

Review article : Bacterial vaginosis in women

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Abstract

Bacterial vaginosis is caused by the overgrowth of some bacteria naturally present in the vagina, Vaginal infection is most common in women, especially in pregnant women. The cause of this disorder is not known, nor is it caused by poor hygiene. women with vaginal bacteria Might not appear any signs or symptoms. Frequent washing and the use of scented soaps cause vaginal imbalance. The most common clinical symptoms of bacterial vaginosis include a thin homogeneous vaginal discharge, pH 4.5, the appearance of clue cells, and an amine odor after 10 percent of Potassium hydroxide. None of them no Lactobacilli in the vaginal fluid are normally detected by microscopy, Several ways of diagnosing BV, Clinical Quality Requirements, Gram Stain, Vaginal Cultures, Papanicolaou smears, Oligonucleotide probes, Gas-Liquid Chromatography, Proline Aminopeptidase Assay, Molecular Methods. This review focuses on the epidemiology, etiology, diagnosis, complications, and treatment of BV, with emphasis on the role of antimicrobial treatment options.

Keywords: *Bacterial vaginosis, Lactobacilli, Gardnerella vaginalis, women.*

I. Introduction

Bacterial vaginosis in women is the most common source of an irregular vaginal discharge. many severe women affected experience Smelly secretions which recur frequently, often around the time of menstruation. Each year affecting millions of reproductive-age women. While the condition can be treated with antimicrobials such as clindamycin and metronidazole, the risk of relapse is strong. women with vaginal bacteria Might not appear any signs or symptoms (Donders, 2010). but it is more commonly associated with vulvovaginal symptoms such as discharge, itch, odor, and discomfort. These are popular female symptoms, most frequently arising during and immediately after menstruation at a period when the vaginal pH appears to be higher relative to certain periods in the menstrual cycle (Melvin, Glasier, Elton, & Cameron, 2008). The cause for the rise in pH remains uncertain, although there is proof of transient vaginal microflora disruption and increased occurrence of bacterial vaginosis and candida infection at the

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menstrual period (Melvin et al., 2008) (Eschenbach et al., 2000). There is also growing proof that the pathogenic Influences, of Bacterial vaginosis, are not limited to the genital tract (Swidsinski et al., 2013). The microbial association of Bacterial vaginosis includes a thick, highly organized polymicrobial biofilm consisting primarily of *Gardnerella vaginalis*, which adheres closely to the vaginal epithelium (Swidsinski et al., 2008). Bacterial vaginosis is a contributing factor for negative effects in pregnancy, including abortion in the second trimester of pregnancy, early birth, and endometritis in the post-Caesarean section (Deese, Pradhan, Goetz, & Morrison, 2018; Javed, Parvaiz, & Manzoor, 2019; Russo, Karadja, & De Seta, 2019).

Normal Flora

The vaginal flora of women without bacterial vaginosis is usually composed of grampositive rods with a predominance of *Lactobacillus crisp ales*, *Lactobacillus jensenii* and *Lactobacillus iners* although the *Lactobacillus iners* of are frequently not detected as they do not grow easily on rosga agar, HiMedia (Johnson, Petzold, & Galask, 1985). Previous studies have shown that vaginal microbial composition depends on factors such as geographic area, for example, normal vaginal flora in African women

in other regions is considered pathogenic to women (Berza et al., 2013). Moreover, *Lactobacillus reuteri* is considered the most popular lactobacillus in India but in Finland, it is *L. Crispatus* (Berza et al., 2013). There is also a change in bacterial flora during different periods of the menstrual cycle in women (Eschenbach et al., 2000).

Epidemiology

Bacterial vaginosis is the most prevalent vaginal infection occurring in reproductive age women and is expected to occur in women from 5 percent to 70 percent in any area (Russo et al., 2019). Interestingly, this disease in parts of Africa is more and is found to be least frequent in Asia and Europe (Russo et al., 2019). In the United States, roughly 30% of women aged 14 to 49 are affected; nevertheless, rates vary between ethnic groups to 51% of African American women, 32% of Mexican American women (Jain et al., 2018) (Eastment & McClelland, 2018). It is reported that at any stage in their lives 1 in 3 women may experience the disease. Its incidence in developing countries varies between 4.9 and 36 percent (Henn, Kruger, & Siebert, 2005). An elevated chance increase for bacterial vaginosis with surgery and birth, where 15 to 20 percent of pregnant women are reported to have bacterial vaginosis (Alfonsi, Shlay, & Parker, 2004). Certain research reported the incidence of bacterial vaginosis in non-pregnant females varying from 15% to 30% and noticed that up to 50% of pregnant women have bacterial vaginosis (Laxmi, Agrawal, Raghunandan, Randhawa, & Saili, 2012). No proof remains that Bacterial vaginosis functions as an STD. Therefore, Bacterial vaginosis is more known as a sexually stimulated disorder (SED), with a vital component in the duration of intercourse (Verstraelen, Verhelst, Vaneechoutte, & Temmerman, 2010). A comprehensive study of the BV epidemiology was performed. The incidence of

BV has been found to differ significantly among ethnic groups in North America, South America, Europe, Middle East and Asia. That may be attributed to various variables such as socio-trends, sexual habits and hygiene behaviors.

Etiology

Bacterial vaginosis etiology is poorly understood and remains a topic for discussion.

Bacterial vaginosis can spontaneously develop and remit, or develop into a chronic or

recurrent disease (Donders, 2010). The spread of bacteria among individuals via sexual intercourse will alter the normal balance of microflora inside the vagina, and this imbalance tends to lead to bacterial vaginosis developing (Coughlin & Secor, 2010). Historically, BV has been named Gardnerella vaginitis, because this bacterium was thought to be the source of this condition (Greenbaum, Greenbaum, Moran-Gilad, & Weintraub, 2019). The newer term, bacterial vaginosis, though, tends to illustrate the reality that several different bacteria that live naturally in the vagina that develops excessively and worsen the disease. While Bacterial vaginosis has not shown to be sexually transmitted, it has an epidemiological profile associated with that of an illness that is sexually transmitted (Henn et al., 2005). After menopause, bacterial vaginosis can sometimes affect women. The drop in perimenopausal and postmenopausal women's estrogen rates was correlated with an elevated vaginal flora of % 35 and 70%, respectively, relative to normal flora (Wilson, Lee, Balen, & Rutherford, 2007). Amenorrhoea has also been found to reduce the incidence of bacterial vaginosis because the lack of blood retains vaginal pH, small and steady around pH 4.5. A good indicator of BV in pregnant women is subclinical iron deficiency (anemia) (Verstraelen et al., 2005). Vaginal Lactobacilli is widely accepted as an important function in preserving an atmosphere that restricts the development of pathogenic microorganisms in the vagina (Mania-Pramanik, Kerkar, & Salvi, 2009). It has been proposed that the involvement of estrogen and Lactobacillus is required, To obtain an optimum vaginal pH of 4.0 to 4.5 (Melvin et al., 2008); (Suresh, Rajesh, Bhat, & Rai, 2009). Bacterial vaginosis is thought to recur during the menstrual period (Henn et al., 2005).

Diagnosis.

At least 50% of females with Bacterial vaginosis had no signs of illness (Henn et al., 2005). The most common clinical symptoms of bacterial vaginosis include a thin homogeneous vaginal discharge, pH 4.5, the appearance of "clue cells", and an amine odor after 10 percent of Potassium hydroxide. None of them no Lactobacilli in the vaginal fluid are normally detected by microscopy (P. Larsson, 1992). Several ways of diagnosing bacterial vaginosis (Cook, Redondo-Lopez, Schmitt, Meriwether, & Sobel, 1992).

1. Amsel's clinical criteria

In clinical practice, Amsel's clinical criteria are the most commonly used criteria. The diagnosis is positive for BV if at least three out of the four criteria are fulfilled. These criteria are :

- presence of a typical discharge,
- $\text{pH} > 4.5$.
- A positive whiff test, and
- The presence of clue cells in the wet smear (Amsel, 1983).

A. With BV, a typical discharge is thin. A normal discharge is floccular.

B. The pH is measured using a pH indicator paper. The sensitivity for BV diagnosis

by pH-measurement is high, but it has a low specificity. The Hallén et al. study found a sensitivity of 98.8% and a specificity of 71%. However, in the study by Amsel, only 81% of the women with BV had a $\text{pH} > 4.5$ (Amsel, 1983).

C. An increase in pH rapidly releases amines, for example, trimethylamine (TMA), which are dissolved in the discharge as an acid when the pH is low. A trimethylamine sniff test/whiff test is performed to detect odor by adding one drop of 10-20 % potassium hydroxide (KOH) to the discharge on the speculum, or by placing a drop of discharge onto a microscope slide and adding one drop of the 10-20 % potassium hydroxide mix and then smelling. TMA is responsible for the smell of spoiled fish and can be detected in vaginal specimens from women with BV. Smelling directly from the speculum is known as a whiff test and this method was proposed by (PIOT, VAN DYCK, GOODFELLOW, & FALKOW, 1980). Amsel et al. introduced the addition of potassium hydroxide to the sniff test in 1983 (Amsel, 1983). Published studies of the sniff test show fairly high sensitivity and specificity. The study by Hallén et al. showed a sensitivity of 95% and a specificity of 100% (Hallén, Pålsson, & Forsum, 1987). In a study by Thomason et al., the sensitivity was 91.1% and the specificity was 61.2% (Thomason et al., 1988).

D. The fourth criteria are clue cells in the wet mount. A small proportion of vaginal discharge is placed on a microscope slide and one drop of saline is added. The specimen is then covered with a glass cover and examined under a microscope. If the patient has BV, some of the epithelial cells are covered with large numbers of Gardnerella morphotype bacteria. Clue cells are epithelial cells of the vagina whose borders are difficult to see because so many bacteria are found on the surface of the cells. The clue cell was one of the clinical criteria introduced by Gardner and Duke. These cells were the clue to the diagnosis (PIOT et al., 1980). Amsel's clinical criteria are one of the gold standards for diagnosing BV (Ahmed, Elhag, & Abdelhalim, 2014). In treatment studies, it is common to say that the patient is "cured" if none of the four Amsel's clinical criteria are present, and "improved" if the patient has one or two of the Amsel's criteria (a typical discharge and a $\text{pH} > 4.5$). If the patient meets the third and the fourth criteria (a positive whiff test and the presence of clue cells), treatment is considered to have failed (P.-G. Larsson & Forsum, 2005).

2. Gram Staining

A gram stain of the vaginal fluid has been used to validate bacterial vaginosis in the laboratory. In a BV diagnosis, the bacteria are either classified as Gardnerella morphotypes, which are short bacteria

that are either Gram-negative or Grampositive or as *Lactobacillus* morphotypes, which are Gram-positive rods. Because the microscope slides are stained, they can be stored and, therefore, this method makes it easy to transport the slides. As a result, the slides can be examined several times by the same assessor or by different assessors (Press et al., 1989). The three bacterial morphotypes were used to develop a (0-10) point scoring system for the diagnosis of BV (S. L. Hillier, 1993). The three bacterial morphotypes were used to establish a method of scoring 0-10 points for BV diagnosis (S. L. Hillier, 1993). A score of 0-3 is normal, A point 4-6 average, and 7-10 is a diagnosis of BV. (Table. 1)

3.Vaginal Cultures

Culture for *Gardenerella* and anaerobes can be done on brain heart infusion blood agar, Columbia blood agar, human blood bilayer medium with Tween 80 (HBT medium), and neomycin blood agar by semiquantitative techniques. The plates are incubated at 37°C in carbon dioxide for *Gardenerella* and in an anaerobic jar for anaerobes. Approximate grading can be done by grading as 1+ growth on one quadrant as 1+ to 4+ if growth is seen in all four quadrants (Rao, Devi, Shriyan, Rajaram, & Jagdishchandra, 2004).

4. Papanicolaou smears

It is a medical examination of the cervix to diagnose diseases such as neck cancer when it develops. The Papanicolaou smear is performed by opening the cervix using a cervical speculum, collecting cells from the impossibility region, and examining them under a microscope. The procedure is intended to diagnose cervical dysplasia triggered by human papillomavirus transmission, the HIV, and is an efficient examination that measures cervical cancer and the modifications that result, although it may even identify diseases and anomalies that exist in the endometrium and cervix. In America, it is recommended to perform a Papanicholau smear test from 21 to 65 years old Others do not recommend it for sexually inactive females. Medical directives recommend testing regularly every three to five years.

5. Oligonucleotide probes

Oligo-nucleotide investigations have the advantage of being specific and can be adjusted in sensitivity to detect low or high bacterial concentration. One of these applications was applied to *G.vaginalis* using the fast isotropic assay for a high concentration of these microorganisms. In another study reported that the detection of more than 107 colony-forming units of *G.vaginalis* per milliliter of vaginal fluid was 95% sensitivity and 79% specificity for the diagnosis of BV (S. L. Hillier, 1993).

6. Gas-Liquid Chromatography

Succinic acid, a metabolic component of anaerobic bacteria, is found more commonly in people with BV at a higher concentration. Since *Lactobacilli* is the primary component of the vaginal flora, the primary current fluid is lactic. Succinate, acetate, and other short-chain organic acids identified can be

found in women with BV (S. L. Hillier, 1993). In another study, it is reported to be 54% - 89% sensitive and 80- 96% specific To be treated this syndrome(S. L. Hillier, 1993). This method is not somewhat adopted. The reason that laboratory equipment not available is not easily accessible.

7. Proline Aminopeptidase Assay

This test is based on the detection of enzymatic activity. Proline aminopeptidase cleaves the substitute material, proline beta naphthalamide, yielding proline, and beta naphthalamide. The naphthalamide can react with many aniline dyes to form various colored complexes. It can also be combined with nitrite to form a diazo complex or it can be measured direct fluorometrically. This test requires no sophisticated instruments and has greater than 80% sensitivity. Another benefit is that in 1-4 hours up to 90 specimens may be performed continuously on a single microtitre plate as opposed to gas-liquid chromatography taking at least 30 minutes per specimen (Thomason et al., 1988).

8. Molecular diagnostics of BV using a validated method

attempts have been made to devise molecular techniques based on methods for BV (Jean-Pierre Menard, Fenollar, Henry, Bretelle, & Raoult, 2008; J-P Menard et al., 2010). Accepting only original Amsel/Nugent criteria applied to populations of women that are susceptible to BV, Menard et al. were able to achieve excellent specificity and sensitivity in a quantitative real-time PCR assay. Because a Nugent's score is a modification of the original Spiegel method, introduced in 1983, it can be concluded that the method used by Menard is undoubtedly the most validated method for laboratory diagnosis of BV. Also, in the future, many new molecular biology-based techniques can be expected to change the way medical laboratories analyze BV samples. The development of a new generation of DNA techniques (i.e. pyrosequencing), matrix-assisted laser desorption/ionization (MALDI) mass spectrometry technique, DNA array technique, and thin layer sensor technique are the most promising. This will, without doubt, make a future diagnosis of BV and normal vaginal flora more precise and, indeed very interesting. FISH analysis of vaginal smears, smears of desquamated cells from the urine of women with or without BV, and from male partners' urine show that a biofilm of *Gardnerella* morphotype occurs in the urine of women with BV and their male partners. This high resolution of FISH can thus be used to study the possible role of biofilms in transmission and treatment failures of BV (Swidsinski et al., 2010) (Swidsinski et al., 2013). In a previous study, used PCR for the study of species infected with BV (Devillard, Burton, & Reid, 2005). denaturing gradient gel electrophoresis (DGGE).

Table.1 Scoring system of Gram-stained smear according to (Nugent et al., 1991)

Bacterial morphotypes	0-3 (normal)	4-6 (intermediate)	7-10 (BV)
Lactobacillus	4+ to 3+	2+ to 1+	0
Gardnella	0 to 1+	2+ to 3+	>4+
Bacteroides	0 to 1+	2+ to 3+	>4+
Mobiluncus (Curved rods)	Nil	Nil	1+ to 4+
Clue cells	Nil	Nil	Present

Average number of morphotypes seen per oil immersion field:

0= Nil, 1+ = 1, 2+ = 2-4, 3+ = 5-30, 4+ =>30 .

Complications

Complications associated with BV are more critical than symptoms. Which tend to be linked to an increased risk of STI sensitivity including Chlamydia trachomatis infection, Neisseria gonorrhoeae, HSV-1 and -2, and an increased risk of AIDS development (Geva, Bornstein, Dan, Shoham, & Sobel, 2006). The incidence of gynecological and obstetric risks such as early labor and childbirth, chorioamnionitis, post-cesarean endometritis, pelvic inflammatory disorder post-abortion, and cervicitis has been shown to increase BV. Several groups described such problems as affecting bacterial vaginal flora (Johnson et al., 1985). Although some of those observations were disproved by other research. The key theory about these relationships is that the lack of defensive Lactobacilli enhances the biological vulnerability of developing an STI after exposure (Alfonsi et al., 2004). However, the temporal existence of the BV acquisition relationship with STIs remains an open debate. While there is proof that BV also presents a strong danger for the acquisition of HPV (Salih, 2018). This also remains a topic for discussion. In the absence of Chlamydia or Neisseria gonorrhea, the pelvic inflammatory disease has been linked with BV since the 1970s (Morris, Nicoll, Simms, Wilson, & Catchpole, 2001). A more recent Cochrane analysis supported this finding that antibiotic therapy would remove bacterial vaginosis during pregnancy, but did not substantially reduce the increased risk of premature birth (Brocklehurst, Gordon, Heatley, & Milan). Also, BV has been found to raise the risk of pregnancy between 13 and 24 weeks (Donders, 2010). the risk of premature babies and Raising the risk of low birth weight by 40 percent (Morris et al., 2001).

Treatment

Treatment of BV is difficult for several reasons, the most compelling of which is that

clinical cure, after various treatment regimes, is not universally successful (Oduyebo, Anorlu, & Ogunsola, 2009) (Zhou et al., 2019). The reported four-week cure rates vary between 60-70% and recurrence rates are high (P.-G. Larsson & Forsum, 2005). Thus, treatment failures continue to haunt both BV patients and their doctors. The plethora of metronidazole, tinidazole, and clindamycin preparations used for eradication of the BV-associated bacterial flora includes tablets, vaginal cream, vaginal pills, vaginal gels, topical slow-release cream, and oral tablets, but systematic studies of the optimal preparation for delivery of the drug are lacking (Zhou et al., 2019).

II. Metronidazole

2.1. Oral metronidazole

Pheifer et al provided metronidazole in the treatment for bacterial vaginosis, a new era began. The treatment results were reported to be very high, with 99% of the patients being cured (Pheifer, Forsyth, Durfee, Pollock, & Holmes, 1978). after one week. Since then, several treatment studies have been published. BV is not caused by one single infectious agent and eradication of the responsible putative agent can not be easily measured in treatment studies, making an evaluation of treatment difficult. In open studies, as opposed to double-blind studies, a cure rate of 82%, after a fourweek course of treatment, has been reported. However, in double-blind studies, the cure rates are considerably lower and very few treatment studies exist that compare metronidazole with placebo (P.-G. Larsson et al., 2005). (Table. 2)

	Cured Patients	Total Patients	%
Double-blind vs. Placebo 7-10-day	28	39	72%
Double-blind/single 7-day	71	87	88%
Double-blind/single 1-day	55	102	54%
Total:	154	228	67.5%

Table 2. The cumulative cure rate of all blind-treatment studies with metronidazole (P.-G. Larsson et al., 2005).

2.2. Vaginal metronidazole

At present, only six published studies have examined treatment with metronidazole gel, all of which show a cure rate of 65% after a follow-up time of four weeks. In the first of these studies, treatment was given twice daily. These studies are not fully comparable with the clindamycin therapy studies since the cure criteria in the two treatments differ. The cure benchmark for the metronidazole gel studies is that 20% of the observed epithelial cells should be clue cells and only one of the Amsel's clinical criteria should be present (P.-G. Larsson et al., 2005).

III. Clindamycin

In 1988, Graves published a treatment study with oral clindamycin that demonstrated treatment of 300 mg twice a day to be as safe and effective as a metronidazole regimen (Greaves, Chungafung, Morris, Haile, & Townsend, 1988). Following this, vaginal clindamycin was introduced as a BV treatment with more or less the same four-week cure rate. Ten published studies, all place-controlled, describe a regimen of clindamycin cream for treating BV (Table 3). However, all 10 studies used somewhat different diagnostic criteria. Diagnosis and cure verification is based on three of the Amsel's clinical criteria: pH 4.5, positive whiff test, and clue cells seen on microscopic examination. BV is considered as improved if one of the three criteria that is scored upon vanishes, but a cure is claimed only when none of the criteria are present. With a follow-up period of four weeks, 73.4% of the cases were considered improved and 53% completely cured. The only microbiology-based study on the effect of clindamycin on vaginal Lactobacilli indicates that clindamycin is effective in eliminating BV-associated flora (S. Hillier, Krohn, Watts, Wolner-Hanssen, & Eschenbach, 1990). Clindamycin affects the entire vaginal flora, including vaginal Lactobacilli. It is debatable.

	Improved (1 of 3 criteria)		Cured (0 of 3 criteria)	
	(n)	%	(n)	%
Livengood-90	14	86 %	13	62%
Hillier-90	16	94%		
Schmidt-92	19	74%	19	58%
Andres-92	21	81%	21	72%
Stein-93	60	75%	60	37%
Fischbach-93	141	73%	141	55%
Dhar-94	18	78%	18	67%
Ahmed-95 (3 d)	52	65%	52	64%
Sobel-2001			180	48%
McCormack-2001	79	70%		
Total	420	73.4%	504	53.4%

Table 3. Treatment studies using vaginal clindamycin cream (P.-G. Larsson et al., 2005).

Clindamycin may be administered in a variety of ways, including vaginal cream and vaginal ovules (J. Sobel et al., 2001). The treatment with vaginal ovules is only for 3 days and is not better than for 7 days of vaginal cream. A slow-release vaginal cream (Faro & Skokos, 2005). Offers a newer form of administration.

IV. Probiotics

Because BV is characterized by a lack of, or very few, Lactobacilli and high numbers of mostly anaerobic bacteria, another obvious treatment modality would be the eradication of the BV-associated bacterial flora followed by vaginal reintroduction of Lactobacilli. However, published studies to date have reported that this approach has not been entirely successful. Despite the acceptable primary treatment outcome, recurrence rates are high (Zhou et al., 2019). Probiotic treatment is used in different ways. The idea to implant Lactobacilli that protect from BV was not fully successful at first (Reid et al., 2001). However, in 2006, Anukam noted that, after a one week of metronidazole treatment supplementation with Lactobacilli, a cure rate of 100%, based on Nugent's criteria, was observed after 30 days. This extremely high cure rate has not been seen in any other studies. In the placebo-treated group, the 30-day cure rate was 70%, a result not reported by any other research group so far (Anukam et al., 2006). In a second study, treatment of BV with Lactobacilli intra-vaginally for five days, as compared to metronidazole gel for five days, resulting in a 30-day cure rate of 55% for the probiotic-treated women and 33% for the metronidazole-treated women. Interestingly, in these studies that used the same diagnostic criteria, the cure rate in the placebo group in the first study was 70%; however, in the second study, using the same set of women (in Nigeria) with the same diagnosis and the same follow-up procedures, the cure rate was only 33%. Even more interesting is that, on day six, i.e., the day after treatment, only 55% of the metronidazole group were cured. In all other published studies that report a cure on day eight (the day after the seven-day treatment had been completed) a cure rate of more or less 100% has been reported if the patient had taken the medicine correctly (Anukam et al., 2006). In 2008, Larsson et al. described a 65%, six-month cure rate for patients who had received an additional probiotic treatment over three months, after receiving the traditional clindamycin treatment, when compared to the placebo cure rate, which was 46% . (P.-G. Larsson et al., 2005). Marcone et al. have carried out adjuvant treatment with Lactobacilli following treatment with oral metronidazole for seven days (Marcone, Calzolari, & Bertini, 2008; Marcone, Rocca, Lichtner, & Calzolari, 2010). The cure rate at six and 12 months was high (>80%). However, the cure rate in women receiving the traditional treatment with metronidazole only was also much higher (approximately 70%) than the cure rate previously reported in other studies (less than 36%) (Bradshaw et al., 2006); (J. D. Sobel et al., 2006). In this study, the definition of cure was not based on Nugent's or Hay/Ison's scoring and only women who used natural

methods of contraception were included, making it difficult to compare the findings with other studies. The women selected in that study were probably engaged in a more stable relationship and less prone to partner changes and relapses of BV. Taken together, probiotics in oral or vaginal preparations have not been demonstrated as successful in preventing BV. Hence, there is a need for thorough studies of the properties of the bacteria to be used in these preparations as well as elucidation of the vaginal microbiome dynamics before robust treatment modalities can be developed (Abad & Safdar, 2009).

V. Other treatments

Antiseptics, including commercial formulas applied to eradicate vaginal flora, are numerous. Antiseptics have a very broad spectrum as they act nonspecifically on the microbe to affect the cell wall or cause membrane disruption. Problems with antimicrobial resistance are not described with these agents and antiseptics are considered safe for mucosal application. Types of commonly used antiseptics include benzydamine, chlorhexidine, dequalinium chloride, polyhexamethylene biguanide, povidone-iodine, and hydrogen peroxide. The antiseptics are administered as vaginal ovules, bioadhesive gels, and loaded pessaries (Verstraelen & Verhelst, 2009). However, to date, commercial antiseptic formulas have not been reported to be effective in preventing or curing BV in well-controlled studies.

VI. Conclusion

while the current antibiotic therapy is successful, experiments have reported positive findings for vaginal acidification to normalize microflora. The usage of antibiotics, in particular to *Lactobacillus*, has also demonstrated some positive results, but the findings are still inconclusive. Because BV can often be asymptomatic, recurrence is also not distinguishable from the inability to treat. Recent research demonstrating the presence of a robust polymicrobial *G. vaginalis* biofilm bound to the endometrium may have important implications for greater knowledge of the pathogenesis of BV, and the adverse results of pregnancy-associated with BV. Most literature reports suggest more work into BV, because although conventional pharmacological therapy is successful, antimicrobial resistance may become a problem, there are few therapeutic options available, and relapse levels remain large.

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