

# Association of Maternal Height with Delivery Outcome: A Prospective Study

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## Abstract

**Introduction:** In a pregnant woman, maternal height and antenatal estimated fetal weight can influence mode of delivery. The aims and objective of this study were to find out the association between the maternal height and estimated fetal weight and the delivery outcome.

**Methods:** 125 full term primigravida women without any obstetric and medical complications who were admitted in Rama Medical College, Hapur, Uttar Pradesh for delivery selected randomly for the study. After delivery, 70 women who underwent cesarean delivery formed the study group and 55 women who underwent vaginal delivery formed the control group. These two groups were compared for their maternal heights and antenatal estimated fetal weight using Johnson's formula.

**Results:** In the present study, mean height of women in the study group was 145.34 cm while that in the control group was 154.02 cm. Out of 44 short statured women (height  $\leq 145$  cm), 41 (93.18%) had the cesarean section, and 2 (4.55%) women were delivered vaginally. Estimated fetal weight in the control group was 2845 g while that in the study group was 2928 g.

**Conclusions:** We conclude that short statured females with larger baby size have the higher incidence of delivery by cesarean section.

**Key words:** Cesarean section, Fetal weight, Maternal height, Mode of delivery

## INTRODUCTION

In a women's life cycle, pregnancy is the most significant and unique stage. This event is regarded as "welcome event" for the successful womanhood.<sup>1</sup> In the countries like India, maternal and fetal mortality and morbidity are major health problems. Throughout the world 800 women/day die as a result of preventable causes related to pregnancy and childbirth, in which most of them or near 99% of all maternal mortality contributed by developing countries.<sup>2</sup>

In general, malnourished females tend to have short stature in adulthood; they have high rates of adverse pregnancy outcome such as perinatal mortality and prematurity.<sup>3</sup>

Several studies from India observed very high rates of low birth weight babies among mothers with height  $< 140$  cm<sup>4-6</sup> and 216 g-birth weight variation between short ( $< 143$  cm) and tall ( $> 162$  cm) mothers.<sup>7</sup> Numerous studies of healthy women from both wealthy and less wealthy countries have shown that shorter maternal height and greater newborn weight associated with increased delivery complications and result in maternal or fetal mortality and morbidity.<sup>8-12</sup> Many studies of maternal anthropometry and pattern of pregnancy outcome recommend the use of anthropometric data like maternal height and weight for screening and its application for betterment for pregnancy outcome.<sup>13</sup>

An important area in which an obstetrician can contribute considerably is the care of pregnant women and for antenatal care is to identify those women with higher risks for problems during pregnancy or delivery they have to ensure that precautionary measures are instituted wherever possible or more intensive medical care is to be arranged. In the developing countries like India, there is a dearth of maternal and child health care services.

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Antenatal care in rural areas is provided by traditional birth attendants (Dais) and village health workers. To prevent these complications, it is important to develop a simple risk indicator, which is easy to use, reliable, and consistent. Maternal height is one of the simplest measurements to take into consideration. Using these indicators, a specified height is defined and below this attention to be paid to the risk of CPD/contracted pelvis and for the referral to higher centers. The current study was carried out to assess the association of maternal height and estimated fetal weight of women on her obstetric outcome.

## METHODS

This study was carried out in Department of Gynecology and Obstetrics, Rama Medical College, Hapur, Uttar Pradesh from 2014 to 2015. It was a cross-sectional, case-control study of 125 full term primigravida women without any obstetric and medical complications who admitted for delivery randomly selected for the study. All the cases were primigravida patients with the gestational age  $\geq 37$  weeks who had spontaneous onset of labor. Those pregnancies with medical or obstetric complications or those with fetal anomalies or fetal death or elective Cesarean Section excluded from the study.

After considering these inclusion and exclusion criteria 125 cases elected, out of which 70 cases who underwent emergency cesarean delivery formed the study group, and 55 women who gave birth vaginally formed the control group.

Fetal weight (FW) estimation was done by Johnson's Formula:

$FW = (\text{McDonald's measurement} - 13) \times 155$  when the presenting part was at "minus" station

$FW = (\text{McDonald's measurement} - 12) \times 155$  when presenting parts at "zero" station

$FW = (\text{McDonald's measurement} - 11) \times 155$  when presenting part at plus station

(McDonald's measurement - symphysio-fundal height, FW - in grams if woman weighed more than 91 kg, 1 cm was subtracted from fundal height).

## RESULTS

In present study from the Table 1, out of 70 patients from the study group, 8 (11.43%) had the height <140 cm. 32 (45.71%) patients had height in between 141 and

145 cm. 28 (40.00%) had height 146-150 cm. Only 2 (2.86%) patients had the height above 150 cm. In the control group, out of 55 patients, none of the patients belonged to <140 cm. 4 (7.27%) patients in between 141 and 145 cm. While 12 (21.82%) patients in between 146 and 150 cm. 39 (70.91%) had height more than 150 cm. The difference between study group and control group was found to be statistically significant ( $P < 0.05$ ). In the study group, mean height was 145.34 cm, while in the controls it was 154.02 cm.

From the Table 2, authors found in maternal height range of <145 cm among 44 cases, 2 (4.55%) cases from control group delivered spontaneously vaginally, 1 (2.27%) case was undergone instrumental delivery, while 41 (93.18%) cases were undergone cesarean delivery. In the maternal height of 145-150 cm among 40 cases, 17 (42.5%) cases of spontaneous vaginal delivery, 2 (5.0%) case was delivered by instrumental delivery while 21 (52.50%) of cases were undergone cesarean delivery. In the maternal height of  $\geq 150$  cm out of 41 cases, 32 (78.05%) cases delivered spontaneous vaginally, 1 (2.44%) were required instrumental delivery while 8 (19.51%) cases were required cesarean delivery. Out of all 125 cases in maternal height range, 51 (40.80%) cases were delivered spontaneous vaginally, 4 (3.20%) cases were required instrumental delivery while 70 (56.00%) cases required cesarean delivery. Using Chi-square test, ( $P < 0.05$ ) the difference was found statistically significant.

In the present study, mean estimated weight in the study group was 2928 g while in the control group it was 2845 g. By applying Chi-square test, the difference was found to

**Table 1: Distribution of patients according to height (cm) in both the groups**

Height (cm)	Study group (n=77)		Control group (n=55)	
	Cases	%	Cases	%
138-140	8	11.43	0	0.00
141-145	32	45.71	4	7.27
146-150	28	40.00	12	21.82
>150	2	2.86	39	70.91
Total	70	100.00	55	100.00

**Table 2: Maternal height and mode of delivery**

Height (cm)	Mode of delivery					
	Spontaneous vaginal delivery		Instrumental delivery		Cesarean delivery	
	n	%	n	%	n	%
$\leq 145$	2	4.55	1	2.27	41	93.18
146-150	17	42.50	2	5.00	21	52.50
>150	32	78.05	1	2.44	8	19.51
Total	51	40.80	4	3.20	70	56.00

be significant ( $P < 0.05$ ). Women with lesser height and more baby weight are more likely to go for cesarean delivery (Table 3).

The author concluded from the Table 4 that in the present study in higher maternal height range ( $>150$  cm) and lower estimated fetal weight range ( $<2.5$  kg) almost all babies were delivered vaginally. In the same way, lower maternal height range ( $<145$  cm) and higher estimated fetal weight range (2.5-3.5 kg), almost all (38 out of 39) babies are delivered by cesarean section.

According to Tables 2-4, we can conclude that cases with maternal height range  $<150$  cm and estimated fetal weight range  $\geq 2.5$  kg should be referred to advanced or higher hospitals without lacking time. In the present study, in the study group, the incidence of cesarean delivery in women with height 145 cm or less was 32.8%. Whereas those with height more than 145 cm was 23.2% (Table 5).

## DISCUSSION

In the present study, the incidence of emergency cesarean delivery in short mothers was 32.8% while that in women with height more than 145 cm was 23.2%. Thus, women who are  $\leq 145$  cm have more risk of cesarean delivery when compared to females of more than 145 cm height. In a study by Kathleen *et al.*,<sup>14</sup> women of 146 cm height ( $-1$  SD) relative to another women of 160 cm height ( $+1$  SD) had 2.5 times of higher risk of cesarean delivery. The independent risk for cesarean delivery occurring for a nulliparous and healthy women with no obstetric or clinical abnormality but of 146 cm height ( $-1$  SD) was

2.5 times higher relative to females of 166 cm ( $+1$  SD) height was clearly established in their study. Thus, women of height  $<145$  cm form a risk group who needs constant observation during their labor for signs of CPD and early referral to higher centers in the event of prolonged labor was needed to avoid a grievous outcome.

In the study, the incidence of cesarean delivery in short mothers was 32.8%. The relative figures of cesarean delivery. However, the current study shows the higher prevalence of cesarean section as compared to Karltreinder,<sup>15</sup> but results of the current series were similar in the comparison with that of Desai *et al.*<sup>16</sup>

Baird<sup>17</sup> postulates that every female has a potential height, which decided by factors such as race, genetics, and geographic distribution. However, there occur certain insults that are exclusively dominant, if it is so during her age of development. As a result of which she becomes short stature or long.

In the present study according to the Table 2, we can conclude that in height range of  $<145$  cm almost all cases were delivered by cesarean section, in height range of 145-150 cm also rate of cesarean section was very elevated, thereafter rate of cesarean section decreased and rate of normal delivery increased. According to the Table 2, cases with height  $<150$  cm was the target population on which consulting doctor have to pay all attention to prevent neglected obstructed labor and undue maternal morbidity.

In the present study, mean estimated weight in the study group was 2928 g while in the control group it was 2845 g. Females with lesser height and larger baby were more likely to go for the cesarean section. Karltreinder<sup>15</sup> mentions that taller females tend to produce heavier children in contrast to the shorter females who tend to produce lighter ones.

**Table 3: Distribution of patients according to estimated fetal weight in both the groups**

Estimated birth weight (g)	Study group (n=77)		Control group (n=55)	
	Cases	%	Cases	%
<2.5 kg	3	4.29	8	14.55
2.5-3.5 kg	65	92.86	45	81.82
>3.5 kg	2	2.86	2	3.64
Total	70	100.00	55	100.00

## CONCLUSIONS

We concluded that short statured women with larger baby size had the higher incidence of cesarean delivery. In the present study, the mean height of women in the study

**Table 4: Maternal height and estimated fetal weight**

Height (cm)	Estimated birth weight in kg						Total	
	<2.5		2.5-3.5		>3.5		Study group	Control
	Study group	Control	Study group	Control	Study group	Control		
$\leq 145$	2	2	38	1	1	0	41	3
145-150	1	4	20	14	0	1	21	19
$>150$	0	2	7	30	1	1	8	33
Total	3	8	65	45	2	2	70	55

**Table 5: Height and emergency cesarean delivery in study group**

Height in cm	Cases	Percentage
<145	41	32.80
>145	29	23.20

group was 145.34 cm while that in the control group was 154.02 cm. Out of 44 short statured women (height  $\leq 145$  cm), 41 (93.18%) had cesarean section and 2 (4.55%) women were delivered vaginally. Estimated fetal weight in the study group was 2928 g while that in the control group was 2845 g.

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