MATERNAL HEIGHT AND OBSTETRIC OUTCOME IN A TERTIARY HOSPITAL OF SOUTHERN NIGERIA: A PROSPECTIVE ANTHROPOMETRIC STUDY

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ABSTRACT

Background: Maternal height has been one of the contributory anthropometric factors that determine obstetric outcome.
Objective: To ascertain the maternal and perinatal risks associated with short maternal height among paturients in Federal Medical Centre, Yenagoa, Bayelsa State, Nigeria.
Methodology: This is a descriptive comparative study of labour ward patients. The study group was the first group which included 94 paturients with maternal height of ≤ 152 cm while the control group was the second group which included 102 paturients with height > 152 cm. A structured self-administered questionnaire was designed and used to collect information from the paturients. The data was processed using SPSS windows version 22.
Results: The study showed that more of the women in the study group had their delivery via caesarean section compared to those in the control group with a ratio of 3:1 for the study and control group. Neonates delivered by short statured mothers had lower mean birth weight (3.3 kg) unlike those in the control group that had a mean birth weight of 3.6 kg. However, the result revealed that poor Apgar score was relatively more in the control group (6.9%) unlike those in the study group (4.4%). Similarly, a relatively higher percentage of the control group (9.9%) had more S.C.B.U. admissions than those in the study group (9.8%) but it was not statistically significant. Despite these, more stillbirths were noted among the study group than the control group with a ratio of 2:1 neonates in the study and control groups respectively.
Conclusion: This study showed that poor obstetric outcomes are commoner among short statured women. The need for individualization of patients, partographic monitoring, prompt diagnosis of cephalopelvic disproportion, early possible caesarean section and neonatal resuscitation in this group are pivotal in the prevention of adverse maternal and perinatal morbidity and mortality.

Keywords: Maternal height, Short stature, Obstructed labour, Maternal mortality, Perinatal mortality.

INTRODUCTION

Pregnancy is a normal physiological process that may be complicated by an interplay of several factors inherent to the woman. Such factors include maternal height and weight. Maternal height has been one of the contributory anthropometric factors that determine

obstetric outcome. Lawson (1967) reported that flattening of the pelvis is generally associated with a height of < 152 cm. Poor nutritional practices have been attributed to stunting and health conditions like rickets in infancy and childhood and osteomalacia in adolescence and adulthood have been implicated for poor or distorted pelvic growth (Cruicshank, 1969).

Medically, short stature is basically defined as an adult height that is more than 2 standard deviations below the mean for age and gender, which corresponds to the shortest 2.3% of individuals (Pedicelli S et al 2009). In developed countries, this actually includes adult women who are shorter than 150 centimetres (4 ft 11 inch) tall (Becker and Kenneth L., 2001). For the records, the World Health Organization recommends a height of 145 centimeters (4 ft 10 inch) as landmark in distinguishing whether a person is short statured or not (Rudman D et al, 1998). Any person that does not get to this height at maturity is said to be short statured. Whereas short stature is often a normal variant it is different from growth failure which is a medical condition.

Although maternal height can predict the risk of obstructed labour, it is also an index of a woman's general health and nutritional status from her childhood, in which genetic factors play a major role. Thus, the obstetric significance of a particular height needs to be related to the patient's own genetic background (Moller and Lindmark, 1997). This is exemplified by the various cut-off points that have been identified in different studies as being associated with or predicting an increased risk of obstructed labour. For instance, associations have been identified for heights ≤ 150–153 cm in Ghana (Kwawukume et al, 1993), < 155 cm in Burkina Faso (Sokal et al, 1991), < 156 cm in Denmark (Kapel et al, 1987), ≤ 150 cm in Kenya (Mati, 1983), < 146 cm in Tanzania (Essex et al, 1977), and < 140 cm in India (Bhatt et al, 1967); caesarean deliveries were predicted by a height < 160 cm in Zimbabwe (Tsu, 1992) and ≤ 157 cm in the United States (Witter et al, 1995).

The relationship between maternal height and obstetric outcome has been assessed in several studies. Cunningham (2005) observed that small women are likely to have small pelvis with a higher frequency of small infant. Konje and Ladipo in 2015 noted that failure to achieve a normal delivery was directly related to the height of the mother, which is influenced by nutritional status in childhood and adolescence. Burgees (1997) showed that anthropometric measurements of the mother showed statistical significant relationship with incidence of obstructed labour and caesarean delivery. Song et al in 2009 observed that stunting is linked with increase in caesarean deliveries and poor perinatal outcome including low birth weight of children. Hadar et al (2002) found higher rates of low-birth weight newborn, neonatal asphyxia, low Apgar scores and increased perinatal mortality in pregnancies of short mothers. Prasad et al (2002) also noted that maternal anthropometrics, such as height and body mass index (BMI), affect birth weight and found that there was a statistically significant positive correlation between maternal height and birth weight. Dujardin et al (1996) in their study observed that maternal height has limited predictive value. Despite controversies on the value of maternal height as an index in determination of cephalopelvic disproportion, the fact remains that it is a useful tool in assessing pregnancies at a relatively higher risk. Early detection of women at risk of obstetric complications remains a goal of antenatal care (Ekabua, Ekabua and Njoku, 2011) and the need for early referral from peripheral centres to centres capable of conducting caesarean delivery becomes important.

In Bayelsa State of Nigeria, there is paucity of data on maternal anthropometric measurements and obstetric outcome. It becomes pertinent to determine maternal height and pregnancy outcome in this locale. Therefore, the purpose of this study is to ascertain the

maternal and perinatal risks associated with short maternal height among paturients in Federal Medical Centre, Yenagoa, Bayelsa State.

METHODLOGY

Study Design

This is a descriptive comparative study of labour ward patients in the Obstetrics and Gynaecology Department of Federal Medical Centre, Yenagoa, Nigeria, conducted from 1st of August 2013 to the 1st of June 2014.

STUDY AREA

Bayelsa state is a Southern state of Nigeria in the core of the Niger Delta, between Rivers state and Delta state.

STUDY POPULATION

This consisted of women in labour.

ELIGIBILITY CRITERIA

Study population included 196 pregnant women who presented with labour pain and were enrolled on admission to labour ward.

Inclusion criteria

- Nulliparous paturients.
- Gestational age ≥ 37 weeks.
- Spontaneous onset of labour.
- Singleton vertex presentation.
- In active phase of labour (Cervical os dilatation of 4 cm).

Exclusion criteria

- Multiparous parturients.
- Gestational age < 37 weeks.
- Induction of labour.
- Non vertex presentation.
- Pregnancy with medical or obstetric complications.
- Those with Intrauterine fetal death or fetal anomalies.
- Elective Caesarean Section cases.

SAMPLING METHOD

Paturients who met the inclusion criteria were divided into two groups based on maternal height. The study group was the first group which included 94 paturients with maternal height of ≤ 152 cm while the control group was the second group which included 102 paturients with height > 152 cm. Paturients in the control group were randomly selected from the labour ward during the study period.

Labour was then monitored partographically, artificial rupture of membrane (ARM) done in active phase labour and oxytocin augmentation was used in cases with slow progress and inadequate uterine contractions.

Vaginal delivery or Emergency Caesarean Section for poor progress in labour due to Cephalopelvic Disproportion was recorded as mode of delivery.
The Apgar scores, birth weight, and the need for the newborns to be admitted to the Special Care Baby Unit (S.C.B.U.) were also recorded.

STUDY INSTRUMENT

A structured self-administered questionnaire was designed and used to collect information from the paturients.

DATA ANALYSIS

The data was processed using SPSS windows version 22. Two methods were used for analysis of data, descriptive and analytic. The descriptive statistics were done by examining the distribution of variables, while in the analytical statistics; t-test was performed for continuous variables, (Chi) square test used for categorical variables and the P value < 0.05 was considered statistically significant.

RESULTS

During the 10 months study period from 1st of August 2013 to the 1st of June 2014, the total deliveries in Federal Medical Centre Yenagoa were 1288 deliveries, of which 94 (7.3%) term singleton nulliparous paturients with height of ≤ 152 cm met the inclusion criteria.

Table 1: Socio-demographic Distribution of Expectant Mothers.

Variable	Frequency (f)	Percentage (%)
Educational qualification:		
None	8	4.1
Primary	42	21.4
Secondary	65	33.2
Tertiary	81	41.3
Occupation:		
Bussiness/Trader	75	38.3
Public/Civil servant	48	24.5
Students	19	9.7
Homemakers	54	27.6
Booking Status:		
Booked	148	75.5
Unbooked	48	24.5
Participants:		
Study group	94	48.0
Control	102	52.0

Source: Analysis by author (2014)

Table 1 showed: 8 (4.1%) had no formal education, 42 (21.4%) had primary education, 65 (33.2%) had secondary education while 81 (41.3%) had tertiary education; 75 (38.3%) were

business/traders, 48 (24.5%) were public/civil servants, 19 (9.7%) were students while 54 (27.6%) were homemakers; 148 (75.5%) were booked while 48 (24.5%) were unbooked; 94 (48.0%) were above 152 cm in height (study group) while 102 (52.0%) were less than 152 cm in height (control).

Table 2: Distribution of Height among Respondents.

Maternal Height (cm)	Frequency (f)	Percentage (%)
< 137	6	3.1
138-142	19	9.7
143-147	26	13.3
148-152	43	21.9
>152	102	52.0
Total	196	100.0

Source: Analysis by author (2014)

Table 2 showed: 6 (3.1%) are < 137 cm, 19 (9.7%) are 138 - 142 cm, 26 (13.3%) are 143 - 147 cm, 43 (21.9%) are 148 - 152 cm while 102 (52.0%) are > 152 cm in height.

Table 3: Height and Mode of delivery among expectant mothers.

Mode of delivery	Study group (≤152cm)		Control group (>152cm)		P. value
	f	%	f	%	
Vagina	55	58.5	88	86.3	0.03
Caesarean	39	41.5	14	13.7	
Total	94	100	102	100	

Note: P value < 0.05 (Significant)
Source: Analysis by author (2014)

Table 3 showed: 55 (58.5%) of the study group delivered vaginally and 39 (41.5%) delivered via caesarean section while 88 (86.3%) of the control group delivered vaginally and 14 (13.7%) delivered via caesarean section. There was a statistical significant relationship between delivery vaginally and via caesarean section between study group (< 152 cm) and control (> 152 cm), P = 0.03.

Table 4: Maternal height and mode of delivery among expectant mothers with height < 152 cm

Height categories (cm)	Frequency	Mode of delivery				P value
		Normal vaginal delivery		Emergency C/S		
		f	%	f	%	
<137	6	2	3.6	4	10.5	0.04
138-142	19	7	12.5	12	31.6	
143-147	24	19	33.9	5	13.2	
148-152	45	28	50.0	17	44.7	
Total	94	56	100	38	100	

Note: P value < 0.05 (Significant).
Source: Analysis by author (2014)

Table 4 showed: those that delivered vaginally, 2 (3.6%) are < 137cm in height, 7 (12.5%) were 138 - 142 cm in height, 19 (33.9%) were 143 – 147 cm in height while 28 (50.0%) were 148 – 152 cm in height. Those that delivered via caesarean section: 4 (10.5%) were < 137 cm in height, 12 (31.6%) were 138 – 142 cm on height, 5 (13.2%) were 143 – 147 cm in height while 17 (44.7%) were 148 – 152 cm in height. 56 (59.6%) delivered vaginally while 38 (40.4%) delivered via caesarean section. There was a statistical significant relationship between height and mode of delivery.

Table 5: Birth weight of babies delivered by caesarean section in the study group and control group.

Birth weight (grams.)	≤152 (Study group)	> 152 (Control group)	P value
2600-3000	16	01	0.02
3100-3500	11	7	0.02
3600-4000	9	4	0.03
4100-4500	3	2	0.01
Total	39	14	

Note: P values < 0.05 (Significant)
Source: Analysis by author (2014)

Table 5 showed Birth weight of babies delivered by Caesarean section. From the table it can be observed that 16 babies delivered by mothers who are below 152 cm in height weighed between 2600-3000 grams while no baby was delivered by mothers whose height is above 152 cm. The table further revealed that 11 and 7 babies delivered by mothers in the study and control group weighed between 3100 - 3500 grams while 9 and 4 babies in the study and control group weighed 3600 - 4000 grams respectively. Finally, 3 and 2 babies in the study and control group weighed 3600 – 4000 grams respectively.

Table 6: Neonatal outcome in the study group and control group.

Neonatal outcome	Study group	Control group	P value
Mean birth weight (g)	3273.7	3627.6	0.3
Apgar scores at 5 minutes <7 ≥7	 4 (4.4) 88 (95.6)	 7 (6.9) 94 (93.1)	0.7
Total	92 (100)	101 (100)	
Admission to the S.C.B.U. Yes No	 9 (9.8) 83 (90.2)	 10 (9.9) 91 (90,1)	0.9
Total	92 (100)	101 (100)	
Health Status: Still birth Alive	 2 92	 1 101	
Total	94	102	

Note: P values of < 0.05 (Significant) and > 0.05 (Not significant)
Source: Analysis by author (2014)

Table 6 indicates that mean birth weight is 3273.7 and 3627.6 grams respectively for the study and the control groups. It can also be observed in the table that 4.4% of the study group and 6.9% in the control had Apga scores of < 7 at 5 minutes of birth. It is further observed in the table that 95.6 and 93.1% of the babies had Apga scores of > 7 at 5 minutes of birth

respectively. On Admission to Special Care Baby Unit (S.C.B.U.), 9.8% of the babies in the study group and 9.9% in the control group were admitted to the unit while about 90.2% and 90.1% of the babies were not admitted to the S.C.B.U. respectively.

Table 7: Perinatal mortality among the study and control group.

Perinatal mortality	Study group	Control group	P value
Still birth	2	1	0.04
Early neonatal death	3	1	
Total	5	2	7

Note:* P value <0.05 (Significant)
Source: Analysis by author (2014)

Table 7 shows the perinatal mortality among the study and control group. It is also imperative to note that in Table 7, a total of 5 babies died (2 still births and 3 early neonatal deaths) in the study group while in the control group only 2 babies lost their life; 1 each as a result of still birth and during the early neonatal period.

DISCUSSION

Maternal height can predict the risk of obstructed labour which is a major contributor to maternal and perinatal morbidity and mortality in developing countries (Ekele BA et al, 2000; Olatunji AO et al, 2002; Ogunnowo T et al, 2003; Dare FO and Oboro VO, 2002; Adamu SMK and Obed SA, 2001; Bujold E and Gauthier RJ, 2002). Howbeit, it is also an index of a woman's general health and nutritional status from her childhood (Cruicshank, 1969, Moller and Lindmark, 1997). Yet it is a very easy and cost effective measurement tool in obstetriccs.

Our finding showed that a total of 196 respondents were involved in the study. 94 (48.0%) of them formed the study group while 102 (52.0%) formed the control group. Booked paturients include 148 (75.5%) while the other 48 (24.5%) were un-booked paturients. 41.3% of them had tertiary education while 33.2% had secondary level of education, 21.4% had primary education while the remaining 4.1% had no form of education. Majority (38.3%) are traders, 24.5% of them are public/civil servants, and 9.7% are students while the remaining 27.6% are homemakers.

The study further showed that more of the women in the study group had their delivery via caesarean section compared to those in the control group with a ratio of 3:1 for the study and control group. A statistical significant relationship was observed in terms of their mode of delivery either vaginally or via caesarean section. P = 0.03 at 95% confidence interval. This implies that women with a height of $\leq$ 152 cm in this locality are more likely to deliver by caesarean section compared to those with a height of greater than 152 cm. Thereby necessitating the need to take precautions on arrival of women with short stature in order to reduce poor outcome during delivery. This finding is similar to studies by Song et al (2009) who noted that stunting is linked with increased caesarean delivery rate among women in their study. A similar finding was observed by Burgees (1997) who showed a statistical significant relationship between maternal height and incidence of obstructed labour and caesarean delivery. It was also supported by Tahir A. M. et al. However, Heevy M. A. and Shahla K. A. at the Arbil Maternity Teaching Hospital, Iraq in 2006 did not reveal any statistical difference between their control group (> 150 cm) and study group ($\leq$ 150 cm) in relation to risk of caesarean section. Kara F. et al at Turkey also could not demonstrate any

statistical difference in their study. Hence, high index of suspicion, monitoring and individualization of paturients with "poor obstetric height" are the watch words for improved obstetric outcome.

A statistical significant relationship was also observed between birth weight and maternal height with more neonates with birth weight of less 2600 – 3000 g being those in the study group while none was in the control. A statistical significant relationship was observed among birth weight and maternal height with those in the study group having less favourable scores compared to control among women who delivered via caesarean section $P < 0.05$.
Our findings also revealed that neonates delivered by short statured mothers had lower mean birth weight (3.3 kg) unlike those in the control group that had a mean birth weight of 3.6 kg. A statistical significant relationship was also observed $P = 0.3$ at 95% confidence interval. This finding is in consonance with previous studies which showed that neonates of short statured mothers had lower birth weight compared to those of mothers with normal heights (Hadar et al, 2002). However, the result revealed that poor Apgar score was relatively more in the control group unlike those in the study group. A percentage of 6.9% for the control group and 4.4% for study group. Similarly, a relatively higher percentage of the control group (9.9%) had more S.C.B.U. admissions than those in the study group (9.8%). Though, there was no significant statistical relationship observed ($P = 0.9$ at 95% confidence interval). This finding is contrary to many studies cited in the literatures. Despite these, more stillbirths were noted among the study group than the control group with a ratio of 2:1 neonates in the study and control group respectively. This was supported by other studies (Song et al, 2009; Hadar et al, 2002).

CONCLUSION

This study showed that poor obstetric outcomes are commoner among short statured women. The need for individualization of patients, partographic monitoring, prompt diagnosis of cephalopelvic disproportion, early possible caesarean section and neonatal resuscitation in this group are pivotal in the prevention of adverse maternal and perinatal morbidity and mortality.

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