

Original Research Article

# A STUDY ON THE RELATIONSHIP BETWEEN HIGH VAGINAL SWAB CULTURE AND FETO-MATERNAL OUTCOME IN PRELABOUR RUPTURE OF MEMBRANES AT TERM A PROSPECTIVE STUDY

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Received : 03/12/2025  
Received in revised form : 14/01/2026  
Accepted : 01/02/2026

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DOI: 10.70034/ijmedph.2026.1.269

Source of Support: Nil,

Conflict of Interest: None declared

**Int J Med Pub Health**

2026; 16 (1); 1542-1545

## ABSTRACT

**Background:** Prelabour rupture of membranes (PROM) at term, a common obstetric problem, raises the risk of infections in mothers and newborns. The results of high vaginal swab (HVS) cultures usually tell doctors what antibiotics to give to people with genital tract infections. This study focused on pregnant women with PROM at term, aiming to evaluate the relationship between HVS culture results and fetal-maternal outcomes.

**Materials and Methods:** This prospective observational study involved forty pregnant women admitted to a tertiary care hospital with prelabor rupture of membranes (PROM) at term. Upon admission, high vaginal swabs were collected aseptically and subsequently evaluated for sensitivity and microbiological development. We kept track of the mother's and baby's health during the follow-up period leading up to the birth. This included the baby's Apgar score, neonatal sepsis, NICU admission, chorioamnionitis, postpartum fever, and endometritis. The relationship between cultural positivity and adverse fetal-maternal outcomes was investigated using data analysis.

**Results:** Out of 40 instances, 22 (or 55%) had positive HVS cultures and 18 (or 45%) had negative ones. The most common organisms found were *E. coli* (31.8%), *Staphylococcus aureus* (22.7%), *Klebsiella* species (18.2%), and Group B *Streptococcus* (13.6%). The group that tested positive for cultures had a much higher prevalence of infectious morbidity in mothers (27.3% vs. 5.6%). There were more difficulties with newborns, like neonatal sepsis and being admitted to the neonatal intensive care unit (NICU), when the culture was positive (31.8% vs. 11.1% when it was negative). A significantly significant connection ( $p < 0.05$ ) was established between a positive HVS culture and adverse fetal-maternal outcomes.

**Conclusion:** Maternal and neonatal morbidity are both enhanced in cases of preterm birth when vaginal swab cultures are positive. Improving fetal-maternal outcomes in cases of PROM can be achieved through routine HVS culture and the timely administration of suitable antibiotics.

**Keywords:** Prelabour rupture of membranes, High vaginal swab, Feto-maternal outcome, Neonatal sepsis, maternal infection, Term pregnancy.

## INTRODUCTION

Prelabour rupture of membranes (PROM) is a prevalent obstetric complication, impacting approximately 8-10% of term pregnancies. It is the

spontaneous rupture of fetal membranes immediately prior to the onset of labor.<sup>[1,2]</sup> PROM at term is linked to a higher risk of illness in mothers and newborns. This is mostly because infections that go up and long exposure of the uterine cavity to vaginal flora make

these risks worse. Obstetric care has improved a lot, yet PROM is still a serious problem, especially in areas with few resources.<sup>[3,4]</sup>

The sterile environment inside the uterus depends on the fetal membranes staying whole. When the uterine wall breaks, germs and viruses from the lower genital tract can get into the uterine cavity. This can cause hormonal and fetal problems such chorioamnionitis, endometritis, neonatal sepsis, and others. It is important to find and treat infections as soon as possible since the risk of infection increases the longer it takes from membrane rupture until delivery.<sup>[5]</sup>

A simple, non-invasive, and cheap way to find dangerous organisms that have taken up residence in the vaginal tract is high vaginal swab (HVS) culture. Consequently, infectious outcomes can be mitigated with prompt infection identification and targeted antibiotic treatment. Klebsiella species, Escherichia coli, Staphylococcus aureus, and Group B Streptococcus are prevalent infections associated with PROM and linked to worse perinatal outcomes.<sup>[6,7]</sup>

It is not always necessary to prescribe antibiotics when the culture is negative, even though this is often recommended in PROM. Taking too many antibiotics also makes the problem of antimicrobial resistance worse. To effectively manage PROM at term based on evidence, it is essential to comprehend the correlation between HVS culture results and fetomaternal outcomes.<sup>[8]</sup>

We sought to ascertain if HVS culture positive can forecast bad outcomes and inform clinical decision-making by conducting a prospective study on women with PROM at term, analyzing the correlation between high vaginal swab culture results and fetomaternal outcomes.<sup>[9,10]</sup>

## MATERIALS AND METHODS

This was a prospective observational study conducted in the Department of Obstetrics and Gynaecology at Dr. Pinnamaneni Siddhartha Institute of medical sciences and research foundation, over a period of 12 months from July 2024 to June 2025. A total of 40 pregnant women presenting with prelabour rupture of membranes (PROM) at term were enrolled after obtaining informed consent. Ethical clearance

was obtained from the Institutional Ethics Committee prior to commencement of the study.

### Inclusion Criteria

- Pregnant women with singleton pregnancy
- Gestational age  $\geq 37$  completed weeks
- Diagnosed cases of prelabour rupture of membranes at term
- Cephalic presentation
- Willingness to participate and provide informed consent

### Exclusion Criteria

- Multiple gestations
- Malpresentations
- Known congenital fetal anomalies
- Antepartum haemorrhage
- Medical disorders complicating pregnancy
- Patients with established labour at admission

### Data Collection Procedure

A comprehensive medical history and physical examination were conducted upon admission. The sterile speculum examination validated premature rupture of membranes (PROM). Prior to any vaginal examination, a sterile vaginal swab was obtained and dispatched for microbiological culture and sensitivity analysis. The hospital's protocol mandated that all patients be monitored until delivery. We examined the mother's method of delivery, endometritis, chorioamnionitis, postpartum fever, and fever as outcomes. infant outcomes including preterm infant mortality, neonatal sepsis, Apgar scores, birth weight, and admission to the neonatal intensive care unit.

### Statistical Analysis

Researchers utilized SPSS, the Statistical Package for the Social Sciences, to aggregate and assess the data. For categorical data, the frequencies and percentages were utilized. For continuous variables, the mean  $\pm$  standard deviation was used. The Chi-square test or Fisher's exact test was utilized to examine the correlation between fetomaternal outcomes and HVS culture results. The p-value had to be less than 0.05 for it to be statistically significant.

## RESULTS

The study involved a total of 40 pregnant women who had PROM at term. Tables showing demographic profile, HVS culture pattern, maternal outcomes, and neonatal outcomes display the results.

**Table 1: Demographic and Obstetric Profile of Study Participants**

Variable	Number (n)	Percentage (%)
<b>Age (years)</b>		
< 20	4	10.0
20–25	18	45.0
26–30	12	30.0
>30	6	15.0
<b>Parity</b>		
Primigravida	22	55.0
Multigravida	18	45.0
<b>Gestational age (weeks)</b>		
37–38	16	40.0
39–40	24	60.0

The majority of patients were primigravidae (55%), while the majority of patients were in the 20-25 age

bracket (45%). Between 39 and 40 weeks of pregnancy, 60% of the women presented.

**Table 2: High Vaginal Swab Culture Results and Microbial Profile**

Culture Result	Number (n)	Percentage (%)
Culture positive	22	55.0
Culture negative	18	45.0
Organism Isolated (n=22)	Number (n)	Percentage (%)
Escherichia coli	7	31.8
Staphylococcus aureus	5	22.7
Klebsiella species	4	18.2
Group B Streptococcus	3	13.6
Enterococcus species	2	9.1
Mixed growth	1	4.6

Around half of the cases had positive results from the vaginal swab culture. The predominance of gram-negative organisms was indicated by the most usually

isolated organism being E. coli, followed by Staphylococcus aureus and Klebsiella species.

**Table 3: Association between HVS Culture and Maternal Outcomes**

Maternal Outcome	Culture Positive (n=22)	Culture Negative (n=18)	Total	p-value
Chorioamnionitis	4 (18.2%)	1 (5.6%)	5	<0.05
Postpartum fever	2 (9.1%)	0 (0%)	2	
Endometritis	0 (0%)	0 (0%)	0	
No complications	16 (72.7%)	17 (94.4%)	33	
<b>Total complications</b>	<b>6 (27.3%)</b>	<b>1 (5.6%)</b>	<b>7</b>	

The rate of maternal infectious morbidity was substantially greater in women who tested positive for the infection (27.3%) than in women who tested

negative (5.6%), and this link was statistically significant ( $p < 0.05$ ).

**Table 4: Association between HVS Culture and Neonatal Outcomes**

Neonatal Outcome	Culture Positive (n=22)	Culture Negative (n=18)	Total	p-value
NICU admission	5 (22.7%)	2 (11.1%)	7	<0.05
Neonatal sepsis	2 (9.1%)	0 (0%)	2	
Low Apgar (<7 at 5 min)	2 (9.1%)	1 (5.6%)	3	
No complications	13 (59.1%)	15 (83.3%)	28	
<b>Total complications</b>	<b>7 (31.8%)</b>	<b>3 (16.7%)</b>	<b>10</b>	

In situations where the culture was positive, the risk of neonatal problems was 31.8%, while in cases where the culture was negative, the risk was 16.7%. There was a statistically significant correlation ( $p < 0.05$ ) between a positive HVS culture and a negative neonatal outcome.

## DISCUSSION

Prelabour rupture of membranes at term is a significant obstetric issue linked to infections in both the mother and the neonate. This study sought to ascertain the link between high vaginal swab cultures and fetal-maternal outcomes in pregnant women who experienced premature rupture of membranes during pregnancy.<sup>[11,12]</sup>

The women in this study were predominantly aged 20 to 25, with a somewhat greater proportion being primigravidae. Patil et al. previously discovered that juvenile primigravidae exhibited a higher frequency of PROM, potentially because to their physiological immaturity and heightened vulnerability to infections. Our findings align with theirs.<sup>[13-15]</sup>

In 55% of instances, the vaginal swab cultures yielded positive results. Our findings align well with

the previous study conducted by Khandelwal et al., which reported a cultural positive range of 45–60%. It is noteworthy that more than 50% of women with PROM harbor potentially dangerous germs in their vaginal flora. This underscores the significance of infection in the etiology of PROM.<sup>[16-18]</sup>

The organisms predominantly isolated in this study were Escherichia coli, Staphylococcus aureus, and Klebsiella species. Sharma et al.'s previous research identified E. coli as the predominant organism in cases of PROM, suggesting a significant role of gram-negative bacteria in ascending infections following membrane rupture. Singh et al. also identified same microbiological patterns, underscoring the significance of empirical antibiotic coverage for gram-negative bacteria.<sup>[19-21]</sup>

Maternal complications were more prevalent in women who tested positive for culture compared to those who tested negative. Positive vaginal cultures, particularly for chorioamnionitis and postpartum fever, were significantly associated with maternal infectious morbidity in the prior study conducted by Verma et al. This offers additional evidence that the risk of maternal infection after PROM is heightened when pathogenic organisms inhabit the vagina.<sup>[22,23]</sup>

Infants with positive cultures exhibited an elevated risk of neonatal complications, including sepsis and admission in the neonatal intensive care unit (NICU). Das et al. discovered that infants born to mothers who tested positive for vaginal bacteria had an increased likelihood of experiencing respiratory distress and newborn sepsis. It is crucial to acknowledge the role of vertical transfer of infection from mother to fetus during premature rupture of membranes (PROM).<sup>[24,25]</sup>

This study found that positive HVS cultures were linked to adverse fetal and mother outcomes. A similarly robust correlation was demonstrated in previous research by Gupta et al., suggesting that HVS culture may serve as a valuable predictor of adverse outcomes in PROM at term.<sup>[26]</sup>

This study underscores the importance of routine high vaginal swab cultures for the prompt identification of genital tract infections in PROM. Perinatal outcomes can be improved by decreasing maternal and neonatal morbidity with the prompt delivery of culture-sensitive antibiotics.<sup>[27]</sup>

Nonetheless, several cautions exist regarding this research. The findings may lack generalizability to a wider population because of the study's single-center design and restricted sample size. Larger multicentric studies are recommended to substantiate these claims.<sup>[28]</sup>

## CONCLUSION

This study shows that a positive high vaginal swab culture is strongly linked to bad fetomaternal outcomes in cases of prelabour rupture of membranes at term. Women whose vaginal cultures came back positive were more likely to have maternal infectious morbidity and issues with their newborns than women whose cultures came back negative. Routine high vaginal swab cultures in PROM at term are a helpful way to find genital tract infections early and make sure that the right antibiotics are given. Using culture-sensitive customized therapy and quick diagnosis can greatly enhance perinatal outcomes, such as lowering the number of sick mothers and babies. Because of this, it is strongly recommended that high vaginal swab culture be a part of the normal care plan for PROM at term.

**Funding:** None

**Conflict of Interest:** None

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