Relationship between maternal height and type of bony pelvis among reproductive age women from South Punjab.

Solmaz Masood[1,*], Muhammad Abdul Basit Ashraf [2], Hira Bushra[3] , Hamna Wahid [4], Aneela Ahsan [5],Zafar H Tanvir[6]

ABSTRACT:
Objective: To explore the relationship between maternal height and type of bony pelvis among reproductive age women from South Punjab.
Methodology: This cross-sectional study was conducted at Sheikh Zayed Hospital, Rahim Yar Khan, from May 2024 to October 2024. 384 postpartum females aged 18-35 years were included in this study. Maternal height was recorded by a stadiometer and pelvic type was measured through X Ray pelvimetry. Data were analyzed using Pearson correlation and Chi-square test.
Results: The mean age was 26.7+4.5 (range 18- 35 years), mean height was 150.2+3.1 cm (range 145-155). The most common type of pelvis was found to be gynecoid (38.0 %), followed by android (25.0%), anthropoid (22.0%) and platypelloid (15.0%). Taller women were more likely to have gynecoid pelvis (r=0.35, p<0.01), while females categorized as short heighted demonstrated higher frequency of android pelvis (r = -0.28, p < 0.05).
Conclusion: Maternal height shows a positive correlation with pelvic type. Tall heighted females are more likely to have gynecoid pelvis which is suitable for vaginal delivery. The maternal height measurement may help in Obstetric planning.

Key words: Maternal height, Pelvimetry, Bony pelvis, Obstetrics, Pelvic morphology

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Introduction:

The anatomical shape of the female bony pelvis plays a vital role in delivery outcomes. As pelvis is the parturition passage, multiple differences exist in the structure of male and female pelvis. The female pelvis is broad with low height and blunt bony markings.[1] It is customary to classify the bony pelvis into four types: gynecoid, android, anthropoid, and platypelloid.[2] Gynecoid pelvis is widely accepted as the most suitable type that aids in normal vaginal delivery. On the other hand, platypelloid and android pelvises are frequently related to complications.[2-4] Many of the anthropometric parameters define the pregnancy outcomes but one of the most important parameters is the maternal height.[5] Various studies emphasized the relationship between maternal height and type of bony pelvis.[6] These studies concluded that maternal height is a major factor that impacts the pelvic dimensions, heighted females have broader pelvis as compared to short heighted females. In contrast the wider pelvis of tall females serves as a roomier birth canal facilitating birth of even good size babies. Hence, the wider pelvises of heighted females act as a positive factor for normal vaginal delivery. The strong impact of maternal height on obstetrics and fetal outcomes has been highlighted for ages and even in Demographic Health Survey (DHS) data from 109 countries.[7] Maternal body height is a basic and easily measurable parameter, supposed to reflect pelvic type. This study focuses to explore the association between maternal height and the pelvic morphology, using radiographic pelvimetry in South Punjab population.

In hard areas of South Punjab, with limited access to imaging facilities and heavy patient influx, measurement of maternal height can be used as a simple, non- invasive indicator for predicting obstetric challenges. South Punjab has a peculiar demographic and nutritional profile which may affect anthropometric traits including pelvic development. Although previous studies have explored maternal height in relation to obstetric outcomes, limited evidence exists on its direct correlation with pelvic morphology using radiographic pelvimetry in South Punjab populations. Most of the current data is non South Asian, which is different due to inherent variations in genetics, anthropometry, nutritional status and socioeconomic status. [8,9] This study focuses on this specific regional gap, by using X-ray pelvimetry to explore the association between maternal height and bony pelvis types in reproductive-age women of South Punjab.

Objective:

Primary objective was to explore the relationship between maternal height and type of bony pelvis among reproductive age women from South Punjab. This study at the same time will allow to report distribution of maternal height among reproductive-age women in South Punjab and the types of bony pelvis based upon X-ray pelvimetry.

Methodology:

This descriptive cross-sectional study was conducted at Sheikh Zayed Hospital's Radiology and Gynecology departments in Rahim Yar Khan from May to October 2024, after ethical permission (IRB No: FRB/BMS/03/017/2024). A total of 384 healthy postpartum females aged 18 to 35

1. Additional Principal Woman Medical Officer; Sheikh Zayed Hospital, Rahim Yar Khan.
2. Associate Professor; Physiology Department, Faisalabad Medical University, Faisalabad.
3. Associate professor; Department of Radiology, Sheikh Zayed Hospital, Rahim Yar Khan.
4. Senior Registrar, Department of Radiology, Rahim Yar Khan.
5. Senior Demonstrator, Department of Anatomy, Khawaja Muhammad Safdar Medical College, Sialkot.
6. Principal and Professor of Physiology, ABWA Medical College, Faisalabad.

**=corresponding author* :
Email: masood.solmaz@gmail.com.

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years were recruited using stratified random sampling.[10] Participants were classified according to age, height, weight, BMI, and parity. Subjects who met the inclusion criteria were included after their written consent. After collecting demographics that includes age, and mode of delivery, the height was measured using a stadiometer. X-ray pelvimetry was performed using a CGR 750 MA X-Ray machine in erect position, with both AP and lateral views. Gynecoid, android, anthropoid, and platypelloid pelvises were all identified. To investigate associations, data was analyzed using SPSS V25 using Pearson correlation and the Chi-square test. A p-value < 0.05 was considered statistically significant.

Results:

The demographic features of participants are shown in table 1. Among 384 postpartum females, mean age was 26.7 ±4.5 (range 18- 35 years), mean height was 150.2±3.1 cm (range 145-155), mean weight was 67.4 ±8.5 kg (range 50-85) and mean BMI was 24.1±3.2 (range 18.5-29.9) while mean parity was 2.1±1.3 (range 0-5).

Table No 1: Demographic features of study population (n=384)

Variable	Mean ±SD	Range
Age (years)	26.7 ±4.5	18-35
Height (cm)	150.2 ±3.1	145-155
Weight (kg)	67.4 ±8.5	50-85
Body Mass Index (BMI)	24.1 ±3.2	18.5-29.9
Parity (number of children)	2.1 ±1.3	0-5

Among study population (n=384), type of the pelvis assessed on x ray was found to be gynecoid in 38% followed by android pelvises (25.0%), anthropoid pelvises (22.0%), and platypelloid pelvises (15.0%) as shown in table no 2. The majority of these women had gynecoid pelvises, which is considered favorable for normal vaginal delivery.

Table No 2: Distribution of different types of bony pelvis.

Type of Bony pelvis	n (%)
Gynecoid	146 (38.0%)
Android	96 (25.0%)
Anthropoid	84 (22.0%)
Platypelloid	58 (15.0%)

Out of 384 participants, 174 women were categorized as having tall stature and 210 as short. Generally, women having height more than 135 cm are considered tall and those 135 or less are considered short heighted.[2] Chi-square test showed a statistically significant association between maternal height and pelvic type (P-value = 0.000).

Table No 3: Distribution of bony pelvis among tall and short stature women.

Pelvic Type	Tall (n, %)	Short (n, %)	Total (n)
Gynecoid	135 (92.5%)	11 (7.5%)	146
Android	15 (15.6%)	81 (84.4%)	96
Anthropoid	13 (15.5%)	71 (84.5%)	84
Platypelloid	11 (19.0%)	47 (81.0%)	58
Total	174	210	384

The correlation if any between bony pelvis and maternal height was analyzed using Pearson correlation analysis. The presence of a gynecoid pelvis and maternal height were found to be positively correlated (p = <0.01), indicating that taller women are more likely to have a gynecoid pelvis, which is advantageous for vaginal delivery. Shorter women are more likely to have an android pelvis, which may result in poor delivery outcomes, according to a negative connection between maternal height and android pelvis (p value <0.05 and r = -0.28).

Table No 4: Correlation Between Maternal Height and Pelvic Type

Pelvic Type	r	p-value
Gynecoid	0.35	< 0.01
Android	-0.28	< 0.05
Anthropoid	0.15	0.12
Platypelloid	-0.10	0.32

r = Pearson correlation coefficient

Discussion:

Anatomically complicated and functionally important, the pelvis bone is essential to obstetrics and human movement. Unquestionably, the pelvis's bony morphology plays a crucial role in obstetrics, making it one of the most important bony elements during labor, along with the birth canal. The bony pelvis serves the vital roles of weight transmission and a pillar for muscle attachment in addition to protecting the internal pelvic organs. The thigh and gluteal muscles are among the powerful muscles stabilized by the outer surface of the pelvis. It is always intriguing for obstetric-related study because of the beneficial effects of maternal height on pelvic dimensions and the ensuing effects on birth outcomes. [11] Both vaginal and surgical labor outcomes are significantly impacted by the size and form of the bony pelvis during childbirth. The purpose of this study was to determine how different forms of bony pelvis relate to maternal height.

Regarding the females' height, our research revealed that their average height was 150.2+3.1 cm. However, Softa and colleagues' [6] investigation found that the female participants were taller than the female participants in our study., reported average height of the female participants was 156.4±6.2 cm.[6] Salk and colleagues[12] conducted a similar study and found that the average height of mothers was 160.0 ± 4.2 cm. According to this finding, the women in their study were generally taller than the participants in our study as well as a study by Softa and colleagues. [6] This disparity in height raises the possibility that maternal height may vary amongst studies due to variations in population demography, nutritional state, or genetic factors. In their study, Munabi and colleagues[13] also explained that the female participants were taller than the female participants in our study. Numerous pelvic classifications based on shape can be found in medical literature. Gynecoid, android, anthropoid, and platypelloid are the general classifications for pelvic kinds. If the pelvic shape is not in line with the size of the fetus, vaginal delivery may be extremely challenging, delayed, or perhaps impossible.[14] The majority of the females (38.0%) in our study had gynecoid pelvises, which were followed by android anthropoid pelvis (22.0%), platypelloid pelvis (15.0%), and pelvis (25.0%). The majority of these women had gynecoid pelvises, which are thought to be the best for vaginal delivery. Our study's results were comparable to those of a study by Vucinic and associates[14], which reported that the most common pelvic type was gynecoid, occurring in 28 pelvises (52%). Plasypelloid pelvises ranked second in 11 cases (20 percent), followed by anthropoid pelvises in 8 cases (15 percent), and android pelvises in 7 cases (13 percent) were the least

common form. The high frequency of the gynecoid form, which is frequently regarded as the best for birthing, is consistent with normal patterns of anatomical distribution. The variability in pelvic forms, which might result in poorer obstetric outcomes, is exemplified by the lower occurrence rate of the platypelloid, anthropoid, and android kinds. In order to customize obstetric care and maximize the health of both the mother and the fetus, it is essential to comprehend the distribution of distinct pelvic types.[14] According to the results of a recent study by Polat and colleagues, the majority of females (50.9%) had gynecoid pelvises, which were followed by anthropoid (24.8%), platypelloid (14.6%), and android (9.7%) pelvises.[15] However, a study conducted by Manandhar and Shrestha (2023) found that 46.7% of females had gynecoid pelvis.[16]

Taller females' higher gynecoid pelvis ratio supports earlier research showing a positive correlation between height and pelvic shape.

Conclusion:

Given the findings, it can be said that good pelvic morphology and maternal height are significantly correlated. In favor of vaginal birth, taller women were more likely to have a gynecoid pelvis.

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Author's Contribution	
Muhammad Abdul Basit Ashraf	Conception and design of the study
Solmaz Masood, Hira Bushra	Acquisition of data
Solmaz Masood, Hira Bushra	Analysis and interpretation of data
Hamna Wahid, Aneela Ahsan	Drafting the article
Hamna Wahid, Aneela Ahsan	Revising content
Zafar H Tanveer	Final approval of the version to be published