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Maternal Height, Pelvic Typology, and Mode of Delivery: A Cross-Sectional Study from South Punjab

Solmaz Masood[1]*, Zahra Haider Bokhari[2], Hira Bushra[3], Aisha Rafi[4], Naeem Shahzad[5], Amna Khan[6]

1. Additional Principal WMO, Sheikh Zayed Hospital, Rahim Yar Khan, Pakistan. Email: masood.solmaz@gmail.com
2. Professor of Anatomy, Azra Naheed Medical College / Superior University, Lahore, Pakistan. Email: zabokhari59@yahoo.com
3. Associate Professor, Department of Radiology, Sheikh Zayed Medical College, Rahim Yar Khan, Pakistan. Email: dr.hirausman@yahoo.com
4. Professor of Anatomy, Shifa College of Dentistry, Shifa Tameer-e-Millat University, Islamabad, Pakistan. Email: aisha_rafi.scm@stmu.edu.pk
5. Assistant Professor of Anatomy, Rahbar Medical and Dental College, Lahore, Pakistan. Email: docnaeemshahzad@gmail.com
6. Demonstrator, Department of Anatomy, NUST School of Health Sciences, National University of Sciences and Technology (NUST),Islamabad, Pakistan. Email: amnaakhan00@hotmail.com

*Corresponding Author: masood.solmaz@gmail.com

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Abstract

Background: Maternal pelvic morphology and height influence delivery outcomes. Pelvises can be classified as Gynecoid, android, anthropoid, and platypelloid pelvis. Short heighted females have more chances of contracted pelvis as compared to heighted females which have broader pelvis. This study explores the association between maternal height and pelvic types, and their effect on delivery mode among women in Rahim Yar Khan.

Methods: A cross-sectional study involving 384 postpartum women aged 18–35 years was conducted at Sheikh Zayed Hospital, Rahim Yar Khan. Maternal height was taken using stadiometer and pelvic types were measured via X-ray pelvimetry. Statistical tests assessed associations with delivery modes.

Findings: 38% of women had gynecoid pelvis, 25% android, 22% anthropoid, and 15% platypelloid. Vaginal delivery was more frequent in women with gynecoid pelvis (82%) and taller height. A Pearson correlation analysis was conducted to calculate the relationship of maternal height to the type of bony pelvis. The results showed a positive correlation between maternal height and the presence of a gynecoid pelvis ($r = 0.35$, $p < 0.01$), suggesting that taller women are more likely to have a gynecoid pelvis, which is favorable for vaginal delivery. Conversely, a negative correlation between maternal height and the presence of an android pelvis ($r = -0.28$, $p<0.05$) was seen, indicating that shorter women ae more likely to have an android pelvis, which may complicate vaginal delivery.

Interpretation: Maternal height is associated with the types of bony pelvis and can significantly influence the mode of delivery. Study concluded a substantial correlation of the maternal height with the mode of delivery. The taller women were more likely to have gynecoid pelvis, favorable for vaginal delivery. X-ray pelvimetry remains a valuable tool in low-resource settings.

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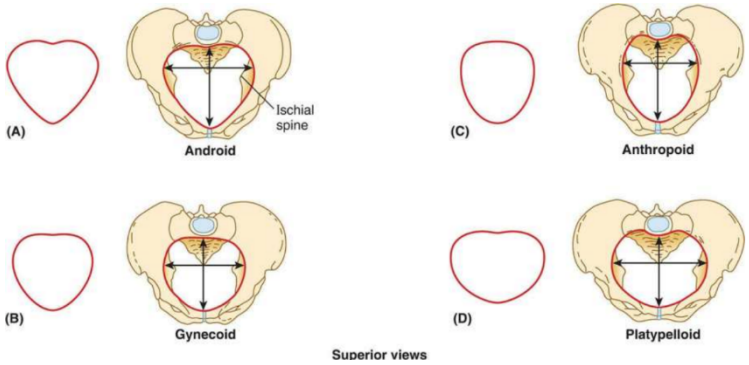
Introduction

Among the bony elements of human body, the morphology of female bony pelvis, always gained importance due to its intricate structure as well as due to its important functional role in childbirth and its outcomes.[1,2] Pelvic typology- gynecoid, android, anthropoid, or platypelloid, as classified by Caldwell and Molly, has been used in predicting delivery routes.[3]



Each type exhibits unique characteristics that can influence the labor and delivery process. The gynecoid pelvis is considered most suitable type for vaginal delivery because it is round and spacious. The android pelvis is heart-shaped and narrower, often facing longer and more difficult labor. The anthropoid pelvis is oval and generally favors vaginal delivery. While the platypelloid pelvis, being flat,normally creates hinderance for spontaneous vaginal deliveries.[3-5] The type of bony pelvis significantly impacts the mode of delivery demonstrating that women with a gynecoid pelvis had the highest rates of spontaneous vaginal delivery, while those with an android or platypelloid pelvis were more likely to require operative deliveries, including cesarean sections. One of the most important parameters ,affecting delivery outcomes, is the maternal height[[6,7]. Various studies emphasized the relationship between maternal height and type of bony pelvis.[8] 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. The broader pelvis favors the spontaneous vaginal delivery.[9] The reciprocity among female height and pelvic measurements manifests that mean pelvic area of tall women is far more than those of short stature. The narrow pelvic area of short heighted females is a cause of labour dystocia as the fetal head or shoulder can get stuck in narrow pelvis. 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.[10]

When normal vaginal delivery is not possible, caesarean section (CS) is done. Although caesarean section is life saving for both the mother and the fetus, there are always possibilities of risks.[11]. A cesarean section should be performed only when the risks of complications for the mother and the fetus are significant. Previous global studies indicate a higher cesarean risk in women of shorter stature. However, most of the current data is non

South Asian which is different due to inherent variations in genetics, anthropometery, nutritional status and socioeconomic status,([12,13]). Thus there exists a region specific research gap, particularly from South Punjab, Pakistan. This study explores the correlation between maternal height, pelvic type, and delivery mode.

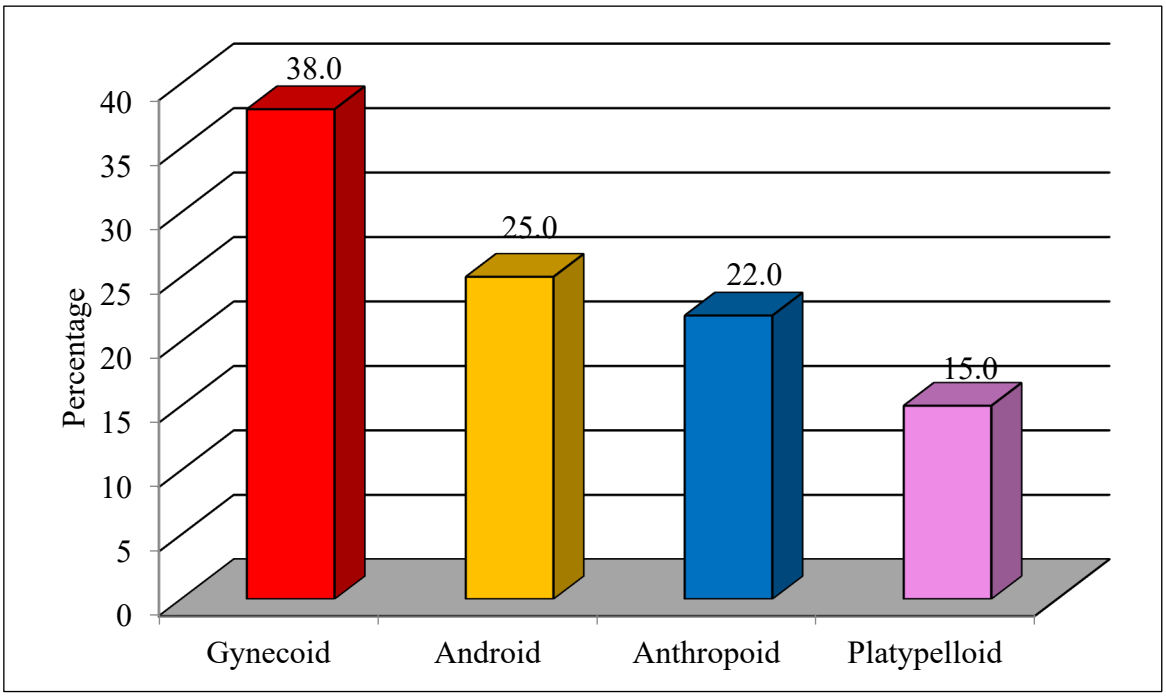
Methods

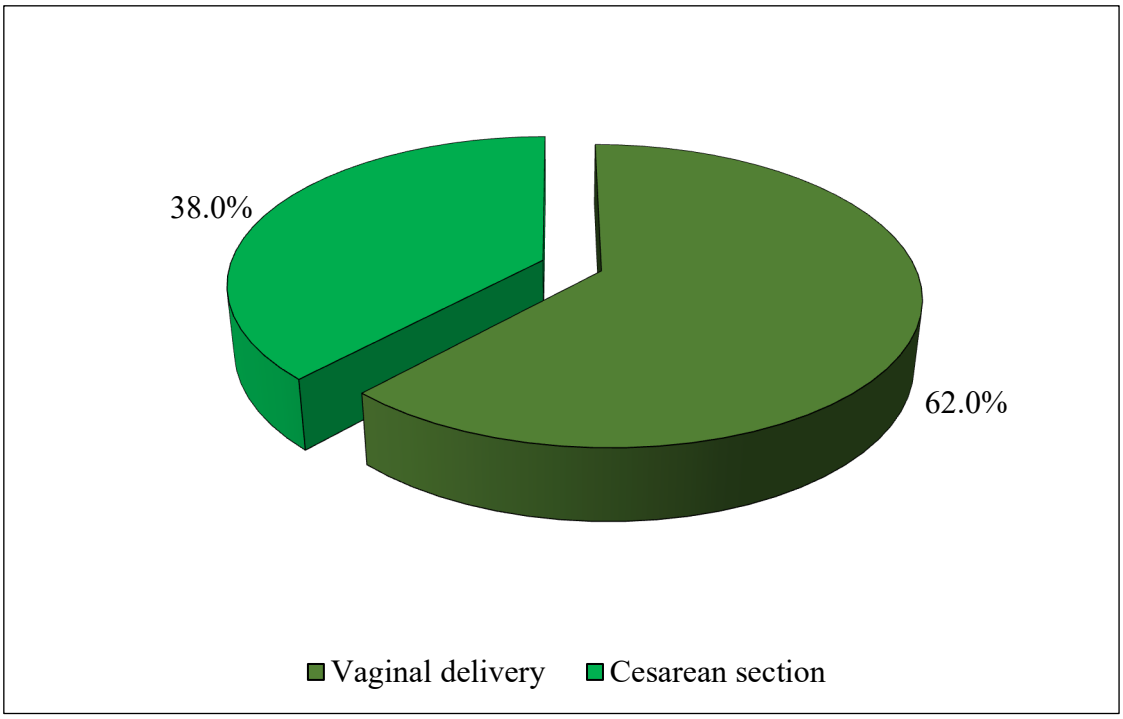
This cross sectional research was conducted at Gynaecology and Obstetric department of Sheikh Zayed hospital, Rahim Yar Khan, from May 2024 to October 2024 ,after the approval of ethical review board vide letter No. FRB/BMS/03/017/2024 dated 27-03-2024.The data was collected from 384 Healthy and Postpartum females at a single point in time during hospital stay. The target population consisted of reproductive age females who underwent spontaneous vaginal delivery or cesarian section. To ensure unbiased representation across relevant sub groups, this research opted for a stratified random sampling method and structured questionnaires were used as data collection tools. The participants were grouped based on age, height, weight, BMI and parity.[14].The pregnant females, or females having co morbidities , history of any bony deformity, history of pelvic trauma or having weight more than 85 kgs were excluded. Written consent was taken from subjects meeting the inclusion criteria. Confidentiality and privacy of participants was strictly maintained. Subjects were sent to the Radiology department of Sheikh Zayed hospital, for x-ray pelvimetry in erect posture. The AP view was taken to assess the transverse diameters of the inlet, midpelvis and pelvic outlet. The lateral view was important for measuring AP diameters of pelvic inlet, midcavity and pelvic outlet. The types of the pelvises were then determined from the obtained data. The collected data was entered in computer software SPSS (Statistical Package for Social Sciences) version 25.0.To assess demographic characteristics of the participants, a descriptive analysis was done. Inferential statistics, such as chi-square tests was employed to determine the association between types of bony pelvis and modes of delivery. Statistical value of <0.05 was taken as significant. To ensure data accuracy, data entry was double checked. Reliability was assessed through test-retest procedures for measurements (in cms) and inter-rater reliability for X-ray pelvimetry. Findings were presented using tables, graphs and charts to facilitate clear communication of the results.

Results

Variable	Mean	SD	Range	Unit
Age	26.7	4.5	18–35	years
Height	150.2	3.1	145–155	cm
Weight	67.4	8.5	50–85	kg
BMI	24.1	3.2	18.5–29.9	kg/m²
Parity	2.1	1.3	0–5	children

Table 1: Demographic characteristics of the study population (n=384).


38.0
25.0
22.0
15.0
Percentage
40
35
30
25
20
15
10
5
0
Gynecoid
Android
Anthropoid
Platypelloid


38.0%
62.0%
Vaginal delivery
Cesarean section

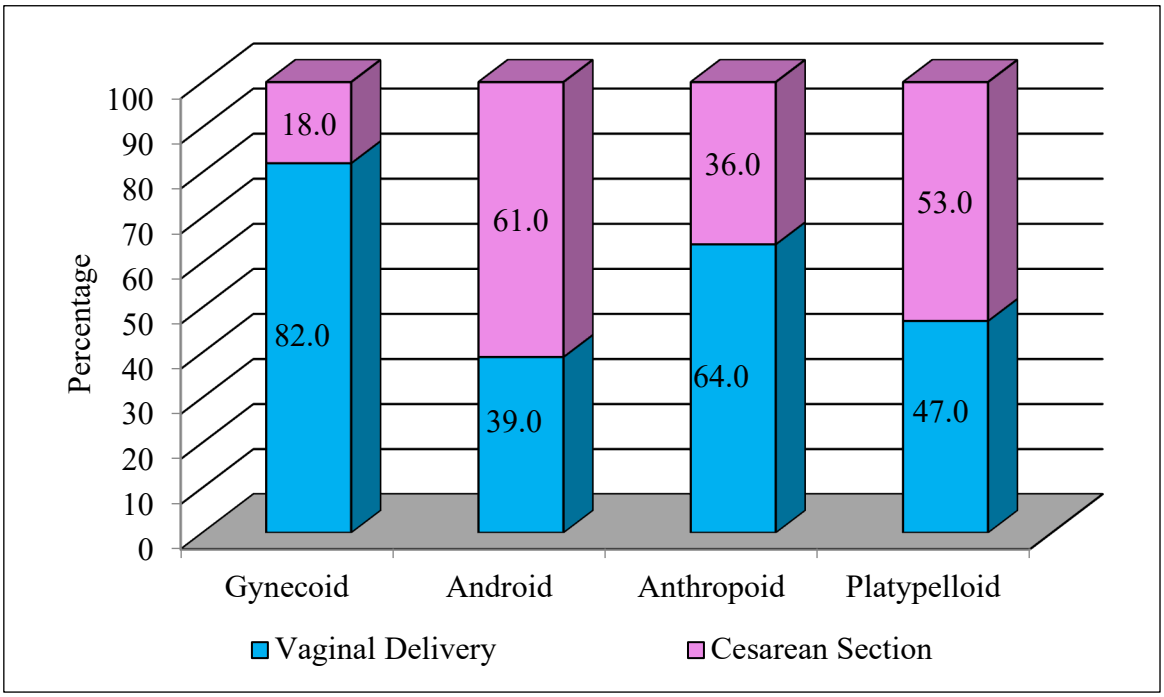
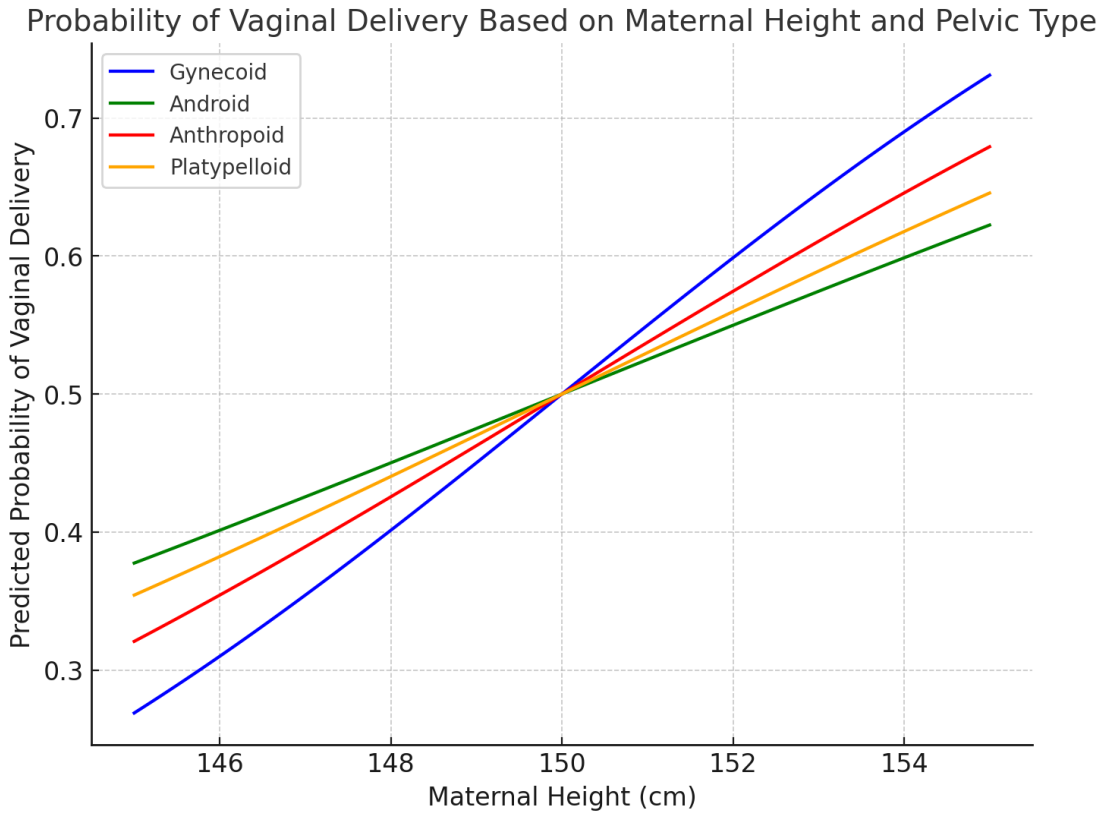


Table – 4.6: Association between Pelvic Type and Height of Females

Pelvic Type	Height		Total
	Tall	Short	
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



Discussion

The pelvis is an anatomically complex and functionally significant bone. It plays a key role in both human locomotion and obstetrics. The bony pelvis acting as a birth canal ,is important in affecting the labor process and determining whether a woman can deliver vaginally or requires a cesarean section. Maternal height has long been a subject of interest in obstetric research, primarily due to its potential influence on pelvic dimensions and subsequent mode of delivery[15,16]. Understanding the combined effect of maternal height and pelvic type on the mode of delivery is crucial for predicting labor outcomes and managing childbirth effectively. This study was carried out to know the relationship of maternal height with types of bony pelvis and its effect on mode of delivery in females of reproductive age in South Punjab ,Pakistan.

To acquire appropriate outcomes, a group of 384 postpartum women was included in the study and found that majority of the women were in their good reproductive age group as the mean age was 26.7±4.5 years.As far as height of the females is concerned, our study disclosed that mean height of the females was 150.2±3.1 cm.

The vaginal delivery can significantly be difficult, delayed or even impossible if shape of pelvis is not according to fetus size[7]. It was found during study that most of the females (38.0%) in our study had gynecoid pelvis, followed by, android pelvis (25.0%), anthropoid pelvis (22.0%) and platypelloid pelvis (15.0%). Among these females, majority had gynecoid pelvis which is considered most favorable type for vaginal delivery. Vučinić and companions (2022) also reported in their study that the gynecoid pelvic type was the most prevalent, observed in 28 pelvises (52%). This was followed by the platypelloid type, found in 11 pelvises (20%), the anthropoid type in 8 pelvises (15%), and lastly, the android type in 7 pelvises (13%). The predominance of the gynecoid type, often considered as the most favorable for childbirth,

aligns with typical anatomical distribution patterns. The lower frequencies of the platypelloid, anthropoid, and android types highlight the diversity in pelvic shapes, which can have implications for obstetric outcomes [17]

This study reinforces findings of previous studies that maternal height and pelvic morphology positively impacts delivery outcomes. Women with taller stature and gynecoid pelvis had higher chances of vaginal delivery. These results align with international research and reinforce the utility of radiological pelvimetry in resource-limited settings. Although MRI and ultrasound are modern alternatives, X-ray remains cost-effective and practical in developing regions.

Conflict of Interest: Nil
Funding Disclosure: Nil

Authors Contribution

Concept & Design of Study: Solmaz Masood, Zahra Haider Bokhari
Drafting: , Hira Bushra, Aisha Rafi
Data Analysis: Naeem Shahzad, Amna Khan
Critical Review: Solmaz Masood, Aisha Rafi
Final Approval of version: All listed above , approved the final version.

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