clinical significance and the ratio of occurrence in male and female adults be scrutinized, hence the need for this research work.

MATERIALS AND METHOD

In this study, a total number of thirty (30) adult Nigerian sacrum were used, of this number 7 were sacralized and 2 were lumbarized. These bones were obtained from the Department of Human Anatomy, University of Port Harcourt, Department Human Anatomy, Nnamdi Azikiwe University and the Department of Anatomy University of Nigeria Enugu campus. The bones were harvested from cadavers and then soaked in tap water at 60-65°C for 12 hours to ensure proper maceration of tissues. The bones were later soaked in 20% caustic soda for 1-4 hours to help remove any remaining tissues.

The bones were then brushed with a brush and rinsed in cold tap water. The bones were further soaked in 10% hydrogen peroxide for 2 weeks

and then thoroughly rinsed in tap water to remove traces of hydrogen peroxide and then finally polished with wood polish to preserve them. Sacral bones collected were observed, and examined to note the morphology for any incidence of asymmetry. Also, one hundred and fifty (150) lumbosacral radiographs of patients were randomly chosen from the Radiology Department of three hospitals in a two year period; between 2006 and 2007. These radiographs were obtained from the University of Port Harcourt Teaching Hospital, Braithwaite Memorial Specialist Hospital as well as Seiyefa Clinic, Borikiri, Port Harcourt. Of this number of radiographs, 86 were male patients and 64 female patients. X-ray radiographs collected were studied, and then the reports were taken down and observed to note the number of sacralized, lumbarized and normal patients. The percentage of asymmetric bones, percentages of radiographs with sacralization and lumbarization of males and females was worked out as well. Data was analyzed using Windows SPSS.

RESULTS

The result of this study is as presented in the tables below. Table 1 shows the mean values of sacral vertebrae that were sacralized and lumbarized. Table 2 shows mean values using X-ray radiographs for male and female patients that were sacralized and lumbarized.

DISCUSSION

Although nearly all bones showed some form of

Table 1. Showing the mean values of sacral vertebrae that are sacralized and lumbarized.

	N	Range	Minimum	Maximum	Sum	Mean	Standard Deviation	Variance
Males	2	4.00	1.00	5.00	6.00	3.0±2.0	2.12	4.50
Females	2	1.00	1.00	2.00	6.00	3.0±2.0	2.12	4.50

N=Sample size

Table 2. Showing descriptive statistics for X-ray sacralization and lumbarization

	N	Range	Minimum	Maximum	Sum	Mean	Standard Deviation	Variance
Males	2	3.00	2.00	5.00	7.00	3.0±1.50	2.12	4.50
Females	2	2.00	1.00	3.00	4.00	2.0±1.00	1.41	2.00

N=Sample size

morphological sexual dimorphism, (Holland, 1991, Krogram and Iscan, 1986; Wu, 1989), the pelvis is the most obvious anatomical site from which to identify sex. The sacrum is dimorphic and it is essential in sex identification, (Moore et al, 2006). The result of this present study describes the frequency of both sexes of the adult Nigerian population with sacralization. This showed a high incidence in the male populace. Sacralization in males indicates a percentage of 62.5% which is extremely high, while that of the female population is 37.5%. The reason for high incidence in male can be attributed to various factors, such as genetics, poor ossification of the sacral vertebrae, type of occupation and nutrition, (Eyo et al, 2001). Anthropologically, sacralization as a type of asymmetry shows variations in the arrangement of the axial skeleton among individuals of a family or community. Comparing the overall frequencies of both sacralization and lumbarization, percentage of lumbarization (66.7%) in males to that in the condition of sacralization (62.5%) is high, while in females lumbarization is 33.3% and sacralization is 37.5%. The effect of sacralization is not substantially evident in this study because clinical reports of patients were not available. However, it has been stated that sacralization is an incidental finding, and if pain is complained of, it is due to decompression of the fifth lumbar nerve, (Chaurasia, 2003). Our result revealed that only an insignificant level of sacralization and lumbarization could be found. Sacralization is noticed incidentally through X-ray and does not affect normal life style. In cases of chronic low back pain, we advocate that the incidence of sacralization and lumbarization be investigated. This study is probably the first on the incidence of sacralization and lumbarization in our environment and could be of immense importance to anthropologists, forensic scientists and clinicians.

REFERENCES

Chaurasia BD (2003). *Humana Anatomy, Regional and applied, dissection and clinical*. Vol. 2, lower limb and abdomen and pelvis. 4th edition. Pg 184.

Eyo MU, Olafin A, Noronha C, Okanlawon A (2001). Incidence of lumbosacral transitional vertebrae in low back pain patients. *West Africa Journal of Radiology*.

Fong Elizabeth, Elvira B. Ferris, Esther G. Skelley (2000). *Body structures and functions*, 7th edition. Delmar Publishers Inc. pg 106.

Romanes GJ (1981). *Cunningham's Textbook of Anatomy*, 12th edition. Oxford medical publications. Pg 502.

Holland (1991). cited by King C (1997). In *osteometric assessment of 20th century skeletons from Thailand and Hong Kong*. Universal Publishers. Pg 7.

Kent Van De Graff (2000) *Human Anatomy*, 5th edition. McGraw-Hill higher education: a division of the Mc Graw-Hill companies. Pg158.

Krogram W, Iscan MY (1986). *Human skeleton in forensic medicine*, 2nd edition. Charles C. Thomas, Springfield.

Meschan I (1985). Incidence of lumbosacral transitional vertebrae in low back pain patients. *West African Journal of Radiology*.

Moore KL, Dalley AE (2006). *Clinically oriented anatomy*, 5th edition. Lippincott Williams and Wilkins, Philadelphia. Pg 446.

Olanrewaju DA (1994). In incidence of lumbosacral transitional vertebrae in low back pain patients. *West African Journal of Radiology*.

Raju PB et al (1981). Sex determination and sacrum. *Journal of Anatomical Society of India*. 30:13-15.

Roger Bannister (1985). *The sacrum: an introduction to the anatomy of children and adult sacrum*, 6th edition. Oxford medical press. Pg144.

Ross et al (1998). A home box gene HLXB9 is the major locus for dominantly inherited sacral agenesis. *Nature genet*. 20:358-362, cited by Origho O. (2006) in pedicle size of the sacral vertebrae in Nigeria.

Sinnatamby Chummy S (1999). *Last's Anatomy regional and applied*. 10th edition. Churchill Living Stone. An imprint of Harcourt publisher's ltd. Pg. 428.

Trotter and Lanier (1945) cited by Origho O. in pedicle size of the sacral vertebrae in Nigeria.

Wu (1989). cited by King C. (1997) in *osteometric assessment of 20th century bones from Thailand and Hong Kong*. Universal Publishers Pg 12.