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Bacterial Vaginosis in pregnancy and it's fetomaternal outcome.

KEYWORDS

Bacterial vaginosis, Maternal and fetal complications.

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ABSTRACT

Introduction: The presence of Bacterial Vaginosis (BV) at a particular gestational age may be a factor in the subsequent development of pregnancy complications and the risk for disease may change based on BV positivity during different stages of gestation. Current study aims to evaluate the prevalence of BV in obstetrics patients using easily available rapid inexpensive diagnostic tests and the detailed fetal effects and maternal effects during pregnancy and post partum periods.

Aims and Objective: To study the prevalence, risk factors of BV and to evaluate the correlation between BV and adverse maternal and fetal outcome in pregnancy.

Materials and Method: 204 pregnant women attending the gynaecological OPD satisfying inclusion criteria were enrolled for this study, which is done over a period of 2 years (Nov-2013 to Nov-2015) in the Department of Obstetrics and Gynaecology,in collaboration with Department of Microbiology , VSSIMSAR, Burla,Sambalpur.

Results: Prevalence of bacterial Vaginosis in pregnancy was 22.55% (46cases were Bacterial Vaginosis positive among the study group of 204cases) and more common among the 20-25years of age group ,lower SES(18.62% vs 3.92% in the high socioeconomic category of women) ,rural habitat , education of primary level of women, Hindu religion (60.86%). Unbooked Primigravida (63.04%) in the 3rd trimester were commonly affected women.

Maternal complications mostly include- Premature Rupture Of Membrane,Preterm labour, Chorioamnitis and puerperal sepsis.

Fetal complications include – Birth asphyxia and Low Birth Weight.

Conclusion: BV can be implicated as one of the contributory factors of adverse maternal and fetal outcome.

Abbreviations: BV-Bacterial Vaginosis, PPROM-Preterm prelabour rupture of membrane, PROM-Prelabour rupture of membrane, SNCU-Special Newborn Care Unit

INTRODUCTION:

The typical vaginal flora of a woman during her fertile period is characterized by a remarkable prevalence of Lactobacillus, which determines and regulates the physiological acid pH(3.5-4.5), contributing to the creation and maintenance of a natural ambient hostile environment to the attack of microbial pathogens.

Bacterial Vaginosis (BV) is a condition in which there is the disturbance of vaginal microbial ecology described as the replacement of the usual lactic acid-producing lactobacillus predominant flora with an overgrowth of *Gardnerella vaginalis* and mixed anaerobic organisms. It is the most common cause of symptomatic vaginal discharge. The prevalence of BV is 6 - 35% according to various authors in different parts of the world. According to *Goldenberg and Hauth et al 2000*[1], prevalence of BV varies from 10-35% among pregnant women.

Two classic symptoms of BV are discharge and odor. Ascending uterine infection from the lower genital tract due to BV has been implicated as an important causative factor for many pregnancy complications namely preterm labor, spontaneous abortion, PPROM, PROM, chorioamnionitis, post partum endometritis and post cesarean wound infection.

The most common symptom among women with BV is a thin, gray, non-pruritic discharge with a fishy odor, while the vagina is not inflamed and there are no prominent symptoms of burning, pain or dyspareunia.

Clinical diagnosis of BV was first proposed by *Dukes* in 1995.Now a days BV is diagnosed mainly according to Amsels composite criteria in routine clinical settings and the Nugents Gram stain evaluation of bacterial morphotypes, which is more suited for diagnosis in research works.

Intrauterine infection is a major cause of preterm labour, and appears to be particularly associated with early preterm birth. It can also cause activation of the fetal inflammatory response, increasing severe neonatal morbidities in these high risk infants. Natural antimicrobials are a family of multifunctional proteins produced by epithelial and inflammatory cells which have broad-spectrum activity against bacteria. They also can modulate the immune response, and their involvement in the pathophysiology of a number of infective and inflammatory conditions is recognized.

The presence of BV at a particular gestational age may be a factor in the subsequent development of pregnancy complications and the risk for disease may change based on BV positivity during different stages of gestation. For example, the risk of preterm delivery due to BV in the first trimester, during early fetal and placental development, may be different compared with the risk of preterm delivery in the second and third trimesters, during profuse placental functioning. These relations currently are unknown.

Current study aims to evaluate the prevalence of BV in obstetrics patients using easily available rapid inexpensive diagnostic tests and the detailed fetal effects and maternal effects during pregnancy and post partum periods.

AIMS AND OBJECTIVE:

To study the prevalence, risk factors of BV and to evaluate the correlation between BV and adverse maternal and fetal outcome in pregnancy.

MATERIALS AND METHODS

Study Design:

The study entitled "Bacterial Vaginosis in pregnancy and its feto-maternal outcome" was a prospective study,conducted in antenatal

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outpatient department of obstetrics & Gynaecology, VSSIMSAR, Burla during the period Nov 2013 to Nov 2015.

Study population:
204 pregnant women attending the gynaecological OPD satisfying inclusion criteria were enrolled for this study.

Study Method and Statistical Analysis:
All patients were thoroughly examined after a written informed consent obtained from all the women after explaining it to them in the language they best understood. Overall 204 obstetrics cases were taken in the study who fulfilled the criteria.

Inclusion criteria:
A singleton pregnancy (primi/multigravida) at any trimesters of pregnancy prior to onset of labor, visiting to the OPD, O&G, VSSIMSAR, Burla with or without any complaints.

Exclusion criteria:
1. All pregnant woman in labor.
2. Antimicrobial therapy in preceding 2wks.
3. History of cervical incompetence and cervical surgery
4. History of antepartum hemorrhage, polyhydramnios, Urinary Tract infection, diarrhea or any other obvious cause of pre-term labor
5. Multiple pregnancies.
6. Intra Uterine Growth Retardation & Intra Uterine Death.
7. History of leaking p/v or absent membranes.
8. Medical complications of pregnancy such as Diabetes Mellitus, Hypertension, Heart disease, severe anemia etc.
9. History of known mullerian anomalies.
10. History of cordocentesis and amniocentesis.

Sample collection:
All participants underwent a standard speculum examination under sterile procedure with no lubricant added.

Macroscopic evaluation of the vaginal walls for colour, amount and consistency of the discharge was noted. Thin grey homogenous discharge is characteristic for BV.

A pH stick was applied on the lateral vaginal wall and the vaginal pH noted. Cervical mucus was avoided as it can cause a higher pH.

A sterile cotton swab was used to obtain the discharge from the posterior fornix and smeared in a glass slide and sent to the laboratory for gram staining.

A drop of vaginal discharge was mixed with a drop of normal saline on a glass slide, covered with a clean cover slip and sent to laboratory for clue cell examination under high power magnification.

The speculum was removed and two drops of 10% KOH added on the lower blade of the speculum for amine or "fishy "odor ("whiff test").

Preparation for Gram's stain in laboratory:
The smeared glass slide was air dried and heat fixed.

Then slide was stained with methyl violet for 1-2min and washed under slow running water.

Again the smear was stained with gram's iodine for 1min and washed under slow running water.

Then decolorized with acetone for 1/2min and washed.

Counterstained with safranin for 1/2min and washed.

Smear was air dried and examined under oil immersion.

Principle of Gram's Stain:
The crystal/methyl violet stain is the primary stain, which stains everything in the smear blue. The Gram's iodine acts as a mordant that causes the crystal violet to penetrate and adhere to the gram-positive organisms. The acetone-alcohol mixture acts as the decolourizer that washes the stain away from everything in the smear except the gram-positive organisms. The neutral red/safranin is the counter-stain that stains everything in the smear that has been decolorized: pus cells, mucus, gram-negative organisms. The gram-negative organisms will stain a much deeper pink than the pus cells, and mucus will stain even lighter pink than the pus cells.

Reading and Reporting the Smears:
The smear was then evaluated for the following morphotypes under oil immersion (1000× magnification): large Gram-positive rods (lactobacillus morphotypes), small Gram-variable rods (G vaginalis morphotypes), small Gram-negative rods (Bacteroides species morphotypes), curved Gram-variable rods (Mobiluncus species morphotypes) and Gram-positive cocci.

The results were graded using Nugent's criteria for diagnosis of BV (*Nugent et al, 1990)*[14].

Total scores are then calculated and used as follows: 0-3 (Normal), 4-6 (intermediate bacterial count), and 7-10 (bacterial Vaginosis).

DIAGNOSTIC CRITERIA:
Amsel et al (1983[4]) suggested the condition should be defined on the basis of the presence of at least three out of four criteria:
Thin homogenous vaginal discharge
Vaginal PH >4.5
Positive Amine/Whiff test
Clue cells on wet mount preparation.
Along with the criteria by Gram stain this study concludes the diagnosis and the different maternal and fetal outcomes are evaluated.

Maternal outcome was assessed as follows:
Abortions, Preterm labor, PPROM, PROM, Chorioamnionitis, Puerperal sepsis

Fetal outcome was assessed as follows
Still born, Birth asphyxia, Apgar score <7, Low birth weight/Preterm birth, SNCU admission, Neonatal jaundice, Neonatal death,

All data were analyzed statistically using chi-square test (X^2) , mean and standard deviation and by using software EPI Info 7.

Results: This study was undertaken in VSSIMSAR, Burla which covers the Western zone population of Odisha and some nearby area of Chattisgarh & Jharkhand.

The rate of Bacterial Vaginosis was found to be 22.55%. Among 204 pregnant women 46 were diagnosed to have Bacterial Vaginosis.

Table-1: Prevalence of bacterial vaginosis

Score	Organism morphotypes per average high power fields		
	Lactobacillus(parallel sided gram +ve rods	Gardnerella/ Bacteroids (tiny, variable coccobacilli & rounded gram negative rods with vacuoles)	Mobiluncus(curved gram negative rods)
0	>30	0	0
1	5-30	<1	1-5
2	1-4	1-4	>5
3	<1	5-30	-
4	0	>30	-

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Above table shows prevalence of Bacterial Vaginosis 22.55%.

Table –2: BV distribution in different trimesters.

Parameters	No of cases	BV +ve	% of BV+ve	Incidence of BV
1st Trimester	94	20	43.47%	21.27%
2nd Trimester	72	16	34.78%	22.22%
3rd Trimester	38	10	21.75%	26.31%
Total =	204	46	22.55%	22.55%

Above table shows 21.27% of cases were bacterial Vaginosis +ve among 1st trimester group, 22.22% positive in 2nd trimester and 26.31% of Vaginosis positive among the 3rd trimester group of cases. Hence incidence of Bacterial Vaginosis was more in 3rd trimester in my study.

Total number of cases taken in the first trimester was 90, second trimester 72cases and in the third trimester was 38cases. As the cases were randomly selected, majority belong to the first trimesters.

The incidence of Bacterial Vaginosis among low socioeconomic group was 24.67% and among high socioeconomic group was 16%. So it was found to be more common among low socioeconomic group of women.

TABLE – 3: Socioeconomic distribution of Bacterial Vaginosis

Parameters	Cases	BV + ve		BV-ve	
		Cases	%age	Cases	%age
Low SES	154	38	18.62%	120	58.82%
High SES	50	8	3.92%	38	18.62%
Total=	204	46	22.55%	158	77.45%

The incidence of BV was significantly higher among low socioeconomic group of cases (18.62%).

Among the booked case of ANC (=158), 32 were BV+ve (=20.25%) and among the unbooked case of ANC (=46), 14 cases were BV+ve (=30.43%). Hence unbooked cases were more prone to have Bacterial Vaginosis .

Among the Primigravida (n =111), 29cases were found to be BV +ve (Incidence= 26.12% among primigravida) and among the multigravida (n =93), 17cases were found BV+ve (Incidence =18.28% among multigravida).

Table – 4: Maternal age distribution in BV+ve and BV-ve cases

Age in years	BV+VE		BV-VE	
	Case	Percentage	Case	Percentage
</=20yrs	2	4.35%	12	7.59%
21-25yrs	26	56.53%	83	52.53%
26-30yrs	7	15.21%	40	25.31%
31-35yrs	9	19.56%	21	13.29%
>35yrs	2	4.35%	2	1.28%
Total =	46	100%	158	100%

Above table shows more prevalence of BV in the age group of 21-25 years which is significant followed by 31-35yrs, 26-30yrs. The least cases were from age group of </=20 years and >35 years.

More number of asymptomatic cases were detected(65.22%) by selecting every antenatal cases into the study.

Symptomatic cases were taken into account by the complain of the pregnant women, i.e, malodor white discharge. But all the symptomatic cases were not diagnosed as BV, as other infections like trichomoniasis or other STDs also cause abnormal discharge and they were accordingly diagnosed and treated.

TABLE -5: BV according to Religion.

Religion	BV+ve	BV-VE	Total
Hindu	28 60.86%	116 73.41%	144 70.58%
Muslim	10 21.73%	18 11.39%	28 13.72%
Christian	8 17.41%	24 15.20%	32 15.7%
Total =	46 100%	158 100%	204 100%

This shows the Religion does not influence the risk of bacterial Vaginosis. But the prevalence of bacterial Vaginosis was more among Hindu religion followed by Muslim and then Christians.

TABLE – 6: Bacterial Vaginosis and Abortion. In this study only 2nd trimester abortions were seen.

	BV+VE	BV-VE	Total
Abortion	2 4.54%	2 1.28%	4 2%
Not aborted	42 95.46%	154 98.72%	196 98%
Total=	44 100%	156 100	200 100%

^{2} = 1.848 d.f.=1 p<0.5

This is statistically not significant (as p value <0.5).

Total 2cases were aborted in BV+ve group and also 2 cases were aborted from BV-ve group all being in 2nd trimester. So this study carried out from the cases who continued the pregnancy till delivery (n=44 for BV+ve, and n=156 for BV-ve group) and the feto maternal outcome were observed as below.

Table – 7: Mode of delivery in different cases in my study.

MODE		BACTERIALVAGINOSIS		TOTAL
		BV+VE (n=44)	BV-VE (n=156)	
TERM VAGINAL	CASE %	24 54.55%	104 66.67%	128 64%
PRETERM VAGINAL	CASE %	8 18.18%	10 6.41%	18 9%
CESAREAN SECTION	CASE %	12 27.27%	42 26.92%	54 27%
TOTAL=	CASE %	44 100%	156 100%	200 100%

TABLE -8: PPROM and Bacterial Vaginosis

	BV+VE	BV-VE	TOTAL
PPROM +VE	8 18.18%	4 2.56%	12 6%
PPROM-VE	36 81.32%	152 97.44%	188 94%
TOTAL	44 100%	156 100%	200 100%

$\chi^2 = \Sigma(O-E)^2/E = 14.81$ d.f.=1 p <0.001

Hence it is statistically significant.

TABLE -9: Premature Rupture Of Membrane and association with Bacterial Vaginosis.

	BV+VE	BV-VE	TOTAL
PROM+VE	12 27.27%	13 8.33%	25 12.5%

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PROM-VE	32 72.73%	143 91.67%	175 87.5%
TOTAL	44 100%	156 100%	200 100%

χ^2 =11.23 d.f.=1 p<0.001

Statistically significant.

TABLE -10: Preterm labor (PTL) and Bacterial Vaginosis

	BV+VE	BV-VE	TOTAL
PTL+VE	12 27.27%	10 6.41%	22 11%
PTL-VE	32 72.73%	146 93.59%	178 89%
TOTAL=	44 100%	156 100%	200 100%

χ^2 = 15.23 d.f.=1 p<0.001
Statistically significant.

The total vaginal delivery in Bacterial Vaginosis including preterm and term cases were 30(68.18%) and in BV-VE group 112(71.79%) where as total cesarean section in BV+ve cases were 12(27.28%) and BV-ve group 42(26.92%). It had not any statistical issue.

TABLE –11: Low birth weight in association with Bacterial Vaginosis.

	BV+VE	BV-VE	Total
Baby wt<2.5kg	14 31.81%	20 12.82%	34 17%
Baby wt>/=2.5kg	30 68.19%	136 87.18%	166 83%
Total	44 100%	156 100%	200 100%

χ^2 = 8.76 d.f.=1 p<0.005

Statistically significant. Low birth weight associated with bacterial Vaginosis could have been because of lower gestational age at birth in bacterial Vaginosis patients.

TABLE -12: Birth Asphyxia in relation to Bacterial Vaginosis.

	BV+VE	BV-VE	Total
Birth Asphyxia	12 27.27%	8 5.12%	20 10%
No birth asphyxia	32 72.73%	148 94.88%	180 90%
Total =	44 100%	156 100%	200 100%

χ^2 = 18.68 d.f.=1 p<0.001

Statistically significant.

TABLE -13: Bacterial Vaginosis and SNCU admission of New born

	BV+ve	BV-ve	Total
Admission to SNCU	18 40.90%	20 12.82%	38 19%
No admission to SNCU	26 59.10%	136 87.18%	162 81%
Total =	44 100%	156 100%	200 100%

χ^2 = 17.57 d.f.=1 p<0.001

Statistically significant.

TABLE -14: Bacterial Vaginosis in pregnancy and Neonatal Jaundice

	BV+ve	BV-ve	Total
Neonatal Jaundice	16 36.36%	42 26.92%	58 29%
No jaundice	28 63.64%	114 73.08%	142 71%
Total =	44 100%	156 100%	200 100%

χ^2 = 1.47 d.f. =1 p<0.5

TABLE 15: Bacterial Vaginosis in pregnancy and Puerperal sepsis.

	BV+ve	BV-ve	Total
Puerperal sepsis	4 9.09%	6 3.84%	10 5%
No sepsis	40 90.91%	150 96.16%	190 95%
Total =	44 100%	156 100%	200 100%

χ^2 = 1.97 d.f.=1 p<0.5

Statistically not significant.

9.09% of the cases of puerperal sepsis are seen in BV+ve group and 3.84% cases in BV-ve group, it may not be statistically significant but more percentage of cases were seen from Bacterial Vaginosis group.It needs extensive research for the correlation.

TABLE – 16: Bacterial Vaginosis in pregnancy and its relation to new born apgar score <7 in 1 min.

	BV+ve	BV-ve	Total
Apgar <7	14 31.81%	22 14.10%	36 18%
Apgar >7	30 68.19%	134 85.90%	164 82%
Total =	44 100%	156 100%	200 100%

χ^2 = 7.27 d.f. =1 p<0.01
Statistically significant.

Out of BV +ve cases only one case of neonatal death(2.27%) occurred may be due to the case was severe fetal distress and low Apgar score. From the BV –ve cases no neonatal death occurred.

Only 1 case from the BV +ve group, developed episiotomy wound gapping, which may be due to pre existing anaerobic bacterial infections, but the detailed study required for the correlation.

In this study the prevalence of BV, the associated sociodemographic factors and correlation of Amsel criteria with Nugent criteria for diagnosis of BV were evaluated.

There was a significant difference in the outcome in women with bacterial Vaginosis compared to those infections other than bacterial Vaginosis or no infection. Neonatal infections occur more often in prematures *(Daikoku et al)*[23]. The bacteria causing neonatal infections are generally the same as those causing amnionitis and are frequent isolates of the vagina (*Naeye et al)*[24].

DISCUSSION

Prevalence of Bacterial Vaginosis:

The prevalence of bacterial Vaginosis varies in different population in

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different clinical situations. *Kenyon et al.(2013)*[3,7,30] conducted a systematic review on the global epidemiology of BV. The BV prevalences were found to vary considerably between ethnic groups in North America, South America, Europe, the Middle East and Asia. Although BV prevalence is, in general, highest in parts of Africa and lowest in much of Asia and Europe, some populations in Africa have very low BV prevalences and some in Asia and Europe have high rates. If these findings are considered, it can be concluded that RTI has a varying degree of prevalence rate among people of different communities which might be due to various factors such as socio-demographic characteristics, sexual practices and hygiene behavior. *Goldenberg and Hatch et al in 2000*[1,18,19] studied 980 pregnant women and found prevalence of Bacterial Vaginosis is 10 – 35%. . Its prevalence ranges between 4.9 and 36% in developed countries (*Henn et al., 2005*[44, 69]).Among pregnant research volunteers in U.S. studies the prevalence of Bacterial Vaginosis varies from 16 – 23 percent. Study by *Mark H. Yudin & Deborah M. Money et al in 2008*[13], in pregnant women, prevalence of BV ranging from 6% to 32%. A Canadian study of maternity patients reported an overall prevalence of bacterial vaginosis of 14%. According to Mathew et al the prevalence of BV is 38%, but in *2010* according to *Rajshree Seth et al*[9,11] *and Indu Lata et al*[9] it is 19% and 20.5% respectively.

All the studies above were accordance with my study as prevalence of BV in this study was 22.55%.

TABLE -17: Prevalence of BV by different authors

Authors	Study group	BV+VE	Prevalence of BV
Gravett et al[33,34]	582	102	19%
Kurki et al[31,32]	790	162	21.4%
Jacobsson et al[39]	924	144	15.6%
Pastor et al[25]	913	163	17.8%
Rajshree seth et al (2010[9,11]*)*	100	19	19%
Mathew et al[16]	200	76	38.5%
Indulata et al (2010)[9]	200	41	20.5%
Mariam Anjum ifthikar et al(2014)[35]	150	30	20%
Our study (2013-2015)	204	46	22.55%

The methods used for diagnosing Bacterial Vaginosis are not uniform in all the studies. However most studies have reported a high degree of correlation between clinical criteria for diagnosis and laboratory methods.

Symptoms:

Around 50% of women with BV are asymptomatic *(Amsel et al., 1983; Donders, 1999; Gibbs, 2007; Klebanoff, et al., 2004; Schwebke; Desmond, 2007*[43]. At least 50% of women with BV have no symptoms and there is a debate on whether this form of BV should be considered a disease (*Nansel et al.2006, Pastore et al)*[3] in their cohort study of 913 pregnant women in USA reported about 80% bacterial Vaginosis were asymptomatic. In my study it was 68.19% which has gone with the others study.

Socioeconomic status:

According to *Jenifer E Allsworth, 2007*[8,17], the prevalance of BV more among low socioeconomic status is accordance with my study.

In a study by *Indulata et al in 2009*[9] showed that the incidence of BV is more among primigravida and at 11-20weeks of GA and also in low socioeconomic status(p=0.0477). In my study also the same result found.

Diagnostic criteria:

BV most often manifests clinically as a thin homogenous vaginal discharge, a pH of more than 4.5, presence of "clue cells" and an amine odor (after addition of 10% of KOH). Few or no Lactobacilli are usually found through microscopy in the vaginal fluid (*Larsson, 1992)*[26]. Several methods are currently in use for the diagnosis of BV (*Cook et al., 1992)*[26,27]. Amsel criteria have been used in most studies as the gold standard. Clue cells are vaginal squamous epithelial cells with coccobacilli-shaped bacteria densely adhered to them and obscuring their borders and making these appear indistinct rather than clearly defined (*Khan et al., 2007)*[28]. Furthermore, there is a significant lack of polymorphonuclear lymphocytes characterised by < 1 PMN per squamous epithelial cell. The sensitivity and specificity of > 20% clue cells in the diagnosis of BV is 81 and 99%, respectively and clue cells are said to be the single most reliable predictor of BV (*Henn et al., 2005)*[44].

Vaginal pH testing alone is highly sensitive, but it is not specific for BV (*Henn et al., 2005; Charonis et al., 2006; Thulkar et al., 2010)*[44]. Various commercial tests to diagnose BV are in use (*Henn et al., 2005)*[5, 44]. Molecular techniques have been used to characterise the normal and BV associated flora but to date are not used in routine diagnosis (*Donders, 2010)*[6].

Even without vaginal discharge, asymptomatic BV can be easily diagnosed when criteria 2, 3 and 4 are met (*Amsel et al., 1983; Sha et al., 2005; Simoes et al., 2006; Hasenack et al., 2008*)[31]. *Nugent, Krohn and Hillier, in 1991*[29], simplified the technique and their classificationis now the accepted gold standard for BV diagnosis (*Workowski; Berman, 2006*[4, 27]*)*. Hence in this study the diagnostic criteria used were Amsel's criteria and Nugent scoring.

According to various authors the sensitivity and specificity of Amsel test were ranging between 70-85% and 90-95% respectively (*Enica et al, Chakraborty et al 2001, and Tanuja et al 2002)*[70]. Sensitivity and specificity of Nugent test ranges between 80-90%, and 80-90% respectively (*Jenerk et al, Goldman and Hatch et al*)[1]. In my study the sensitivity and specificity of Amsel test was 84.5% and 93.7% respectively and that of Nugent test was 92% and 95% respectively.

Abortions:

Pippa Oakesshott et al[3,41] found that bacterial Vaginosis is associated with miscarriage in the second trimester. It has been shown that BV increases the risk of miscarriage between 13 and 24 weeks (*Donders, 2010)*[42]. In my study 4.54% cases of BV +ve in 1st trimester, undergone abortion in 2nd trimester.

Relation between preterm labor and Bacterial Vaginosis:

Premature labor occurred in 15% of the women studied by *Tânia Maria M. V. da Fonseca et al. 2013*[10]. In my study it was 11% in my study group, but 27.27% in BV+ve group and 6.41% in BV-ve group. The p value for the PTL was significant (p<0.001) as supported by various authors stated below.

TABLE -18: Significance of PTL by various authors.

Authors	Study group	P value (Significance)
Purwar et al[36]	1006	P=0.001
Gravett et al[33,34]	582	P<0.01
Kurki et al[32]	790	P<0.001
James Mc Gregor et al[31]	494	P=0.003
Our study	200	P<0.001

In my study the preterm labor was 27.27% in the Bacterial Vaginosis group where as it is only 6.41% in the BV –ve group. So it is very much significant for preterm labor. This was supported by the study of Uma laxmi et al, 2012, as shown below.

TABLE -19: Prevalence of preterm labor by various authors.

Authors	Study group	Preterm labor
Uma Laxmi et al,2012[37]	152	24.34%
Our study,2013-2016	200	27.27%

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PPROM:

The preterm premature rupture of membrane was 7% shown by *James Mc Gregor et al and 4% by Kurki et al*[31,32] in their study group, but in my study, it was 18%,i,e.more may be due to small study group and incorrect gestational age calculated from the incorrect LMP date given by pregnant mothers. But the data in all the study group were significant as given below.

TABLE -20: Significance of PPROM by various authors.

Authors	Study group	P value (Significance)
Purwar et al[36]	1006	P=0.001
Gravett et al[33,34]	582	P<0.01
Kurki et al[32]	790	Odd ratio=7.3
James mc Gregor et al[31]	494	P=0.006
Our study	200	P<0.001

A secondary cohort analysis of 12,734 found that of the 169 who experienced PPROM, 12.5-17.7% was infected with bacterial vaginosis (*Simhan et al., 2005)*[21]. In our study it was 18.18%. So it was similar to the cohort study.

In this study about 62.5% of PPROM were from Low socioeconomic status group as evidenced by the study of 2,244 women delivering in Rio Grande, Brazil, the researchers found a prevalence ratio of 1.94 among women with lower SES and 2.43 with lower levels of schooling (*Hackenhaar, Albernaz, & Fonseca, 2014)*[10]. A Canadian case control study also found that women experiencing PPROM were three times more likely (OR 3.1, 95% CI 1.6–6) to be of low socio-economic status, indicated by a total household income of less than $25,000 (*Ferguson, Smith, Salenieks, Windrim, & Walker, 2002)*[20].

Gravett et al[33,34] described the low birth weight among bacterial Vaginosis positive (p<0.005), in accordance with my study (p<0.001).

Neonatal jaundice in relation to Bacterial Vaginosis according to *Mariam Anjum ifthikar et al,2014*[35] was around 34%, also found in my study was 36.36%. The p value was not significant in my study as there were also Jaundice developed in BV-ve group in any other causes.

TABLE -21: Apgar score at 1 min in relation with Bacterial Vaginosis by various authors.

Authors	Significance of the study
Chakraborty B et al.2011[29]	P<0.05
Mariam Anjum ifthikar et al,2014[35]	P<0.208
My study,2013-2015	P<0.01

This study goes with the study by *Chakraborty B et al,2011*[29] as in both studies the p value was significance.

In a study by *Gravett et al*[32,33] using gas liquid chromatography (GLC) for diagnosis of Bacterial Vaginosis reported prevalence of BVwas 19%, and did not find any difference with respect to demographic and socioeconomic factors and parity. However gas liquid chromatography as a method of diagnosis, having sensitivity 92% and specificity of 92% and reported a significant increase of preterm labor, PPROM, low birth weight and chorioamnionitis among bacterial Vaginosis women(p<0.01, p<0.01, p<0.05). All the results were similar in my study.

Bacterial Vaginosis is more having asymptomatic and is not an uncommon problem in women during pregnancy. This often associated with preterm labor, PPROM, PROM and subsequent maternal and fetal morbidity in terms of chorioamnionitis, puerperal sepsis, endometritis, low birth weight, low apgar score in neonate and neonatal jaundice. Various studies have shown that treatment with metronidazole in BV+ve women is associated with significant decrease in maternal morbidity and risk of fetal morbidity. Hence screening of BV during pregnancy and treatment of it may reduce the fetomaternal morbidity and mortality arising due to Bacterial Vaginosis in pregnancy period.

CONCLUSION:

The prevalence of Bacterial Vaginosis in pregnancy in Veer Surendra Sai, Medical College & Hospital, Burla, Sambalpur, Odisha was significant(22.55%).Prevalence studies indicate that there was a potentially large reservoir of BV infection in pregnant women.

The clinical methods using Amsel's criteria in combination with Gram stain can be used for diagnosis of Bacterial vaginosis, which are simple, inexpensive and easily reproducible methods.

Given the high proportion of asymptomatic cases, is likely that the prevalence of BV is under-estimated by most studies. Once questions about infection have been addressed, high risk groups could be targeted more efficiently.

The Bacterial Vaginosis is more common in low socioeconomic group because of poor nutrition; poor hygiene etc leads to more vulnerability to infection.

Bacterial Vaginosis is more common in primigravida, Low SES, and lower age group with more becomes asymptomatic.

It is known to be a strong independent risk factor for adverse pregnancy outcomes such as preterm labour, premature rupture of membranes, spontaneous abortion, chorioamnionitis, postpartum endometritis. Considering the vast spectrum of maternal and fetal morbidity associated with this infection and availability of rapid inexpensive diagnostic tests, it may be prudent to screen BV in pregnancy, so that it can be treated early and hence prevent the adverse outcomes.

Universal screening of pregnant women at the time of booking visit may be initiated and the BV+ve cases should be treated with oral/vaginal metronidazole or oral/vaginal clindamycin to reduce the rate of maternal and fetal morbidity.

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