

Association of Maternal Height on Fetal Outcome (Birth Weight, Length, APGAR Score): A Hospital Based Prospective Study

Anju Sharma¹, Praveena^{2*}, Megha Agarwal³, Hina Chaturvedi⁴, Charusmita Agarwal³, Nikita²

¹Professor & Unit Head, ²Resident, ³Assistant Professor, ⁴Senior Medical Officer (SMO),
Department of Obst. & Gynae, Mahila Chikitsalaya, SMS Medical College & Hospital, Jaipur, Rajasthan, India.

ABSTRACT

Background: Anthropometric assessment methods develop an effective & practical tool Capable of predicting foetal health condition and prevention of perinatal morbidity & mortality. This study is focused on maternal height and its relation to perinatal outcomes including birth weight length & APGAR.

Methods: The study was comprised of 300 pregnant women selected randomly among the nulliparous singleton term pregnancy admitting in labor room of Mahila Chikitsalya. Height of mother was measured by using a locally made stadiometer, weight of infant measured at the time of birth without any clothes & length of newborn taken by two examiners.

Results: Our study showed that the birth weight (<2.5kg) babies were maximum in height category <140 cm (67.44%) while macrosomic babies were maximum in maternal height group (>160 cm) (14.08%). Newborn height >46 cm was observed highest in maternal height group > 160 cm (60.56%) while new born height < 40 cm observed lowest in maternal height group < 140 cm (72.09%) and the association of these parameters were statistically significant (P<0.001) (table 2). It was observed that APGAR score of Newborn found significant association (P=0.020) with maternal height.

Conclusion: Hence in concluding the present study it is confirmed that the maternal height is a useful indicator for assessment of risk to foetal outcome.

Keywords: Birth Weight, Newborn Height, Foot Length, APGAR Score.

*Correspondence to:

Dr. Praveena,
Resident,
Department of Obst. & Gynae,
Mahila Chikitsalaya,
SMS Medical College & Hospital, Jaipur, Rajasthan, India.

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INTRODUCTION

Anthropometry is measurement of size & proportion of human body. An essential element in achieving a successful birth process is the knowledge about maternal anthropometric measurements. Anthropometric assessment methods develop an effective & practical tool Capable of predicting foetal health condition and prevention of perinatal morbidity & mortality. Assessment of maternal height is important because it is critical for monitoring and quantifying risk among specific population for policy & programme development. In addition their easy application, low cost & Non – invasive nature reinforce their usefulness.

Its actual effectiveness depends on:

- 1) The availability of services.
- 2) Number of prenatal care visits.
- 3) Women's consent to having their measurement taken.

Several studies examining the relationship between maternal height and low birth weight showed that shorter maternal height was associated with reduced fetal growth and low birth weight (LBW)¹⁻⁴ and concluded that the primary reason for this

association was undernutrition/ malnutrition. In developed countries, however, few studies are available on the effects of shorter maternal height on birth outcomes. Witter and Luke⁵ reported that infants born from shorter women were symmetrically smaller than infants born from taller women in the United States. Evidence for the effects of shorter maternal height on birth outcomes remains sparse among women in developed countries. According to WHO there will be two areas of maternal anthropometry as priorities for further investigations.

1. To test the performance of selected indicator in predicting various pregnancy risk for infant.
2. To find out that indicators have predictive role to develop suitable reference value for screening and monitoring.

The relation of maternal height to foetal mortality and morbidity is fascinating and growing is of interest in medical practice.

This study is focused on maternal height and its relation to perinatal outcomes including birth weight length & APGAR.

MATERIALS & METHODS

This study was a hospital based observation conducted in Department of Obstetrics and Gynaecology, Mahila Chikitsalya, SMS Hospital, Jaipur

Selection of Cases

The study was comprised of 300 pregnant women selected randomly among the nulliparous singleton term pregnancy admitting in labor room of Mahila Chikitsalya.

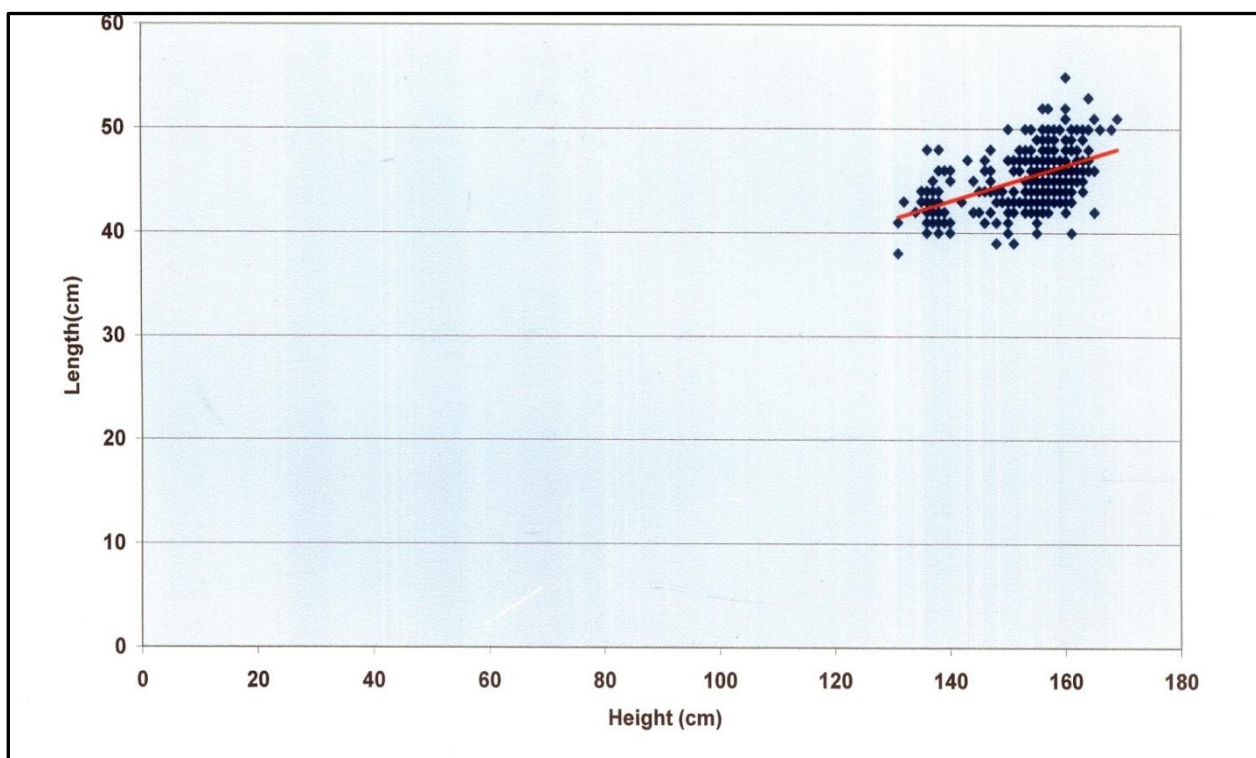
Women with multiparity, multifoetal pregnancy and pregnancy with medical disorders like Heart disease, Hypertension, DM, Asthma

and pregnancy with fetal congenital malformation were excluded in this study. Height of mother was measured by using a locally made stadiometer, women maintaining an upright and erect posture, with feet together and back her heel touching the pole of the anthropometry. Weight of infant measured at the time of birth without any clothes. Length of newborn taken by two examiners (one to position the baby with the child supine on a measuring board)

Results were analysed statistically to find out degree of association between maternal height and foetal outcomes.

Table 1: Distribution of cases according to maternal height, arm length, leg length, foot length and Birth weight of Newborn.

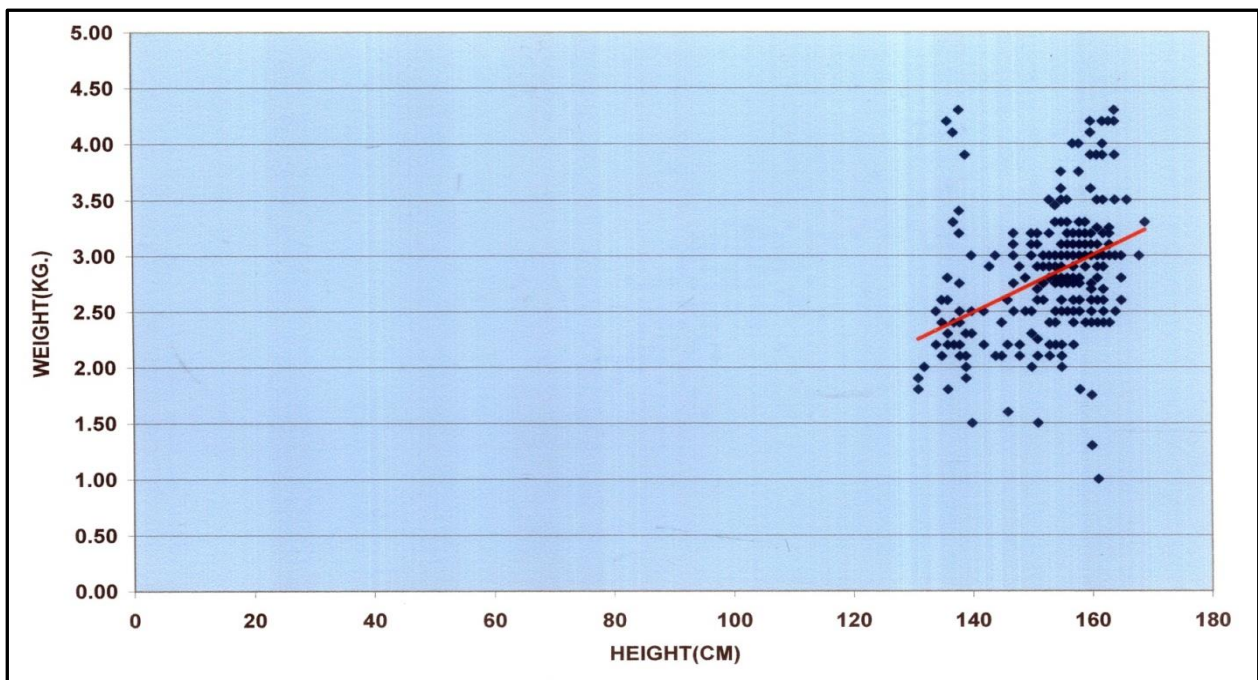
	Birth Weight (in Kg)					Total	'P' Value	Significance
	<2.5	2.5-3.0	3.0-3.5	3.5-4.0	≥4.0			
HEIGHT (CMS.)								
					(r=0.394)			
<140	28 (70.0)	6 (15.0)	3 (7.5)	1 (2.5)	2 (5.0)	40 (100.00)	<0.001)	Highly Significant
140-150	11 (35.48)	13 (41.93)	7 (22.58)	0 (0.00)	0 (0.00)	31 (100.00)		
150-160	24 (15.18)	59 (37.34)	66 (41.77)	7(4.43)	2 (1.26)	158 (100.00)		
≥160	10 (14.08)	19 (26.76)	20 (28.17)	12 (16.90)	10 (14.08)	71 (100.00)		
ARM LENGTH (CMS)								
					(r=0.422)			
60-65	58 (40.84)	50 (35.21)	30 (21.12)	3 (2.11)	1 (0.70)	142 (100.00)	<0.001	Highly Significant
65-70	15 (9.49)	48 (30.37)	64 (40.50)	17 (10.75)	14 (8.86)	158 (100.00)		
LEG LENGTH (CMS)								
					(r=0.373)			
<85	58 (31.01)	60 (32.08)	61 (32.62)	6 (3.20)	2 (1.06)	187 (100.00)	<0.001	HS
≥85	16 (14.15)	38 (33.62)	32 (28.31)	14 (12.38)	13 (11.50)	113 (100.00)		
FOOT LENGTH (CMS.)								
					(r=0.287)			
<25	63 (26.25)	81 (33.75)	82 (34.16)	10 (4.16)	4 (1.66)	240 (100.00)	<0.001	Highly Significant
≥25	11 (18.33)	16 (26.66)	12 (20.0)	10 (16.66)	11 (18.33)	60 (100.00)		



Graph 1: Correlation between Maternal Height and Newborn Length

Table 2: Distribution of cases according to maternal height and length arm length, leg length, foot length and of Newborn

	Length (CMS.)			Total	'P' Value	Significance
	<44	44-46	>46			
HEIGHT (CMS.)						
<140	30 (75.0)	8 (20.0)	2 (5.0)	40 (100.00)	<0.001)	Highly Significant
140-150	12 (38.70)	16 (51.61)	3 (9.67)	31 (100.00)		
150-160	32 (20.25)	73 (46.20)	53 (33.54)	158 (100.00)		
≥160	9 (12.67)	19 (26.76)	43 (60.56)	71 (100.00)		
ARM (CMS.)						
60-65	60 (42.25)	51 (35.91)	31 (21.83)	142 (100.00)	<0.001	Highly Significant
65-70	23 (14.55)	66 (41.77)	69 (43.67)	158 (100.00)		
LEG LENGTH (CMS.)						
<85	76 (40.64)	75 (40.10)	36 (19.25)	187 (100.00)	<0.001	Highly Significant
≥85	8 (7.07)	39 (34.51)	66 (58.40)	113 (100.00)		
FOOT LENGTH (CMS.)						
<25	80 (33.33)	100 (41.66)	60 (25.0)	240 (100.00)	<0.001	Highly Significant
≥25	3 (5.0)	15 (25.0)	42 (70)	60 (100.00)		

**Graph 2: Correlation Between Maternal Height and Birth Weight****Table 3: Distribution of cases according to maternal height arm length, leg length, foot length and APGAR of Newborn at 5 min.**

	APGAR Score		Total	'P' Value	Significance
	6-7	8-9			
Height (CMS.)					
<140	25(62.5)	15 (37.5)	40 (100.00)	0.023	Highly Significant
140-150	8 (25.80)	23 (74.19)	31 (100.00)		
150-160	51 (32.27)	107 (67.72)	158 (100.00)		
≥160	23 (32.39)	48 (67.61)	71 (100.00)		
ARM LENGTH (CMS.)					
60-65	56 (39.43)	86 (60.56)	142 (100.00)	0.218	NS
65-70	49 (31.01)	109 (68.99)	158 (100.00)		
LEG LENGTH (CMS.)					
< 85	67 (35.82)	120 (64.17)	187 (100.00)	0.742	NS
≥85	38 (33.62)	75 (66.37)	113 (100.00)		
FOOT LENGTH (CMS.)					
<25	89 (37.08)	151 (62.92)	240 (100.00)	0.293	NS
≥25	18 (30.0)	42 (70.0)	60 (100.00)		

RESULTS

Our study showed that the birth weight (<2.5kg) babies were maximum in height category <140 cm (67.44%) while macrosomic babies were maximum in maternal height group (>160 cm) (14.08%). So the birth weight showed an increasing trend with increasing maternal height with highly significant association ($p < 0.001$) (Table 1).

In the present study newborn height >46 cm was observed highest in maternal height group > 160 cm (60.56%) while newborn height < 40 cm observed lowest in maternal height group < 140 cm (72.09%) and the association of these parameters were statistically significant ($P < 0.001$) (table 2). It was observed that APGAR score of Newborn found significant association ($P = 0.020$) with maternal height. (table 3)

DISCUSSION

Anthropometry measurement is a low cost non-invasive, simple procedure. This study showed the association of maternal height on foetal outcomes, subsequent analysis will consider indicators usefulness so that these indicators could be ranked in order of preference for practitioners. Birth weight of new born showed significant positive correlation ($p < 0.001$) with maternal height. Maximum occurrence of LBW in underweight women with height <140 cm while macrosomic babies maximum in women with height >160 cm. Maximum length of newborn >46 cm found in women height group >160 cm with significant positive correlation ($p < 0.001$) $r = 0.516$.

Witter and Luke⁵ reported that shorter women are more likely to have smaller newborns than taller women. This previous study was conducted with participants in the United States; the results are consistent with our study results. Wills et al.⁴ demonstrated a relationship between parental height and fetal growth in the United Kingdom. However, there was no clear association between maternal height and lower birth weight.

Mothers who are short in height may have a narrow pelvis, resulting in limited intrauterine space. This may restrict intrauterine fetal growth.⁶⁻⁹ Differences in the size of the pelvis depend on differences in individual body size, and this mechanism may be common in any setting. However, this is insufficient to explain the mechanism of the relationship between maternal height and LBW. There may be other reasons why the growth of newborns is restricted.

CONCLUSION

Hence in concluding the present study it is confirmed that the maternal height is a useful indicator for assessment of risk to foetal outcome. Peripheral health workers can assess women's health and nutritional status by using simple, low technology

methods to detect problems. Based on this assessment decision can be taken regarding referral to higher levels of care at the appropriate time.

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