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Full Length Research Paper

Radiologic studies of pubic length, ischial length and ischiopubic index of adult Kalabaris and Ikwerres of Nigeria

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The study was carried out to determine and compare the pubic length; ischial length and ischiopubic indices of the Kalabari and Ikwerre people of Nigeria. Anteroposterior radiographs of 140 adult pelvis (age range, 18-65 years) were evaluated. Sixty (60) of the radiographs (25 males and 35 females) were those of the Kalabari people, while eighty (80) of the radiographs (30 males and 50 males) were those of the Ikwerre people of Nigeria. The morphological measurements were pubic length, ischial length and ischiopubic index. The mean values of pubic length, ischial length and ischiopubic index for Kalabari males were 72.2mm, 82.8mm and 87.3 respectively while those of their females were 80.4mm, 77.3mm and 104.1 respectively. The mean values for pubic length, ischial length and ischiopubic index for Ikwerre males were 64.2mm, 74.3mm and 86.1 respectively while those of their females were 71.1mm, 68.8mm and 101.1 respectively. The mean pubic length was significantly longer in females in the population ($p<0.05$). The mean ischial length was significantly higher in females than males ($p<0.05$). Using the radiographs, sex could be assigned to 84% of Kalabari males, 94.2% of kalabari females, 90% of Ikwerre males and 98% of Ikwerre females. Comparison with other populations of the world showed that Nigerian population differed from most populations of the world previously studied .The accurate determination of sex and race are important tools to forensic Scientists and Physical Anthropologists. Thus, this study is important as it has provided the necessary data for the Nigerian populations under investigation. The data is recommended to obstetricians, physical anthropologists, and forensic scientists.

Keywords: Radiographs, pubic length, ischial length, ischiopubic index, anthropology.

INTRODUCTION

The innominate or hip bone or pelvic bone is formed three which are fused in a Y-shaped epiphysis involving the acetabulum. These bones include: Pubic, ischium and ilium (Chummy, 2000). Measurements of these bones and determination of related indice and angles have been very usful in forensic, clinical practice, (most especially Obstetrics and Gynaecology) and Physical Anthropology (Igbigbi et al, 2003; Oladipo, 2006; Rogers and Saunders, 1994; Kurihara et al., 1996).

The accurate identification of sex and race in human skeleton remain is pivotal of forensic and physical anthropology, especially because of the escalating crime rates, which have become a world0wide phenomenon. The literature contains sufficient evidence that metric and morphologic biologic differences exists amonst Caucasoid, Mongoloid and Negroid races. (Oladipo, 2006: Oladipo et al., 2009) reports have suggested that data on pelvic bone be considered for Forensic Science (Schultz, 1930).

The ischiopubic index for instance produced values of 83.7 – 100% for adult white American (Tague, 1989). In a

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Table 1. Mean and standard deviation of the measurements among Kalabari and Ikwerre people of Nigeria

Subject	N	Pubic Length± SD (mm)	Ischial Length± SD (mm)	Ischiopubic± index SD
Kalabari Males	25	72.2±9.0	82.8±8.2	87.3±6.1
Kalabari Females	35	80.4±7.7	77.3±7.1	104.1±4.2
Ikwerre males	30	64.2±12.5	74.3±11.0	86.1±7.5
Ikwerre females	50	71.1±13.9	68.8±13.4	101.1±3.7

P<0.05(Sexually dimorphic)
SD- Standard deviation

study of ischiopubic index of Malawians sex could be accurately assigned to 87.8% of male and 100% of female using skeletal bones (Igbigbi, 2000). No significantly differences have reported to exist between studies from skeletal remains and radiological pelvimetry.

Thus radiological pelvimetry has become the most popular defined techniques in assessing obstetric and forensic problems such as sexing and identification of skeletal remain which are most certainly established from the pelvis (Kurihara et al., 1996)

Despite the anthropological, clinical and forensic importance of the ischiopubic index, reports on Nigerians are very scarce. So far no report on the above subjects exists on the Nigerian ethnic group under investigation. The present study was, therefore, carried out to produce a comprehensive data on the Nigerian populations under investigation to solve the aforementioned problems.

MATERIALS AND METHODS

One hundred and forty (140) anteroposterior pelvic radiographs (85 females and 55 males) were examined for the study. Sixty of the radiographs were selected from the Radiology Department of the University of Port-Harcourt Teaching Hospital (UPTH), while the remaining eighty were from the Radiology Department of the Braitwaite Memorial Hospital (BMH) Port Harcourt. The ages of all subject ranged from 18-65 years.

The radiographs were identified to be those of indigenous Kalabaris and Ikwerres of Nigeria based on their names and the other data collected. All the radiographs used were normal and showed no underlying bone disease or fracture of any kind. They represents all radiographs of pelvis taken in these hospitals for other clinical conditions. Only radiographs with best alignment at the inferior margins of the pubic bones at the pubic symphysis were measured.

Measurement was carried out by choosing 3 points on the radiographs: points A, B and C. Points A were the acetabular point where the three pelvic bones meet. Points B and C were the ischial tuberosity and pubic tubercle respectively. A marker was used to mark these points for clear visualization. The distance between these points were then measured with the aid of vernier calliper. Distance AB gave the ischial length while AC gave the pubic length. Each distance was measured twice and average recorded as the actual distance to ensure accuracy. The distance AC was divided by the distance AB, the resultant result was then multiplied by 100. This gave the ischiopubic index. (IP = AC/AB X 100).

Radiographs were placed on an X-ray view box for clear visualization. All radiographs were taken at a distance of 100cm. The results were compared with previous studies on other populations. Analysis (statistics) was done using z text. Sex was determined by using the demarking point method. This method involves calculating the maximum and minimum limit of range of the ischiopubic index by using the formula, Mean $\pm$ 2SD (standard deviation).

RESULTS

The mean and standard deviation of the three measurements are shown in table 1. The mean values of pubic length, ischial length and ischiopubic index for Kalabari males were 72.2mm, 82.8mm and 87.3 respectively while those of their females were 80.4mm, 77.3mm and 104.1 respectively. The mean values for pubic length, ischial length and ischiopubic index for Ikwerre males were 64.2mm, 74.3mm and 86.1 respectively while those of their females were 71.1mm, 68.8mm and 101.1 respectively The range, mean and demarking points of ischiopubic index of the studied populations are shown in table 2. Sex was accurately assigned to 84% of Kalabari males, 94.2% of kalabari females, 90% of Ikwerre males and 98% of Ikwerre females.

The mean ischiopubic indices of various populations previously studied and the present study were shown in table 3. In all the populations including the present study, sexual dimorphism was observed.

DISCUSSION

Sexual dimorphism has been previously reported in schiopubic index of Amerindians (Tague, 1989), White

Table 2. Ranges, means and demarking points of ischiopubic index of Kalabari and Ikwerre people of Nigeria

Ischiopubic Index	Kalabari		Ikwerre	
	Male	Female	Male	Female
Range	75-96	98-116	69-94	95-110
Mean ± SD	87.3±6.1	104.1±4.2	86.1±7.5	101.1±3.7
Mean ± 2SD	75.1±99.5	95.7±112.5	71.9±101.1	93.8±108.9
Demarking point	<95.7	>99.5	<93.8	>101.1
Identification by Sex	84%	94%	90%	98%

Table 3. Mean Ischiopubic index various populations

Populations	Sex	Mean ± SD	N	P	Authors
Black Malawians	Male	85.0 ± 15.7	120	<0.05	Igbigbi & Msamati; 2000
	Female	104.6 ± 15.7	135		
France	Male	82.0 ± 7.2	93	<0.05	Wasbum, 1948
	Females	94.5 ± 3.1	61		
Portuguese	Male	78.2 ± 6.2	129	<0.05	Phenice, 1989
	Female	71.3 ± 3.1			
Americans	Male	67.4 ± 8.1	253	<0.05	Tague,1989
	Female	93.1 ±10.4	212		
White American	Male	63.7 ± 7.8	50	<0.05	Tague, 1989
	Female	88.4 ± 8.5	50		
Black Americans	Male	65.8 ± 8.7	50	<0.05	Tague 1989
	Female	85.2 ± 8.5	49		
Caucasians	Male	<60	-	<0.05	Caldwell & Moloy, 1933
	Female	<90	-		
South-South	Male	81.4 ± 6.4	30	<0.05	Oladipo et al 2009
Nigerians	Female	104.2 ± 11.1	40		
Middle Belt Nigerians	Male	83.1 ± 5.8	20	<0.05	Oladipo et al 2009
	Female	101.7 ± 11.3	30		
Eastern Nigeria	Male	84.0± 10.4	100	<0.05	Present study
	Female	102.6 ± 11.7	100		

and Black Americans (Tague, 1989), Caucasians (Caldwell, 1933), Malawians (Igbigbi, 2003), Frence (Washburn, 1948) and Portuguses (Phenice, 1969). Our observation in the present study, agreed with these earlier reports.

Previous authors (Igbigbi, 2000; Wasburn, 1969) reported males as having an ischiopubic index between 76-85 and females as having an ischiopubic index of above 90. The observation in the present study on the two Nigeria populations agreed with the report of these authors as ischiopubic index in females was higher than 90 as previously reported. The direction of size differences was consistent with Blacks having higher ischiopubic index than Whites.

The values in Malawians were, however, higher than those of Nigerians. This suggests regional variation of in ischiopubic index. Although the sample demonstrated significant differences between sexes and regions, there would 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 if ischiopubic index.

This study has established the presence of sexual dimorphism in ischiopubic index of Kalabari and Ikwerre people of Nigeria and also racial and regional variations. Thus, the value of the ischiopubic index in Kalabari and Ikwerre males and females overlaps with those of South-South and Middle Belt males and females respectively. In other word, there is no significant difference in ischiopubic index of these four Nigerians populations. The high level of accuracy of this non-invasive method cannot be over emphasized. It is therefore recommended to obstetrics, physical and forensic anthropologists for sex and race determination in developing countries while more sophisticated methods are awaited.

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