PREVALENCE AND RISK FACTORS OF BACTERIAL VAGINOSIS DURING PREGNANCY: A REVIEW

By

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A thesis submitted to the Department of Mathematics and Natural Sciences in partial fulfilment of the requirements for the degree of B.Sc. in Microbiology

Department of Mathematics and Natural Sciences

Brac University

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Declaration

It is hereby declared that

1. The thesis submitted is my/our own original work while completing degree at Brac University.
2. The thesis does not contain material previously published or written by a third party, except where this is appropriately cited through full and accurate referencing.
3. The thesis does not contain material which has been accepted or submitted, for any other degree or diploma at a university or other institution.
4. I/We have acknowledged all main sources of help.

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Approval

The thesis/project titled “PREVALENCE AND RISK FACTORS OF BACTERIAL VAGINOSIS DURING PREGNANCY: A REVIEW” submitted by Taima Islam (20126026) of Summer, 2025 has been accepted as satisfactory in partial fulfilment of the requirement for the degree of BSc in Microbiology on 29-09-25.

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Abstract/ Executive Summary

Bacterial vaginosis (BV) is a polymicrobial disorder characterized by a decrease in Lactobacillus species and an overgrowth of facultative and anaerobic bacteria in the vaginal fluid. It is essentially an underappreciated problem, as BV has been implicated in adverse pregnancy outcomes such as preterm labour and delivery, preterm premature rupture of the membranes, low birth weight, spontaneous abortion, and postpartum infections.

BV is one of the most common vaginal infections worldwide, and its prevalence is estimated to range between 10% and 30% in pregnant women according to geographic, ethnic, and care settings. Although often asymptomatic, BV may cause vaginal discharge, malodour, and discomfort. Significantly, both symptomatic and asymptomatic cases are associated with substantial maternal and neonatal complications, including preterm delivery, low birth weight, and postpartum sequelae.

The prevalence of BV in pregnancy is determined by demographic features (age, race, socioeconomic status), behavioural factors (unprotected intercourse, douching), and medical history. Hormonal shifts and changes in vaginal pH during pregnancy also increase susceptibility to infection. Diagnosis is typically made using Amsel's criteria and Nugent scoring, and treatment usually involves antibiotics, specifically metronidazole or clindamycin. However, caution should be exercised in their use due to the potential risks to the developing fetus, such as teratogenic effects and increased risk of preterm birth.

Addressing persistent BV is a significant challenge, underscoring the need for proactive and responsible preventive follow-up of BV in prenatal care. Early screening, particularly in high-risk populations, is not just crucial but a proactive step towards reducing complications and ensuring the health of both mothers and newborns.

Given the global burden of disease, the World Health Organization (WHO) advocates for screening and treatment of symptomatic pregnant women, with all HIV seropositive cases. However, the need for additional research to elucidate the biological pathways responsible for the association between BV and preterm birth and Low birth weight is urgent. This research is crucial to determine effective prenatal interventions that can interrupt these pathways, underscoring the importance of work in this field.

Keywords: bacterial vaginosis, Pregnant woman, vaginal microflora, risk-factors and prevalence.

Dedication

This thesis is dedicated to my beautiful family

Acknowledgement

First and foremost, I would like to extend my heartfelt gratitude to my thesis supervisor, Professor Dr. Fahim Kabir Monjurul Haque, Associate Professor of the Department of Mathematics and Natural Sciences (Microbiology Program) of Brac University, His unwavering patience and encouragement have been a constant source of strength throughout my thesis work at the University. His profound knowledge, love, and dedication have not only inspired me endlessly but also significantly contributed to my personal growth. Prof. Dr Haque has generously shared his invaluable time and ideas, guiding the progress of my research with wisdom. I consider myself truly fortunate to have him as my mentor.

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Table of Contents

Approval 2
Dedication 4
Acknowledgement 5
List of Figures 7
List Of Tables 7
List of Acronyms 7
Abstract 8
Chapter 1 9
Introduction 9
Chapter 2 11
Research Methodology: 11
2.1 Search Strategy: 11
2.2 Inclusion Criteria: 11
2.3 Exclusion Criteria: 11
Chapter 3 12
3. Prevalence of bacterial vaginosis during pregnancy 12
3.1 Region-wise total prevalence of BV among pregnant women 12
3.2 Age group-wise distribution of BV 14
3.3 Gestational period-wise distribution of BV 15
3.4 Socioeconomic level, educational status, parity-wise distribution of BV 15
Chapter 4 18
Risk Factors for BV During Pregnancy 18
4.1 Pregnancy-Related Factors 18
4.2 Clinical Factors 19
4.3 Behavioural Factors 21
Chapter 5 24
5. Conclusion 24
References 26

List of Figures

Figure 1: Prevalence of BV across different regions in Africa 13

Figure 2: Prevalence of BV by age group 15

Figure 3: Prevalence of BV among expectant mothers in Cameroon 17

List Of Tables

Table 1: Region-wise Total Prevalence Among Pregnant Women 12

Table 2: Age group wise distribution of BV 14

Table 3: Socio-economic level, education level, parity-wise distribution of BV 16

List of Acronyms

Acronyms	Explanation
BV	**Bacterial Vaginosis**
STD	**Sexually Transmitted Diseases**
STI	**Sexually Transmitted Infection**
HSV-1	**Herpes simplex virus-1**
HSV-2	**Herpes simplex virus-2**

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Abstract

Bacterial vaginosis (BV) is a polymicrobial disorder characterized by a decrease in Lactobacillus species and an overgrowth of facultative and anaerobic bacteria in the vaginal fluid. It is essentially an underappreciated problem, as BV has been implicated in adverse pregnancy outcomes such as preterm labour and delivery, preterm premature rupture of the membranes, low birth weight, spontaneous abortion, and postpartum infections.

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Chapter 1

Introduction

Bacterial Vaginosis (BV), the most prevalent vaginal infection in women of reproductive age, is also referred to as non-specific vaginitis. Approximately 5 to 70 percent of women will get this infection at some time. In BV, physiologic levels of hydrogen peroxide and lactic acid-producing Lactobacillus species are replaced with high concentrations of anaerobic bacteria associated with vaginal dysbiosis. The anaerobic bacteria implicated are *G. vaginalis, Prevotella spp., Mobiluncus spp., Atopobium vaginae,* and others, which are related to BV. Several studies have recognized *G. vaginalis, Lactobacillus species, Prevotella,* and anaerobes such as Mobiluncus and Bacteroides as major causative agents of the infection. Other microorganisms present in BV include *Peptostreptococcus, Fusobacterium, Veillonella, Eubacterium, Streptococcus viridans, Atopobium vaginae,* and *Ureaplasma urealyticum,* which have great potential in microbial research (Kenyon et al., 2013; Redelinghuys et al., 2015).

Bacterial Vaginosis (BV) is one of the third most common vaginal infections worldwide. Though it can strike at any age, it is prevalent among women of reproductive age. It has been estimated that 5–10 million women consult a physician annually for gynaecological advice concerning vaginitis. The prevalence of BV varies between 8% to75% with much higher prevalence in some areas of Africa. BV is an established risk factor for adverse obstetric and gynaecological health outcomes, with pregnant women most commonly affected (van den Munckhof et al., 2019). These consequences include preterm labour, premature rupture of membranes, intrauterine growth restriction, low birthweight, spontaneous abortion, and postpartum infections, such as endometritis and surgical site infections after caesarean sections (Bagnall & Rizzolo, 2017; Hay, 2000; Barsoum, 1990).

Several risk factors are associated with bacterial vaginosis, such as marital status, residence, multiparity, abortive history, douching prevalence, and multiple sexual partners. Bacterial vaginosis is common in pregnant women. Early diagnosis is important for prompt treatment and to avoid reduction in pregnancy complications and poor outcomes, since the majority of cases are asymptomatic. Thus, it is important to screen BV in symptomatic or asymptomatic pregnant women by vaginal swabs (Bagnall & Rizzolo, 2017).

Women are also at an elevated risk for BV if they report certain sexual behaviours: having multiple male or female partners, having sex with more than one person, having a new sex partner, not using condoms, and HSV-2 seropositivity. Male circumcision has been demonstrated to decrease the likelihood of BV in women. Gardnerella vaginalis is transferable between women, via direct sexual contact and possibly on shared sex toys. Even though BV is a risk for multiple health problems, the identification of the several factors predisposing women

to have this infection is important. This investigation aims to establish risk factors for BV and treatment outcomes of BV infections (Redelinghuys et al., 2015).

Women with BV are more susceptible to STIs, and BV can stimulate viral replication and vaginal shedding of both HSV-1(herpes simplex virus-1) and HSV-2 (herpes simplex virus-2), leading to their transmission. On the whole, BV is now a public health issue because of its link with STIs. According to various research, BV is currently recognized as an important public health matter. (Bagnall & Rizzolo, 2017; Bautista et al., 2016; Kenyon et al., 2013).

Chapter 2

Research Methodology:

2.1 Search Strategy:

This review searched the scientific literature using different databases (Google Scholar, PubMed, ScienceDirect) for eligible studies. Many keywords, including *lactobacillus, Streptococcus viridians*, prevalence, pregnancy, risk factors, and BV, were used to retrieve the articles. Use of Boolean operators such as "AND," "OR," and "NOT" was utilized to keep the searches specific. Only original research papers and reviews with a large number of citations were accepted to gather information related to the research question (Downes et al., 2016).

2.2 Inclusion Criteria:

The review was concentrated on the primary literature examining the prevalence of BV during pregnancy, factors associated with an increased prevalence of BV during pregnancy, and the prevalence of lactobacillus and anaerobic species among pregnant women. The literature overview also contained a report that described the symptoms and complications of BV in pregnancy (Kenyon et al., 2013).

2.3 Exclusion Criteria:

Articles that reported on the incidence or risk factors for vulvovaginal candidiasis, Candida vaginitis, antibiotic resistance of Candida species, diagnosis or treatment of BV without comparisons were not taken into account. In addition, studies only reporting BV prevalence among women who were not pregnant or of reproductive age were not included (Bradshaw et al., 2006; Kenyon et al., 2013).

Chapter 3

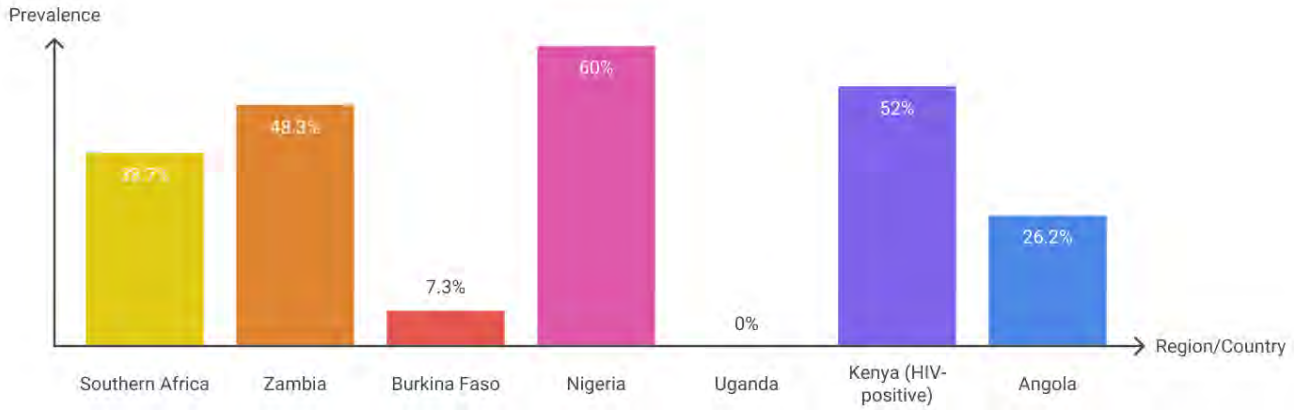
3. Prevalence of bacterial vaginosis during pregnancy

3.1 Region-wise total prevalence of BV among pregnant women

The geographic difference in prevalence exhibits how alarming a global health problem bacterial vaginosis (BV) is. In Africa, BV is more prominent in pregnant women. In accordance with, Kamga et al. (2019), in Southern Africa, the prevalence of BV is about 38.7%, and in countries such as Zambia. It is as high as 48.3%. The prevalence of BV is quite variable, from 7.3% in Burkina Faso to 60% in Nigeria. This variance is driven by the underlying socioeconomic status and healthcare coverage (Kamga et al., 2019; Afolabi et al., 2016).

Again, the differences in prevalence in East Africa are also considerable (from 0% in Uganda to 52% among pregnant women in Kenya) (Farquhar et al., 2011; Marx et al., 2011). A study by Kamga et al. (2019) estimated the prevalence of BV in Angola at 26.2%, with rural areas having a higher prevalence than urban areas. This heterogeneity is indicative of the diverse healthcare accessibility and sanitary conditions (Kamga et al., 2019). At the global level, differences in the rates of BV are an expression of the interplay between social, geographical, and health determinants (Bertini, 2017).

Region	Prevalence Rate	Source
Southern Africa	38.7%	Kamga et al. (2019)
Zambia	48.3%	Kamga et al. (2019)
Burkina Faso	7.3%	Kamga et al. (2019)
Nigeria	60%	Kamga et al. (2019)
Uganda	0%	Kamga et al. (2019)
Kenya	52%	Farquhar et al. (2011)
Cameroon	26.2%	Kamga et al. (2019)



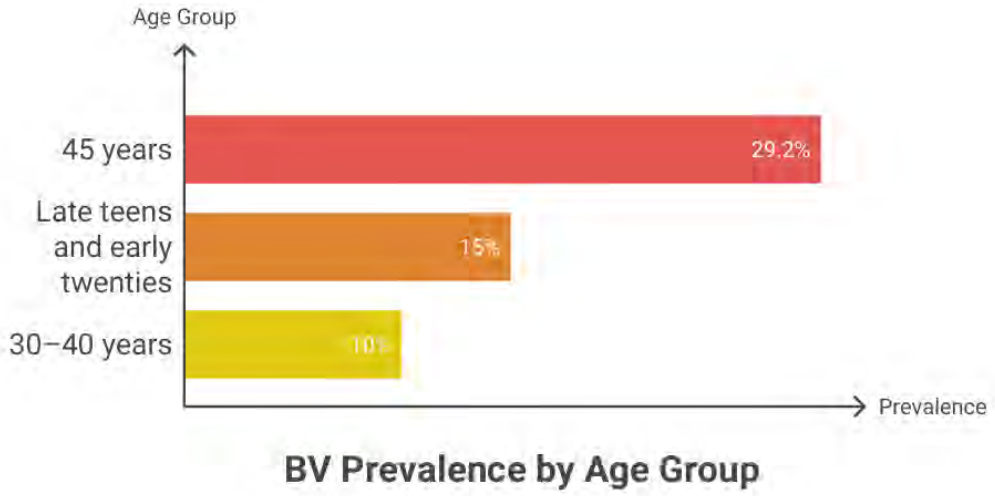
Prevalence of Bacterial Vaginosis in Pregnant Women by Region

3.2 Age group-wise distribution of BV

BV is associated with younger pregnant women, and advanced age is a powerful factor influencing the presence of BV. BV has been reported to peak in women in their late teens and early twenties in several studies. In Cameroon, women aged 45 years recorded the highest prevalence of 29.2% (Kamga et al., 2019). Sexual practice and perhaps a not fully developed vaginal microbiome render this age group particularly vulnerable (Ibrahim et al., 2014).

Other findings indicated that older age, particularly the age group of women that rivals 30–40 years old, is not spared from increased BV prevalence that may arise as a result of past vulnerability to vaginal infections over time (Ranjit et al., 2018). There are differences in how common it is in other countries, depending on a woman's age. However, a woman's risk remains higher if she is younger and engages in sexual activity at an early age or has limited access to medical care. It underscores the significance of specific education and prophylaxis (Mengistie et al., 2014).

Age Group	Prevalence of BV	Source
18-22 years	29.2%	Kamga et al. (2019)
23-29 years	20%	Ibrahim et al. (2014)
30-40 years	15%	Ranjit et al. (2018)



BV Prevalence by Age Group

3.3 Gestational period-wise distribution of BV

The variation also occurs between stages of pregnancy. In the Cameroonian setting, the second trimester was the most affected by BV with a prevalence rate of 31.7% compared to the first (20.7%) and third (18.0%) trimesters (Kamga et al., 2019). This result is consistent with international research, which has indicated that biological changes in pregnant women, variations in sexual hormones in pregnant women, especially high levels of progesterone and estrogen, may affect the vaginal microbiota and indicate a high risk of BV (Farquhar et al., 2011).

Early second trimester is a crucial period of gestation, the increased prevalence of BV in this stage initiates concerns regarding a probable role in subsequent outcomes, such as low birth weight and preterm birth.

3.4 Socioeconomic level, educational status, parity-wise distribution of BV

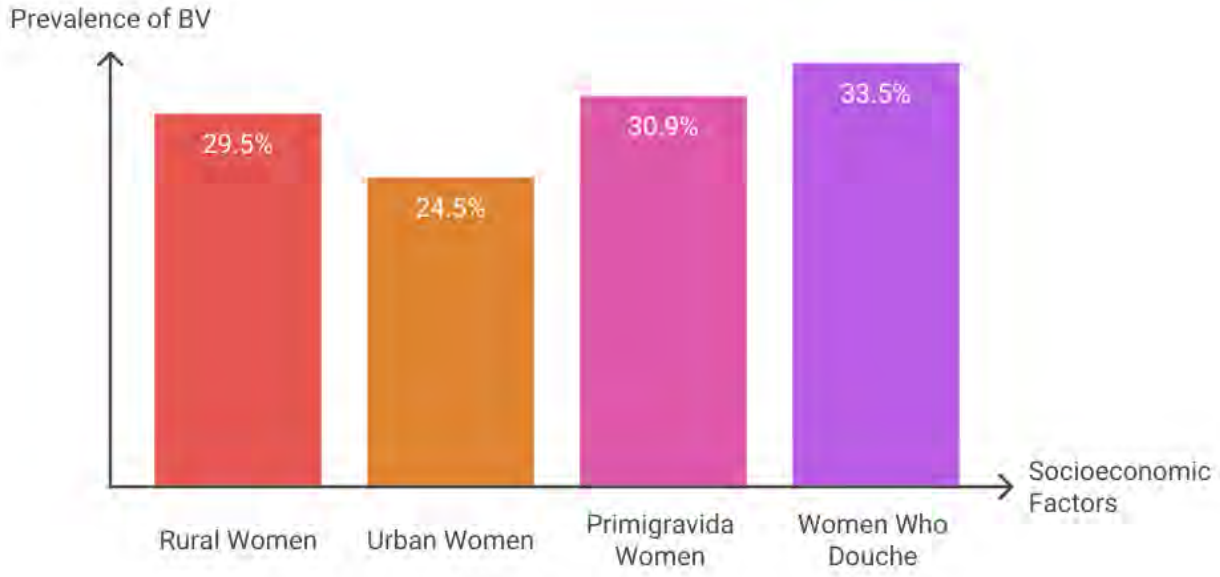
Parity, education, and social class also have strong relationships with the incidence of BV in pregnant women. BV was higher among rural (29.5%) than urban women (24.5%) in Cameroon, possibly reflecting the restricted and poor infrastructural facilities for quality healthcare and poor hygienic practices (Kam et al., 2019). Level of education is also involved, women who have no formal education exhibiting the highest BV prevalence, but this was not statistically notable.

Parity is another important factor. In this study, the prevalence of BV increased in the primigravida women (30.9%) than in the multigravida ones, indicating the possibility of better access to health care and education about hygiene in the latter (Kamga et al., 2019; Afolabi et al., 2016). Vaginal douching was also an important risk factor. According to

Kamga et al. (2019), there was a greater prevalence of BV (33.5%) among women who reported douching than among those who did not.

In order to lower the burden of BV and its consequences, these results highlight the pressing need for better health information concerning hygiene and reproductive health, in particular in rural areas and among less privileged women.

Factor	Subgroup	Prevalence of BV	Source
Region	Rural	29.5%	Kamga et al. (2019)
	Urban	24.5%	Kamga et al. (2019)
Education	No Formal Education	Highest prevalence	Kamga et al. (2019)
Parity	Primigravida	30.9%	Kamga et al. (2019)
	Multigravida	Lower prevalence	Kamga et al. (2019)
Douching Habits	Douching	33.5%	Kamga et al. (2019)
	Non-Douching	Lower prevalence	Kamga et al. (2019)



Prevalence of BV in Pregnant Women by Socioeconomic Factors

Chapter 4

Risk Factors for BV During Pregnancy

The vagina tightens and becomes more sensitive during a pregnancy, which is why getting a yeast infection is often very hard to avoid. Pregnancy is a strong risk factor for this. Others have noted an aggregation of BV cases and the influence of pregnancy. Several clinical, behavioural, and demographic factors influence BV during pregnancy. BV has been linked to various host-related factors also.

4.1 Pregnancy-Related Factors

Multiple literatures have also described how a woman's body changes during pregnancy, specifically her increased ability to carry a pregnancy, the retention of nutrients and Vaginal pH decreases. These determinants have been associated with increased BV risk.

4.1.1 Weakened Immune System

Pregnant women are at higher risk of infection due to their "immunocompromised state". It could be too much stress. When a woman is pregnant, there is an overload of emotions, which tends to reduce the immune response. For example, by inhibiting the immune system, pathogens like *G. vaginalis, Prevotella sp., Mobiluncus sp., and A. vaginae* may grow unchecked (Esber et al., 2015; Redelinghuys et al., 2015).

4.1.2 Elevation of Reproductive Hormones

Hormones vary tremendously across pregnancy and culminate at a very high level not seen anywhere else. Researchers found that increased levels of sex-steroid hormones, including progesterone (P4) and/or estrogen (E2), during pregnancy increase the likelihood that she will become infected. High progesterone changes the structure of the cells lining the vagina, so that more bacteria can enter the vagina. Furthermore, antimicrobial neutrophils can be inhibited with progesterone. Increased estrogen can upset the bacterial balance that exists normally in the vagina and result in vaginal infection from bacteria. Researchers also found that the bonding between yeasts and vaginal mucus cells is stronger when there are higher levels of estrogen.

Furthermore, it was demonstrated that high estradiol levels (Estradiol is a form of estrogen, which is a primary female sex hormone) may decrease immunoglobulins in vaginal secretions. Attenuating the antibacterial function of epithelial cells could eliminate estrogen-induced downregulation of bacterial growth, and such downregulation might further increase the risk of pregnancy complications. (Jespers et al., 2015; Rosca et al., 2020)

4.1.3 Decreased pH Level

Vaginal pH is 4.0-4.5, and therefore, the vagina has an acidic environment that suppresses the growth of many vaginal pathogens. also reported that all physiological changes influencing

both commensal and pathogenic vaginal microorganisms are sufficient to disturb vaginal acidity, in which the pH is elevated to an acidity of 5.0-6.5. This will also increase the opportunity for pathogenic bacteria like *G. vaginalis* to colonize the vagina (Yadav & Prakash, 2016). It has been demonstrated that high progesterone levels during pregnancy lower the vaginal pH, which can favour bacterial overgrowth (Bagnall & Rizzolo, 2017; Kenyon et al., 2013).

4.1.4 Large Amount of Deposition of Glycogen

Glycogen content in the vagina is increased by progesterone as well as estrogen. A thick deposit of glycogen in the vaginal wall furnishes a carbon substrate for the growth and germination of a variety of organisms. This also implies there might be an increased likelihood of BV in pregnant women due to a conducive immunological context for their propagation (Bradshaw et al., 2006; Coudray & Madhivanan, 2020).

4.2 Clinical Factors

Other risk factors that have been associated with vaginal colonizing organisms in pregnant women include diabetes mellitus and HIV infection.

4.2.1 Diabetes Mellitus

Poorly controlled diabetes mellitus is an established risk factor for bacterial vaginosis. Patients with diabetes mellitus appear to be predisposed to suffer from bacterial infections such as those of the skin and vagina, regardless of the type of diabetes. When someone has diabetes mellitus, the glucose amounts in their vaginal secretions will increase. This facilitates the attachment of Candida to epithelial cells and leads to an increase in the growth and the level of virulence factor production of Candida. During hyperglycaemia, neutrophils do not phagocytose and kill pathogens as they usually would.

Furthermore, hyperglycaemia may induce bacteria to produce proteins, which not only help bacteria attach to the host but also prevent the host from engulfing the bacteria through phagocytosis. For this reason, as diabetes causes bacterial growth, pregnant women with the infection may bear a higher risk for BV. Masri et al. (2015) also observed the relationship between diabetes and episodes of BV during pregnancy to be statistically significant (Masri et al., 2015).

4.2.2 HIV Infection

Although bacteriuria is more prevalent in immunosuppressed females, immunoprotected factors are known to control the composition of bacteria in the vagina, and upregulation results in increased colonization of the vagina by bacteria. Bacterial colonization correlates closely with diminished cell-mediated immunity in immunodeficient residents. Predisposing host factors such as HIV infection and other immunosuppressive illnesses are among the leading predisposing factors in the pathogenesis of BV. In addition, proteinase activity is one of the prominent factors in the pathogenesis of BV, which may be the reason for the elevated prevalence of BV in HIV positive cases. There are increased proteinase levels in HIV-positive women. However, some studies have reported that no statistical correlation exists between BV and HIV. Contrastingly, in HIV+ pregnant women, BV increases by more than twofold relative to HIV− controls (Foessleitner et al., 2021). The observation that the severely immunocompromised are potentially more susceptible to developing BV could explain the finding of a lack of association (Atashili et al., 2008; Esber et al., 2015).

4.3 Behavioural Factors

Multiple behaviours, which are not uncommon in pregnant women, also have the potential to influence bacterial growth during pregnancy. Factors such as Dietary Habits,oral contraceptives, wearing tight clothing, unhealthy hygiene behaviours such as douching were all found to be potential risk factors of BV during pregnancy in various studies.

4.3.1 Dietary Habits

Unhealthy eating habits (like nutrient-poor diets) weaken the immune system and set the stage for infections like BV. A Balanced diet is also critical in ensuring the equilibrium of the vaginal microbiome. BV is associated with decreased Lactobacillus and overgrowth of anaerobic bacteria. It is associated with adverse sequelae, such as HIV acquisition, preterm birth, and STIs. A lack of micronutrients, such as vitamin A, iron, and zinc, weakens the immune defence, thus raising the risk of BV.

Studies on diet and BV show:

- A high intake of dietary fat, especially saturated fats, increases the risk of BV by elevating vaginal pH and disrupting the microflora.
- Increased consumption of folic acid, vitamin E, and calcium was inversely associated with BV severity, possibly reflecting its immune-modulating function.
- Nutrient consumption in terms of carbohydrate and protein failed to reveal statistically significant correlations.
- Phytochemicals, including flavonoids and phenolic acids, have antimicrobial effects, which can protect against BV pathogens. High phytochemical-composed diets are linked to decreased BV risk. A small body of evidence also indicates that vitamin D and probiotics can improve BV outcomes (Coudray & Madhivanan, 2020).

4.3.2 Frequent Oral Contraceptive Use

Hormonal contraceptives are a standard treatment that can significantly impact the vaginal microbiome. They can disrupt hormone levels and potentially those of friendly bacteria living in the ecosystem of the vagina. This variation may favour the overgrowth of pathogenic bacteria, promoting the onset of bacterial vaginosis (BV).

According to a 2019 United Nations report, around 407 million women around the world were using hormones for birth control. Of these, 27% used IUDs, 16% used OCPs, 8% used injectable contraceptive methods, and 2% used other methods. Because of the changed balance between estrogen and vaginal microbiota, hormonal contraception may influence CSTs in the vagina and colonization with Lactobacillus species (Bradshaw, Morton, et al,2006).

Studies show that both Oral contraceptives and condoms protect against BV, but less strongly for condoms. Oral contraceptives can raise vaginal glycogen concentrations in genital epithelial cells, promoting Lactobacillus growth and inhibiting bacteria that cause BV. Condom use may also be of benefit by reducing changes in vaginal flora that encourage anaerobic bacteria.

4.3.3 Tight and Synthetic Clothing

Narrow and synthetic clothing provides a warm and moist surface for bacteria to grow on, elevating the risk of BV. Literature shows that dressing also influences the vaginal microbiome and hence BV acquisition (Coudray & Madhivanan, 2020).

4.3.4 Douching and Female Hygiene Product

Use of fragranced feminine hygiene products and vaginal douching disturbs the normal vaginal flora and predisposes to a higher risk of BV.

Although douching has consistently been linked to BV, the chain of causality is unspecified. If BV-related symptoms were inducing women to douche, a higher prevalence of other cleansing practices would also be found among symptomatic women. However, we found no significant associations with other practices, such as clothing or modes of menstrual protection.

Woodman et al. investigated the association between vaginal douching and BV. The findings showed a consistent relationship between the two, but it did not prove cause and effect. While douching has been linked to BV in a dose-response pattern, the investigation detected a weak positive association between other hygienic practices (alternating trouser types and menstrual protection) and BV. This evidence supports an inference that the strong relation between douching and BV found in the study was not due to women douching in direct response to symptoms of BV. Vaginal douching, on the other hand, is associated with increased risk for clinical sequelae related to BV (Brotman et al., 2008).

The study also opposes the view that women douche because of BV symptoms. Douching has been strongly associated with increased BV prevalence, but other hygienic practices that did not involve douching did not follow this pattern. This work adds to our understanding of potential candidates in BV etiology, and continues to support the case for further focused studies on hygiene practices and the development of BV (Brotman et al., 2008, 2008).

Chapter 5

5. Conclusion

Bacterial Vaginosis (BV) is one of the most prevalent vaginal infections during pregnancy and an important public health problem globally. Its commonness (affecting 10–30% of pregnant women) requires early identification and correct clinical management. The infection is caused by an imbalance in the normal vaginal flora with a decrease in *Lactobacilli* species, and overgrowth of anaerobic pathogenic bacteria such as *Gardnerella vaginalis* and *Mobiluncus* species. This disturbed microbiota can result in a variety of detrimental maternal and neonatal outcomes that include preterm birth, premature rupture of membranes (PROM), low birth weight (LBW), postpartum endometritis, and susceptibility to sexually transmitted infections.

The results of this study are consistent with the concept that BV is more frequent during pregnancy than in nonpregnant women, due to hormonal (estrogen and progesterone surges) induced changes in the vaginal environment, which would predispose anaerobe growth. The rate increases linearly throughout the second trimester, suggesting a window during which screening and intervention may have the most significant potential impact for preventing pregnancy complications.

Among primigravid women, factors associated with BV in pregnancy include:

- Demographic characteristics: Higher prevalence rates are observed in younger maternal age (18–22 years), lower socioeconomic status, and rural residence.
- Behavioural factors: It has been shown that BV risk is higher among women who engage in unprotected sex, have multiple sex partners, and use vaginal douches.
- History of BV Prior to BV: recurrent vaginal infections and current STIs are all risk factors for recurrence of BV.
- Intriguingly, regional disparities are huge – prevalence in African countries, for example, ranges from 7.3% (Burkina Faso) to almost 60% (Nigeria), reflecting variations in sanitation behaviour, use of healthcare, and social determinants of health among others. These findings also emphasize the importance of regional screening programs and public health interventions.
- Co-infections, especially those with Candida albicans, are also clinically significant as they render diagnosis more complex and necessitate the use of combined treatment procedures.
- Early detection is important as BV is treatable, but symptomatic recurrence rates are high, and therefore, re-evaluation periodically through pregnancy is recommended. As a result, management approaches need to be comprehensive and multifaceted: Routine prenatal screening, particularly during the second trimester, is essential in high-prevalence populations.

- Promoting behaviour change in relation to modifiable risk factors—discouraging vaginal douching, promoting safe sex practices, and encouraging personal hygiene.
- Post-treatment follow-up for the prevention of recurrence and monitoring maternal-fetal conditions.
- Treating bacterial vaginosis in pregnancy is a whole-of-cohort need for policymakers, researchers, and clinicians. The incorporation of BV screening into standard antenatal practice and targeting interventions towards women with sociodemographic risk factors is likely to yield substantive benefits in terms of mother and neonate health. Future research should aim to characterize further the complex interaction between the vaginal microbiome and pregnancy, as well as cost-effective treatment strategies that are sustainable in resource-limited settings, in order to minimize this global burden.
- Finally, proactive treatment of BV to reduce the risk of preterm birth not only affects pregnancy outcomes but also contributes to improving maternal health care systems, which have as their goal safe motherhood and healthy generations.

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