Research Article

The prevalence of bacterial vaginosis among women with preterm labour

Miami A. Ali[1] *FICOG,* **Zainab Abdulameer**[2] *FICOG,* **Isra S. Ibraheem**[3] *MBChB*
[1]*Prof. in Gynecology and Obstetrics / Al-Mustansiriya University, College of Medicine*
[2] *Senior Lecturer in Gynecology and Obstetrics/ Al-Mustansiriya University, College of Medicine*
[3] *Department of Gynecology and Obstetrics - AL Yarmouk Teaching Hospital*

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Abstract

Background: Preterm birth is a major health concern. It is the leading cause of perinatal mortality and morbidity. bacterial vaginosis(BV) is the most common infection worldwide, the presence of bacterial vaginosis is claimed to cause preterm labour.
Aims: To assess the prevalence of bacterial vaginosis in preterm labour.
Patients and Methods: A case- control study was carried out in a Department of Gynecology and Obstetrics of Al-Yarmouk Teaching Hospital for a period of one year from May 2013 to May 2014.
100 pregnant women with singleton fetuses were divided into two groups: first group included 50 pregnant women diagnosed to have preterm labour with a gestational age < 37 weeks were taken as a study group and second group included 50 term pregnant women with a gestatioal age ≥ 37 weeks were taken as control group, vaginal swab was taken from each pregnant women in the above groups and the swab was sent for microbiological examination looking for the presence of Amsel's criteria .Bacterial vaginosis was diagnosed when at least three of the four criteria were positive .
Results: Bacterial vaginosis was more prevalent in patients with preterm labour (32%) in comparison with patients with term labour (14%) and the difference was statistically significant since the P-value (0.032).bacterial vaginosis among preterm labor is about three times higher than that among term labor
Conclusion: The prevalence of bacterial vaginosis in preterm labour women is higher than that in term labour group.

Key words: **Bacterial vaginosis, Amsel's criteria, preterm labour, term labour.**

INTRODUCTION

Preterm birth is a major cause of neonatal morbidity and mortality in developed countries [(1)]. Preterm birth is not a single disease entity but is a symptom or syndrome that may have one or more causes [(2)]. Risk factors for preterm birth include: preterm labor; prior preterm birth; multifetal gestation; second-trimester vaginal bleeding; low socio-economic status; familial history; chronic stress and poor nutrition. There is great interest in the role of infection as a primary cause of preterm labor in pregnancies with intact membranes [(3)]. Subclinical intrauterine infection of the choriodecidual space and amniotic fluid is the most widely known factor that underlying spontaneous preterm births [(4)]. Subclinical genital tract infection cause as much as 30% of spontaneous preterm birth and even a greater percentage of preterm premature rupture of membranes (PPROM) [(1)]. It has been suggested that bacteria can gain access to intrauterine tissues through: (1) transplacental transfer of maternal systemic infection (2) retrograde flow of infection into the peritoneal cavity via the fallopian tubes, or (3) ascending infection with bacteria from the vagina and cervix. The uterine cavity is normally sterile but the vagina contains commensal bacteria depending on the bacterial load and cervical resistance the bacteria may ascend through the cervix and reach the fetal membranes [(3)]. This might be due to immunosuppression and microbial colonization of vagina due to increased

circulating estrogen and deposited glycogen in the vagina during pregnancy [5].Bacterial vaginosis is a polymicrobial condition characterized by replacement of normally dominant lactobacilli by an overgrowth of anaerobic commensals in the vagina which includes microaorganisms like Gardnerella Vaginalis, Mobilincus, Mycoplasma Hominis, Ureaplasma U1realyticum and Prevotella[6]. Bacterial vaginosis is the most common vaginal infection in the United States today [7]. bacterial vaginosis during pregnancy is associated with preterm delivery, premature rupture of membranes, preterm labor, chorioamnionitis and postpartum endometritis. Other associated conditions include postoperative infections (e.g., post abortion, post hysterectomy) [8]. These anaerobic bacteria through specific products stimulate the decidual tissue; an increase of cytokine level and of the release of A2 phospholipase, and prostaglandins will lead to uterine contractions and preterm labor activity [9] **.** Two methods are used for BV diagnosis: the first was described by Amsel and the second method, the gram stain score of vaginal smears according to Nugent, involves the microscopic quantitation of bacterial morphotypes yielding a score between 0 and 10. A gram stain score ≥7 is considered indicative of BV. In recent years, culture-independent techniques based on the analysis of rRNA gene sequences have been developed, providing powerful tools to reveal the phylogenetic diversity of the microorganisms found within the vaginal ecosystem and to understand community dynamics[10].

PATIENTS AND METHOD:

A case-control study was carried out in the Department of Obstetrics and Gynecology, of Al-Yarmook Teaching Hospital, Baghdad, Iraq. The study was conducted over a period of one year starting from May, 2013 to May, 2014. The study protocol was approved by Obstetrics and Gynecology committee of Arab Board for medical specializations and from the scientific committee of research of Obstetric and Gynecological Department of AL-Yarmook Teaching Hospital. Total numbers of 100 women were included in the study, which were divided into two groups: **Study group**: included 50 women who were diagnosed to have preterm labour (gestational age≥ 28 &<37 weeks). **Control group**: included 50 term pregnant women (gestational age ≥ 37 weeks) who were admitted to the hospital because of labor pain. We selected the women while attending the labor ward ,the women who were included in the study must fulfill the inclusion and exclusion criteria.

Inclusion and exclusion criteria for both study and control groups

Inclusion criteria**:** Gestational age after 28 weeks and before 37 weeks (for the study group),singleton pregnancy, at any maternal age, parity, educational level, cervical dilatation ≥ 3 cm with effacement intact membranes. Exclusion criteria: Patients who had bloody discharge, leakage of amniotic fluid or rupture of membranes (P-PROM), multiple gestations& polyhydramnios. Verbal consent was obtained from each woman included in this study before any interference and vaginal swab collection.

Study tools and vaginal swab sample collection: On admission, complete evaluation for each patient in the study and control groups was done including, detailed history of age, gravidity, parity, history of previous preterm labor, multiple gestations, and smoking. Gestational age was determined by the last menstrual period (LMP) and early ultrasound examination. General examination, abdominal, and obstetrical examinations were recorded. All studied patients underwent examination looking for; cervical dilatation, presence or absence of any watery vaginal discharge was noted by exposing the vagina with a sterile unlubricated vaginal speculum.objective diagnosis of the type of discharge was made. The vaginal PH was measured by means of a narrow range PH strip which placed at the lateral vaginal wall for one minute and the change in the color of stripe was noted and recorded. A wet smear of vaginal secretion was made by rotating a sterile cotton swab on the posterior vaginal fornix and placing it on a glass slide with addition of few drops of saline then examined under microscope for clue cells. Whiff test was done by placing a few drops of 10% KOH on a glass slide mixed with discharge; a fishy smell make (whiff test) positive.

Bacterial vaginosis was diagnosed when at least three of the four Amsel′s criteria were positive [10].

1. thin, homogeneous vaginal discharge;
2. vaginal pH higher than 4.5
3. ‘fishy’ odour of vaginal fluid after addition of 10% KoH (whiff test);
4. Presence of clue cells on microscopic evaluation of saline wet preparations. [10]

The investigations were conducted for each patient, including FBC (full blood count) , blood group and Rh, RBS (blood sugar measurements) ,MSU (mid-stream urine).

Statistical analysis: Statistical Package for Social Sciences (SPSS) version 20 was used for data input, coding and managing. Chi-square, binary logistic regression was used for assessing the association between the variables. Results were reported as means,

standard deviation (SD), or frequencies and percentages. Tests defined statistically significant as p <0.05.

RESULTS

Preterm labour was found to be more prevalent among women of more than 1 gravida and parity, while; term labour was more among gravida 1 and nulliparous (primigravida). The results also revealed that previous history of one abortion was higher among patients with preterm labor in comparison with patients with term labour.

Table 1: Demographic characteristic of the study groups

Demographic data		Preterm Labour (n=50)	Term Labour (n=50)
Maternal age: Mean ± SD (95% CI)		26.4 ± 5.2 (25.0 – 27.8)	24 ± 4.5 (22.8 – 25.2)
Gestational age at admission (weeks): Mean ± SD (95% CI)		32.7 ± 2.4 (32.0 – 33.4)	38.4 ± 1.1 (38.1 – 38.7)
		No. (%)	No. (%)
Gravida	1	22 (44%)	30 (60%)
	>1	28 (56%)	20 (40%)
Parity	0	22 (44%)	30 (60%)
	1	17 (34%)	12 (24%)
	>1	11 (22%)	8 (16%)
Previous history of abortion	0	33 (66%)	37 (74%)
	1	13 (26%)	8 (16%)
	>1	4 (8%)	5 (10%)

Each one of the Amsel's criteria (KOH , PH>4.5 , Clue cells) was higher among women with preterm labor in comparison to women with term labor and the difference was statistically significant since the p-values were (0.009 , <0.001 , 0.016) respectively as shown in (table 2).

Table 2: Testing for bacterial vaginosis among the study groups

Amsel's criteria	Preterm Labour (n=50)	Term Labour (n=50)	p-value
Suggestive discharge	10 (20%)	10 (20%)	NS
KOH test	14 (28%)	4 (8%)	0.009*
PH>4.5	40 (80%)	16 (32%)	<0.001*
Clue cells	16 (32%)	6 (12%)	0.016*
≥3 Amsel's criteria	16 (32%)	7 (14%)	0.032*
*Significant at p <0.05. NS =Not Significant at alpha level<0.05.			

Among the 100 women included in the study (study and control groups) (23%) patients positive with bacterial vaginosis .Bacterial vaginosis was more prevalent in women with preterm labor **(32%)**in comparison with women with term labor**(14%)** and the difference was statistically significant since the p-value was (0.032) as shown in(table 3) ,figures (1 and 2) .

Table 3: Prevalence of bacterial vaginosis between the study groups

Bacterial vaginosis (≥3 Amsel's criteria)	Preterm labour	Term labour	Total
Positive	16 (32%)	7 (14%)	23 (23 %)
Negative	34 (68%)	43 (86%)	77 (77 %)
Total	50 (100%)	50 (100%)	100 (100 %)
Chi-square= 4.574	d.f. = 1	p-value= 0.032*	

we conduct the binary logistic regression model which revealed that; the odds of woman for being positive for bacterial vaginosis among preterm labor is 2.9 times about three times higher than that among term labor as shown in (table 4).

Table 4: Binary logistic regression; for the association between bacterial vaginosis and the types of labour.

Type of labour	O.R.	95% CI	p-value
Preterm labour	**2.9**	**(1.07 – 7.82)**	**0.037***
Term labour	**Constant**	-	-
***Significant at p <0.05.** **O.R. = Odds Ratio which means: (times of event to be occur/ times that same event will not occur)**			

Figure (1): Bacterial vaginosis prevalence among females with preterm labour

Figure (2): Bacterial vaginosis prevalence among females with term labour

DISCUSSION

Preterm labor is a distressing problem facing both the patient and the obstetrician, so it is clinically important to find out any predictor of the preterm labor that may help in prevention or in treatment of high-risk women. The cause of preterm labor is not yet completely known; in 50% cases it is spontaneous and idiopathic, although several potential risk factors have been identified [(11)]. Since large clinical and casuistic data have correlated BV with specific complications of pregnancy, we have tried to study the role of its presence in a sample of Iraqi pregnant women, whose labor were followed up at our facility. Previous reports of studies recorded correlation of bacterial vaginosis and preterm labor but the exact incidence varied among these studies. Diagnosis of bacterial vaginosis can be made by Gram staining or gas–liquid chromatography of vaginal fluid, or on clinical grounds based on high vaginal pH, a fishy odour in a thin homogeneous vaginal discharge and the presence of clue cells in the discharge on a wet mount . There is no significant difference in the ability of each of these diagnostic tests to predict preterm birth.Amsel's criteria sensitivity 92% and specificity of 77%[(8)].

In our study, we had a prevalence of BV of (23%), the condition was consistently more frequent in patients having a preterm labor (32%), when compared with patients having birth at the term (14%), and there is statistically significant association between BV and preterm labour.

Luni et al in 2005 [(12)] who carried out a cross –sectional study to determine the frequency of bacterial vaginosis in women with vaginal discharge (pregnant and non pregnant) either symptomatic or asymptomatic, by using Amsel`s criteria and Gram`s stain.were 16.1% of all observed patients had (BV).

In 2006, in Denmark, Svare et al [(13)] conduct a prosective cohort study on 3262 pregnant women to assess the prevalance of BV in the early second trimester (< 20 weeks) which was found to be 16% **,** the bacterial vaginosis was marginally associated with preterm delivery. A cross-sectional study was conducted in Thailand By Thanavuth et al in 2007 [(14)] . Bacterial vaginosis blue test was performed on the vaginal fluid collected from 158 pregnant women with suspected preterm labor between 28-36 weeks. A higher prevalence of BV in women in the preterm labor group was found 25.8%. In Iran, Nejad and Shafaie in 2008 [(15)] carried out a study on 160 labouring women to establish the association of bacterial vaginosis and preterm labour based on the presence of clue cells, were found that the prevalence of BV in patients with preterm labour 25% and prevalence in term patients 11.3% .

Nelson et al in 2008 [(16)] had confirmed BV in 40 % of pregnant women and 67% of these BV positive women reported no vaginal symptoms. He found that asymptomatic positive pregnant women are at similar risk of adverse pregnancy outcome compared to symptomatic pregnant women. In Pakistan , in 2009 Islam et al [(6)], were conducted a cross-sectionl study of 100 women with preterm labour and by using Amsel′s criteria they found that the prevelance of BV was 21%.and they found that Patient with preterm labour and a positive Whiff (Amine) test was 63%[(6)] which was more than what we found in our study (28%). In Thailend Chawanpaiboon and Pimol in 2010 [(17)] conduct a study to estimated the prevelance of BV in threatend preterm, preterm and term labour by using Amsel′s criteria. the prevalence of bacterial vaginosis in all the preterm labour group was higher than the term labour group (33% versus 16.1%) with statistical significance ($p < 0.05$) .

In 2012 a study done by Gakwad et al [(18)] Vaginal samples were collected from 120 patients for detecting the presence of BV by using Nugent′s scoring method ,they divided into 2 groups, 60 patients with preterm labour and 60 patient with term labour. They found that 45% of patients with preterm labor had positve BV, and 13.3%of 60 term patients had positive BV .

Keith et al in (2012) [(19)] studied the relationship between BV and preterm labour and he concluded that (BV) double risk of preterm labour. In the current study BV was 2.9 times higher in those with preterm labour than those with term labour .

In 2015 Awoniyi et al [(20)] investigated the prevalence of BV among pregnant women attending antenatal clinic and high vaginal samples were collected from pregnant women having vaginal discharge using Amsel′s criteria and Nugent criteria. (33.3%) were identified for BV with Amsel′s criteria while (60%) were identified by Nugent criteria. Bacterial vaginosis was more prevalent among pregnant women in first trimester (36.7%).It is possible that variations in the degree of virulence of the microorganisms exist and more likely a difference in the immune response, by the host against the infection may determine the severity of the condition[(21)]. the variation in the prevelance of BV between our study and others may be due to differece in the sample size, different method used for diagnosis, study design and criteria for patient selection.

Conclusion: Bacterial Vaginosis is found to be more prevalent in patients with preterm labour in comparison to patient with term labour. This may suggest that BV could be implicated in the etiology of preterm labor.

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