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RADIOGRAPHICCHARACTERIZATION OF NORMAL FEMALE PELVIS IN JOS PLATEAU, NIGERIA.

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ABSTRACT

Background: Functional analysis of the true pelvis (defined as that portion lying below and including the pelvis brim) was undertaken on a sample of 588 females of reproductive age sent for an anterioposterior examination of the pelvis from January 2005 to June 2009 in two hospitals from Jos metropolis in Plateau State, Nigeria. **Method**: Standard radiographic measurement were taken and used in the characterization of the normal female pelvis living in this region to ascertain their pelvis type and percentages of their prevalence. **Result**: This was compared to that reported on a global scale and the result showed three (3) pelvis types, prevalent among the female population living in Jos Metropolis. These are the Gynecoid with 8% prevalent rate, Andriod pelvis type 39% and the platypelloid pelvis type with 53%. Each having an average index of 93%, 84% and 64% respectively. **Conclusion**: Platypelloid pelvis was found to be the most common in the population with 53% prevalence rate, and calls for concern in the health sector since the capacity of female pelvis for child bearing is profoundly influenced by size and shape of the pelvis.

KEYWORDS: Pelvimetry, Gynecoid pelvis, Andriod pelvis, Platypelloid, Normal female pelvis.

INTRODUCTION

Characterization of the female pelvis attracted the attention of researchers since the mid 1980's and it is of great importance to the Anatomist, Gynecologist, Anthropologist and the Radiographers among other professionals. A true knowledge of the female pelvis is essential to the understanding of the mechanism of labour.[1] The pelvis is a basin shaped structure that supports the spinal column and protects the abdominal organs. It consists of Sacrum (A spade shaped bone that is formed by the fusion of five originally separate sacral vertebrae), Coccyx (also called the tail bone, formed by the fusion of four originally separate coccygeal bones) and three hip bones (ilium, pubis and Ischium).[1]

The female bony pelvis is further divided into three: namely the false pelvis which is above the pelvic brim, it has no obstetric importance but radiological importance. The true pelvis which is below the pelvis brim is associated with child bearing and finally, the superior circumference of the pelvis and the lower circumference.[2]

Pelvis imaging techniques such as the conventional radiography, the computed tomography and the Magnetic Resonance Image (MRI) have been very useful in the characterization of the pelvis into its various types which includes the Gynecoid pelvis, the Anthropoid pelvis, the Android pelvis and the platypelloid pelvis. In gynecoid pelvis the cavity of the pelvis is ample in all directions and it is found in 50% women, while the platypelloid pelvis is about 4.4% of women.[2,3,7] The shape of the pelvis may become abnormal as a result of either of congenital or of acquired disease. Congenital abnormality such as achandroplasia or osteomalacia may cause obstruction to labour.[4] Other problems associated with pelvis are pelvis fractures and pelvis floor disorders. Pelvis fractures occur in 20% of all poly trauma cases.[4,5] Pelvis floor disorders involve prolapse of bladder, urethra, uterus and is common as women aged and this may require surgery.[7]

Lack of adequate information and data on radiographic characterization of normal female pelvis in Nigeria called for the study in this direction. The availability of quality data in this area will enhance reproductive medicine in Nigeria and the proper understanding of labour mechanism and its outcome will be understood. Therefore, the purpose of this study is to characterize the normal Nigerian female pelvis in Jos and to determine the percentage of the pelvis types prevalent in among the female population.

MATERIALS AND METHODS

In this research work, the conventional radiography was used to ensure the characterization of the normal female pelvis, because of the availability and affordability of the imaging modality within the area of study.

RESEARCHDESIGN

A non-parametric research design was employed for this work. It allows for collection of large number of data and enhances generalization due to large sample size. The design was used to outline the various type of pelvis among the female population within the Jos metropolis and to estimate the percentage outcome.

POPULATION OFSTUDY

TABLE 1: THE POPULATION SIZE FOR THE STUDY

Hospitals of study	Total sample size	Percentage %)
Jos University teaching hospital (JUTH)	388	66
Plateau State Hospital (PSH)	200	34
Total	**588**	**100**

The study was carried out on a total of five hundred and eighty eight (588) pelvis radiographs of sample patient within the productive age of 16 – 74 years sent for anterior posterior (AP) pelvis examination. The sample collected shows that 66% were collected from JUTH (Jos University Teaching Hospital) and 34% from Plateau State General Hospital.

SAMPLE AND SAMPLINGTECHNIQUE

A non-probability sampling technique (non- random) was adopted. The method employed in this technique is the purposive (judgmental) sampling, in which the samples were picked on the bases of doctor's queries and patient clinical histories.

MEASUREMENT PROCEDURE

Cumulative records (cases) of Anterioposterior (AP) pelvis radiographs was used for the data collection and the following parameters were drawn from it.

i Anteriorposterior diameter or conjugate diameter of the pelvis inlet.
ii. Transverse diameter of the pelvis inlet.
iii. The oblique diameter of the pelvis inlet as shown in the diagram below\

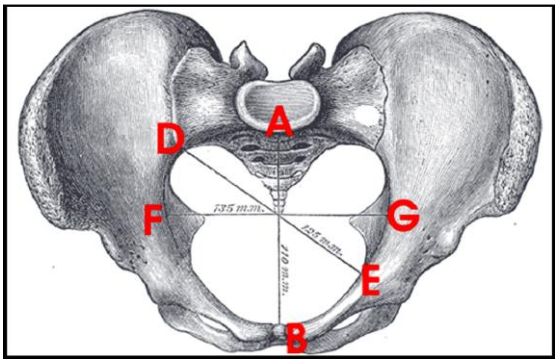

Fig. 2: A diagram showing the various measurements of the pelvis.

Where
AB = Anterioposterior diameter, this is a line extending from the sacrovertebral angle to the pubis symphysis.
FG = Transverse diameter, this is a line extending across the greatest width of the superior aperture from the middle of the brim on one side to the same point on the opposite side and the oblique diameter
DE = The iliopectineal eminence of one side to the sacroiliac articulation of the opposite side.

The diameters were measured with the use of an optical illuminator where each radiographs was examined. The radiographs showed no positioning defects, no bone pathology and no fracture thus making it ideal for this research work. However this measurement was taken using a transparent plastic meter ruler and a pencil. Positioning accuracy was based on the proper alignment of iliac crest, alignment of the pubis symphysis with the vertebral column and the superimposition of the ischial spin on the pelvic brim[8]

DATA ANALYSIS

The data collected was subjected to manual statistical processes. The data was processed and tabulated into tables, bar charts and pie charts to demonstrate the distribution of female reproductive age and the prevalence of the various pelvis types in Jos metropolis. Results from this study were statistically compared with those reported by other researchers.

RESULTS

The reproductive age distribution of the sample collected among the normal Nigerian female living in Jos metropolis falls between the ages of 16 – 48 years, where 45.6% is of the age range of 27 – 37 years, while 20. 9% within 38– 48% years and 7.1% fall with the age of 49 – 59 years. However as one approaches menopause, there is a decline in the reproductive activities in females and this could be seen by the 5.3% and 0.5% of the population being within the ages ranges of 60 – 70 and 71 – 80 respectively.

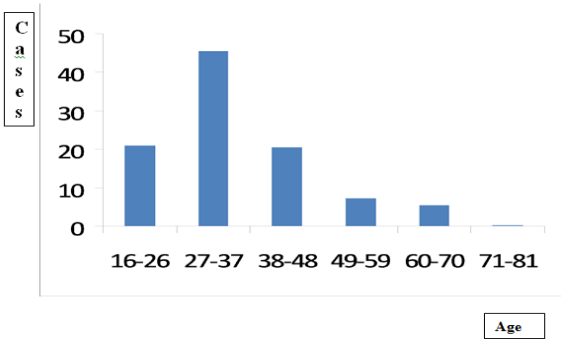

Fig.3: A bar chart showing the age distribution

From the table 2, there was some degree of variation in the pelvis diameter which conform with previous report of Benson.[9]

TABLE: 2 PELVIS DIAMETER MEASUREMENT

Pelvic inlet diameter	pulation size	Mean (cm)	S.E.M	Coefficient of variation	Range (cm)
Anterioposterior.	588	11.1	± 6.5	7.1	6.0 –14.5
Diameter					
Transverse	588	14.4	±10.5	5.7	8.7 –17.5
Diameter					
Oblique	588	12.0	± 7.9	6.3	6.7 –15.5
Diameter					

4.1 CLASSIFICATION OF THE PELVIS TYPE

After measurements, all pelvieses were classified according to the system of Thoms et al.[10], which was based on the relative lengths of the inlet diameter as shown in table 4a below.

TABLE 3a: CLASSIFICATION OF THE PELVIS

Types of pelvis	Reason for classification
Anthropoid pelvis (long oval)	The anterioposterior diameter is greater than the transverse diameter.
Gynaecoid pelvis (round)	The antherioposterior and transverse in diameter are equal in length or the transverse diameter exceeds the anterioposterior diameter by not more than1cm.
Android pelvis (Transverse oval)	The transverse diameter exceed the anterior diameter by more than 1cm but less than 3cm.
Platypellic pelvis (flat)	The transverse diameter exceed the anterior diameter by 3cm or more.

Using the above method of classification the result obtained showed that out of a total of 588 patients sampled, 44 of them had a Gynaecoid type of pelvis, 230 had an android type of pelvis and 314 had a platypellic type of pelvis, whereas none had the anthropoid pelvis type. This represent 8%, 39%, 53% and 0% respectively of the population sampled. This is illustrated in table 3b.

TABLE 3b: OUTCOME OF CLASSIFICATION

Pelvis types	Population size	Percentage (%)	Ratio value	Average Brim index
Gynaecoid	44	8	1	93
Andriod	230	39	5	84
Platypeloid	341	53	7	64
Anthropoid	0	0	0	0
Total	588	100	13	241

From the above table, it is observed that the prevalence rate of the various types of pelvis in Jos metropolis is in the ratio of 1:5:7 for every 13 female in the population.

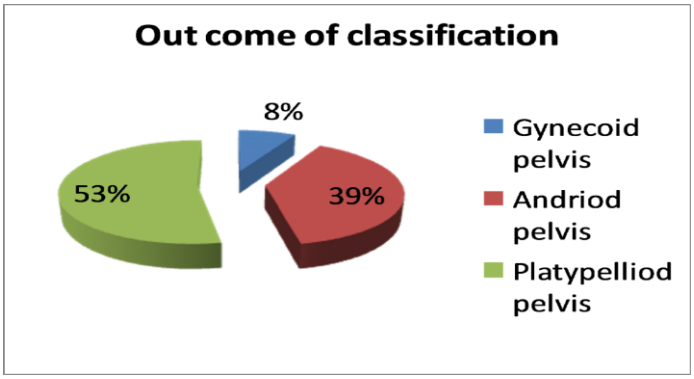

Fig. 4: A pie chart showing the percentage outcome of the various pelvis types in Jos.

This representation of the percentages of the types prevalent in Jos among the females population, shows that Jos is predominately populated with females having the platypelloid pelvis type and list dominated with the Gynaecoid pelvis.

Each of the pelvis type were further characterized, the Gynaecoid pelvis having an average antherioposterior diameter of 12.8cm, transverse diameter of 13.4cm and oblique diameter of 12.5cm respectively, with an average brim index of 93% as shown in table 5.

TABLE: 4 CHARACTERISTIC OF GYNECOID PELVIS IN JOS

Anterioposterior diameter	Transverse diameter	Oblique diameter	Brim Index	Percentage (%)	Ratio
12.8cm	13.4cm	12.5cm	93%	8%	1

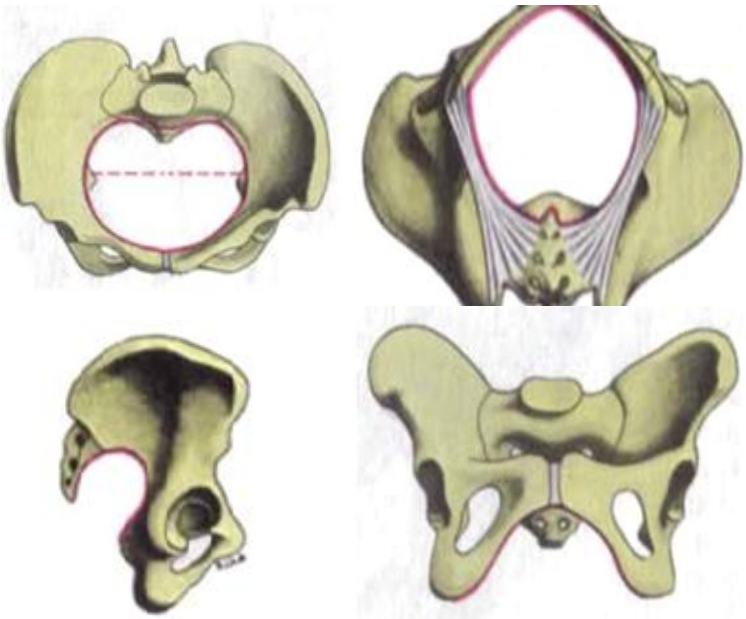

Fig: 5: Structures of the Gynaecoid pelvis

The characteristics of the pelvis were as follows, Brim slightly oval transverse but almost rounded, Sacrum curve, Ischial spine not prominent, Short cone pelvis, Obtuse greater sciatic notch, Triangular obturator foramen and Sub-pubic arch round.

The android pelvis which constitutes 39% has an anteriopsoterior diameter of 11.8cm, transverse diameter of 14.1cm and oblique diameter of 12.2cm with an average brim index of 84% as shown in Table 6.

TABLE 5: CHARACTERISTIC OF ANDROID PELVIS IN JOS

Anterior posterior diameter	Transverse diameter	Oblique diameter	Brim Index (%)	Percentage (%)	Ratio
11.8cm	14.1cm	12.2cm	84%	39%	5

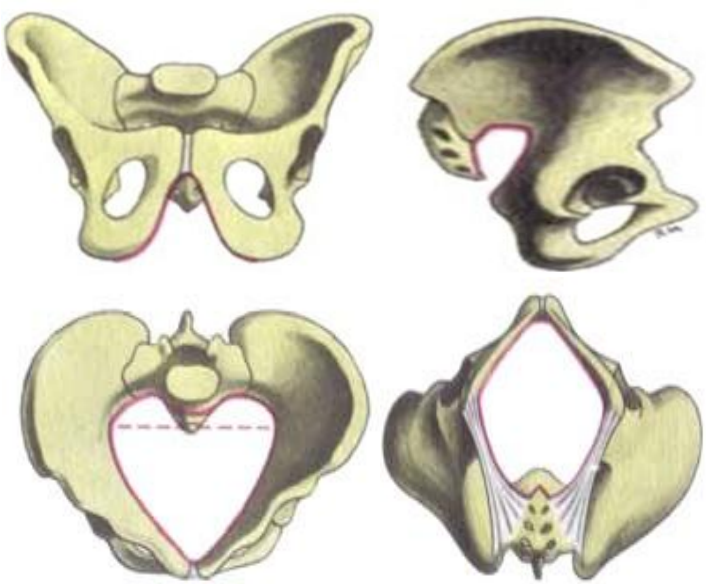

Fig. 6: Structures of the Andriod pelvis.

The characteristics of the examined android pelvis were as follows;
Brim heart shaped, Sacrum curved, Ischial spines prominent, Long cone funnel pelvis, Acute greater sciatic notch, Oval obturators foramen, Sub-pubic arch arch very narrow (Gothic arch).

TABLE7: CHARACTERISTICS OF PLATYPELLOID PELVIS IN JOS

Anterior posterior diameter	Transverse diameter	Oblique diameter	Brim Index (%)	Percentage (%)	Ratio
10.8cm	14.4cm	11.7cm	64%	53%	7

The platypelloid pelvis has an average anterioposterior, transverse and oblique diameter of 10.8cm, 14.4cm and 11.7cm respectively with an average brim index of 64% as shown in table 7 and makes 53% of the female population.

The characteristics are as follows,
Brim oval transversely, Sacrum very slightly curved, Ischial spines prominent, Short cone shallow pelvis, Acute greater sciatic notch, Triangular obturator foramen, and wide arch narrow.

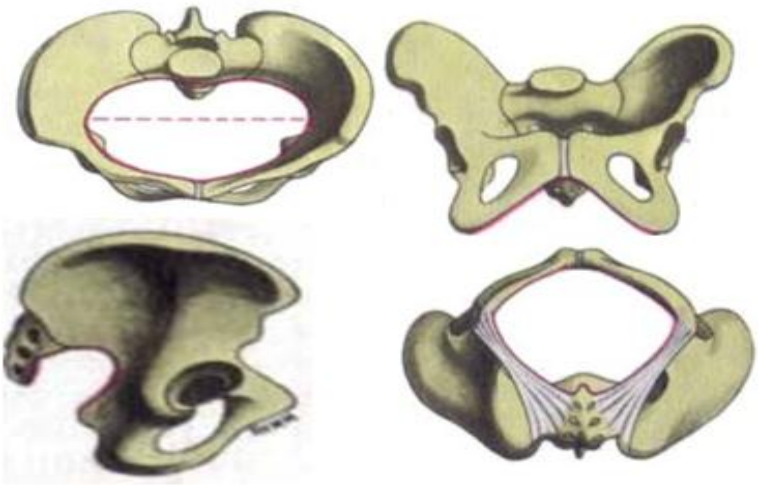

Fig: 7. Structure of the Platypelliod Pelvis.

DICUSSION

From our observation and result, the reproductive age among the normal Nigerian females living in Jos falls within the ages of 16 – 48 years, making a total of 66.5% of the female population.

The size and shape of their pelvis reflects a complex history of heredity and environment interactions. However, it has been noted that in the temperate, and industrialized population, that women of greater socio-economic means are generally healthier, taller, have roomier pelvis and better reproductive history than those who are less fortunate.[10]

It cannot be assumed however that the same holds true for women living under different bicultural condition.[11] More so studies done on the characterization of the normal female pelvis globally shows that 50% women had the Gynaecoid pelvis, 22.4% had android, 22.7% had anthropoid pelvis and 4.4% had the platypelloid.[12]

In contrast to this global result, our result shows that there are only three (3) types of pelvis present in Jos and these are the Gynecoid consisting 8% of the population, having an average antrioposterior diameter of 12.8; transverse diameter of 13.4cm and oblique diameter of 12.5cm respectively with an average brim index of 93%. The android, with an outcome of 39% having an anterioposterior diameter of 11.8cm, transverse diameter of 14.1cm, oblique diameter of 12.2cm with an average brim index of 84%. Finally, the platypelliod pelvis having an average anterioposterior, transverse and oblique diameters of 10.8cm, 14.4cm and 11.7cm respectively with an average brim index of 64%. This difference could be as a result of the geographical location, nutrition; during the formation year to development of the pelvis and also socio-economic factor.

5.1 CONCLUSION

In conclusion there are three pelvis types prevalent among females in Jos metropolis; these are the Gynaecoid, the android and the platypelliod pelvis. The platypelloid pelvis was found to be the most common with 53% prevalence rate. This calls for concern in the health sector since the capacity of female pelvis for child bearing is profoundly influenced by size and shape of the pelvis, which is also associated with labour mechanism during child birth.

5.2 RECOMMENDATION

Since the prevalent pelvic type is platypelloid pelvis, which is flatten in its inlet and also associated with problems during child birth, we will strongly recommend that radiographers should always access the female pelvis as a part of routine for female of reproductive age in order to avoid complications during child birth and prolong labour time. If the Gynecologist can have access to these information provided by the radiographer, they will be enhance in saving the life of the mother and child. The findings will be useful in reproductive medicine and there will be an increase in successful child birth in Jos metropolis.

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