

The Normal Sub pubic Angle in Adult Sudanese Population

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Abstract: Background: Many worldwide studies have investigated the anatomical differences between males and females. One of the most areas was studied is the morphological differences in the bony pelvis. Apart from their medical and anatomical values these information had been used in forensic and anthropological studies. Objectives: This study is held to shed a light in presence of difference in bony pelvis regarding the subpubic angle among Sudanese males and females subjects. Methods: A sample of 54 males and 53 females X-ray pelvises had been collected, examined and the subpubic angle was measured for each individual. Results: The range of the subpubic angle in male was found (82 to 128) and the mean was 106. In females the range was found (104 to 170) and the mean was 140 with significant statistical difference. Conclusion: The anatomical difference of the subpubic angle in males and females was significant in this study. Our results are comparable to that obtained from other regional studies held in Africa with some minor differences that may reflect ethnic variation.

Keywords: Anthropological studies, Bony pelvis, Morphological differences, Subpubic angle, X-ray.

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I. Introduction

The subpubic angle (SPA) is the angle exists between the inferior rami of the pubic bones. It lies just below the inferior margin of the symphysis pubis.⁽¹⁾ Identification of human skeletal remains is one of the most important investigations in forensic medicine and forensic anthropological studies. Many different skeletal remains had been used to help sex identification. One of the most frequently used and accurate tools is the bony pelvis^(4, 5). There are many differences in osteometric and morphological studies comparing male and female bony pelvis. These differences are mostly related to physiology of female pelvic which has adapted to house the gravid uterus and facilitate easy passage of the baby during delivery. The diameters of female pelvis are larger than that of the male⁽³⁾. The different parts of the bony pelvis had been studied to find out these differences in both sexes and their significance in sex identification. One of the most parameters used is the shape and the contour of the articulated pelvis regarding the shape and diameters of the pelvic inlet and outlet^(1, 3). Other points that noticed to be different between the two groups are the SPA, obturator foramen, ischial spine, acetabulum, and the ischiopubic index.^(1, 2, 3, 4)

II. Material And Methods

This is an observational descriptive cross-sectional hospital based study, which was conducted at Atbra Medical Complex, in Atbara, Sudan, during the period from March to August 2014. The study population included the patients clinically referred for plain pelvic X- rays, or X-rays of intravenous urogram (IVU) series. All the patients referred to Atbra Medical Complex during the above mentioned period were included with total size of 107 (54 were males and 53 females). All their pelvic X – rays were clearly showing the subpubic angle. Any X-ray films that showed pelvic or lower limb fracture or with inappropriate alignment had been excluded. After that the X-ray films were printed out then the SPA was measured. The SPA was measured by drawing tangential lines along the inferior borders of the both pubic rami which intersected at a point (centered just below the inferior border of the symphysis pubis). Then the SPA was measured by using the goniometer. Data collection sheets were used to include the study variations and to record the results. Data was analyzed both, manually and with SPSS computer program, version 17, then presented and described by using the text, tables, and figures.

III. Result

One hundred and seven patients, who attended to Atbara Medical Complex and underwent pelvic X-rays, were included in this retrospective hospital based study. 54 (50.5%) of these patients were males and 53 (49.5%) were females (49.5%), as shown in table (4.1).

Table 4.1: Gender Distribution

Sex	Frequency	Percentage %
Male	54	50.5
Female	53	49.5
Total	107	100

Fifty four male pelvic X-rays had been examined with SPA measured, and the maximum degree of SPA was 128 and the minimum degree was 82, their mean was 106 and the SD was 10, as shown in table (4.2) & fig (4.1).

Table 4.2: Values of SPA in Sudanese males.

Sex	n	Range	Mean	SD
Male	54	82-128	106	10.00



Fig (4.1): AP male pelvic X-ray shows a narrow subpubic angle.

After measuring the SPA in fifty three female pelvic X-rays, it was found that, the maximum degree was 170 and the minimum was 104, with mean value of 140 and SD 14, as shown in table (4.3), fig (4.2).

Table (4.3): Values of SPA in Sudanese females

Sex	n	Range	Mean	SD
Female	53	104-170	140	14.00

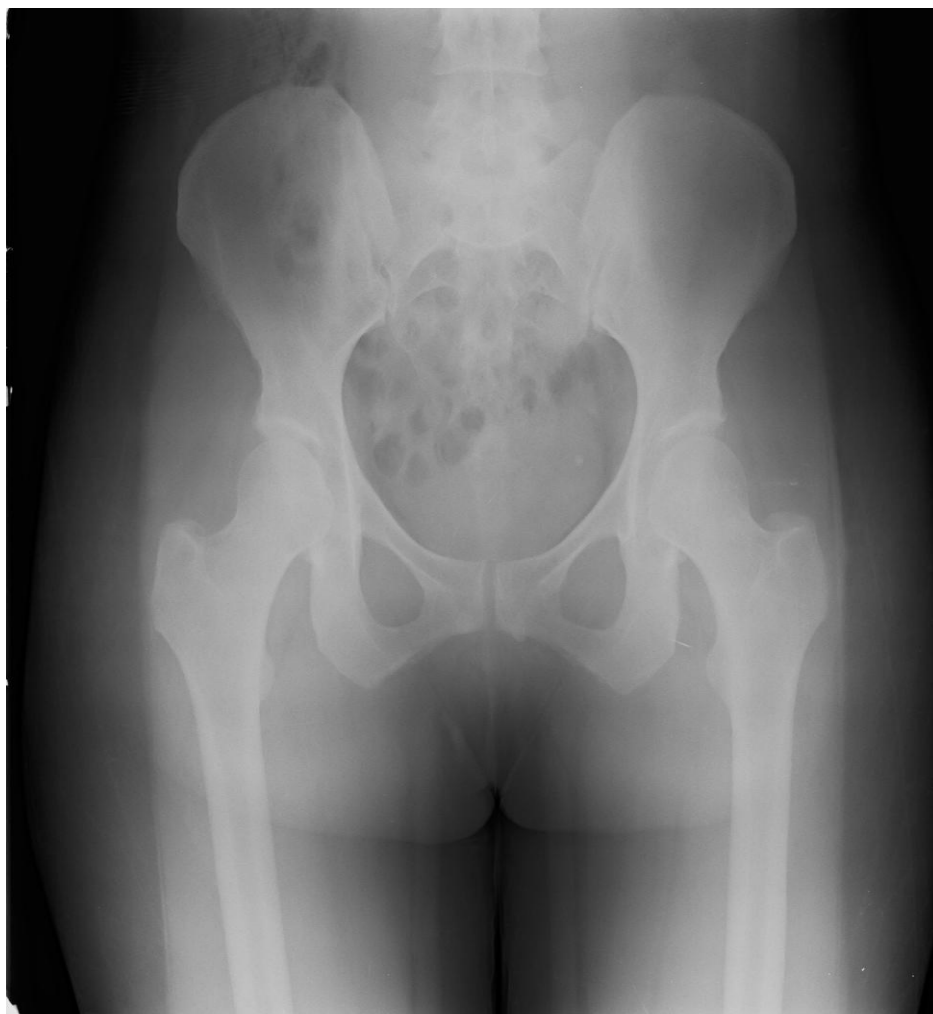


Fig (4.2): AP female pelvic X-ray shows a wide subpubic angle.

Table (4.4) shows the mean of SPA in both sexes of Sudanese subjects. The females had wider angles than males (140) with SD 14 and (106) with SD 10 respectively. The SPA shows significant difference between the both sexes.

Table (4.4): The Mean Of SPA In Sudanese Males And Females

Sex	Mean	SD	P value
Male n=54	106	10	P 0.05
Female n=53	140	14	

IV. Discussion

The present study focuses on the presence of normal anatomical variation on the SPA by analyzing pelvic X-rays of 104 subjects. Out of 107 patients 54 were males and 53 were females. The mean of SPA in males was (106) and in females was (140) with significant statistical difference. The maximum angle observed in males was 128 with 82 was the minimum. In females the maximum angle observed was 170 and 104 was the minimum. When comparing the results of SPA values of both sexes in the Sudanese subjects with other populations done in published studies e.g. Nigerian (Ikwerreo and Kalabaris ethnic groups), Egyptian and Malawian^(6, 7), it was found that there was a significant difference between all of them, as shown in table (4.8).

All the four studies showed that the SPA is greater in females than in male with significant statistical difference. With some differences in measurement that may be referred to some extent to the ethnic differences in population of each geographic area. Therefore it can easily interpret from this study in Sudanese population a SPA measures more than 128 belongs to a female skeleton and an angle less than 104 belongs to a male skeleton.

Table (4.8): The values of SPA in different populations

Population		Sex	Range	Mean	SD
Nigerian	Ikwerreo	Male n=85	75-176	100.25	7.80
		Female n=173	96-142	119.38	3.00
	Kalabaris	Male n=129	86-128	105.63	3.88
		Female n=213	95-151	125.00	3.17
Egyptian		Male n=200	66-126	102.31	12.50
		Female n=200	96-191	143.28	15.82
Malawian		Male n=73	66-150	99.00	15.73
		Female n=46	86-174	129.00	14.19

V. Conclusion

In this study 107 X-rays of the pelvic region of Sudanese subjects were reviewed trying to shed some lights on the difference in the SPA of both sexes, which was found significant. The female angles are greater than that of male. In comparing the SPA of both sexes in Sudanese subjects with others, there was a high statistical significant racial variation. In conclusion the results from this study confirm the existence of regional and sexual variations in SPA among populations of the different countries, in the same continent. Those significant variations allow their use in medico-legal entification of sex and race.

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