

## A clinical study of association of maternal height and estimated foetal weight on mode of delivery

Anup Ramrao Patil\*, Manjusha Shailesh Agrawal, Deepti Sandeep Shrivastava

Department of Obstetric and Gynecology, Jawaharlal Nehru Medical College, Sawangi (M), Wardha, India

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\*Correspondence:

Dr. Anup Ramrao Patil,  
E-mail: anuppatil68@yahoo.in

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### ABSTRACT

**Background:** Maternal height and antenatal estimated fetal weight can affect mode of delivery. The aims and objective of this study were to study the association between the mode of delivery and maternal height and estimated foetal weight.

**Methods:** 240 full term primigravida women without any obstetric and medical complications who were admitted in Acharya Vinoba Bhave Rural Hospital Wardha for delivery were randomly selected for study. After delivery 138 women who underwent caesarean delivery formed the study group and 102 women who underwent vaginal delivery formed control group. These two groups were compared for their maternal heights and antenatal estimated foetal weight (by Johnson's formula).

**Results:** In present study (1) Mean height of women in study group was 147 cm while that in control group was 155 cm. (2) Out of 49 short statured women (height  $\leq$  145 cm) 47 (95.91%) had emergency caesarean section and 2(4.08%) women were delivered vaginally. (3) Estimated foetal weight in study group was 2956 grams while that in control group was 2845 grams.

**Conclusions:** We conclude that short statured women with larger baby size has higher incidence of emergency caesarean delivery.

**Keywords:** Maternal height, Estimated foetal weight, Mode of delivery

### INTRODUCTION

Pregnancy is one of the most critical and unique period in a woman's life cycle. It is regarded as 'welcome event' for successful womanhood<sup>1</sup>. Maternal and fetal mortality and morbidity are major health problems in developing countries like India. Throughout the world 2, 92,000 per year (800/day) women die as a result of preventable causes related to pregnancy and childbirth, of which 99 % of all maternal mortality occurs in developing countries.<sup>2</sup>

Numerous studies of healthy women from both affluent<sup>3-8</sup> and less affluent countries<sup>9,10</sup> have shown shorter maternal height and or larger newborn weight to be associated with increased delivery complications.

One of the important area in which obstetricians can contribute significantly is the care of pregnant women. And one of the primary goals of antenatal care is to identify those women with raised risks for problems during pregnancy or delivery, in order to ensure that precautionary measures are instituted wherever possible or more intensive medical care is to be provided. In developing countries like India, there is dearth of MCH care services. In rural areas, antenatal care is provided by Traditional Birth Attendants (TBA'S) and village health workers. For them, it is important to develop a simple risk indicator, which is easy to use and reliable. Maternal height is one of the simplest measurements to take into consideration. Usually a specified height is defined and below this attention to be paid to risk of CPD/contracted pelvis and for referral to higher centers, a good weight

gain during pregnancy predicts a good baby weight. Weight gain especially in third trimester is associated with the weight of baby.

The present study was carried out to analyze the association of maternal height and estimated fetal weight of women on her obstetric performance in particular to emergency caesarean delivery.

## METHODS

It was a cross sectional case-control study carried out in department of Obstetrics and Gynecology, Acharya Vinoba Bhave Rural Hospital, Sawangi Meghe, Wardha, Maharashtra from 2012-2014. 240 full term primigravida women without any obstetric and medical complications who were admitted for delivery were randomly selected for study.

### Inclusion criteria

- 1) Primigravida patients.
- 2) Singleton vertex presentation.
- 3) Gestational age  $\geq$  37 weeks.
- 4) Spontaneous onset of labour.
- 5) In early active phase of labour (75% effaced cervix, at least 3 cm dilated).

### Exclusion criteria

- 1) Pregnancy with medical or obstetric complications.
- 2) Non vertex presentation.
- 3) Those with fetal anomalies or fetal death.
- 4) Those were indicated for elective Caesarean Section.

After considering these inclusion and exclusion criteria 240 cases were selected out of which 138 cases who underwent emergency caesarean delivery formed the study group, and 102 women who gave birth vaginally formed the control group.

Fetal Weight Estimation done by Johnson's Formula-

Fetal weight (g) = (McDonald's measurement - 13)  $\times$  155  
When the presenting part was at "minus" station

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

= (McDonald's measurement - 11)  $\times$  155 when presenting part at plus station (McDonald's measurement - symphysiofundal height)

If woman weighed more than 91 kg, 1 cm was subtracted from fundal height.<sup>11-13</sup>

## RESULTS

In present study out of 138 patients from study group, 15 (10.87%) had height less than 140 cm. 63 (45.65%)

patients had height in between 141-145 cm. 56 (40.58%) had height 146-150. Only 4 (2.90%) patients had height above 150 cm. In control group out of 102 patients, none of patient was belonging to less than 140 cm. 7 (6.86%) patients in between 141-145 cm. While 22 (21.57%) patients in between 146-150 cm. 73(71.57%) 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 147.74 cm, where as in the controls it was 155.79 cms (Table 1).

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

Height (cm)	Study Group (n=138)		Control Group (n=102)		$\chi^2$ - value	p-value
	Cases	%	Cases	%		
138- 140 cms	15	10.87	0	0.00		
141- 145 cms	63	45.65	7	6.86		
146- 150 cms	56	40.58	22	21.57	108.9	p<0.0001 S
>150 cms	4	2.90	73	71.57		
Total	138	100	102	100		
Mean $\pm$ SD	147.74 $\pm$ 3.88		155.79 $\pm$ 5.63			

In the present study (1) In maternal height range of <145 cm among 49 cases, 2(0.83%) cases from control group delivered spontaneous vaginally, no case was undergone instrumental delivery, while 47(19.58%) cases were undergone caesarean delivery. (2) In maternal height range of 145 - <150 cm among 66 cases, 8(3.33%) cases was undergone spontaneous vaginal delivery, 1(0.42%) case was delivered by instrumental delivery while 57(23.75%) of cases were undergone caesarean delivery. (3) In maternal height range of  $\geq$ 150cm out of 125 cases, 85(35.42%) cases delivered spontaneous vaginally, 6(2.50%) were required instrumental delivery while 34(14.17%) cases were required caesarean delivery. Out of all 240 cases in maternal height range 95(39.58%) cases were delivered spontaneous vaginally, 7(2.92%) cases were required instrumental delivery while 138(57.50%) cases required caesarean delivery. By using chi-square test (99.17, p-value=0.000,  $p<0.05$ ) the difference was found statistically significant (Table 2).

In the present study mean estimated weight in study group was 2956 grams, while in control group it was 2845 grams. By applying chi-square test the difference was found to be significant ( $p<0.05$ ). Women with lesser height and larger baby are more likely to go for caesarean delivery (Table 3).

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

Maternal Height(cms)	Mode of delivery						Total	
	Spontaneous vaginal delivery		Instrumental Delivery		Caesarean Delivery			
	n	%	N	%	n	%		
≤145cm	2	0.83	0	0.00	47	19.58	49	
<150-145cm	8	3.33	1	0.42	57	23.75	66	
≥150cm	85	35.42	6	2.50	34	14.17	125	
Total	95	39.58	7	2.92	138	57.50	240	
$\chi^2$ -value	99.17, p-value=0.000, S, p<0.05							

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

Estimated Birth Weight (gram)	Study Group (n=138)		Control Group (n=102)		$\chi^2$ -value	p-value
	Cases	%	Cases	%		
<2.5 kg	5	3.62	14	13.73		
2.5 to 3.5 kg	129	93.48	87	85.29		0.031
>3.5 kg	4	2.90	1	0.98	6.91	S, p<0.05
Total	138	100	102	100		
Mean ± SD	2956.59±293.80		2845.09±285.64			

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

Maternal Height (cms)	Estimated Birth weight in kg						Total	
	<2.5 kg		2.5 to 3.5 kg		>3.5 kg		Study group	Controls
	Study group	Control	Study group	Control	Study group	Control		
<145cm	3(2.17%)	1 (0.98%)	44 (31.88%)	1 (0.98%)	0(0%)	0(0%)	47 (34.06%)	2 (1.96%)
<150-145 cm	2(1.45%)	1 (0.98%)	53 (38.41%)	8 (7.84%)	2(1.45%)	0(0%)	57 (41.30%)	9 (8.82%)
≥150 cm	0(0%)	12 (11.76%)	32 (23.19%)	78 (76.47%)	2(1.45%)	1 (0.98%)	34 (24.64%)	91 (89.22%)
Total	5(2.08%)	14 (13.73%)	129 (53.75%)	87 (85.29%)	4 (2.90%)	1 (0.98%)	138 (57.50%)	102 (100%)
$\chi^2$ -value	8.97		75.91		0.75		82.05	
p-value	0.01,S		p<0.0001,S		0.38,NS, p>0.05		p<0.0001,S	

In the present study in higher maternal height range (>150 cm) and lower estimated fetal weight range (<2.5 kg) almost all (12 out of 12) babies are delivered vaginally. Similarly in lower maternal height range (<145 cm) and higher estimated fetal weight range (2.5-3.5 kg), almost all (44 out of 45) babies are delivered by caesarean section (Table 4).

According to table 2, 3 and 4; we can conclude that cases with maternal height range <150 cm and estimated fetal weight range ≥ 3.5 kg (corresponding to 34-35 cm of symphysis-fundal height) should be referred to higher hospitals without delay.

In present study in the study group the incidence of caesarean delivery in women with height 145 cm was 32.5%. Whereas those with height more than 145 cm was 25 % (Table 5).

**Table 5: Height and emergency caesarean delivery in study group.**

Height in cm	Cases	Percentage
< 145	78	32.5% (of all 240 cases)
> 145	60	25% (of all 240 cases)

**Table 6: Comparative figures.**

Caesarean Section	Karlreinder <sup>15</sup>	Desai et al <sup>16</sup>	Parsons et al <sup>8</sup>	Tripathi m et al <sup>18</sup>	Nourah et al <sup>19</sup>	Present study
	5.2-10.4 %	22.6%	35.45%	28.5%	26.6%	32.5%

## DISCUSSION

In the present study incidence of emergency caesarean delivery in short mothers was 32.5% while that in women with height more than 145 cm was 25%. Thus women who are less than or equal to 145 cm have higher risk of emergency caesarean delivery when compared to women of more than 145 cm. In a study by Kathleen et al.,<sup>14</sup> women of 146 cm height (-1 SD) relative to another of 160 cm (+1 SD) had a 2.5 times of higher risk of emergency caesarean delivery. The independent risk for emergency caesarean delivery occurring for a healthy, nulliparous women with no obstetric or clinical pathology but of 146 cm (-1 SD) was 2.5 times higher relative to women of 166 (+1 SD) in height was clearly established in their study. Thus women of height < 145 cm form a risk group who needs constant vigilance during their labour for signs of CPD and early referral to higher centres in the event of prolonged labour was needed to avoid disastrous labour outcome.

In the present study, incidence of emergency caesarean delivery in short mothers was 32.5 %. The above table shows the comparative figures of caesarean delivery. Though the present study show higher incidence of caesarean section as compared to Karlreinder,<sup>15</sup> but results of the present series were in near comparison with that of Desai et al.<sup>16</sup> (Table 6).

Baird<sup>17</sup> postulates that every woman has a potential height. This is decided by factors like race and genetics. However, there occur certain insults that are entirely influential, if it is so during her period of development. As a result of which she becomes short stature.

In the present study according to table no. 2 we can conclude that in height range of <145 cm almost all cases were delivered by caesarean section, in height range of 145 - <150 cm also rate of caesarean section was very high, thereafter rate of caesarean section decreased and rate of normal delivery increased. According to table, cases with height < 150 was the target population on which we have to pay all attention to prevent neglected obstructed labour and undue maternal morbidity.

In the present study mean estimated weight in study group was 2956 grams while in control group it was 2845 grams. Women with lesser height and larger baby were more likely to go for caesarean delivery. Karlreinder<sup>15</sup> mentions that taller women tend to produce heavier children in contrast to the shorter women who tend to produce lighter ones.

## CONCLUSIONS

We concluded that short statured women with larger baby size had higher incidence of emergency caesarean delivery. In present study (1) Mean height of women in study group was 147 cm while that in control group was 155 cm. (2) Out of 49 short statured women (height ≤ 145 cm) 47 (95.91%) had emergency caesarean section and 2(4.08%) women were delivered vaginally. (Table 2) (3) Estimated foetal weight in study group was 2956 grams while that in control group was 2845 grams.

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