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Original Article

Impact of Maternal Height on Delivery Outcome: A Cross-Sectional Study

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ABSTRACT

Maternal height influences obstetric effects, especially the delivery outcome**.** It is crucial to identify and anticipate potential CPD at every birth in order to avoid the detrimental effects of an undiagnosed imbalance. Maternal height is closely associated with women's ease of vaginal delivery. **Objective:** To assess the impact of maternal height on the delivery outcome. **Methods:** The study included nulliparous women aged between 19 to 35 years, with a height between 140-155 cm, and a singleton pregnancy with cephalic presentation. Data were collected through a predesigned questionnaire. The pregnant women were categorized concerning their heights, and the delivery outcomes and complications were compared. The main outcome was the manner of delivery (vaginal delivery or CS). Secondary outcomes were a composite of newborn morbidity, including infant distress, mechanical ventilation, neonatal intensive care unit hospitalization, perineal injury, postpartum hemorrhage, and puerperal fever. **Results:** A total of 383 cases were included in the present study. The range of the patient's height was from 140 to 155 cm. The age of pregnant women was between 19-35 years. Women of ≤ 145 cm had a higher cesarean section (CS) rate than the group of 150-155 cm. No significant correlation was observed between maternal and neonatal mortality concerning maternal height. **Conclusion:** Females with short stature have higher chances of Cesarean Section than vaginal delivery. As a result, these women should deliver in a health-care institution where their labor may be thoroughly watched and a prompt choice about delivery mode made. Clinical examinations during prenatal visits should include maternal height.

INTRODUCTION

Most women in underdeveloped nations give birth at home or in health institutions that lack operative capabilities. Home deliveries to critical cases can increase maternal and fetal mortality rates [1]. Maternal morbidity and mortality continue to be a serious problem for health systems worldwide, particularly in developing countries [2]. Obstructed labor problems such as postpartum hemorrhage, birth canal trauma, and genital infections cause a high number of maternal mortality in underdeveloped nations. In rural hospitals, patients with dystocia may delay deciding to seek treatment or arrive at an appropriate medical facility [3]. One option for reducing maternal and perinatal mortality and morbidity is to identify women at risk of dystocia before labor and refer them to a district hospital for delivery. Maternal and perinatal/morbidity and death rates are therefore higher in Pakistan [4]. Maternal height influences obstetric effects, especially the delivery outcome. Previous research has found that shorter women have a greater rate of overall and emergency cesarean deliveries [5]. Lower maternal height is linked to shorter gestational length in the newborn [6]. Previous research has revealed that shorter women have a higher prevalence of overall and emergency cesarean delivery (CD) [7]. The possible reason for the link between short females and the incidence of CS is that shorter women have smaller pelvises due to environmental and genetic factors [8-9]. Malnourished women, on average, have small adult height and a high incidence of unfavorable pregnancy outcomes such as perinatal death and prematurity [10]. A cesarean birth for cesarean delivery is best for the woman and her fetus if done at the right time. Timely diagnosis for cesarean delivery can be helpful for

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mother and fetus. The repercussions of late diagnosis are particularly severe in developing countries, where the female may go into labor in a situation where cesarean section services are limited [11]. However, there is no agreement on the minimum height when CS is indicated. Most studies have utilized a height cut-off of 150 cm to predict the need of CS [12]. This, however, will not be appropriate for all ethnic groups. To prevent the negative repercussions of an undetected imbalance, it is vital to recognize and predict likely CPD at every birth. The ability of women to deliver vaginally without difficulty is closely linked to maternal height [13]. The main objective of this research was to observe the relationship between maternal height and the mode of delivery in Pakistani women and evaluate the link between maternal height with newborn and maternal morbidity.

METHODS

Permission was taken from the ethical review committee of the institute. The study included nulliparous women aged 19 to 35 years, 140-155 cm in height, and a singleton pregnancy with cephalic presentation. A questionnaire was used to collect data after informed consent was obtained, and the mode of delivery was noted. Every patient had a thorough medical history recorded to rule out diseases and pregnancy issues. Method of conception, height, age, pregnancy complications (hypertension, glucose intolerance, pregnancy disorders), gestational age (weeks,) body mass index (BMI) at delivery, neonatal birth weight, mode of onset of labor (natural or induced), and spinal analgesia at the time of labor, were all examined. Weight was divided by the square of height to calculate BMI. The main outcome was the manner of delivery (vaginal delivery or CS). Secondary outcomes were a composite of newborn morbidity, including infant distress, mechanical ventilation, neonatal intensive care unit hospitalization, perineal injury, postpartum hemorrhage, and puerperal fever. Mothers with a definitive fetal or maternal disease (e.g., fetal hydrocephalus and maternal skeletal dysplasia with considerable head enlargement) were diagnosed with cephalopelvic disproportion (CPD) before childbirth. Elective cesarean sections were arranged for cases with substantially inadequate pelvic diameters clinically, taking into account the patient's wishes. Patients with a borderline pelvis received a labor trial. A partogram was used to track the progress of labor. Patients who experienced primary or secondary labor arrest in the first stage were delivered via emergency cesarean section. Each case's mode of delivery was recorded. Data were analyzed using SPSS version 22.0.

RESULTS

During the study, 383 women with a singleton pregnancy were admitted to the labor ward. The range of the patient's height was from 140 to 155 cm. The age of pregnant women was between 19-35 years. Table 1 shows maternal features and fetal birth weights based on maternal height. Except for BMI at delivery, all maternal variables were identical among the three groups. The mother's height has a substantial impact on neonatal birth weight. Women who were shorter delivered the babies with low weight, and vice versa.

Characteristics	Maternal Height		
	140-145 cm (n= 72)	146- 150 cm (n= 116)	151-155 cm (n= 195)
Maternal Age (Years)	28 ± 3.6	26 ± 8.5	31.2 ± 4.8
BMI at delivery (median)	25.7	24.8	24.3
Gestational age at delivery (median)	39	39	39
Hypertensive disorder of pregnancy	9 (12.5)	13 (11.2)	23 (11.8)
Birth weight grams (median)	2756(2589-2994)	2835 (2644-3084)	2948 (2637-3148)
Induction of labor (%)	18	37	71

Table 1: Description of characteristics of pregnant women and fetus birth weight

Table 2 compares maternal height with delivery mode, mother outcomes, and neonatal outcomes. Short women had higher rates of CS than taller ones. The rate of CS due to failure to deliver was found to have a stronger relationship with maternal height when CS was stratified by its indication. Short women were more probable to suffer from CS due to their incapacity to progress. There were no maternal and neonatal deaths reported. Regardless of mother height, each determinant for maternal and neonatal outcomes was similar.

Outcome	Maternal Height		
	140-145 cm (n= 72)	146- 150 cm (n= 116)	151-155 cm (n= 195)
Vaginal delivery	27 (37.5)	64 (55.2)	138 (70.7)
Cesarean delivery	45 (62.5)	52 (44.8)	57 (29.2)
Postpartum hemorrhage	2 (2.8)	4 (3.4)	40 (20.5)
Severe perineal injury	2 (2.8)	5 (4.3)	10 (5.1)
Puerperal fever	3 (4.1)	3 (2.5)	7 (3.6)
Neonatal distress	3 (4.1)	3 (2.5)	29 (14.9)
Mechanical ventilation	1 (1.4)	4 (3.4)	14 (7.1)
NICU admission	2 (2.8)	5 (4.3)	9 (4.6)

Table 2: Description of the mode of delivery and feto-maternal outcome

Of those given a labor trial, 122 (31.8%) had secondary cervical dilatation arrest (As shown in Table 3). The average cervix dilation when labor was stopped was 6 cm + 1.0SD. In 34 (8.9%) cases, the head did not descend. The average head station where an arrest took place was -1 + 0.2SD. 154 (40.2%) of those given a trial of labor required an emergency cesarean section, whereas 209 (54.6%) were delivered vaginally.

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Height Range(cm)	Inadequate n (%)	Borderline n (%).	Adequate n (%)
141-145 cm n= 72	48 (66.7)	14 (19.4)	10 (13.9)
146-150 cm n=116	11 (9.5)	8 (6.9)	97 (83.6)
151-155 cm n= 195	6 (3.07)	10 (5.1)	179 (91.8)
Total n=383	65 (16.9)	32 (8.3)	286 (74.7)

Table 3: Description of adequacy of pelvis according to height

DISCUSSION

Female height is often associated with their pelvic size. In obstetrics, the size of the pelvis is crucial. It's an excellent tool for predicting delivery methods. As a result, the height of pregnant women, which is easily measured in prenatal clinics, is crucial in antenatal evaluation. In the present study, we observed the mode of delivery and complications during delivery in short-statured nulliparous pregnant females from age 19-to 35 years. In all of our cases, we performed a clinical pelvic examination. Patients with questionable clinical pelvimetry findings were offered a labor trial. This strategy saved money and lowered the number of elective cesarean sections. The present study observed different groups of heights with mode and complications of delivery and observed that height was directly linked with CS. CS rates were greater in the lower stature groups compared to the average height group. The link was persistent after controlling for patients' age, maternal labor induction, BMI at delivery, regional analgesia during labor, and neonatal birth weight. Comparable results were observed in other studies as well [14-15]. In recent findings, no significant correlation was observed between maternal height with complications at the time of delivery, including postpartum hemorrhage, severe perineal injury, mechanical ventilation, neonatal distress, etc. Our study also observed that mother height had no significant relationship with maternal or newborn morbidity. However, preterm delivery, low birth weight, small-for-gestational-age babies, and neonatal mortality have all been linked to short mother height in previous research [6, 16]. Obstetric outcomes can be influenced by socioeconomic situations and nutritional status, recognized environmental factors of adult height. These links might be partly explained by factors that cause short stature, including poor socioeconomic situations and malnutrition [17]. The physical restrictions in short women might explain these correlations. Small pelvic size results from genetic and environmental conditions, such as malnutrition in early development, and contributes to CS. Several research studies have shown a favorable association between pelvic size and height [18-19]. As a result, several previous research suggested that the shorter the mother, the higher the risk of CS [20]. We observed clinical pelvimetry of every short female included in the present study to identify pelvic adequacy for further facilitation in delivery. Shorter females (<145 cm) had the most inadequate pelvis observed than the 150-155 cm. Because labor is the superlative predictor of pelvic adequacy, every pregnant female with short stature was offered a well-monitored labor trial unless the pelvis is significantly constricted clinically. For any indicators of poor labor progression or fetal compromise, a prompt choice about the desired method of birth, either vaginal delivery or cesarean section, was made. Our findings were in line with the bulk of past research. This information will help doctors provide successful prenatal communication to all nulliparous pregnant women, regardless of size.

CONCLUSION

According to the study, maternal height is a simple measure of pelvic sufficiency. A small pelvis is related to a short height. Short-statured nulliparous women have a greater chance of cesarean section and instrumental vaginal birth. As a result, these women should deliver in a health-care institution where their labor may be thoroughly watched and a prompt choice about delivery mode made. This study will assist our country in minimizing maternal and fetal morbidity and death.

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