

East African Medical Journal Vol. 91 No. 10 October 2014

## ANTHROPOMETRIC STUDY OF ISCHIOPUBIC INDEX OF THE ISOKO AND BENIN IN NIGERIA

L. E. Chris-Ozoko, O.A Ebeye and T .P.Ufuoma, Department of Human Anatomy, Faculty of Basic Medical Science, College of Health Science of Delta State University, Abraka

Request for reprints to: Lilian Ebele Chris-Ozoko, Senior Lecturer, Department of Anatomy Faculty of basic Medical Sciences, Delta state University, Abraka.

## ANTHROPOMETRIC STUDY OF ISCHIOPUBIC INDEX OF THE ISOKO AND BENIN IN NIGERIA

L. E. CHRIS-OZOKO, O.A EBEYE and T .PUFUOMA

### ABSTRACT

**Background :** The ischiopubic index is calculated by dividing the pubic length by the ischial length and multiplying by 100. It has been said to be one of the parameters affecting the pelvic inlet and this is of interest to obstetricians and anatomic anthropologists.

**Objectives :** To determine and compare the pubic length, ischial length and ischiopubic index among the males and females of Isoko and Bini ethnic groups of Nigeria.

**Design :** A retrospective cross sectional study.

**Setting:** University of Benin teaching hospital (UBTH), Irrua Specialist teaching hospital (ISTH) and Eku Baptist Hospital.

**Subjects:** Four hundred antero-posterior radiographs ; two hundred for the Isoko (males 105 and females 95) and two hundred also for the Bini (males 110 and females 90) adult pelvis in the age range of 18 – 65 years were evaluated.

**Results :** Pubic length, ischial length, and ischiopubic index were measured. The mean pubic length, mean ischial length and mean ischiopubic index of Isoko males are respectively (mm)  $78.42 \pm 3.40$ ,  $69.41 \pm 5.10$ ,  $75.2-97.5$ ,  $87.52 \pm 1.30$ . The range and point of demarcation are (mm):  $75.2-97.5$ ,  $<86.22$ . For Isoko females, the mean pubic length, mean ischial length and mean ischiopubic index are (mm):  $81.20 \pm 5.0$ ,  $74.30 \pm 6.10$ ,  $106.21 \pm 9.10$ . The range and demarcation point are (mm):  $87-125.10$ ,  $<97.11$ .

The mean pubic length, mean ischial length and mean ischiopubic index of Bini males are respectively (mm):  $74.32 \pm 5.40$ ,  $82.71 \pm 7.20$ ,  $88.72 \pm 2.40$ . The range and point of demarcation are (mm)  $70-98$ ,  $<86.32$ . For Bini females they are (mm);  $86.48 \pm 4.20$ ,  $78.61 \pm 7.41$ ,  $112.21 \pm 7.71$ . The range and point of demarcation are (mm):  $84.1-132.50$ ,  $<104.50$  respectively.

**Conclusion:** The study showed sexual dimorphism in the ischiopubic index of the study population and a significant difference in actual mean values and demarking points between the two population groups studied. This contributes growing database of anthropologically and obstetrically significant data for ethnic groups in Nigeria and could help in identification of skeletal remains in the hitherto restive Nigerian Niger-Delta region.

### INTRODUCTION

The hip bone has been called the most reliable skeleton in sexual dimorphism (1). The pelvis which is made up of the hip bones (ilium, pubis and ischium), sacrum and coccyx, is essential in the outcome of labour and delivery and this function essentially differentiates males from females. Ischiopubic index (I.P index) is calculated by dividing the pubic length by the ischial length and multiplying by 100. The sexual differences

noticed in the pelvis region are of interest to the anatomist, anthropologist, as well as the obstetrician/ gynecologist. This index has been said to be one of the parameters affecting the size of the pelvic inlet (2,3).

Sexual dimorphism and racial morphologic differences of the pelvis has been noted in studies (4). In a study of adult Malawians, sex could be accurately assigned to 87.8% of male skeletal bones and 92.3% of female skeletal bones by using the ischiopubic index (5). This study used skeletal

remains and antero-posterior radiographs of the pelvis. No significant differences has been reported to exist between studies from skeletal remains and

those from radiographs of the pelvis, so radiological pelvimetry is the most widely used method in the study of ischiopubic index (4).

**Table 1**  
*Populations in the world*

Population	Sex	Mean± SD	N	P	Authors
Black Malawians	Male	85.0±15.7	120	<0.05	Igbigbi&Msamati, 20005
	Female	104.6±15.7	135		
France	Male	82.0±7.2	93	<0.05	Wasbum, 19483
	Female	94.5±3.1	61		
Portuguese	Male	78.2±6.2	129	<0.05	Phenice, 19696
	Female	71.3±3.1			
Americans	Male	67.4±8.1	253	<0.05	Tague, 19897
	Female	93.1±10.4	212		
White Americans	Male	63.7±7.8	50	<0.05	Tague,19897
	Female	88.4±8.5	50		
Black Americans	Male	65.8±8.7	50	<0.05	Tague,19897
	Female	85.2±8.5	49		
Middle Belt-Nigerians	Male	83.1±5.7	20	<0.05	Oladipo <i>et al</i> 20098
	Female	101.7±11.3	30		
Eastern Nigeria	Male	84.0±10.4	100	<0.05	Oladipo <i>et al</i> 20129
	Female	102.6±11.7	100		

Sexual dimorphism of ischiopubic index has been reported and several studies in America, Europe, Australia and Africa show female pubis to be longer than males and female ischium to be shorter than males leading to a mean higher ischiopubic index in females. A study among Portuguese subjects showed a reversal of this pattern (5,10,11).

Isoko is an ethnic group found mainly in Delta state of southern Nigeria. It is also regarded as a region in the state and is divided into two local governments. This region was part of the defunct mid-western region and former Bendel state. The main economic activity of the isoko people involves subsistence crop farming and this has been severely hampered by crude oil spills from pipelines of major oil companies. This has led to frustrations and skirmishes including kidnappings (12).

The Edo people also called Bini people of southern Nigeria are found in Edo state of southern Nigeria. Their capital, Benin city is also the centre of the Benin kingdom which flourished from the 14th to 17<sup>th</sup> century. Farming is the main economic activity of the traditional bini people as well as rubber tapping. Benin city was also the capital of the defunct mid western region and former Bendel state of Nigeria (13).

There are several studies of ischiopubic index among Nigerians and these show differences in ethnic groups, however no studies were found among subjects of the Isoko and Bini speaking people of southern Nigeria. This study is intended to fill this gap and further enrich a growing database on ischiopubic index among Nigerians which is of anthropological interest with applications in reproductive medicine and forensic anatomy.

## MATERIALS AND METHODS

*Ethical approval:* ethical approval was sought and obtained from the ethics and research committee of the college of health sciences, Delta state University Abraka.

*Subject:* The study population was composed of 400 radiographs of individuals between the age of 18-65 years who are healthy. 200 radiographs belong to subjects of the Isoko ethnic group of Nigeria which includes 105 males and 95 females. 200 radiographs belong to subjects of the Bini ethnic group of Nigeria; 110 males and 90 females.

The radiographs were taken from a routine distance of 100 cm and satisfied the following criteria:

Age group between 18-65 years old, using the bio data recorded at the time the radiographs were taken. Only radiographs which showed no pathology and had best alignment at the inferior margins of the pubic bone at the pubic symphysis were used.

*Samples and sampling techniques:* This is a retrospective study of suitable radiographs of adult subjects of Isoko and Bini ethnic groups at the University of Benin teaching hospital (UBTH), Irrua Specialist teaching hospital (ISTH) AND Eku Baptist Hospital.

**Anthropometric measurement**

*Method of validation of instrument:* Three parameters were investigated which are pubic length, ischial length and the ischiopubic index.

*Pubic length:* This is given by a straight line (AB) drawn on the radiograph from the centre of the triradiate cartilage to the pubic symphysis.

*Ischial length:* This is given by a straight line (AC) drawn on the radiograph from the centre of the triradiate cartilage to the point of maximal ischial tuberosity.

*Ischiopubic index (I.P index):* is obtained by the division of the pubic length by ischial length and multiplication by hundred (100).

$$IP\ index = \frac{AB \times 100}{AC} = 4.11$$

*Method:* The measurement was carried out by choosing three points on the radiograph, point A, B and C. point A is the triradiate cartilage on the superior rim

of the acetabulum. Point B is the pubic symphysis (very close to the pubic tubercle) and C is the point of maximal ischial tuberosity. A marker was used to mark these points for clear visualization. The distance between the points will then be measured with the aid of vernier calipers.

Each distance was measured twice and the average taken and recorded. The Pubic length was divided by the Ischial length, the resultant result was then multiplied by hundred (100). This gave the ischiopubic index. X-ray view box or an illuminator was used for each radiograph for clear visualisation.

*Data analysis:* Data obtained from the study were subjected to statistical analysis. The mean, range, standard deviation were determined and the student t-test was used to determine sexual differences. The highest and lowest values of the range were used for gender identification. Demarking point is the low or high value got from the calculated range which is obtained using the formula  $mean \pm 2\ standard\ deviation$ . T-test was used to determine the sex differences and ( $p < 0.05$ ) was taken as being statistically significant.

**RESULTS**

Table 1 shows the pubic lengths, ischial length, means, ischiopubic index and the demarking points of the males and females of the Isoko and Bini ethnic groups. Values are given in mean + SD. Values in the same column with sharing similar superscript letter ( male versus female ) differ significantly ( $P < 0.05$ ).

**Table 1**

*Pubic lengths, ischial length, means, ischiopubic index and the demarking points of the males and females of the Isoko and Bini ethnic groups*

Sex	N	Pubic length (cm)	Ischial length (cm)	Ischiopubic index	P-value
Isoko males	105	69.41± 5.10	78.42 ±3.40	87.52 ±1.30	<0.05
Isoko female	95	81.20±5.0	74.30±6.10	106.21±9.10	
Bini males	110	74.32±5.40	82.71±7.20	88.72±2.40	<0.05
Bini females	90	86.48±4.20	78.61±7.41	112.21±7.71	

**Table 2**

*Ranges, mean and demarking point of ischiopubic index of isoko and bini people of Nigeria*

Ischiopubic index	Isoko male	Isoko female	Bini male	Bini female
Range	75.2–97.5	87–125.10	70–98	84.1–132.50
Mean ± SD	87.52±1.30	106.21±9.10	88.72±2.40	112.21±7.71
Mean+2SD	84.92±90.12	88.10±124.41	83.92±93.52	96.79±127.63
Demarking point	<86.22	<97.11	<86.32	<104.50

## DISCUSSION

This study shows significant sexual dimorphism in the ischiopubic index of the study population and this is in agreement with previously reported studies in the ischiopubic index of the Americans, both white and black (7). The mean ischiopubic index reported here is higher in female which is in agreement with patterns already seen in studies of different parts of Nigeria and the world. Whereas there is a concordance in pattern, it also shows a significant difference in actual mean values and demarking point between these two ethnic groups and some other Nigerian studies (1,4,11).

Even in the presence of regional variation in ischiopubic index, there could always be individual variation in pelvic structures within a given population which could explain why subjects did not show 100% accuracy in sexual and racial variability of ischiopubic index (8). This study did not show a significant difference ( $P < 0.05$ ) between these two ethnic groups of Nigerian population.

The findings of this study is important not only in contributing to the database of anthropologically and obstetrically significant data for Nigerian ethnic groups but also it would be of use in identifying skeletal remains in the hitherto restive Nigerian Niger-delta region which is currently being threatened with insurgency and its attendant carnage.

## REFERENCES

1. Okoseimiema S.C, Udoaka A.I, radiologic determination of ischiopubic index in South –south Nigerian population 2013. *AJMS*. 2013; 5:96-100
2. Davivong, V, The pelvic girdle of the Australian aborigines, sex differences, sex determination. *J. Obstet. Gynecol.* 1963; **26**: 479-505.
3. Wash burn S.L, Sex differences in the pubic bone *Am. jphyAnthropol* 1948; **6**: 199-208
4. Oladipo G.S Anugweje K.C .Curr Trends Tech Sci. 2014. 3(2)
5. Igbigbi, P.S. and B.C. Msamati. Ischiopubic index in black Malawians. *East Afr. Med. J.*, 2000; **77**: 514-516.
6. Phenice, T.W., A newly developed visual methods of sexing the ospubis. *Am. J. Phys. Anthropol.* 1969; **30**: 297-301.
7. Tague, R.G., Variations in pelvic size between males and females. *Am. J. Phys. Anthropol.*, 1989; **80**: 59-71.
8. Oladipo, G.S., P.D. Okoh and Y.A. Suleiman,. Radiologic study of pubic length, ischial length and ischiopubic index of south-south and middle belt Nigerians. *J. Appl. Biosci.*, 2009; **23**: 1451-1453.
9. Oladipo G.S, Okoh P.D, Leko B. radiologic studies of pubic length, ischial length, ischiopubic index of adult kalabaris and ikwerres of Nigeria. *JMMS*. 2012; vol 3(2)
10. Oladipo, G.S., P.D. Okoh and Y.A. Suleiman, Radiologic studies of pubic length, ischial length and ischiopubic index of eastern people of Nigeria. *Res. J. Med. Med. Sci.*, 2010; **5**: 117-120.
11. Ekanem T, Udongwu A, Singh S. radiographic determination of sex differences in ischiopubic index of a Nigerian population. *Internet journal of biological anthropology*. 2008; vol 3(2)
12. Isoko people in Wikipedia online encyclopedia; cited August 25, 2014 available from [en.m.wikipedia.org/wiki/isoko\\_region](http://en.m.wikipedia.org/wiki/isoko_region):
13. Edo people; in encyclopedia Britannica: Cited August 25, 2014 : available from [www.britannica.com/EBchecked/topic/179361/edo](http://www.britannica.com/EBchecked/topic/179361/edo).