Original Research Article

Association between bacterial vaginosis and preterm labor and high risk cases for preterm labor

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International Archives of Integrated Medicine, Vol. 5, Issue 12, December, 2018.

Available online at http://iaimjournal.com/

ISSN: 2394-0026 (P) **ISSN: 2394-0034 (O)**

Received on: 05-12-2018 **Accepted on:** 11-12-2018

Source of support: Nil **Conflict of interest:** None declared.

How to cite this article: T. Suchetha Lakshmi, Sameena Anjum. Association between bacterial vaginosis and preterm labor and high risk cases for preterm labor. IAIM, 2018; 5(12): 116-124.

Abstract

Background: Preterm delivery is a major contributor to neonatal morbidity and mortality and its prevention assumed special importance in the practice of obstetrics. It is well known that the risk of neonatal death increases exponentially with decreasing gestational age and weight. Aim of present study was to study the incidence of bacterial Vaginosis in established preterm labor and also in Pregnant Women with previous History of Preterm Labor in our Population as several recent studies have documented association between bacterial vaginosis and Preterm labor.

Materials and methods: The present study was undertaken for a period of two years from 2015-2017 at Government Hospital, Siddipet. 50 Cases with high risk for preterm labor were included in the study and 50 cases with term labor in control group.

Results: Majority of the women in both groups were between 20-24 years. Majority of the cases had no previous abortion in both the groups. Mean gestational age who has gone into preterm labor was 31-33 weeks. The incidence of BV was higher among the study group (36%) compared to control group and was statistically significant ($p<0.05$). BV has significantly associated with 3.45 fold risk for preterm labor (odd's ratio – 3.45) C.I. 1.28-9.8 statistically significant when compared to controls.

Conclusion: In this study, a significant difference in the presence of BV in patients of preterm labor and term labor was found ($P<0.05$). This observation could indicate a definite association of BV with preterm labor. The relative risk of the presence of the BV in preterm labor was found to be 3.45 (95% CI -1.28 -9.18). Also BV was associated with 2.5 fold increased risk for preterm labor at earlier gestational age.

Key words

Bacterial vaginosis, Preterm labor, High risk cases, Preterm labor.

Introduction

Preterm delivery is a major contributor to neonatal morbidity and mortality and its prevention assumed special importance in the practice of obstetrics. It is well known that the risk of neonatal death increases exponentially with decreasing gestational age and weight. Dramatic progress in the management of preterm labor and preterm neonate has resulted in decrease in neonatal mortality rate. It is how ever agonizing and frustrating fact that the incidence of prematurity has not declined and remained nearly constant at 7-10% pregnancies [1], have shown prematurity to be responsible for 85% perinatal [2] deaths.

Once the preterm labor is established, the prevention of delivery is not always successful. Expert and advanced neonatal care in a country like ours is accessible and affordable to few. So the ultimate decrease of perinatal mortality and childhood handicap requires a reduction in the preterm labor. The etiology of preterm labor is multi factorial and the identification of risk factors for preterm birth is essential for developing intervention programes designed to reduce the incidence of preterm delivery.

Apart from the four important obstetric causes that result in preterm delivery; preterm labor, preterm PROM (premature rupture of membranes), maternal medical or obstetric complications and fetal distress or death; there is now substantial evidence that infection ascending in to the uterine cavity from lower genital tract is, associated with idiopathic preterm labor [3]. Such infection can result in deciduitis, chorioamnionitis, amniotic fluid infection, fetal sepsis and IUFD. A large number of studies demonstrate an association between specific organisms and preterm delivery. Organisms as Chlamydia trachomatis, Neisseria gonorrhoae, T.vaginalis, Mycoplasma horninis, G.vaginalis, Peptostreptococcus, Ureaplasma urealyticurm and group B streptococci have all been correlated with one or more of such abnormal outcomes of pregnancy.

Bacterial vaginosis (BV) is a common abnormal vaginal condition which is the leading cause of abnormal vaginal discharge and other symptoms worldwide. Over the past 40 years, researchers have attempted to describe the pathobiology, etiologic factors, clinical characteristics, diagnostic methods, pathologic sequelae, and effective treatment for BV. Before 1980 Bacterial vaginosis was commonly regarded as a "nuisance" infection, and mostly not recognized and was ignored by physicians. Significant work over the past decade has focused national and international attention on this common condition and BV is increasingly recognized as directly related to a number of serious obstetrical and gynecological complications. BV is characterized by high concentration (10^8 to 10^{11} CFU/gm of fluid or greater) of G. vaginalis and a set of potentially pathogenic BV -associated microorganisms, most notably Bacteroides spp, peptostreptococcus spp, and Mobiluncus spp, along with M. hominis [4, 5].

These microorganisms are present in concentrations which are 100-to 1000-fold higher than is found in the healthy vagina. Besides Lacto bacillus spp. which are normally present in high Numbers (10^5 to 10^6 CFU/gm of fluid), are decreased in number or absent in BV. Eschenbach, et al. are the first to implicate BV as a risk factor for preterm labor. Eschenbach, et al compared cervico-vaginal infection among those patients in preterm labor with matched control subjects without preterm labor [6]. In this analysis, Bacterial vaginosis was identified in 43% of patients with preterm labor and 14% of women without preterm labor (p=0.02) yielding a relative risk of preterrn labor for patients with Bacterial vaginosis of 3.8 in a prospective study.

So far no study has been conducted in Govt. General Hospital, Siddipet about association between BV and preterm labor. There is a possibility that BV could be treated and thus preterm labor could be prevented if it is associated with BV. Hence, this study is being planned to evaluate the role, if any, and to define the relationship between BV and preterm labor with or without rupture of membranes.

Aim and objectives

- To study the incidence of bacterial Vaginosis in established preterm labor and also in Pregnant Women with previous History of Preterm Labor in our Population as several recent studies have documented association between bacterial vaginosis and Preterm labor.

Materials and methods

The present study was undertaken for a period of two years from 2015-2017 at Government Hospital, Siddipet. 50 Cases with high risk for preterm labor were included in the study and 50 cases with term labor in control group.

Inclusion criteria

Criteria for inclusion of a patient in study of Preterm Labor were

- The gestational age between 28 weeks and 35 weeks.
- Painful uterine contractions (frequency of at least one contraction lasting for a minimum of 10-15 seconds during the interval of 10 minutes).
- At least minimal cervical changes (i.e. Bishop score 3 and Cervical dilatation 1 cm)

Exclusion criteria

- Rupture of membrane, Chorioamnionitis
- Ante partum hemorrhage
- Vaginal candidiasis
- Meddled outside
- No predisposing factors

Investigations done

Following set of investigations were done

Vaginal P^H

Vaginal P^H measured by dipping pH paper into the discharge, collected on the speculum (**Figure – 1**). It is a sensitive test, over 90% of patients with Bacterial Vaginosis had a vaginal P^H of >5.

Positive Whiff Test

Raised vaginal pH results in the liberation of certain Volatile amines such as putriscine and cadaverine -the breakdown products of amino acids generated by the metabolism of the abundant bacteria found in BV.

These amines are responsible for the typical odor of BV. Odor is recognized on speculum examination, the intensity of the smell increased markedly with the addition of 10% KOH solution. This formed the basis of the amine or Whiff test.

Figure – 1: Vaginal pH kit.

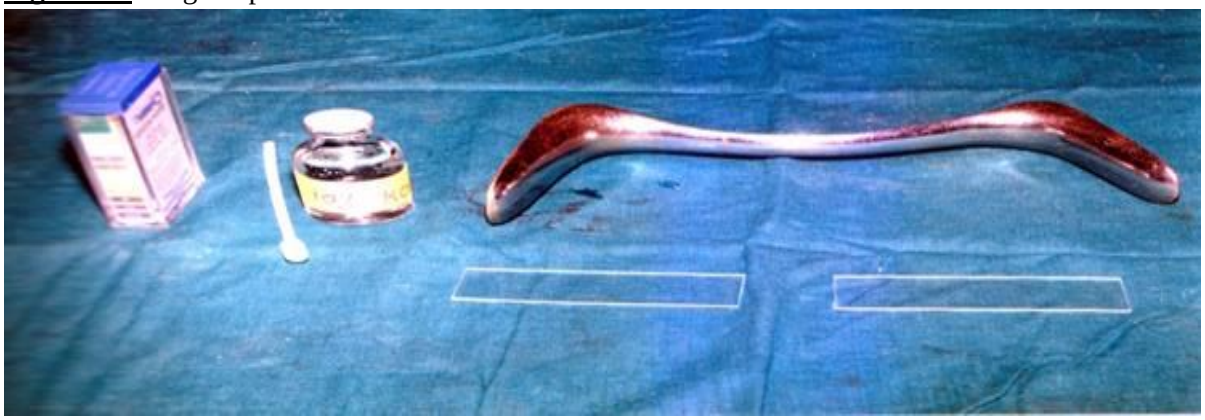
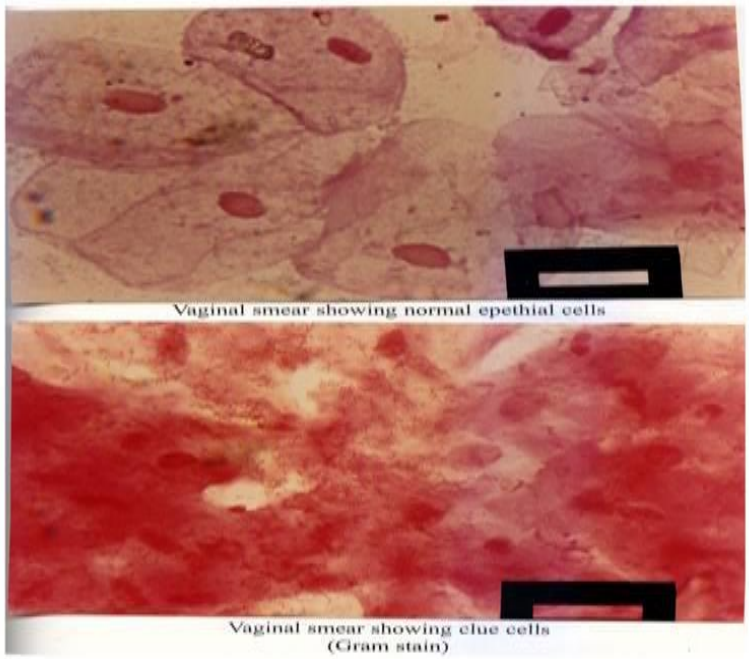


Figure – 2: Vaginal smear showing normal epithelial cell and clue cells.



Presence of clue cells on the gram stain

This is the best method of diagnosis and is based on the presence of clue cells in the vaginal fluid or secretions (**Figure – 2**). Smear is prepared on sterile glass slide and taken to the Microbiology department for Gram staining and examination for presence of Clue cells. Clue cells are epithelial cells which are covered by masses of bacteria of varying morphology. This can be recognized on Gram stain and wet smears also.

Patients with milky homogenous vaginal discharge

The diagnosis of bacterial vaginosis is based on presence of 3 or 4 of above criteria.

Statistical analysis

The study consisted of 100 cases, divided into two groups of 50 each. Group I comprised of 50 women in spontaneous preterm labour (study group) and Group II comprised of 50 women in spontaneous labour at term (control group).

Results

Age distribution has been shown in **Table - 1**. Majority of the women in both groups were between 20-24 years. Both groups matched for age distribution. P > 0.05, not statistically significant. Parity distribution was as per **Table – 2**.

Table - 1: Age distribution.

Age Intervals (Years)	Study Group	Control Group	P-value
16-19	12	7	P>0.05NS
20-24	25	32	P>0.05NS
25-29	12	10	P>0.05NS
30-35	1	1	P>0.05NS

Table - 2: Parity Distribution.

No. of previous pregnancies	Study Group	Control Group	P-value
0	23	7	P>0.05NS
1	17	16	P>0.05NS
2	9	5	P>0.05NS
>3	1	2	P>0.05NS

Majority of the cases had no previous abortion in both the groups. Both the groups matched for the number of previous abortions as per **Table - 3** (P.0.05 not significant).

Table - 4 shows the distribution of the cases in the study group, according to the period of

gestation at the time of onset of labour. All the 10 (20%) of patients who came in preterm labour between 28-30 weeks. 8 (16%) patients in preterm labour between 31-33 weeks of gestational age. So mean gestational age who has gone into preterm labour was 31-33 weeks. The distribution was not statistically significant.

Table - 3: Distribution according to number of previous abortions.

No. of previous abortions	Study Group	Control Group	P-value
0	45	45	P>0.05NS
1	2	4	P>0.05NS
2	3	-	P>0.05NS
3	-	1	P>0.05NS

Table - 4: Gestational age (study group) at enrollment.

Periods of Gestation (weeks)	Onset of labor	%
28-30	10	20
31-33	8	16
34-36	22	14

Table - 5: Incidence of Bacterial Vaginosis (BV) (Clinical criteria).

	Study Group	Control Group	P-value
Women with BV	18 (36%)	7 (14%)	<0.05
Women without BV	32(64%)	43(86%)	<0.05

The incidence of BV was higher among the study group (36%) compared to control group and was statistically significant (p<0.05). BV was significantly associated with patients in the preterm labor (**Table – 5, Figure - 3**).

Table – 6, Figure - 4 showed that BV has significantly associated with 3.45 fold risk for preterm labor (odd's ratio – 3.45) C.I. 1.28-9.8 statistically significant when compared to controls.

Table – 7 shows that majority of them were between 20-24 years group. However, the difference was not statistically significant (P>0.05 NS).

Figure - 3: Incidence of Bacterial Vagionsis.

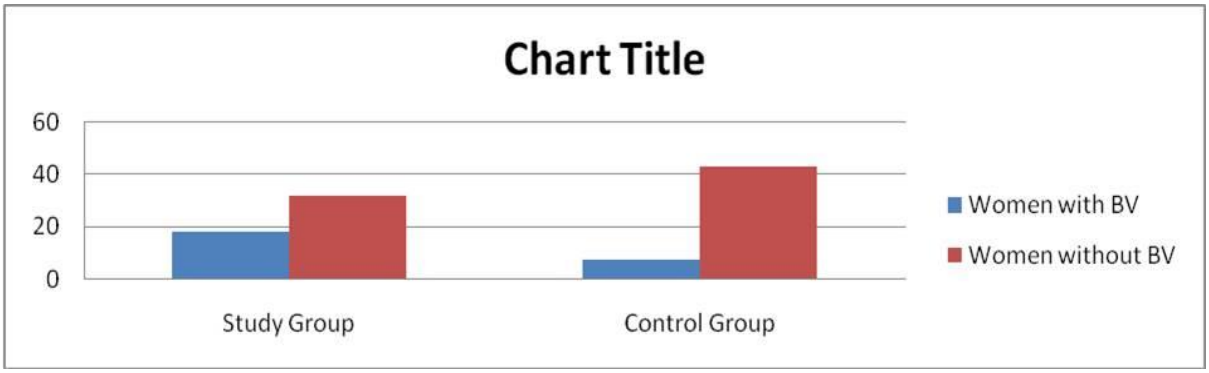


Figure - 4: Relative risk of preterm labour in women with Bacterial Vaginosis.

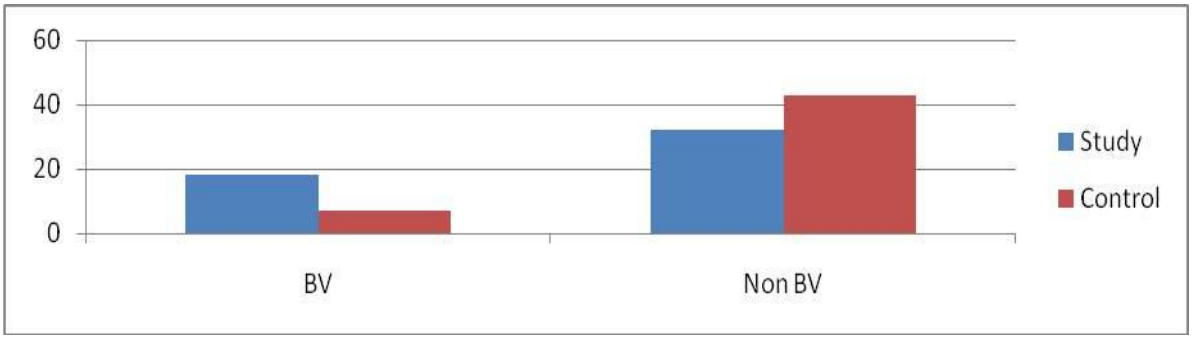


Table - 6: Relative risk of preterm labor in women with Bacterial Vaginosis.

Groups	Total No. of Cases	BV	Non BV	RR/OR	95%CI
Study	50	18	32		1.28-9.18
Control	50	7	43	3.45	

Table - 7: Age, parity, obstetric history of related distribution of BV among study group.

Age intervals (years)	Total No. of Cases	BV +ve cases	x^2	p-value
16-19	12	0		
20-24	25	11	2.42	>0.05
25-29	12	6	Df1	
30-35	1	1		

Table - 8: Bacterial Vaginosis +ve cases with history of vaginal symptoms.

Vaginal Symptoms	Total cases	BV +Ve (%)	x^2	p-value
Vaginal discharge (+)	21	17 (85)		<0.001
Vaginal discharge absent	29	1 (3.5)	2.84	Significant

Table - 9: Vaginal pH in study and control groups.

H/o previous preterm deliveries	No. of BV + cases	Vaginal pH>4.5	x^2	p-value
Study group	18	18		
Control group	7	5	0.52	>0.0543

Figure - 5: Bacterial Vaginosis +ve cases with history of vaginal symptoms.

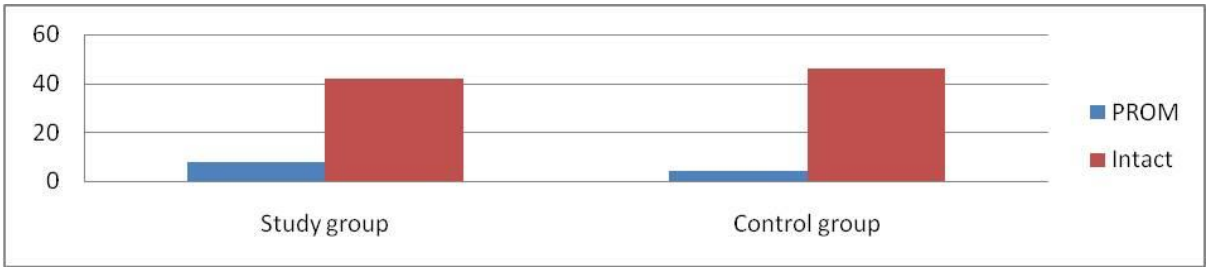
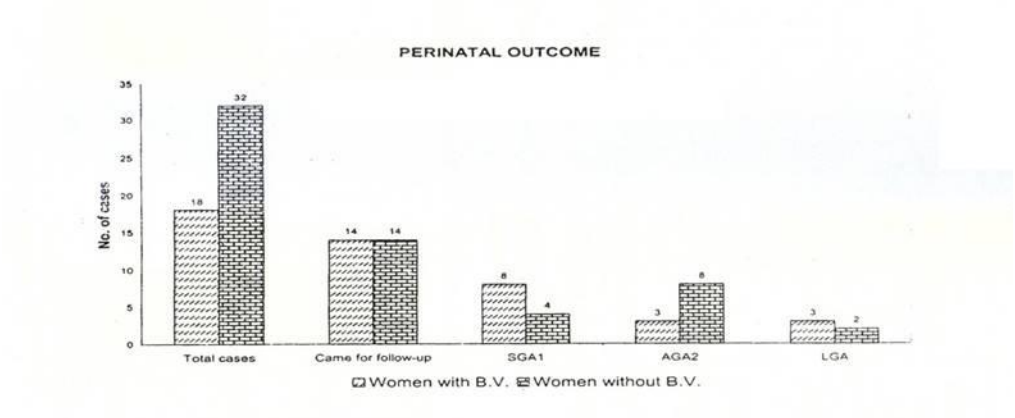


Figure - 6: Perinatal Outcome.



Bacterial Vaginosis +ve cases with history of vaginal symptoms were as per **Table – 8, Figure – 5**. The difference was statistically significant (P<0.001).

There was no statistically significant difference in vaginal pH both in study group and control group (**Table – 9**). Perinatal outcome was as per **Figure – 6**.

Discussion

The frequency of Preterm birth has not significantly decreased over the last 30 years despite major advances in obstetric neonatal care. The incidence of preterm birth has remained nearly constant at 7-10% pregnancies. During the past two years, the most popular theory for one cause of preterm labor has been intra-uterine infection. Many investigations have suggested that the most common route of intra-uterine infection is the ascending spread of bacteria from vagina and cervix". A number of clinical studies have indicated that Asymptomatic genital tract infection may play a significant role in preterrn birth. Such evidence is based on the studies showing recovery of organisms from Amniotic fluid of women in preterm labor, histological evidence of Chorioamnionitis 6, and a reduction in the birth of immature babies with antibiotic treatment of pregnant women with threatened preterm labour.

In the present study a total of 100 pregnant women were enrolled at the onset of labor either preterm or term with or without rupture of membrane. At the time of admission to the labour room, vaginal pH assessed by pH strips. Amine test done by using 10% KOH. Vaginal smears are prepared and sent to laboratory for Gram's staining. In the present study BV was significantly associated with preterm delivery ($p<0.05$) with an incidence of 36%. The relative risk of preterm delivery for patients who carried the diagnosis of BV was as high as 3.45.

Kurki, et al. [7] performed vaginal culture and gram stain at 8-17 weeks gestation in 750 women. BV was diagnosed by culture was associated with 2.6 times increased risk for preterm labour (95% CI -1.3 -4.9) a 6 -9 times increased risk for preterm labor and 7.3 fold risk for preterm PROM. Similarly, Holst, et al. [9] reported that BV was diagnosed in 41% of women who had preterm labor and delivery with a relative risk of 2.1.

In the studies done by Hillier, et al. [9], Mc Donald, et al. [1] have reported that BV and associated microorganisms seen to increase the risk of preterm birth at the lowest gestational age. Similarly in the present study, out of 50 women in preterm labor, 36% cases had Bacterial vaginosis.

In the present study, subjects were with similar relation to age, prior deliveries and abortions between the study and control groups. In this study BV was found significantly more common among the women who did not have history of prior preterm deliveries. This could be because the majority of the women enrolled in the study were nulliparous. Similarly in the study by Holst, et al. [9], none of the women with BV had a history of previous preterrn delivery. These eliminating the single best historical predictor of preterm delivery in these women.

Bacterial vaginosis isolated microorganisms were strongly associated with the presence of BV. In this study this was similar to study by Holst, et al. [9]. The isolation rate of G. Vaginalis more common in preterm delivery group (study group). The difference was statistically significant when compared to the term delivery.

In the present study, symptoms of vaginal discharge, vaginal malodor, or vulva1 irritation were present in 83% of 18 women diagnosed as having BV. Vaginal symptoms were also mentioned by 14% of normal women and most of the women admitted to vaginal symptoms only on direct questioning. The study shows that BV was significantly associated with women who had vaginal symptoms.

In the present study, BV was not associated with increased risk for preterm PROMS, conversely the BV was found more common among that who had intact membrane. The difference was not statistically significant. Also the isolation rate of BV associated organisms was not associated with PROM. Mc. Gregor, et al. [10] (1995), Gibbs, et al. [11] (1992) all have demonstrated

that BV is associated with increased risk for preterm PROM. Results of a large study by National Institute of Child Health Development (NICHD-sponsored vaginal infections and precautious study group demonstrated 10% increased in risk for preterm PROM.

The recent awareness of the possible adverse sequelae of BV infection during pregnancy and the resultant associated costs to the health care system has brought national attention to the screening and treating women of BV. In addition, the recent availability of more rapid, easier to use and less expensive diagnosis tests along with low cost anti-microbial treatment has broadened physician acceptance of screening for and treating their important condition; a condition which if left to its own can have tremendous negative impact on health care system as well as human life through personal biological and economic impairment resulting from preterrn birth or other perinatal complications.

Summary

A total of women divided into 2 groups of 50 each attending the labor rooms of the Government Maternity Hospital, Siddipet were included in the study.

The groups were divided into study group consisted of 50 women in spontaneous preterm labor with or without rupture of membranes. The control group consisted of 50 women in spontaneous labor at term pregnancy i.e. > 37 completed weeks of gestation with or without rupture of membranes.

The results obtained from the study are as follows:

- Both groups matched for age, parity and number of previous abortions. However history of previous preterm delivery and PROM was found to be significantly more common among the study group.
- The presence of BV was significantly associated with the patients who had preterm labor and preterm birth. The incidence of BV has 36% in patients who had preterm labor compared to only 14% of the patients who delivered at terms. The relative risk of the presence of BV in preterm labor was found to be 3.45 (95% C.I. was 1.28 -9.18).
- The presence of BV did not differ significantly with relation to age parity and number of previous abortions (P>0.05).
- The presence of BV did not differ significantly in patients who had preterm PROM and intact membranes (P>0.05).
- 83% of the patients who had BV gave in History of vaginal symptoms in the forms of white discharge or vaginal malodor and vulval irritation. BV was significantly associated in patients who had preterm birth with history of vaginal symptoms (P < 0.001).
- BV was significantly found more common among the patients who did not have the history of previous preterm delivery. This could be because the majority of the patients recruited were primigravide (P>0.05 NS).
- BV was significantly associated with 2.5 fold risk for preterm birth at earlier gestational age.
- BV was not statistically associated with small for gestational age.

Conclusion

In this study, a significant difference in the presence of BV in patients of preterm labor and term labor was found (P<0.05). This observation could indicate a definite association of BV with preterm labor. The relative risk of the presence of the BV in preterm labor was found to be 3.45 (95% CI -1.28 -9.18). Also BV was associated with 2.5 fold increased risk for preterm labor at earlier gestational age.

The study population was too small to derive conclusive inference regarding the role of BV associated organisms in terms of association with preterm labor, preterm PROM, preterm birth.

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