

Lower genital tract infections between 18 and 24 weeks of pregnancy and its association with adverse pregnancy outcome

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Abstract

Introduction: Lower genital tract infection (LGTI) is common among apparently healthy-looking pregnant women, and its overall prevalence is 40%–54%. LGTI is strongly associated with major adverse pregnancy outcomes such as spontaneous preterm delivery (SPTD), premature rupture of membranes (PROM), and neonatal morbidities. **Materials and Methods:** A prospective cohort study was performed in a tertiary care hospital in Gujarat with the objective of finding out the presence of LGTI in the second trimester and looking for its association with various adverse pregnancy outcomes. Two hundred and fifty pregnant women were screened for the presence of vaginal discharge. Various microbiological examinations were done. Diagnosis of specific LGTI was made based on the predecided criteria. Patients were followed up till delivery and maternal and neonatal outcomes were recorded. Data were compared to find out a possible association between LGTI and various adverse pregnancy outcomes such as SPTD, PROM, and neonatal deaths. **Results:** Out of 194 LGTI cases diagnosed, 54% were having bacterial vaginosis (BV), while 3% were diagnosed having trichomonas. While observing an association of LGTIs and adverse pregnancy outcomes, a maximum number of PROM were observed in the BV and beta *Streptococcus* infections group. Neonatal admissions were required in 60% of cases. Intrauterine fetal deaths and neonatal deaths were observed in only laboratory-positive cases mainly associated with beta *Streptococcus* infection and trichomonas. **Conclusion:** In this study, the most common LGTI prevalent in pregnant women was BV and the least common was trichomoniasis. There was a significant positive association present between LGTIs and adverse pregnancy outcomes such as SPTD and PROM.

Key words: Adverse pregnancy outcome, lower genital tract infection, pregnancy

Introduction

Pregnancy is a natural process involving various physiological changes occurring in the body, especially in the vagina.^[1] Lower genital tract infection (LGTI) during pregnancy occurs as a result of an imbalance in these physiological changes in the vagina. They are very common among apparently healthy-looking pregnant women, and its overall prevalence is 40%–54%.^[2] Various exogenous organisms such as bacteria, fungi, and protozoan are the causes for these infections.^[3] The most common LGTIs are bacterial vaginosis (BV), candidiasis, and *Trichomonas vaginalis*.^[4] LGTI is strongly associated with major adverse pregnancy outcomes such as spontaneous preterm delivery (SPTD), premature rupture of membranes (PROM), and low-birth-weight (LBW)

babies.^[5,6] Preterm birth is also associated with poor infant health, neonatal intensive care admissions, prolonged hospital stay, and neonatal morbidity and mortality.^[7] LGTI in both symptomatic and asymptomatic pregnant women is best detected with a routine high vaginal swab and gram staining.^[8] Effective prompt screening and treatment programs in pregnant women might decrease preterm birth and LBWs.^[8,9]

The present study was undertaken with the objective of finding an estimate of LGTI in midtrimester and looking for its association with various adverse pregnancy outcomes.

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Materials and Methods

This study was a prospective cohort study conducted in a tertiary care hospital in Gujarat. The study protocols were approved by the Institutional Ethics Committee for Human Research of the same institute. The sample size of 243 was calculated using SAS 9.2 software, India (considering 43% prevalence of LGTI,^[10] at 95% confidence interval on 80% power).

A total of 250 antenatal women between 18 and 24 weeks of gestational age visiting the ANC (Antenatal Care) outpatient department (OPD) were recruited in this study after taking written informed consent. After noting the sociodemographic profile, obstetric history, and presenting complaints if any,

The patients underwent a speculum examination, during which,

- The presence/absence of discharge was noted
- Vaginal pH was noted with the help of litmus paper
- Three high vaginal swabs were collected from the posterior fornix, where the first swab was processed in OPD itself as wet mount preparation and for the KOH test, while the remaining two were sent to the in-house laboratory for gram staining and culture.

The diagnosis of candidiasis was made by application of 20% KOH and visualization of hyphae or pseudohyphae under a microscope. It was confirmed with the help of a culture report. The diagnosis of trichomoniasis was done by wet mounts showing motile flagellated trichomonas, while the diagnosis of BV was confirmed with the help of gram staining where the Nugent score between 7 and 10 was considered positive for BV.^[11] Gram staining followed by culture to confirm the presence of other bacteria. All these tests if positive were considered LGTIs.

Those with symptoms or signs suggestive of vaginal discharge syndrome were treated following the syndromic sexually transmitted infection case management guidelines.^[12] Those who were laboratory positive for LGTI were treated for specific infections during the follow-up visit. All pregnancies were followed up till delivery. The following pregnancy outcomes were recorded.

- Maternal outcomes such as SPTD, PROM, and intrauterine fetal deaths (IUFD)
- Neonatal outcomes such as neonatal admissions and neonatal deaths.

Utmost care was taken during data collection so that it would not pose any potential risk or harm to the participants. Privacy was ensured while collecting sociodemographic details as well as during sample collection. All the data were entered into a Microsoft Excel sheet which was kept password protected. Data analysis was performed using SPSS software (IBM, Armonk, New York). A descriptive analysis of patient characteristics was conducted with the participant sociodemographic data. The prevalence of infection with each etiology was calculated, and it was correlated with adverse perinatal outcomes with the help of Fisher's exact test.

Results

The mean maternal age of the participants was 25 years, while nearly half of the participants belonged to the 18–24-year age group. Maximum number of participants had gestational age between 22 and 24 years. Forty percentage of them were primigravidae [Table 1].

Out of 250 patients, a total of 194 were diagnosed with LGTIs according to the laboratory criteria. Among which, 53% of cases were found positive for BV [Table 2].

The cases found positive for BV had a maximum number of preterm deliveries and PROM. It is also observed that a maximum of SPTDs and PROMs were associated with BV. This group also showed the highest number of LBW babies [Table 3].

Table 4 shows a strong association between screen positivity and adverse pregnancy outcomes such as preterm delivery (PTD), PROM, IUFD, neonatal deaths, and neonatal admissions on applying Fisher's exact test ($P < 0.001$). None of the screen-negative women delivered preterm or had PROM and IUFD [Table 4].

Table 1: Maternal demographic variables - Maternal age, gestational age, and obstetric history

Maternal characteristics	Range	n (%)
Maternal age categories	18≤24	123 (49.2)
	25-29	87 (34.8)
	30-34	34 (13.6)
	≥35	6 (2.4)
Gestational age (weeks)	18-19	27 (10.8)
	20-21	104 (41.6)
	22-24	119 (47.6)
Gravida status	1	100 (40)
	2	77 (30.8)
	3	50 (20)
	4	20 (8)
	5	3 (1.2)

Table 2: Vaginal swab tests and organisms isolated

Organisms isolated	Number of cases found laboratory positive, n (%)
Trichomonas	8 (3.2)
BV	134 (53.6)
Candida	36 (14.4)
Beta Streptococcus	16 (6.4)
No organisms	56 (22.4)
Total	250 (100.0)

BV=Bacterial vaginosis

Table 3: Lower genital tract infection and pregnancy outcome

LGTI	Preterm birth	PROM	IUFD	LBW
Beta Streptococcus	13	12	2	16
Candida	6	4	0	24
BV	122	105	0	133
Trichomonas	6	6	2	8
Total	147	127	4	47

PROM=Premature rupture of membranes; LGTI=Lower genital tract infection; IUFD=Intrauterine fetal deaths; BV=Bacterial vaginosis; LBW=low-birth-weight babies

Table 4: Association of overall screen positivity with pregnancy outcomes

Screen positivity	SPTD		Spontaneous rupture of membranes		IUFD	Neonatal admissions	Neonatal death
	Yes	No	Yes	No			
Present (194)	147	47	56	47	4	148	15
Absent (56)	0	56	0	56	0	0	0

IUFD=Intrauterine fetal deaths; SPTD=Spontaneous preterm delivery

Discussion

Our study aimed to identify LGTIs in women with 18–24 weeks of pregnancy using specific diagnostic tests. We have also tried to find out any possible association between LGTI and adverse pregnancy outcomes, mainly SPTD, PROM, and neonatal deaths.

In this study, among 250 total patients, only 169 patients had vaginal discharge clinically, while 132 patients were positive on laboratory diagnosis and were labeled as having LGTI. Out of 81 patients who had no vaginal discharge clinically, 62 turned out to be laboratory positive, while 19 were laboratory negative.

Out of 194 LGTI cases diagnosed, a maximum number of cases were diagnosed having BV (54%), while only 3% were diagnosed having trichomonas. Even in cases who did not have any vaginal discharge, 44% were diagnosed having beta *Streptococcus* and 34% had BV. While in a study by Shah *et al.*, out of 183 clinically diagnosed cases of vaginal discharge syndrome among pregnant women, laboratory-positive cases of BV were 35% and trichomonas were 14%.^[13] Similarly, Tellapragada *et al.*, in their study, found a prevalence of BV in 2%, candidiasis in 13%, and trichomoniasis in 8% of cases.^[5]

In this study, a total of 147 cases had SPTD among all LGTI cases. Out of these, 91% were diagnosed as BV, while 81% were diagnosed having beta *Streptococcus* infection. In a study by Gupta *et al.*, 23 out of 98 diagnosed BV patients had SPTD.^[14]

In this study, while observing an association of LGTIs and adverse pregnancy outcomes, a maximum number of PROM were observed in the BV and beta *Streptococcus* infections group. Van Gerwen *et al.*, in their study, concluded that trichomoniasis in pregnant women is associated with PTD and prelabor rupture of membranes.^[15]

In this study, neonatal admissions were required in 60% of cases. IUFD and neonatal deaths were observed in only laboratory-positive cases mainly associated with beta *Streptococcus* infection and trichomonas. Neonatal deaths were observed in 6% of cases. A study by Gupta *et al.* also concluded that bacteria-related vaginitis was a major reason for perinatal mortalities.^[14]

In this study, we found a statistically significant association between screen positivity of vaginal discharge and pregnancy outcome. Women who were screen negative in the midtrimester were less likely to go into SPTD and preterm PROM. None of the screen-negative women delivered preterm, and none of the screen-negative women had PROM, IUFD, or requirement for neonatal admissions.

This was a prospective cohort study where patients were recruited from 18 to 24 weeks and followed up throughout pregnancy up to delivery to observe adverse pregnancy outcome. This was one of the strengths of the study. In addition, the data were collected only by a single observer to reduce interobserver bias.

Since this was a hospital-based study, the sample may not represent the general population. Furthermore, treatment provided to the patients was based on a syndromic approach only, and improvement in the outcome after this treatment was not observed in the study.

Conclusion

In this study, the most common LGTI prevalent in pregnant women was BV and the least common was trichomoniasis.

There was a significant positive association present between LGTIs and adverse pregnancy outcomes such as SPTD and PROM.

Recommendations

Further studies, including a large population, shall be carried out before recommending routine screening of all pregnant women for possible LGTIs.

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Conflicts of interest

There are no conflicts of interest.

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