Original article

Proximate Predictors of Vaginal Delivery in Primigravid women at a Tertiary Health Facility in Ibadan, Nigeria.

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Abstract

Background

Successful vaginal delivery (VD) is the desire of every parturient. This is however not always so especially for primigravid women. Predictive factors can help the counselling process and allay the anxiety that this group of parturients experience.

Objective

To determine the prevalence and predictors of vaginal delivery among primigravid women at a tertiary health facility.

Methods

This was a 6-month cross-sectional study of 200 primigravid women that were planned for vaginal delivery. Information was obtained using structured proforma. Bivariate and multivariable analysis was used to identify the proximate predictors of VD.

Results

The prevalence of vaginal delivery was 50.0%. Labour onset was spontaneous in 78.0%; 10.0% had engaged fetal head prior to labour onset while labour was augmented in 18.0% of the parturients. Labour lasted ≤12 hours in majority (67.5%) with about half (49.5%) having successful vaginal delivery. Factors predicting successful vaginal delivery were spontaneous labour onset (OR=3.555, 95% CI=1.626-7.774), booked pregnancy (OR=3.008, 95%CI=1.361-6.647), and early fetal head engagement (OR=6.484, 95% CI=1.686-24.943).

Conclusion

The identified predictive factors of vaginal delivery in this study will aid counselling of primigravid women regarding the likelihood of successful vaginal delivery especially in the absence of other obstetric complications.

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Keywords: vaginal delivery, primigravid parturient, labour onset.

Introduction

Primigravidas are women who are pregnant for the first time. They are usually at risk due to lack of experience regarding childbearing. Primigravid women with unengaged fetal head at term are likely at increased risk of operative delivery.[1,2] The mode of delivery can be spontaneous vaginal delivery (SVD), instrumental vaginal delivery (IVD) or caesarean section (CS). SVD is a natural process that does not need significant medical intervention and it is often considered the preferred outcome for pregnancy.[3]

Meanwhile, instrumental VD involves the use of either forceps or a vacuum device to help the mother in achieving vaginal delivery of the fetus.[4] CS is a form of surgical intervention with delivery of the fetus through an incision made on the maternal abdomen and uterus with intention to avert or treat maternal or fetal life threatening complications. In most cases, when a vaginal delivery poses a risk on the life or health of either the mother or the baby, a CS or instrumental VD is performed.[5]

Globally, every year about 140 million women give birth. [6] In Nigeria, rates of spontaneous vaginal delivery among primigravidas range from 53.6% to 74.8%.[7,8] In labour management, it is essential to adopt and practice the accepted current guideline on the knowledge of the relevant screening and normal labour process. This will invariably increase the probability of having an uncomplicated VD and postpartum period as proposed by the American College of Obstetricians and Gynecologists.[9] Nevertheless, there are a few absolute contraindications to VD like major placenta previa and contracted pelvis.[9,10] In addition, stress and pain were identified as issues bordering a normal delivery process.[11]

Primigravid women are in the category of obstetric high-risk patients because they are more predisposed to antenatal and intrapartum complications.[12,13] Likewise, studies have reported primigravid women have about 5 to 12 times higher risk of complications during labour and delivery.[12,13] Furthermore, primigravid women usually require more interventions in labour because of the need for more uterine force to overcome the inertia in the reproductive tract.[8] The uterus in primigravid women is noted to be less effective in maintaining uterine contractions thus augmentation of labour and instrumental deliveries are common among them.[8,14,15]

The concept of fetal head engagement (2/5th of the fetal head or less palpable on abdominal examination) in primigravid women before the onset of labour increase the chance of VD.[8] Other documented factors predicting VD include normal range of maternal body mass index (BMI) and fetal birth weight.[8] Variations in these factors such as timing of fetal head engagement, high or low maternal body mass index and fetal birth weight have been identified as the underlying reasons for failure of labour progress, which is the main indication for CS among primigravidas.[8,16] Early booking, prompt referral at the onset of complications, antenatal risk assessment and health education during pregnancy were revealed to improve pregnancy outcome in primigravidas.[7]

When compared to vaginal delivery, CS has been shown to increase the prevalence of maternal morbidity and mortality.[16] CS is linked with several complications like an increased risk of uterine rupture, post-partum haemorrhage, damage to structures adjoining the uterus, endometritis, sepsis, placenta praevia in subsequent pregnancies, and ectopic pregnancy.[16] There is also evolving evidence that babies delivered through CS have different exposures to hormones and bacteria than babies delivered via the vagina and this may alter the development of the immune system.[17]

In Nigeria, there is aversion for CS for sociocultural, religious, and economic reasons.[7,18] Lawani et al. reported barriers to acceptance of CS is not inflenced by parity with some of the parturients studied insisting on VD despite counseling on the potential danger(s). [18] However, the study did not explore factors that predicts successful VD among women of different parity despite the fact that primigravidas and nulliparas are more likely to develop labour abnormalities that require intervention when compared with multiparous women.[8,14,15]

Identifying various factors that can predict or hinder VD among primigravidas will help in the counselling, education, and management of parturients in this category.

Therefore, it is against this background that this study aimed to determine the prevalence and predictors of successful vaginal delivery among primigravidas at the University College Hospital, Ibadan which could serve as a basis for counselling them during pregnancy and labour.

Methods

Study Design

A cross-sectional study conducted between January 2017 and June 2017.

Study location

The study was conducted at the labour ward of the department of Obstetrics and Gynaecology of the University College Hospital, Ibadan, Oyo state, Nigeria. As a tertiary centre, the hospital serves as a referral centre for the primary and secondary health centres and private hospitals in Oyo state. University College Hospital Ibadan is the premier and the largest teaching hospital in Nigeria with an average of about 2,500 deliveries per year.

Sampling Technique

A purposive sampling strategy was used to recruit the primigravid women who met the inclusion criteria during the study period. The women were identified and informed about the study at presentation to labour ward or on the antenatal ward (for women scheduled for induction of labour). All the participants were counselled and recruited in labour ward after the vaginal examination performed was adjudicated to have met the inclusion criteria. The study population consist of primigravidas with singleton gestation at gestational age of 36 weeks and above. All the consenting primigravidas who presented at the labour ward with spontaneous labour or for induction of labour and are planned for VD were included in the study. Parturients who presented in advanced labour with cervical dilatation of greater than 3 cm and those that had previous history of uterine surgery were excluded from the study.

Data collection tool and procedures

At presentation in the labour ward, the parturient who met the inclusion criteria were reviewed and examined by the labour ward obstetrician or senior resident doctor (specialist trainees) to ascertain the eligibility for the study. The fetal head engagement and vaginal examination findings were documented.

An interviewer administered structured questionnaire adapted from previous studies on predictive factors and mode of delivery in primigravidas was used to obtain information from the study participants.[7,19] The questionnaire was pre-tested among 10 nulliparous women in the facility to assess for clarity and understanding of the questions and validation. It included three sections - Section 1 was the participant's demographic characteristics, obstetrics, and medical history. Section 2 was on the intrapartum events and Section 3 was the fetal and maternal outcomes. All needed information was extracted from the medical records within 24 hours of delivery.

Two research assistants (nurses) trained on the objectives of the study, data collection tool and extraction of information from the medical records completed the proforma.

According to the labour ward protocol, admission CTG was performed on all the patients, uterine contraction monitored every 30 minutes if not on continuous CTG, fetal heart rate monitored every 30 minutes in the first stage and 5 minutes in the second stage of labour, vaginal examination was performed every 4 hours (or 2 hourly when necessary) during the first stage of labour and hourly in the second stage of labour. Labour was monitored on a partograph for all parturients. Augmentation of labour with oxytocin was commenced if uterine contractions were inadequate (less than 3 strong contractions in 10 minutes) and labour progress was poor. Labour is only augmented in the presence of the above conditions after other abnormalities such as cephalo-pelvic disproportion (CPD) and fetal distress have been excluded. The active phase of labour for those on induction of labour and spontaneous labour was managed the same way according to the standard protocol. Caesarean section was performed when indicated after a review by the senior obstetrician on duty.

Data management and analysis

Data collected was entered, cleaned and analyzed using the Statistical Package for the Social Sciences (SPSS) version 20. The dependent variable is the mode of delivery. The independent variables are booking status, BMI recorded at booking, onset of labour, augmentation of labour, early fetal head engagement ($\leq$ 2/5th of the fetal head palpable per abdomen when cervical dilatation is < 3cm), gestational age at booking and at delivery. Continuous variables were described using mean± standard deviation (SD). Chi-square test was used to determine the association between the mode of delivery and the independent variables in categories.

Bivariate analysis was done to determine the relationship between the demographic and obstetric characteristics and mode of delivery. Logistic regression was used to establish the predictors of VD. The level of statistical significance was set at $p < 0.05$ and 95% confidence level. The questionnaires were destroyed after successful entry and analysis. It was stored on a pass worded computer and there was also a back-up on an external storage. Only the principal investigator presently has access to it.

Ethical Considerations

Ethical approval was obtained from the Institutional ethics review committee and a written informed consent was obtained from each of the parturient before administering the questionnaire. Anonymity was ensured by using identification numbers. No personal details or contact of the participants were obtained to ensure privacy. Confidentiality was established by maintaining strict non-disclosure of all the information obtained.

Results

During the study period, there was a total of 1,076 deliveries in labour ward of which 259 were primigravidas. Two hundred and six (206) primigravid women met the inclusion criteria and 200 consented to participate in the study.

Demographic and Obstetrics characteristics

The mean age was 28.15±4.78 years with majority (68.5%) in the 25-34 age category. Most of the women (78.5%) were booked with mean gestational age at booking of 16.76±10.3 weeks. Of the booked patients, 98.7% registered their pregnancy early at ≤14 weeks. Fifty-three percent had term delivery and the mean gestational age at delivery of 38.62±2.32 weeks. At booking, 49.0% were of normal body mass index (BMI) and 92.0% of them had no associated medical disorders (Table 1).

Table 1. Demographic and Obstetrics Characteristics

Variables	Frequency (n=200)	percent
Age (years)		
15-24	43	21.5
25-34	137	68.5
≥35	20	10.0
Mean 28.15 (SD=4.78)		
Booking status		
Booked	157	78.5
Unbooked	43	21.5
Gestational age at booking (weeks)*	155	98.7
≤14	2	1.3
>14		
Mean 16.76 (SD=10.3)		
Gestational age at delivery (weeks)	50	25.0
36<37	106	53.0
37-40	44	22.0
>40		

Mean 38.62 (SD=2.32)		
BMI*		
Underweight (<19)	6	3.8
Normal weight (19-24.9)	77	49.0
Overweight (25-29.9)	47	29.9
Obese (30 and above)	27	17.2
Associated medical disorder		
None	184	92.0
Hypertension	4	2.0
Gestational diabetes	1	0.5
Anaemia	2	1.0
Renal disease	1	0.5
Sickle cell disease	2	1.0
HIV	2	1.0
Hepatitis B infection	2	1.0
Fibroid in pregnancy	2	1.0

*n=157 **HIV- Human immunodeficiency virus infection; BMI-Body Mass Index

Intrapartum events and outcomes

Spontaneous onset of labour was observed in 78.0% of the study participants. Ninety percent had no fetal head engagement at presentation in labour ward and labour was augmented in only 18.0% of them. Labour (duration of active phase) lasted for ≤12 hours in a higher proportion (67.5%) with a mean duration of 7.36±1.1 hours.

As regards the mode of delivery, 50.0% delivered via caesarean section and 49.5% had vaginal delivery. Only 0.5% had instrumental vaginal delivery (vacuum delivery). The proportion of live birth was high (98.0%) and majority (85.5%) of the babies had normal birth weight (Table 2).

Table 2. Intrapartum events and outcomes

Variables	Frequency	Percent
Onset of labour		
Spontaneous	156	78.0
Induced	44	22.0
Fetal head engagement		
Engaged	20	10.0
Not engaged	180	90.0
Augmentation of labour		
Yes	36	18.0
No	164	82.0
Duration of labour (hours)		
≤12	135	67.5
> 12	65	32.5
Mean 7.36(SD=1.1)		
Mode of delivery		
Vaginal Delivery	99	49.5
Assisted Vaginal Delivery	1	0.5
Caesarean Section	100	50.0
Indications for Caesarean Section		
Cephalopelvic disproportion	36	36.0
Fetal distress	31	31.0
Cervical dystocia	18	18.0
Failure of descent	11	11.0
Others	4	4.0
Maternal complications postpartum		
Yes	17	8.5
No	183	91.5
Fetal status		
Live birth	196	98.0
Still birth	3	1.5
Early neonatal death	1	0.5
Birth weight (kg)		
Low Birth Weight (< 2.5kg)	29	14.5
Normal Birth Weight (2.5 < 4.0kg)	171	85.5
Mean birth weight 2.99±0.58		

Factors associated with vaginal delivery

The factors associated with VD were their booking status (p=0.025), onset of labour (p<0.001), fetal head engagement (p=0.002) and gestational age at delivery (p=0.039). Majority (85.0%) of the women who booked had VD compared to 15.0% of those that were unbooked. A significant association exists between the women's booking status and having VD (p=0.025). Eighty nine percent of the women who had spontaneous onset of labour had VD compared to 11.0% of those whose labour were induced. Onset of labour was significantly associated with having a VD (p<0.01).

VD occurred in 83.0% of the women whose fetal head were not engaged compared with 17.0% with early engaged fetal head with a significant difference of p=0.002. Among the women who had VD, 62.0% delivered at term, 20.0% delivered after 36 weeks but before 37 completed weeks and 18.0% delivered post-term babies. A significant relationship exists between VD and the gestational age at delivery (p=0.039), (Table 3).

Table 3. Bivariate analysis of factors associated with vaginal delivery among primigravid women.

Variable	Mode of delivery		Total	X^2	p-value
	VD (n=100)	CS (n=100)			
Booking status				5.01	0.025
Booked	85 (85.0)	72 (72.0)	157 (78.5)		
Unbooked	15 (15.0)	28 (28.0)	43 (21.5)		
BMI (kg/m²)				1.62	0.655*
Underweight	4 (4.7)	2 (2.8)	6 (3.8)		
Normal weight	39 (45.9)	38 (52.8)	77 (49.0)		
Overweight	25 (29.4)	22 (30.6)	47 (29.9)		
Obese	17 (20.0)	10 (13.9)	27 (17.2)		
Associated medical disorder				1.09	0.297
Yes	6 (6.0)	10 (10.0)	16 (8.0)		
No	94 (94.0)	90 (90.0)	184 (92.0)		
Onset of labour				14.1	<0.001
Spontaneous	89 (89.0)	67 (67.0)	156 (78.0)		
Induced	11 (11.0)	33 (33.0)	44 (22.0)		
Augmentation of labour				2.88	0.09
Yes	26 (24.5)	10 (11.9)	36 (18.0)		
No	80 (75.5)	84 (88.1)	164 (82.0)		
Early Fetal head engagement				10.89	0.002*

Engaged	17 (17.0)	3 (3.0)	20 (10.0)		
Not engaged	83 (83.0)	97 (97.0)	180 (90.0)		
Gestational age at delivery				6.51	0.039
36 <37 weeks	20 (20.0)	30 (30.0)	50 (25.0)		
37 – 40 weeks	62 (62.0)	44 (44.0)	106 (53.0)		
>40 weeks	18 (18.0)	26 (26.0)	44 (22.0)		
Duration of labour (hours)				1.85	0.174
≤12	72 (72.0)	63 (63.0)	135 (67.5)		
>12	28 (28.0)	37 (37.0)	65 (32.5)		
Age (years)				0.222	0.637
<35	91 (91.0)	89 (89.0)	180 (90.0)		
≥35	9 (9.0)	11 (11.0)	20 (10.0)		
Fetal birth weight (kg)				1.01	0.315
Low birth weight (< 2.5)	17 (17.0)	12 (12.0)	29 (14.5)		
Normal birth weight (2.5 – 4)	83 (83.0)	88 (88.0)	171 (85.5)		

*=fisher's exact BMI – Body mass index

Predictors of vaginal delivery

In the multivariable analysis, the predictors of VD were booking status, onset of labour and fetal head engagement. Booked primigravidas were three times more likely than unbooked primigravidas to have VD (OR=3.008, 95%CI=1.361-6.647).

Also, those who experienced spontaneous onset of labour were four times more likely to have VD than those whose labour were induced (OR=3.555, 95% CI=1.626-7.774) while those with early engaged fetal head were seven times more likely to have VD compared with those with unengaged fetal head (OR=6.484, 95% CI=1.686-24.943), (Table 4).

Table 4. Predictors of vaginal delivery

Factors	ODDS RATIO	95% CI	P-Value
Booking status			
Booked	3.008	1.361-6.647	0.006
Unbooked	1	-	
Onset of labour			
Spontaneous	3.555	1.626-7.774	0.001
Induced	1	-	
Fetal head engagement			
Engaged	6.484	1.686-24.943	0.007
Not engaged	1	-	
Gestational age at delivery (weeks)			
36 <37	1.011	0.417-2.452	0.981
38-40	1.786	0.830-3.842	0.138
>40	1	-	

Discussion

This study revealed the prevalence and predictors of vaginal delivery among primigravidas. The findings revealed that spontaneous labour onset, booking status and early fetal head engagement in the absence of other obstetric complications are predictive factors of vaginal delivery in primigravid women.

Demographic and Obstetrics characteristics

The proportion of primigravid parturients out of the 1,076 deliveries within the study period was 23.7%. This value falls within the range of values (15.3% to 45.6%) from studies in different regions in Nigeria.[8,19,20] In this study, majority (78.5%) of the pregnancies were booked. This is similar to the findings of Okunade et al in Southwestern region in which 76.7% of the primigravidas studied booked their pregnancy.[19] However, some Nigerian studies reported a higher proportion unbooked or 'late-booked' pregnancies.[8,21,22] Majority of the booked parturients

had a successful VD compared to the unbooked parturients which was statistically significant. Some studies have also reported poor pregnancy outcomes among women with late booking and those unbooked for antenatal care.[19,21]

The mean age of the study participants of 28.15±4.78 years is similar to those reported in South-western Nigeria and Denmark, but age was not a predictive factor for vaginal delivery.[8,17] However, elderly primigravidas (aged 35 or more) were found to have lower rate of VD which is similar to the findings of Moses et al.[23] This may be related to the fact that they are at high risk of several medical and obstetrics complications.[20]

Meanwhile, the prevalence of successful vaginal delivery among the primigravidas was 50.0% essentially equal to the caesarean delivery rate which disagrees with reports from other studies in which higher proportion of the primigravidas had VD.[8,24,25] This could be because of the use of electronic fetal monitoring – cardiotocograph (CTG) in the study centre. Studies have shown increase in CS rate due to non-reassuring fetal heart rate tracing in health institutions where CTG is used to monitor parturient in labour.[26,27] This corroborates with our finding of fetal distress as one of the main indications for CS.

The major indications for CS were failure to progress due to cephalo-pelvic disproportion and fetal distress. This agrees with the finding from other studies that identified similar indications as leading reasons for caesarean section among primigravid women.[8,28] In the primigravida, the uterus is likely less efficient physiologically and this may cause irregular contractions with slow progress in labour leading to fetal distress and failure to progress in labour.[15]

Labour lasted for ≤12 hours in more than half of the parturient and only 18.0% of those with spontaneous laboured augmentation. This was consistent with studies by Khurshid et al. and Chaudhary et al. who reported a similar pattern as regards the duration of labour.[24,29] Lower rate of labour augmentation was however found in some other studies.[1,25,30]

Predictors of Vaginal delivery in Primigravid women

The predictors of VD identified were labour onset, booking status and fetal head engagement. Primigravidas with spontaneous onset of labour were more likely to have VD compared to those with induced labour (89.0% versus 11.0%) and was statistically significant. Those with spontaneous onset of labour were four times more likely to have vaginal delivery than those with induced labour. This is in keeping

with other studies in which spontaneous onset of labour was a predictor of successful vaginal birth.[30–32]

Booked primigravidas were three times more likely to have VD compared with their unbooked counterparts which buttresses findings.[33] This may be because the booked patients have more advantages regarding identification of contraindication to VD and risk factors for unsuccessful VD for which the patient would have been offered an elective CS. Also, the booked patients receive counselling on birth preparedness and complication readiness during the antenatal visit making them more emotionally and psychologically prepared for labour and delivery compared to their unbooked counterparts. Early fetal head engagement was also observed to be a factor predicting VD among the parturients as those with engaged fetal head at presentation were seven times more likely to have VD compared with those with an unengaged fetal head. This agrees with other studies which reported women with early labour fetal head engagement were more likely to achieve VD than those with persistently unengaged fetal head at advanced cervical dilatation.[8,31,34] Engaged fetal head results in good contact between the fetal head and the cervix, thus reducing the risk of dystocia.[35] Once engagement occurs, it is an indication that the pelvic inlet is adequate for the fetal head and vaginal delivery becomes more likely.

Limitations

The main limitation is that all the factors (including epidural analgesia, social support) that may influence labour outcome could not be accounted for, though many identifiable confounders were controlled for using multivariable analysis. Despite all these, our findings identified the proximate predictors of VD among primigravidas. This is crucial in modern obstetric care where women ought to experience institutional routine care grounded on evidence-based medicine.

Conclusion

Proximate predictors of vaginal delivery among the studied primigravid women were booking status, fetal head engagement and spontaneous onset of labour and the prevalence of vaginal delivery was 50.0%. High rate of caesarean delivery in the primigravid women could have a cascading effect on their reproductive career. Therefore, this calls for adequate counselling of these women, labour management according to guideline or protocol and prompt intervention by skilled health care personnel considering the identified predictive factors of vaginal delivery.

Conflict of interest

All authors declare no conflict of interest.

Authors' contribution

O.O Bello – OOB, R.M.E Takpe – RMET, C.A Onebunne - CAO

OOB: Design of the study, data acquisition, analysis and interpretation, drafted the manuscript and substantively revised it.

RMET: Design of the study, Data acquisition, analysis and interpretation, and substantively revised the manuscript.

CAO: Data acquisition, drafted the manuscript and substantively revised the manuscript.

All authors approved the manuscript in the present format.

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