

BACTERIAL VAGINOSIS AND PREGNANCY OUTCOMES IN WOMEN DELIVERED AT OUR LADY OF APOSTLES HOSPITAL, JOS, NIGERIA

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Background: Bacterial vaginosis has been associated with adverse pregnancy outcomes affecting the neonate, mother and invariably the whole family. The general objective of the study was to determine the association between bacterial vaginosis and pregnancy outcomes among women delivered in O. L. A Hospital, Jos, in order to recommend management guidelines for such women.

Methods: A prospective observational study of women delivered at O.L.A. Hospital, Jos was done over a period of four months. Two hundred and eleven study participants were recruited. The diagnosis of bacterial vaginosis was made using The Amsel criteria. Pregnancy outcomes in terms of gestational age at delivery, delivery outcomes, neonatal morbidity and maternal morbidity were observed.

Results: The prevalence of bacterial vaginosis among the participants in this study was 25.6%. There was a significant relationship between bacterial vaginosis and educational status ($X^2 = 8.596$, $p = 0.035$), gestational age at delivery ($X^2 = 18.272$, $p = 0.011$), preterm rupture of membranes ($X^2 = 10.812$, $p = 0.001$) and prolonged pre-labour rupture of membranes ($X^2 = 82.72$, $p = 0.004$). Prolonged pre-labour rupture of membranes was predictive of bacterial vaginosis (Odds ratio = 0.185, $p = 0.0005$). There was a significant relationship between foetal/neonatal morbidity and bacterial vaginosis ($X^2 = 4.370$, $p = 0.037$), but there was however no significant relationships between bacterial vaginosis and each of the foetal/neonatal morbidities identified ($p > .05$).

Conclusion: The study shows bacterial vaginosis is prevalent in pregnant women who deliver in the facility. Lack of formal education was identified as a risk for bacterial vaginosis. Bacterial vaginosis has a significant relationship with adverse pregnancy outcomes in these women.

INTRODUCTION

Bacterial vaginosis, the commonest cause of vaginitis among women of child bearing age, has been related to various complications of pregnancy as well as to gynaecological conditions.¹⁻³ Bacterial vaginosis is a syndrome characterized by a shift in vaginal flora from a predominant population of lactobacilli, which promote a healthy ecosystem, to their gradual or total replacement with anaerobes.⁴ With few exceptions, all bacterial vaginosis-associated microbial species, particularly *Gardnerellavaginalis*, exist in low concentrations in the vaginal ecosystem of healthy women.¹ The cause of the replacement of lactobacilli by these anaerobes has not fully been understood though risk factors ranging from multiple concurrent sexual partners and not using condoms to smoking and douching have been identified.^{1,5-13}

Bacterial vaginosis-related organisms have been associated with processes of inflammation in the upper genital tract and in foetal membranes and amniotic fluid during pregnancy with outcomes such as premature rupture of membranes, preterm labour, preterm deliveries, facilitation of heterosexual transmission of HIV, endometritis and pelvic inflammatory disease.^{2,14,15}

Unfortunately more than 50% of women with bacterial vaginosis are asymptomatic and will not seek medical care as a result.¹ The absence of

symptoms however does not preclude the increased risk of preterm rupture of membranes, preterm labour or preterm delivery. Among those who are symptomatic and seek medical care, bacterial vaginosis is often misdiagnosed and remains untreated.¹⁶

The prevalence of bacterial vaginosis in pregnant women varies from one geographical location to another. It is lowest in industrialized nations where it ranges from 7% in France¹³ to between 15% and 20% in the United States of America.¹⁷ In sub-Saharan Africa, the prevalence is much higher. Various studies have reported prevalence rates of 28.5% in Tanzania¹⁸, 14.6% in Zaria, North-West Nigeria¹⁹, 25% in Osogbo²⁰, and 64.3% in Lagos²¹, both in South West Nigeria.

The syndrome of bacterial vaginosis was first characterized using clinical criteria and simple laboratory tests applied to vaginal samples. With time, a constellation of evaluations became known as the Amsel criteria. These criteria, which have been established for the clinical diagnosis of bacterial vaginosis clinically and was the preferred diagnostic tool for this study.²²

METHODS

The study was conducted in the labour ward of Our Lady of Apostles (O.L.A) Hospital; a faith based secondary health facility located in Jos, North

Central Nigeria. It was an observational study of women who delivered in the hospital from February 2013 to June 2013. Ethical clearance was received from the Ethical Review Committee of O.L.A. Hospital.

A total of 211 consenting pregnant women, whose gestations were at least 28 completed weeks, were recruited when they were admitted into the labour ward for delivery. Adequate counselling of the participants was done before questionnaires were administered. The questionnaires were used to obtain data of the study participant's socio-demographics, clinical symptoms and obstetric history.

Each participant then had a high vaginal swab taken. The appearance of any discharge present was recorded. The vaginal swab was tested for its pH using pH indicator strips. A Whiff test was done by applying a drop of 10% potassium hydroxide solution to a sample of the specimen in order to detect the presence of a fishy (amine) odour. Microscopy to identify clue cells was also done. The Amsel Criteria were used to determine if a study participant had bacterial vaginosis.²²

Pregnancy outcomes were observed and recorded. Maternal outcomes of interest included gestational age at delivery and the presence of preterm rupture of membrane/prolonged pre-labour rupture of membranes. Foetal outcomes of interest were live births, still births and perinatal deaths.

RESULTS

Two hundred and eleven women were recruited for this study. They were predominantly between 20 and 35 years of age. Most were either housewives (35.5%) or self-employed (33.6%). The vast majority were married (96.2%). Most (47.4%) had secondary education, while a notable 4.7% had no formal education.

Fifty four (25.6%) of the participants had bacterial vaginosis. Two hundred and two (95.7%) had live births, eight (3.8%) had stillbirths and 1 (0.5%) had a perinatal death.

Twenty six participants (12.3%) delivered at gestations of less than 37 weeks. Twenty two

(10.4%) had had rupture of membranes before 37 weeks gestation. Prolonged Pre-labour rupture of membranes, defined as rupture of membranes at 37 weeks gestation or above lasting 24 hours or longer before onset of labour, occurred in 27(12.8%) of the participants.

Seventeen (8.1%) participants had maternal morbidities particularly hypertensive disease of pregnancy and postpartum haemorrhage.

Eight (3.8%) of the neonates had low birth weight, 6 (2.8%) had neonatal sepsis, 1 (0.5%) had a congenital abnormality and 191 (90.5%) did not have any foetal morbidity. Five (2.4%) had suffered intrauterine foetal demise.

There was a significant relationship between bacterial vaginosis and gestational age at delivery ($X^2 = 18.272$, $p = 0.011$), preterm rupture of membranes ($X^2 = 10.812$, $p = 0.001$) and prolonged pre-labour rupture of membranes ($X^2 = 82.72$, $p = 0.004$). However, there was no significant relationship between delivery outcomes of the foetuses and bacterial vaginosis ($X^2 = 0.243$, $p = 0.622$).

In this study, prolonged pre-labour rupture of membranes was predictive of bacterial vaginosis (Odds ratio = 0.185, $p = 0.0005$). However, gestational age at delivery and preterm rupture of membranes were not significant predictors of bacterial vaginosis.

There was a significant relationship between foetal morbidity and bacterial vaginosis ($X^2 = 4.370$, $p = 0.037$). The presence of a foetal morbidity was predictive of bacterial vaginosis (Odds ratio = 0.377, $p = 0.042$). There were however no significant relationships between bacterial vaginosis and maternal morbidity ($p > 0.05$), type of maternal morbidity ($p > 0.05$), and type of foetal morbidity ($p > 0.05$).

There was also a significant relationship between the educational status of participants and bacterial vaginosis ($X^2 = 8.596$, $p = 0.035$). Lack of formal education was predictive of bacterial vaginosis (Odds ratio = 0.167, $p = 0.013$).

Table I Socio-demographics of the Study Participants and Bacterial Vaginosis

<i>Socio-demographic</i> <i>Characteristics</i>	<i>Bacterial Vaginosis</i>		<i>Chi-square</i> (X^2)	<i>df</i>	<i>p -value</i>	<i>Odds Ratio</i>	<i>p-value</i>
	<i>yes</i> <i>No.(%)</i>	<i>no</i> <i>No.(%)</i>					
Age (Years)							
			8.399	5	0.136		
15-25	10(4.8)	55(26.1)					
26-35	36(17.1)	93(44.1)					
36-45	8(3.8)	9(4.3)					
Occupation							
			11.776	6	0.067		
Housewife	23(10.9)	52(24.6)					
Student	7(3.3)	25(11.8)					
Public servant	2 (0.9)	25(11.8)					
Employed	22(10.4)	49(23.2)					
Unemployed	0 (0.0)	4(1.9)					
Others	0 (0.0)	2 (0.9)					
Marital status							
			1.222	3	0.748		
Single	1 (0.5)	4 (1.9)					
Married	52 (24.6)	151(71.6)					

Table II Pregnancy outcomes and Bacterial Vaginosis

	Bacterial Vaginosis		Chi-square (X^2)	df	p - value	Odds Ratio	p-value
	yes No.(%)	no No.(%)					
Gestational Age							
			18.272	7	0.011		
33 weeks	(3) 1.4	(1) 0.5				0.108	0.080
34 weeks	(1) 0.5	(2) 0.9				0.593	0.699
35 weeks	(2) 0.9	(5) 2.4				1.023	0.985
36 weeks	(7) 3.3	(5) 2.4				0.362	0.404
37 weeks	(6) 2.8	(5) 2.4				0.290	0.078
38 weeks	(4) 1.9	(16) 7.6				2.022	0.294
39 weeks	(6) 2.8	(35) 16.6				2.-78	0.166
≥ 40 weeks	(25)11.8	(88) 41.7					
Preterm Rom							
			10.812	1	0.001		
Yes	(12) 5.7	(10) 4.7				0.451	0.447
No	(42) 19.9	(147)69.7					
Prolonged Pre-labour ROM							
			8.272	1	0.004		
Yes	(13) 6.2	(14) 6.6				0.185	0.0005
No	(41) 19.4	(143)67.8					
Delivery Outcome							
			0.243	1	0.622		
Live birth	(51) 24.2	(151)71.6					
Still birth	(3) 1.4	(5) 2.4					
Perinatal death	(0) 0.0	(1) 0.5					
Maternal morbidity							
			0.243	1	0.622		
Yes	(3) 1.4	(14) 6.6					
No	(51) 24.2	(143)67.8					
Foetal morbidity							
			4.370	1	0.037		
Yes	(9) 4.3	(11) 5.2					
No	(45) 21.3	(146)69.2					
Type of Foetal Morbidity							
			8.091	4	0.888		
None	(45) 21.3	(146)69.2					
Neonatal Sepsis	(4) 1.9	(2) 0.9					
Congenital abnormality	(1) 0.5	(0) 0.0					
Low birth weight	(2) 0.9	(6) 2.8					
IUFD	(2) 0.9	(3) 1.4					
Types of Maternal Mortality							
			8.412	7	0.298		
None	50 (23.7)	(143)67.8					
Hypertensive dx of pregnancy	(1) 0.5	(8) 3.8					
APH	(0) 0.0	(1) 0.5					
Prolonged pregnancy	(1) 0.5	(0) 0.0					
Chicken Pox	(1) 0.5	(0) 0.0					
PPH	(1) 0.5	(3) 1.4					
Coagulopathy	(0) 0.0	(1) 0.5					
Graves dx	(0) 0.0	(1) 0.5					

DISCUSSION

Bacterial vaginosis is present in about 20% of women during pregnancy^{23,24,26} making the result obtained in this population (25.6%) just above average. The result obtained in this study is similar to the prevalence of 25% in Oshogbo, South West Nigeria.¹⁹ A lower prevalence of 14.6% had been found in Shika, Zaria of Kaduna State and a higher prevalence of 64% was found in a teaching hospital in Lagos.²¹

This variation in different parts of Nigeria may be as a result of variations in the occurrence of predisposing factors like frequency of coitus, failure to use condoms and having three or more male sexual partners over a twelve month period.^{5,8} Most of the risks for bacterial vaginosis were not investigated in the aforementioned studies or in this study. The Lagos study however found the highest prevalence of bacterial vaginosis in women who had sexual intercourse two or more times in a week.²¹

The women in this study who had no formal education had a greater risk of developing bacterial vaginosis than women who had at least primary school education highlighting another need for basic primary education for the girl child in Nigeria. Similar results were obtained in other studies done Mwanza, Tanzania and Lagos, Nigeria.^{18,21} In France which has a diversity of immigrants from the developing world, educational level (completed only primary school and completed only secondary school) were independent risk factors for bacterial vaginosis.¹³ Studies with larger cohorts may give us a better understanding of the role education plays in the prevalence of bacterial vaginosis in women.

In this study, 24.1% of the women with bacterial vaginosis had preterm deliveries compared with 8.2% of the women without bacterial vaginosis. In Oshogbo 17.65% of the women with bacterial vaginosis had preterm deliveries compared with 7.84% among those without bacterial vaginosis.²⁰ In a Danish study, 5.2% of the women with bacterial vaginosis had preterm deliveries compared with 2.4% of those without bacterial vaginosis.²⁵ In an Iranian study, 24% of their bacterial vaginosis positive women had preterm births compared with 4.9% of their bacterial vaginosis negative counterparts.²⁷ It can be that bacterial vaginosis may be a risk for preterm deliveries. Further analysis in these and future studies can reveal the significance of this relationship between bacterial vaginosis and preterm deliveries.

Pre-term rupture of membranes occurred in 10.4% of the study participants and prolonged pre-labour rupture of membranes occurred in 12.8% of the

participants. More than half of the women with preterm rupture of membranes had bacterial vaginosis. Twelve of the women who had bacterial vaginosis (22.2%) had had preterm rupture of membranes compared with 6.4% of women who did not have bacterial vaginosis. Similarly 24.1% of the women with bacterial vaginosis had had prolonged pre-labour rupture of membranes compared with 8.9% of those without bacterial vaginosis. Overall the women with bacterial vaginosis were three times more likely to have preterm or prolonged pre-labour rupture of membranes than those who did not. Comparatively, an Iranian study of 1223 pregnant women found 5.6% of the bacterial vaginosis positive women had preterm rupture of membranes compared with 2.9% of their bacterial vaginosis negative counterparts.²⁷ The results are not surprising as bacterial vaginosis has been implicated as a cause for adverse pregnancy outcomes including both preterm rupture of membranes and prolonged pre-labour rupture of membranes.^{20,25}

This study corroborates the current evidence that bacterial vaginosis increases the risk of preterm rupture of membranes and preterm deliveries. It is relevant for Family Physicians and other healthcare workers in Nigeria who provide antenatal, delivery and post natal services and all those who are working hard to ensure Nigeria achieves the fourth and fifth Millennium Development Goals.

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