Section: Obstetrics & Gynaecology

Original Research Article

ANTIBIOGRAM OF BACTERIAL ISOLATES FROM HIGH VAGINAL SWABS OF PREGNANT WOMEN FROM TERTIARY CARE HOSPITAL

Mamta Goyal[1], Monika Agarwal[2], Smita Nagar[2]

[1]Associate Professor, Department of Obstetrics & Gynaecology, F.H. Medical College and Hospital, Agra, India.
[2]Assistant Professor, Department of Obstetrics & Gynaecology, F. H. Medical College and Hospital, Agra, India.

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Corresponding Author:
Dr. Monika Agarwal,
Email: drmonikagupta80@gmail.com

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Abstract

Background: The vaginal microbial flora forms a complex environment, consisting of various microbiological species in differing quantities and proportions, with their concentrations serving as indicators of vaginal health. So the aim of this study was antibiogram of bacterial isolates from high vaginal swabs of pregnant women from tertiary care hospital. **Materials and Methods:** This study was conducted in Department of Obstetrics and Gynaecology at F.H. medical college and Hospital, Agra. The duration of study was over a period of one year. The present study was included 310 total antenatal populations. **Result:** A total of 310 individuals were included in this study. Of these, 30% were over the age of 22, with the rest falling into other age groups. The study also examined obstetric scores, finding that the G1A0 score was more prevalent compared to G2P1, G2A1/G3A2, and >G3P2. Regarding gestational age, 190 cases were between 34 to 36.6 weeks, with the remaining cases between 28 to 33.6 weeks. The study revealed that 57.7% of the samples showed positive growth, while the rest were negative. Various organisms were identified in the positive cultures. Among the positive cases this study found resistant pattern in many antibiotics. **Conclusion:** In conclusion, vaginal discharge during pregnancy is common, but distinguishing between abnormal vaginal discharge and the normal leucorrhoea associated with pregnancy can be challenging. Early identification and appropriate treatment are essential to manage these infections effectively.

INTRODUCTION

The vaginal microbial flora forms a complex environment, consisting of various microbiological species in different quantities and proportions, with their concentrations serving as indicators of vaginal health (Donders et al., 2005).[1] The microbial ecology undergoes significant changes throughout life of female due to developmental and hormonal factors (Pybus et al., 1999).[2] In childhood, the vaginal flora primarily contains skin commensals and bowel organisms. During menarche, the vaginal pH decreases from neutral to approximately 4, leading to the predominance of lactobacilli. Other organisms, such as anaerobic and facultative anaerobic bacteria, as well as Candida species, may be present in lower concentrations (Donders, 1999).[3] Among women of reproductive age, Lactobacillus species remain dominant, characterized by their ability to thrive in acidic environments, with pH levels around 4.5. These lactobacilli ferment carbohydrates, producing lactic acid (Sobel, 2000).[4] In healthy premenopausal women, Lactobacillus species play a key protective role in preventing infections in the urogenital tract (Romanik and Martirosian, 2004).[5] Bacterial vaginosis (BV) results from an imbalance in the vaginal flora and is one of the leading causes of vaginitis, alongside vulvovaginal candidiasis and trichomoniasis. Vaginitis typically presents with symptoms such as vaginal discharge, vulvar itching, irritation, or foul smelling (Witt et al., 2002).[6]

The World Health Organization (WHO) and the International Federation of Gynaecology and Obstetrics (FIGO) define preterm infants as those born before 37 completed weeks of gestation. Preterm births are categorized as either early preterm (birth before 33 weeks and 6 days) or late preterm (birth between 34 and 37 weeks), with late preterm births accounting for 70% of all preterm deliveries. Preterm premature rupture of membranes (PPROM) refers to the spontaneous rupture of fetal membranes before 37 weeks of gestation and prior to the onset of labor. Preterm labor is one of the most challenging complications in obstetrics, affecting approximately one in ten births (11%), with higher rates in developing countries. In the United States, preterm

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births contribute to around two-thirds of infant deaths, and prematurity is responsible for 80–85% of neonatal morbidity and mortality in developing nations (Witt et al., 2002). In India, prematurity is linked to 75% of perinatal mortality (Witt et al., 2002).[6]

This study focuses on the antibiogram of bacterial isolates from high vaginal swabs of pregnant women in tertiary care.

MATERIALS AND METHODS

Study Area: This study was conducted in Department of Obstetrics and Gynaecology at F.H. medical college and Hospital, Agra.

Study Duration: The duration of study was over a period of one year.

Study Population: The present study was included 310 total populations.

Data Collection: Antenatal women with gestational age ranging from 28 weeks to 36 weeks and 6 days and who were admitted to the labor room due to preterm labor or preterm premature rupture of membranes (PPROM), were selected for this study. The participants included women with singleton pregnancies, cephalic presentations, and no other medical, surgical, or obstetric complications. Gestational age was confirmed using the last menstrual period (LMP) and first-trimester ultrasound (USG). The study variables included maternal age, obstetric history, gestational age, spontaneous preterm labor or PPROM, culture positivity, and antibiotic sensitivity of the isolated organisms. Sampling involved the insertion of two sterile cotton swabs to diagnose vaginal flora and bacterial vaginosis (BV). One swab was used for smear preparation and Gram staining, while the other was used for culture. The samples were immediately sent to the microbiology laboratory, and data were collected from the culture and Gram stain reports.

Data Analysis: Data were analysed by using Microsoft Excel.

RESULTS

A total of 310 individuals were included in this study. Of these, 30% were over the age of 22, with the rest falling into other age groups. The study also examined obstetric scores, finding that the G1A0 score was more prevalent compared to G2P1, G2A1/G3A2, and >G3P2. Regarding gestational age, 190 cases were between 34 to 36.6 weeks, with the remaining cases between 28 to 33.6 weeks. The study revealed that 57.7% of the samples showed positive growth, while the rest were negative. Various organisms were identified in the positive cultures, with Escherichia coli (34.6%) being the most common, followed by Klebsiella spp. (15.6%), Staphylococcus aureus (12.8%), Enterococcus (10.1%), Candida (7.8%), Acinetobacter (5.5%), Streptococcus (3.9%), Pseudomonas species (3.9%), CONS (3.3%), Proteus species (1.6%), and Providencia (0.5%). Additionally, the study observed antibiotic resistance patterns (shown in Table no. &). Among the culture positive cases, 34 patients were diagnosed with PPROM, while 29 patients experienced spontaneous preterm labor.

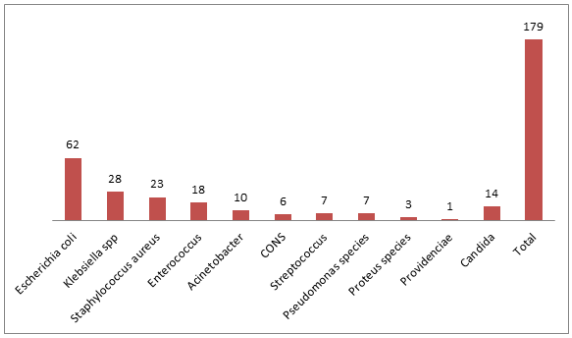

Figure 1: Distribution of organisms

Table 1: Distribution of cases according to Maternal Age.

Maternal Age		
Yrs	**Number of patients**	**%**
<22	93	30
22-25	81	26.1
25-30	81	26.1
>30	55	17.7
Total	310	100

Table 2: Distribution of cases according to Obstetric Score

Obstetric Score		
Gravida	**Number of patients**	**%**
G1A0	129	41.6
G2A1/G3A2	78	25.1
G2P1	90	29.1
>G3P2	13	4.1
Total	310	100

Table 3: Distribution of cases according to Gestational Age (Weeks)

Gestational Age (Weeks)	**Number of patients**	**%**
>28 – 33.6	120	38.7
>34 – 36.6	190	61.3
Total	310	100

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Table 4: Distribution of cases according to Culture growth

Culture growth	Number of patients	%
Negative growth	131	42.3
Positive growth	179	57.7
Total samples	310	100

Table 5: Antibiotic susceptibility test of gram negative bacteria

Isolates	Amoxicillin-clavulanate	Cefuroxime	Cephotaxime	Ceftriaxone	Doxycycline	Meropenem	Gentamicin	Amikacin	Levofloxacin	Ofloxacin
Escherichia coli	54	35	38	41	22	31	36	8	12	8
Klebsiella spp	18	15	11	12	10	8	8	3	14	6
Acinetobacter baumannii complex	8	7	9	10	4	5	10	10	9	10
Pseudomonas species	3	2	2	0	0	0	1	1	4	2
Proteus species	1	3	1	2	-	-	1	1	0	0
Providenciae	1	0	0	0	0	0	0	0	0	0

Table 6: Antibiotic susceptibility test of gram positive bacteria

Isolates	Trimethoprim/ Sulfamethoxazole	Tigecycline	Tetracycline	Teicoplanin	Penicillin	Oloxacin	Linezolid	Clindamycin	Erythromycin	Levofloxacin	Ciprofloxacin	Ampicillin
Staphylococcus aureus	16	2	11	4	22	8	7	17	11	14	16	13
CoNS	4	0	0	0	3	2	0	4	4	0	0	2

Table 7: Among cases with positive cultures, a notable number of complications occurred

Complications	Number of cases	Percentage
PPROM	34	53.9%
Preterm Labour	29	46.1%
Total	63	100%

DISCUSSION

The present study included a total of 310 participants. Among them, 30% were under the age of 22, while 17.7% were above 30 years old, indicating no significant relationship between maternal age and preterm birth. The distribution based on obstetric history was as follows: 41.6% were primigravidas, 25.1% were G2A1, 29.1% were G2P1, and 4.1% were G3P2 or higher. There was no statistical association between obstetric score and preterm birth. Out of the 310 vaginal swabs analyzed, 29 were from cases of spontaneous preterm labor and 34 from preterm premature rupture of membranes (PPROM). Of the 310 samples enrolled in the study, 179 (57.7%) yielded positive vaginal cultures. A total of fifteen microorganisms were isolated, including non-pathogenic bacteria such as Micrococcus, Diphtheroid, and Lactobacillus spp., as well as pathogenic Gram-negative bacteria, Gram-positive cocci, and Candida spp.

Escherichia coli was the most prevalent pathogen, isolated in 34.6% of cases, followed by Klebsiella spp. (15.6%), Staphylococci (12.8%), Enterococcus (10.1%), Candida spp. (7.8%), and other organisms. Providencia was found in 0.5% of cases, Proteus spp. in 1.6%, and coagulase-negative Staphylococcus (CONS) in 3.3%. Among the 179 isolates, 111 were Gram-negative bacteria, 54 were Gram-positive bacteria, and 14 were Candida isolates.

Gram-negative bacteria exhibited the highest resistance to penicillins (Amoxicillin-clavulanate) and fluoroquinolones (ciprofloxacin, levofloxacin, ofloxacin). However, E. coli demonstrated higher sensitivity to Amoxicillin-clavulanate and ceftriaxone, while Klebsiella spp. showed 64.2% sensitivity to Amoxicillin-clavulanate. The study concluded that E. coli is the most common cause of urinary tract infections (UTIs) among pregnant women, with low to moderately high levels of resistance to first-line drugs and high resistance to third-generation cephalosporins. Gram-positive organisms showed resistance to vancomycin and oxacillin, and there has been a decreasing trend in susceptibility to cephalosporins over recent years. Antibiotics such as aminoglycosides, piperacillin-

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tazobactam, amikacin, and cefoperazone/sulbactam exhibited high antibacterial activity. (Lakshmi et al., 2011).[7]

Vaginal infections significantly impact women's health, being one of the most common gynecological issues. Lactobacillus species play a crucial role in maintaining the normal vaginal ecosystem by preventing the growth of opportunistic bacteria. This study highlights the prevalence of potential vaginal pathogens in symptomatic pregnant women. The results are comparable to those of Lakshmi et al. (2011),[7] who compared the prevalence of vaginal infections between premenopausal and postmenopausal women, finding increased infections in postmenopausal women due to the colonization of pathogenic organisms over protective flora. The highest frequency of infection was noted in the 20 to 30-year age group, with a decline in infection rates as age advances. Similar age-related results were observed in a Kenyan study, although it was limited to the investigation of a single organism.[6]

Escherichia coli was identified as the most prevalent pathogen isolated not only from high vaginal swabs but also from urine, pus, blood, and wound samples, consistent with the findings of Dutta et al. in Dhaka.[8] Candida spp., which can tolerate acidic environments, are present in the vagina in low concentrations that typically do not cause symptoms. However, in conditions of decreased local immunity, Candida hyphae can multiply and transform into infective forms, resulting in symptomatic Candida colonization also occurs during pregnancy, leading to symptomatic vaginitis.[9,10] Infections with methicillin-resistant Staphylococcus aureus (MRSA) became a global health concern in the 1960s due to their multiple antibiotic-resistant profiles and varying prevalence, making them difficult to treat. Coagulase-negative Staphylococci (CoNS), considered skin commensals, were found in 3.3% of cases.

No cases of trichomoniasis, chlamydial infection, or Neisseria gonorrhoeae infection were detected. The presence of co-morbidities such as hospitalization, immunosuppression, and concurrent reproductive tract infections should be evaluated accordingly. It is known that vaginal infections, resulting from disruptions in the normal vaginal flora, increase the risk of sexually transmitted infections, especially human immunodeficiency virus (HIV). However, this study did not identify any association with HIV, and diabetic status records were unavailable. Additionally, no patients were taking hormone supplements or other medications that could interfere with the results.

This study has several limitations. Swab cultures were primarily conducted in clinical microbiological laboratories, and clinical diagnosis may have been suboptimal. Sensitivity testing was limited to commonly used antibiotics, and socio-demographic factors were not considered. Future studies should address these limitations, and proper protocols should be implemented to preserve the efficacy of these lifesaving drugs. Diagnosing these infections based on culture sensitivity is a critical step in their treatment. In regular practice, fixed protocols are often followed, and inadequate antimicrobial treatment due to non-compliance or under-prescription leads to high recurrence rates. Extensive resistance rates have emerged among commonly used antibiotics due to indiscriminate use. While antibiotics like imipenem and meropenem are highly effective, they are expensive. A significant proportion of pathogens causing vaginal infections have developed resistance to conventionally used antibiotics. This study underscores the importance of adapting treatment protocols based on culture sensitivity to prevent resistance and chronic complications. Therefore, the present study advocates for a shift from syndromic treatment protocols to those based on culture sensitivity, aiming for substantial health improvements and a reduction in the disease burden among women.[5,6]

CONCLUSION

In conclusion, vaginal discharge during pregnancy is common, but distinguishing between abnormal vaginal discharge and the normal leucorrhoea associated with pregnancy can be challenging. Bacterial vaginosis and candidiasis are frequent issues among women of reproductive age. Given that studies have shown that vaginal candidiasis and bacterial vaginosis are common causes of abnormal vaginal discharge in pregnancy, efforts should be made to exclude these conditions in pregnant women presenting with such symptoms. Early identification and appropriate treatment are essential to manage these infections effectively.

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