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PREVALENCE OF VAGINAL DYSBIOSIS (BACTERIAL VAGINOSIS AND AEROBIC VAGINITIS) IN ANTENATAL WOMEN AND ITS ADVERSE PREGNANCY OUTCOMES (MATERNAL/FETAL) IN A TERTIARY CARE HOSPITAL IN NORTH INDIA

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Abstract

Background: Bacterial Vaginosis (BV) is a condition characterized by an imbalance in the normal vaginal flora, where Lactobacillus is replaced with mixed flora of aerobic, anaerobic and microaerophillic species. Bacterial vaginosis has been associated with adverse pregnancy outcomes. Likewise, aerobic vaginitis can cause perinatal complications.

Aims: This study was conducted to determine the prevalence of vaginal dysbiosis (bacterial vaginosis and aerobic vaginitis) and its adverse pregnancy outcomes (maternal/fetal outcome) in pregnant women attending antenatal clinic in a tertiary care hospital in North India.

Design: Prospective cohort study

Materials and method: The prospective cohort study was conducted on women attending the antenatal clinic of a tertiary hospital. All obstetric and neonatal data covering antenatal events during the course of pregnancy, delivery, puerperium and condition of each newborn at the time of birth was collected. Vaginal dysbiosis was detected as per standard microbiological techniques.

Conclusion: The findings help to understand the importance of targeted interventions, effective prenatal and perinatal care, and addressing socioeconomic and parity-related disparities to improve maternal and neonatal health outcomes. However further studies to explore the underlying causes of these distributions and develop strategies to optimize health care delivery and outcomes are required.

Key words: Aerobic vaginitis, bacterial vaginosis, fetal outcome, maternal outcome, vaginal dysbiosis.

INTRODUCTION

Vaginal dysbiosis is termed as a state in which there is an imbalance in the flora which is normally present in the vagina, where mixed flora of aerobic, anaerobic and microaerophilic species [1,2] instead of Lactobacillus are present. Vaginal dysbiosis, encompassing variations such as BV and AV, represents a significant concern in maternal health due to its potential impact on pregnancy outcomes. In antenatal women, these disturbances in vaginal microbiota can lead to various adverse consequences for both mothers and fetuses. Understanding the prevalence of vaginal dysbiosis and its association with adverse pregnancy outcomes is crucial, particularly in settings such as tertiary care hospitals in North India where maternal and neonatal health outcomes are of paramount concern. Bacterial Vaginosis is known to be associated with

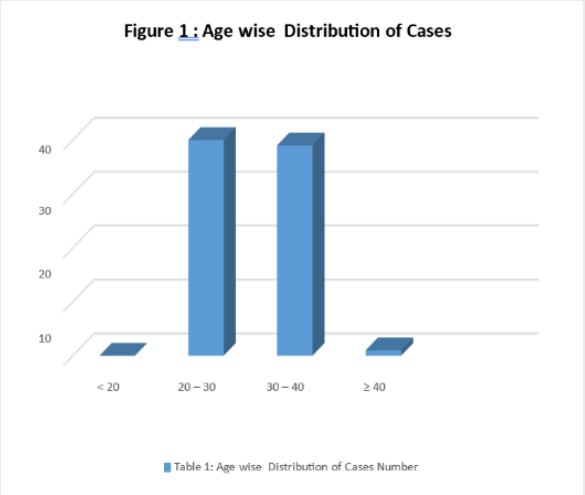
adverse pregnancy outcomes like premature rupture of membranes, preterm delivery, chorioamnionitis, spontaneous abortion, low birth weight. Bacterial vaginosis predisposes individuals to the acquisition of STIs such as Neisseria gonorrhoea, Chlamydia trachomatis, HIV and HSV-2. These conditions not only affect maternal health during pregnancy but also influence fetal development and neonatal health outcomes. Given the diverse population demographics and health disparities in North India, investigating the prevalence and consequences of vaginal dysbiosis is essential for tailored clinical management and improved maternal-fetal outcomes. Bacterial vaginosis has been shown to be asymptomatic in most of the cases but may present with symptoms like vaginal discharge, odour, pain, burning sensation, itching on presentation. It is associated with long-term sequelae including pelvic inflammatory disease. Data suggest that around 26-30 percent of antenatal women have BV and around 47% are asymptomatic. [3]. Bacterial vaginosis is identified by Gram stain and Amsel's criteria (Gold standard). Epidemiological studies have shown that advanced maternal age, multiple sexual partners, previous spontaneous miscarriages, alteration of vaginal bacterial communities are among the causative factors for BV. Recurrence is not uncommon though there are regimens to treat available. Likewise, aerobic vaginitis also lead to perinatal complications. A critical part of aerobic vaginitis is a change of vaginal flora from Lactobacillus-dominated bacteria to aerobic bacteria, which causes variation in vaginal microbiome and leads to lesser positive perinatal outcomes. Additionally, aerobic vaginitis seems to be linked to increased levels of cytokines, which are recognized as risk factors for adverse pregnancy outcomes. However, it is still not completely understood and there are studies that have done research on the microbial diversity of aerobic vaginitis in women during antenatal period. This acts as a hint to understand it is quite a possibility to avoid a preposition of delivery before gestation age of 37 weeks by screening women for BV and AV [38] . This study aims to explore the prevalence of BV and aerobic vaginitis among antenatal women attending a tertiary care hospital in North India. Additionally, it seeks to evaluate the correlation between these vaginal dysbiosis conditions and unfavorable pregnancy outcomes, including neonatal sepsis, and maternal infections. By elucidating these relationships, the research intends to contribute valuable insights into optimizing antenatal care strategies and enhancing maternal and neonatal health outcomes in the region. This sets the stage by outlining the importance of the topic, highlighting the specific conditions under study, and emphasizing the relevance of further research in the context of maternal and fetal health in North India.

RESULTS AND OBSERVATIONS

This study was conducted in the Department of Obstetrics and Gynaecology, Christian Medical College and Hospital, Ludhiana, Punjab. 80 pregnant women attending antenatal clinic were recruited for the study after informed consent. All antenatal and perinatal data encompassing every stage from prenatal care through delivery and the immediate postpartum period for both maternal and neonates was collected. Vaginal dysbiosis was detected using standard microbiological techniques. Prevalence of vaginal dysbiosis (bacterial vaginosis and aerobic vaginitis) in antenatal women and its adverse pregnancy outcomes (maternal/fetal) were assessed and the outcomes are as follows. Four cultures in the analysis showed growth. The organisms identified are Candida albicans, Escherichia coli and Enterobacter.

Table 1: Age wise Distribution of Cases

Age	**Number**	**Percentage**
< 20	0	0.0
20 – 30	40	50.0
30 – 40	39	48.7
≥ 40	1	1.3
Total	80	100.0

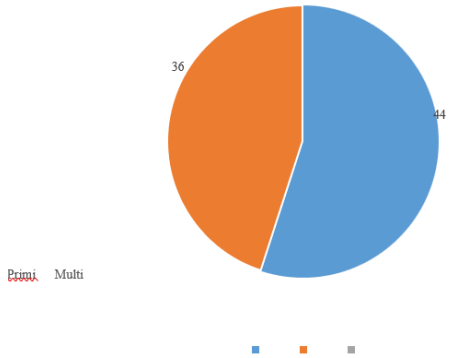


The study involved 80 patients, with age groups classified as less than 20years, 20-30 years, 30-40 years, and more than 40 years. 50% of the participants were in the category 20-30 years. The remainder were in the 30-40 age group (48.7%). There was no individual whose age group lies in less than 20 years category. The data indicates that the vast majority of cases (98.7%) were concentrated in the age groups of 20-40 years (Table 1, figure 1).

Table 2: Distribution according to Parity

Parity	Number	Percentage
Primi	44	55.0
Multi	36	45.0
Total	80	100.0

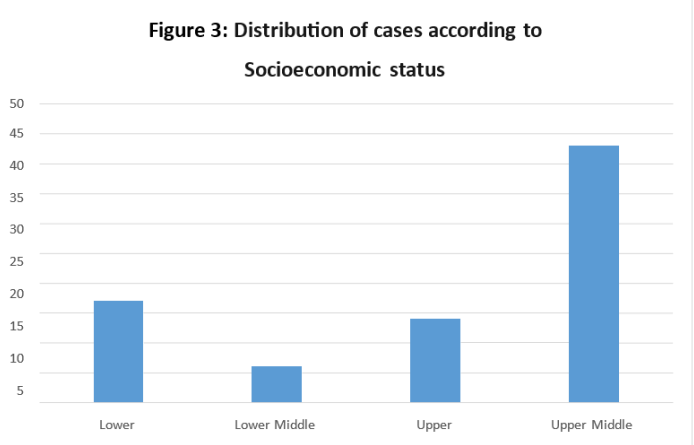
Figure 2: Distribution according to Parity



The study included 44 primigravida and 36 multigravida participants. The majority(55%) of the study participants were primigravidas, while the remaining 45% were multigravidas." (Table 2, figure 2).

Table 3: Distribution of Cases according to socio economic status

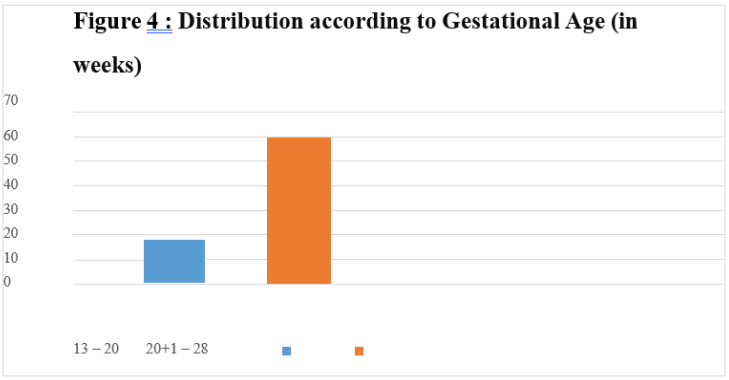
Socio Economic Status	Number	Percentage
Lower	17	21.2
Lower Middle	6	7.5
Upper	14	17.5
Upper Middle	43	53.8
Total	80	100.0



A notable proportion of participants belonged to the upper middle class comprising 53.8% based on the Modified Kuppuswamy scale. 6 patients from the study participants were from the Lower Middle socioeconomic status comprising 7.5 % .14 individuals were from upper and 17 individuals were from Lower socioeconomic status comprising 17.5 % and 21.2 % respectively. (Table 3, figure 3).

Table 4: Distribution according to Gestational Age

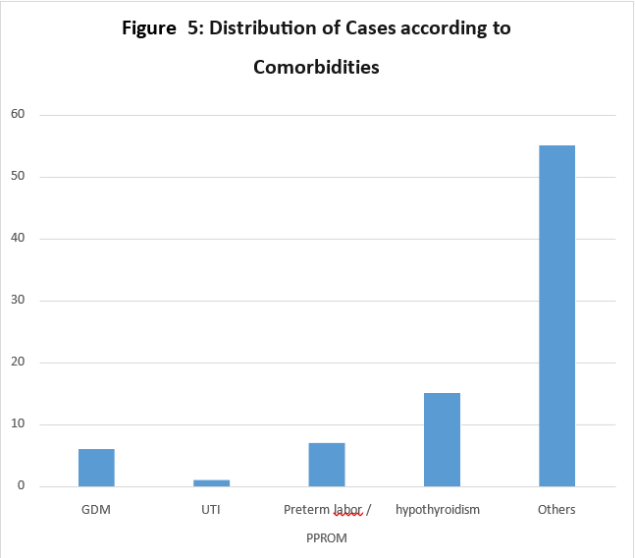
Gestational Age(weeks)	Number	Percentage
13 – 20	18	22.5
20+1 – 28	62	77.5
Total	80	100.0



The above table shows the distribution according to gestational age. The table was classified into two groups i.e., 13 – 20 weeks of gestation, 20 weeks 1 day -28 weeks of gestation. Majority of the study population fell in the category of 20 +1 weeks to 28 weeks of gestation. A total of 62 participants who constituted 77.5% of the study population. There were 18 participants between 13-20 weeks constituting 22.5 % (Table 4, figure 4).

Table 5: Distribution of Cases according to comorbidities

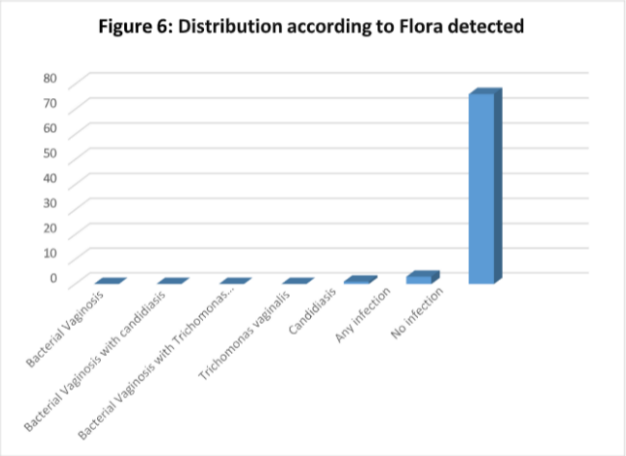
Co Morbidities	Number	Percentage
GDM	6	7.5
UTI	1	1.3
Preterm labor / PPROM	7	8.8
Hypothyroidism	15	18.8
Others	55	68.8



This table is aimed to study the various comorbidities associated with aerobic and bacterial vaginosis. 15 participants had hypothyroidism as the major contributing comorbidity followed by Preterm Premature Rupture of Membranes and gestational diabetes mellitus. There was one woman who had urinary tract infection (Table 5, figure 5).
[The abbreviations used above are as follows GDM- Gestational diabetes mellitus
UTI- Urinary tract infections
PPROM- Preterm Premature Rupture of Membranes
Others – Cholestasis in pregnancy, Anhydramnios, Rh negative pregnancy, Antepartum eclampsia]

Table 6: Distribution according to Flora detected

Flora Detected	Number	Percentage
Bacterial Vaginosis	nil	0
Bacterial Vaginosis with candidiasis	nil	0
Bacterial Vaginosis with Trichomonas vaginalis	nil	0
Trichomonas vaginalis	nil	0
Candidiasis	1	1.3
Any infection	3	3.7
No infection	76	95
Total	80	100.0



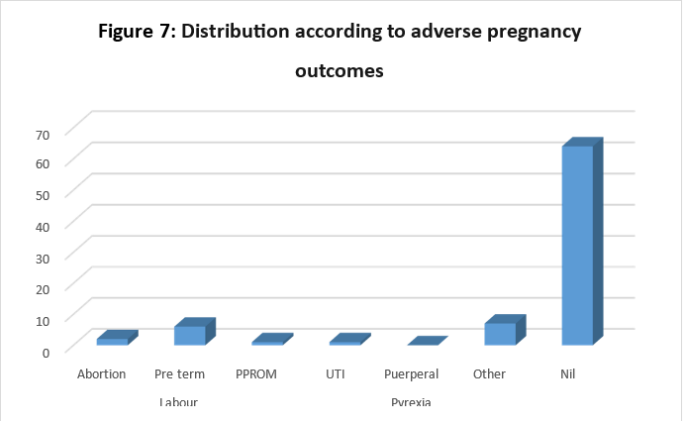
This table highlights the flora detected.

In this study, majority of the cultures were unsterile contributing to 95%.

Only three organisms were identified, namely Candida albicans, Escherichia coli and Enterobacter. Escherichia coli contributes to 2.5 % of the study population. 1 culture each of Candida albicans and Enterobacter were obtained. There were no cases of Bacterial vaginosis, Bacterial Vaginosis with Candida albicans, Bacterial Vaginosis with Trichomonas vaginalis and Trichomonas vaginalis (Table 6, figure 6).

Table 7: Distribution according to adverse pregnancy outcomes

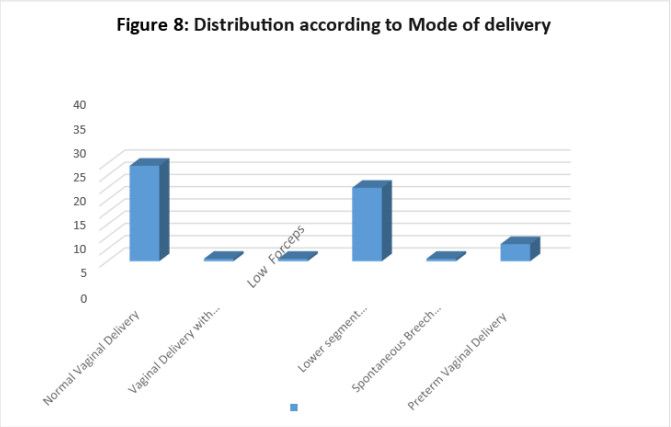
Adverse pregnancy outcomes	Number	Percentage
Abortions	2	2.4
Pre-term Labour	6	7.4
PPROM	1	1.2
UTI	1	1.2
Puerperal pyrexia	0	0
Other	7	8.6
Nil	64	79.2



This table and graphs are aimed to depict the key adverse outcomes of pregnancy. Majority (79.2%) of the patients had no adverse outcomes. The other outcomes include two participants who underwent abortion, 6 participants with preterm labour, 1 participant each of PPROM and urinary tract infections. There were no participants with puerperal pyrexia. The other outcomes include Preeclampsia with severe features (Table 7, figure 7).

Table 8: Distribution according to Mode of delivery

Mode of Delivery	Number	Percentage
Normal Vaginal Delivery	39	48.8
Vaginal Delivery with First degree tear	1	1.3
Low Forceps	1	1.3
Lower segment caesarean section	30	37.5
Spontaneous Breech Delivery	1	1.3
PTVD	7	8.8
Total	79	

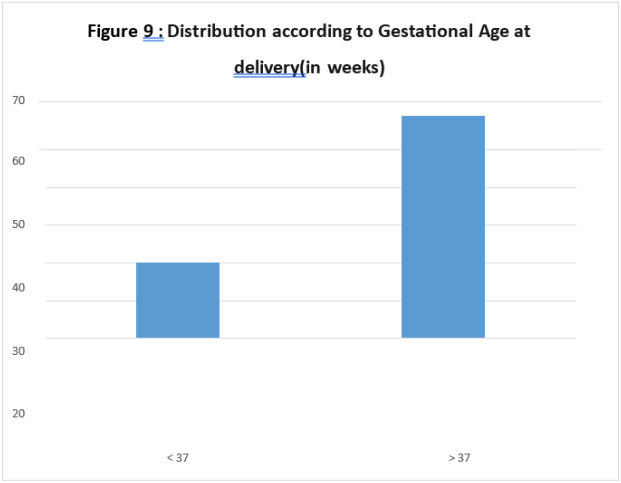


One patient had abortion.

Majority of the patients had normal vaginal delivery which comprises 48.8 % followed by 30 patients with lower segment caesarean section contributing to
37.5 %. There was one case each of vaginal delivery with first degree perineal tear, low forceps and spontaneous breech (Table 8, figure 8)

Table 9: Distribution according to Gestational Age at delivery

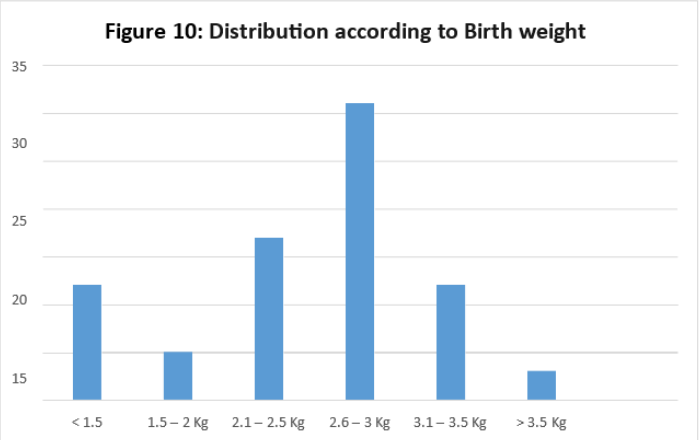
Gestational Age at delivery (weeks)	Number	Percentage
< 37	21	26.3
> 37	59	73.8
Total	80	100.0



The above table depicts the population distribution according to gestational Age at delivery. The categories were divided as less than 37 weeks(preterm), 37 weeks and above (Term). Most patients who took part in this study (73.8%) belonged to term deliveries category. Only 26.3 % of patients belonged to preterm deliveries (Table 9, figure 9).

Table 10: Distribution according to Birth weight

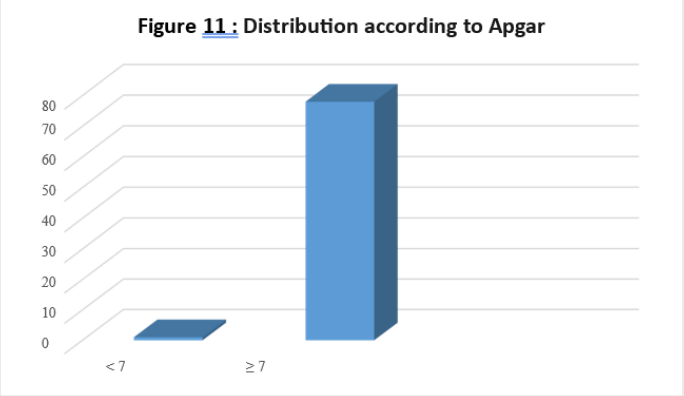
Birth Weight (in Kgs)	Number	Percentage
< 1.5	12	15.0
1.5 – 2	5	6.3
2.1 – 2.5	17	21.3
2.6 – 3	31	38.8
3.1 – 3.5	12	15.0
> 3.5	3	3.8
Total	80	100.0



Among the cases reviewed, majority of the babies weighed between 2.6 - 3 kg which totalled to 31 babies (38.8%). Twelve babies belonged to the category of less than 1.5 kg and between 3.1-3.5 kgs and constituted 15% each. On the other hand, 17 (21.3%) babies weighed between 2.1-2.5 kg and 6.3% of babies weighed between 1.5 – 2 kgs. There were 11 babies with the birth weight less than 1.5 kg in the sterile group (14.5 %). Furthermore only 3 babies are noted to have weight more than 3.5 kg at birth which comprised 3.8% (Table 10, figure 10).

Table 11: Distribution according to APGAR

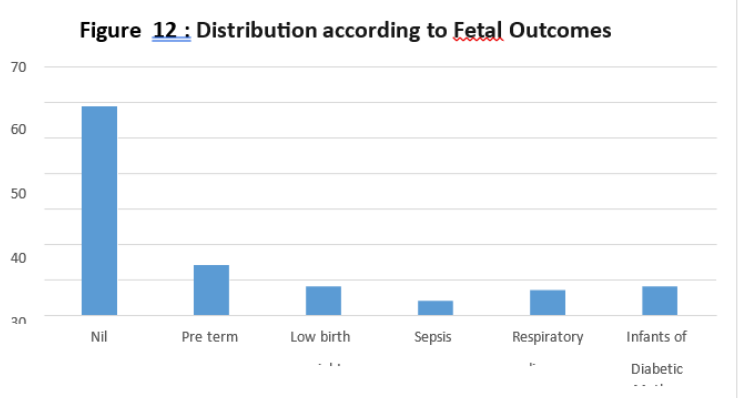
APGAR	Number	Percentage
< 7	1	1.3
≥ 7	78	98.7
Total	79	100.0



The above table showed that 98.7 % of babies have APGAR score greater than
7. Only 1.3% of the population showed APGAR of less than 7. This reflects on efficient neonatal practices of the institution (Table 11, figure 11).

Table 12: Distribution according to Fetal Outcomes

Fetal Outcomes	Number	Percentage
Nil	59	73.8
Pre term	14	17.5
Low birth weight	8	10.0
Sepsis	4	5.0
Respiratory disease	7	8.8
Infants of Diabetic Mother	8	10.0



This table denotes the distribution according to Fetal Outcomes. 73.8% had no adverse fetal outcomes. However, 14 of the total number of babies had preterm birth and 8 had low birth weight. 7 of them had respiratory disease and 4 ended up with sepsis. It is also noted that 7 babies are the infants of diabetic mothers (Table 12, figure 12).

DISCUSSION

This study analyzed various parameters of antenatal women attending the outpatient department to a tertiary healthcare facility in North India aimed to determine the prevalence of vaginal dysbiosis (BV and AV) and its adverse pregnancy outcomes, both maternal and fetal. The data was divided into twelve distinct tables, and graphical representations were created to facilitate easier interpretation and analysis.

AGE DISTRIBUTION

In this current study, the majority of the cases (50%) fell within the 20-30 years age group, succeeded by the 30-40 years age group (48.7%). This indicates that the incidence is significantly higher among individuals aged 20-30 years. Only 1.3% of the cases were aged 40 years or above, and there were no cases below 20 years. This age distribution suggests a trend where younger adults are more in the antenatal period. The trend is common similar to the study done in Northern Ethopia by Yalew et. al [2] wherein the age group 20-29 years has 69 % of study population. Similar study done by Mulinganya et al. [3] showed 25-29 years as the ubiquitous age group in the analysis.
Cases are notably absent among individuals under the age of 20, as indicated by the age distribution. Furthermore, the minimal number in the ≥40 age group might point towards effective family planning methods.

PARITY-WISE DISTRIBUTION

The parity-wise distribution revealed that a majority (55%) of the cases were primigravida (first-time mothers), while the other 45% were multigravida (having had at least one child). This distribution is critical in understanding maternal health dynamics. In this study, 75% which showed growth in high vaginal swab were primiparous. Parity has been associated with various health outcomes, and the higher proportion of primi cases may indicate a need for proper interventions for first-time mothers. In the study by Lata, I et .al [1] also had more of primigravid women.The slightly higher proportion of primi cases (55%) compared to multi cases (45%) could indicate that first-time pregnancies have more association with

certain complications that might require hospitalization . This emphasizes the importance of tailored prenatal care for the first - time mothers to mitigate potential risks

DISTRIBUTION OF CASES ACCORDING TO SOCIOECONOMIC STATUS

Socioeconomic status plays a vital role in health outcomes. In the study, 53.8% of the population were from the upper middle class, while the lower socioeconomic class accounted for 21.2%. The lower middle class and upper class comprised 7.5% and 17.5% of the cases, respectively. This distribution suggests that the upper middle class is more represented among the cases [41]. Socioeconomic disparities often influence access to healthcare and the prevalence of certain conditions. The study titled," Maternal and fetal outcomes of pregnant women with bacterial vaginosis" [2] has shown that lower socioeconomic status correlates with higher morbidity and mortality rates due to limited healthcare access and poorer living conditions. The dominance of upper middle-class cases (53.8%) could suggest that individuals from this socioeconomic background are either more likely to seek medical care or have better access to healthcare services. In contrast, the lower representation of the lower middle class (7.5%) might highlight barriers to accessing care, such as financial constraints or lack of awareness. Study done by Seth et.al [5] had pointed out that socioeconomic status is a significant determinant of health outcomes, with lower socioeconomic groups typically facing more challenges in accessing quality healthcare.

GESTATIONAL AGE

The gestational age distribution indicated that the majority of cases (73.8%) were between 20+1 and 28 weeks. Cases between 13-20 weeks constituted
22.5% . This data is crucial for understanding pregnancy outcomes and to plan prenatal care. The high incidence in the second trimester highlights the importance of monitoring and interventions during this critical phase. In the Ethiopian study by Yalew GT et.al [2], it has shown that second trimester is more prone to changes in the vaginal microbiome hence leading infections. This shows that second trimester is crucial for fetal development and maternal health, necessitating close monitoring.
The distribution showing the majority of cases between 20+1- and 28-weeks' gestation aligns with the critical period of pregnancy where complications are more likely to arise, necessitating medical intervention. The lower percentage of cases in the early gestation period reflect better management and monitoring during earlier stages.

DISTRIBUTION OF CASES ACCORDING TO COMORBIDITIES

Comorbidities were prevalent in the study population, with hypothyroidism (18.8%) and PPROM (8.8%) being notable conditions. Other comorbidities included GDM (7.5%) and UTI (1.3%). A significant proportion of cases (68.8%) had other unspecified comorbidities. The presence of comorbidities complicates the clinical management of patients and underscores the need for comprehensive care plans. For instance, hypothyroidism during pregnancy can lead to adverse outcomes like abortions if not well controlled. The more prevalence of various comorbidities in this study aligns with findings from Malaysian study titled "Maternal and fetal outcomes of pregnant women with bacterial vaginosis, which emphasize the need for early detection and management" [23]. It also shows the clear association of preterm labour/PPROM with Vaginal dysbiosis.
The high percentage of "other" comorbidities (68.8%) indicates a diverse range of additional health conditions affecting the study population. This diversity underscores the complexity of managing pregnant patients, who may present with various underlying health issues. Conditions like hypothyroidism (18.8%) highlight the need for regular screening and management to prevent adverse outcomes. The relatively low incidence of conditions like UTI (1.3%) may suggest effective preventive measures (accurate screening for asymptomatic bacteriuria) or treatment protocols in place.

DISTRIBUTION ACCORDING TO FLORA DETECTED

The flora detected in the study cases showed that 95% had no infection, while Candida albicans, E. Coli, and Enterobacter were detected in a small percentage of cases (1.3%, 2.5%, and 1.3%, respectively). The low incidence of infections could be indicative of effective infection control practices [42]. However, the presence of these pathogens, even in a small percentage, necessitates vigilance in monitoring and treatment. Previous studies on maternal infections, like the study done by Charu et.al [5] have shown that even low incidence rates can have significant impacts on pregnancy outcomes. Ma X et al [32] in their study concluded that the pathogenic bacteria of aerobic vaginitis can produce different toxins or affect the local immunity of patients and then lead to the occurrence of infection.
The low incidence of infections (e.g., candidiasis 1.3%, E. Coli 2.5%) suggests effective hygiene practices and infection control measures. The existence of E. coli in urinary tract infections (UTIs) underscores the importance of ongoing screening and preventive strategies. E.coli is a common uropathogen, particularly in pregnant women, due to its ability to colonize the periurethral area and ascend into the urinary tract.

Preventive measures such as proper hygiene, staying hydrated, and timely emptying of the bladder can help reduce the risk of UTIs. Additionally, screening for asymptomatic bacteriuria in certain populations, such as pregnant women, can help identify and treat infections before they lead to complications. Regular screening and preventive strategies are crucial not only for managing UTIs caused by E. coli but also for reducing the overall burden of these infections on individuals and healthcare systems.

The high percentage of cases with no infection (95%) is reassuring, owing to the vaginal microbiome that acts as a protective barrier.

yalew et.al [2]	Bacterial vaginosis of 12.3 % aerobic vaginitis of 1.4% women with no infections 72.3 %
Seth AR et.al [5]	Bacterial vaginosis- 44.8% Vaginal candidiasis- 28.5 % Trichomonas vaginalis-8.03%
Bitew A et . al [8]	Bacterial vaginosis-48.6%
Ng BK et.al [31]	Bacterial vaginosis -10.1%

DISTRIBUTION ACCORDING TO ADVERSE PREGNANCY OUTCOMES

Adverse pregnancy outcomes were observed in a minority of cases, with 80% having no adverse outcomes. Preterm labour was noted in 7.5% of cases, followed by abortion (2.5%), PPROM (1.3%), and preeclampsia (1.3%). Other adverse outcomes were present in 8.8% of cases. Understanding the distribution of adverse outcomes is crucial for improving maternal and fetal health. The low incidence of certain outcomes like puerperal pyrexia (0%) suggests effective preventive measures, while the presence of preterm labor highlights the need for focused interventions. Research has shown that adverse pregnancy outcomes can significantly impact long-term health, emphasizing the essence of preventive care. The study by InduLata et.al [1] showed that the incidence of poor pregnancy outcome was higher in bacterial vaginosis with UTI. It showed no complication in 60.4%, abortion in 3%, PROM in 12.2%, preterm labour in 22.6%, Puerperal Pyrexia in 1.8%. While the most of cases had no adverse outcomes (80%), the outcomes like preterm labor (7.5%) and abortion (2.5%) points to areas needing attention. The occurrence of preeclampsia (1.3%), a serious condition characterized by high blood pressure, necessitates close monitoring of blood pressure throughout pregnancy and early intervention in case of fetal growth restriction and doppler abnormalities. The diversity of adverse outcomes emphasizes the importance of comprehensive prenatal care to identify and manage potential risks early.

MODE OF DELIVERY

The distribution of delivery methods varied among the cases, with normal vaginal delivery (NVD) accounting for 48.8%, while lower segment caesarean section (LSCS) comprised 37.5%. Other modes included preterm vaginal delivery (8.8%), vaginal delivery with first degree tear (1.3%), low forceps (1.3%) and spontaneous breech (1.3%). The high rate of normal vaginal delivery suggests favourable outcomes in most cases. Studies on delivery modes have highlighted the importance of choosing the appropriate mode based on clinical indications to ensure maternal and neonatal safety. In the Malaysian study [23] done as above said, vaginal delivery is linked to a higher risk of vaginal dysbiosis. The significant proportion of cases undergoing LSCS (37.5%) reflects the necessity of surgical intervention in a substantial number of pregnancies, possibly due to complications or maternal-fetal indications. The variety of delivery modes, including spontaneous breech (1.3%) and PTVD (8.8%), illustrates the range of clinical scenarios managed within the study. The distribution aligns with findings from other studies, which show a growing trend in caesarean deliveries globally due to various medical and non-medical reasons.

GESTATIONAL AGE AT DELIVERY

The larger part of cases (73.8%) was delivered beyond 37 weeks of gestation, with 26.3% delivered before reaching 37 weeks. This distribution indicates that a majority of pregnancies reached full term, which is associated with better neonatal outcomes. However, the quarter of cases delivered preterm requires attention, as preterm births are linked with higher

morbidity and mortality. Research on gestational age at delivery emphasizes the need for strategies to prevent preterm births and manage them effectively when they occur.

A study by Son KA et. Al [9] showed that abnormal vaginal colonization detected in the second trimester but not in first trimester was associated with a significant increase in preterm delivery before 28 weeks of gestation (P=0.006) The higher percentage of full-term deliveries (>37 weeks, 73.8%) is a positive indicator, suggesting effective prenatal care and management. The presence of preterm deliveries (<37 weeks, 26.3%) still calls for focused interventions to address the factors leading to early delivery. Preventing PTB is crucial in reducing neonatal morbidity and mortality, representing a significant public health priority.

BIRTH WEIGHT

Birth weight distribution revealed that the majority of neonates weighed between 2.6-3 kg (38.8%). Other weight categories included <1.5 kg (15%),
1.5-2 kg (6.3%), 2.1-2.5 kg (21.3%), 3.1-3.5 kg (15%), and >3.5 kg (3.8%). Birth
weight is a critical determinant of neonatal health, with LBW being associated with adverse outcomes. This distribution suggests a relatively healthy birth weight range for most neonates, but the presence of LBW cases highlights the need for enhanced prenatal care. Studies on birth weight of babies have shown that optimizing maternal health can significantly improve birth weight outcomes.

The distribution of birth weights, with the majority in the 2.6-3 kg range (38.8%), indicates generally healthy birth weights. Yet, the LBW cases (<1.5 kg, 15%) are concerning, given its association with elevated risks of neonatal complications and long-term health issues. The data underscores the necessity for bolstered nutritional and medical support for women in antenatal period to enhance birth weight outcomes.

In the conducted study, by ng BK et al. [31], the findings indicated an association between BV and LBW.

APGAR

APGAR scores indicated that 98.7% of neonates had scores ≥7, while only 1.3% had scores <7. High APGAR scores are indicative of good neonatal health and effective immediate postnatal care. The near-universal high scores in this study suggest successful perinatal care practices. The APGAR score is a widely used measure of neonatal well-being, and the findings in this study align with other research that underscores its importance in assessing and improving neonatal outcomes. The very high percentage of neonates with APGAR scores ≥7 (98.7%) is an encouraging sign of good immediate postnatal health and effective neonatal care practices. The rare instances of lower scores (<7, 1.3%) warrant further investigation to identify any underlying issues or areas for improvement in delivery and postnatal care. In the research undertaken by Szubert et.al [32] showed APGAR <4 is related to bacterial vaginosis

FETAL OUTCOMES

Fetal outcomes were predominantly favorable, with 73.8% of cases reporting no adverse outcomes. Preterm births were noted in 17.5% of cases, LBW in 10%, sepsis in 5%, respiratory disease in 8.8%, 10% were infants of diabetic mothers, and fresh still born is in 1.3%. Understanding fetal outcomes is essential for improving neonatal care and reducing morbidity and mortality. The existence of conditions like preterm birth and low birth weight necessitates the need for targeted interventions. Research on fetal outcomes highlights the importance of comprehensive maternal and neonatal care to mitigate risks and improve health outcomes. Study by Hosevar et. Al [21] provide additional evidence suggests that vaginal microbiome composition is linked to preterm delivery.

The predominance of favorable fetal outcomes (73.8%) highlights the effectiveness of prenatal and perinatal care in the current study setting. However, the proof of preterm (17.5%), LBW (10%), and other conditions like sepsis (5%) and respiratory disease (8.8%) underscores the importance of continuous monitoring and intervention strategies to manage and prevent these outcomes. The data reflect the need for integrated maternal-fetal healthcare services to optimize both maternal and neonatal health outcomes.

Mulinganya et.al [3]	Low birth weight -5.2% PROM-20.6 % Preterm birth-14.6% NICU admission-4.2 %
Ng BK et.al [31]	Preterm birth – 22.7 % NICU admission – 19%
Present study	Preterm birth – 17.5% Low birth weight -10% Respiratort distress – 8.8% Sepsis – 5%

This discussion offers a comprehensive analysis of risk factors correlated with vaginal dysbiosis, encompassing age distribution, parity, socioeconomic status, gestational age, comorbidities, detected flora, delivery method, adverse pregnancy outcomes, APGAR scores, birth weight, gestational age at birth and fetal outcomes. Each section highlights the key findings and compares them with existing literature, providing a comprehensive understanding of the study's implications.

CONCLUSION

This comprehensive analysis of the cases provides valuable insights into the distribution and characteristics across various parameters. These findings underscore the importance of targeted interventions, effective prenatal and perinatal care, and addresses socioeconomic and parity-related disparities to improve maternal and neonatal health outcomes. Our study represents only the tip of the ice berg as it was conducted on 80 patients, however it can pave way for further studies to explore the underlying causes of these distributions and develop strategies to optimize health care delivery and outcomes.

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