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The Vaginal Microbiome in Women's Health and Bacterial Vaginosis

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ABSTRACT

Background: You may have heard of the gut microbiome, but the vagina also has a microbiota. The bacterial composition of the vaginal microbiome is thought to be associated with women's health and disease states. The vaginal microbiome is a complex and dynamic micro-ecosystem that fluctuates throughout the menstrual cycle and throughout a woman's life. The vaginal mucosa consists of a stratified, non-keratinised squamous epithelium covered by cervicovaginal secretions. The composition of the vaginal microbiota varies greatly between healthy and diseased individuals, and there are many factors that can influence the balance of microbiota in the vagina.

Aim of Study: The aim of the study was to review the current literature on the importance of the vaginal microbiota and to discover what factors may influence the composition of the vaginal microbiome.

Materials and Methods: A systemic review was conducted using Google Scholar, PubMed and ScienceDirect databases and the search was limited to studies published between 2000 and 2024. The search strategy was based on following terms: microbiome, vaginal bacteria, health and microbiome, vaginal microflora and human vaginal microbiota.

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Introduction

The vaginal microbiota is the collective term used to describe the collection of microorganisms that inhabit the human vagina. As with all microbiota, it includes bacteria, fungi, viruses, archaea and protists [1]. The human body can be considered a holobiont, comprising the host organism and a diverse range of microbial species. Over the course of approximately half a billion years of human–microbial coevolution, the interdependencies between these two entities have undergone a significant evolution. The vaginal microbiota establishes a mutually beneficial relationship with their host, exerting a significant influence on health and disease [2].

Vaginitis is defined as an inflammatory process affecting the vagina. Furthermore, vulvovaginitis is characterised by inflammation of the external female genital organs [2-4]. The aetiology of vaginitis is multifactorial, with infection, alterations in hormonal equilibrium, mechanical irritation and allergic reactions all identified as potential causes. Vaginitis is frequently a source of discomfort and can also become a significant source of pain.

Microbial Infections of The Vaginal Tract

It is thought that the vaginal microbiota, which is formed by several aerobic, anaerobic and facultative bacteria, plays an important role in maintaining reproductive function. This is because it prevents the growth of pathogenic microorganisms.

The vaginal microbiota is the collective term used to describe the collection of microorganisms that inhabit the human vagina. As with all microbiota, it includes bacteria, fungi, viruses, archaea and protists. However, the relative abundance of microorganisms other than bacteria is not yet well mapped. Over the past decade, the advent of advanced sequencing techniques has enabled a shift from traditional characterisation methods, such as microscopy and culturedependent approaches, towards a more comprehensive understanding of the vaginal microbiota.

Vaginal infections are classified into three principal categories: candidiasis, bacterial vaginosis and trichomoniasis. Of these, candidiasis, also known as "yeast infection," is the cause of 20 to 40 percent of all cases of infectious vaginitis. Furthermore, it is the most frequently occurring form of vaginal infection [5].

It seems that the individual microbiome achieved during birth is subject to change throughout life, which would appear to indicate microbiome specificity. In the vagina, the close relationship between microbes and the host provides a kind of first line of defence against the migration of opportunistic pathogens [5,6]. This healthy balance is referred to as eubiosis. However, if the opportunistic pathogens are allowed to outweigh the pathogens, this can disrupt the symbiotic balance, which is referred to as dysbiosis. This can then lead to inflammation.

Bacterial Vaginosis (BV)

Bacterial vaginosis (BV) is a common mild imbalance of bacteria in the vagina. The vagina normally contains harmless bacteria. BV

occurs when that a bacterium over-grows. BV is an inflammatory condition caused by vaginal dysbiosis. A BV-associated vaginal microbiome is generally Lactobacillusdepleted with an increase in the relative number of anaerobic bacteria such as of anaerobic bacteria such as G. vaginalis, Prevotella and Mobiluncus spp. BV is the most common vaginal infection in women of reproductive age, affecting an estimated estimated to affect approximately 25% of women worldwide. The most common symptoms of BV include excessive vaginal discharge, fishy odour, vaginal irritation and a vaginal pH higher than 4.5 [7-11].

Candidiasis

Vulvovaginal candidiasis is an opportunistic yeast infection. A vaginal yeast infection is a fungal infection that can cause irritation, discharge, and intense itching of the vagina and the vulva - the tissues at the opening of the vagina.

Candida albicans is the organism most responsible for infection. which is a commensal fungal species that is part of the normal vaginal microbiota in many women. There are no symptoms of infection in most women colonised with C. albicans, however, candidiasis can occur as a result of changes in host and behavioural factors.

Role of Female Intimate Hygiene

It would be fair to say that women around the world use a variety of intimate hygiene products as part of their daily cleansing routine. It is important to recognise that these practices are influenced by a number of factors, including personal preference, cultural norms, religious practices and guidance from healthcare professionals. Despite the wealth of literature on the vaginal environment, there is still much to be discovered about the vulvar area and how personal hygiene practices can affect its biological and physiological stability.

A multitude of factors contribute to the formation of feminine hygiene practices, including personal preference and the influence of cultural and societal norms. Although vaginal douching is a common practice among many women, there is currently no evidence to suggest that it offers any confirmed health benefits. Furthermore, it may potentially undermine the innate immune defences by altering the normal vaginal flora and predisposing women to infections. Vaginal douching has also Furthermore, there is an increased risk of developing pelvic inflammatory disease, endometriosis and sexually transmitted infections. Conversely, it is beneficial to perform routine washing of the vulva in order to prevent the accumulation of vaginal discharge, sweat, urine and faecal contamination, which can otherwise result in offensive body odour. While vulvar cleansing may be beneficial as an adjunct to medical treatment, it is important to note that vulvar cleansing products are not designed to treat infections. There has been a notable increase in the availability of intimate hygiene products for the purpose of maintaining cleanliness and controlling odour. However, some of these products may disrupt the pH balance in the vulvovaginal area, which could potentially affect the composition of the normal vulvovaginal microbiota, which is necessary for protection against infection.

The Effect of the Vaginal Microbiome on Health

Due to the limited blood supply, the vaginal mucosa obtains oxygen, glucose and other nutrients from the underlying submucosal tissues by diffusion. This creates a habitat that is relatively anaerobic in nature. A complex microbial community living in a symbiotic relationship with the host is found in the vagina. Thus, the indigenous environment, the microorganisms and their genomes together constitute the entire habitat, also known as the vaginal microbiome. Vaginal yeast infections occur when there is a change in the number and type of bacteria that live in the vagina. Lactobacilli are a type of bacteria normally found in vaginas. The levels of lactobacilli are reduced and other bacteria are increased in people with BV. The reason for these changes is not known [12-15]. Vaginal dysbiosis can be defined as a non-optimal state whereby the vaginal microbiota is disrupted due to a range of factors such as stress, antibiotics, and sexual activity. It is thought that a reduction in the relative abundance of protective Lactobacillus spp. may potentially lead to an increase in the vaginal pH and allow colonisation by a range of pathogenic organisms.

The vaginal microbiome, which is associated with bacterial vaginosis, is thought to be a contributing factor to infertility in women of reproductive age (30). A higher incidence of abnormal vaginal microbiota has been reported in women with idiopathic infertility (31).

Signs and Symptoms of Bv

Vaginal discharge from bacterial vaginosis is yellow-green or grey, thin and foulsmelling, usually with a fishy odour, often increasing with more alkaline discharge after coitus and during menstruation. It is not common to have pruritus, irritation, erythema or oedema.

Diagnosis

Physical examination and laboratory tests are used to diagnose BV. The physical examination will usually include an examination of the pelvic area, which will allow the healthcare provider to observe and test the vaginal secretions. Doctors can examine vaginal discharge with a microscope or use laboratory tests [16]. It can be difficult to know whether vaginal discharge is caused by BV, another type of infection (such as a yeast infection), or both, without an examination and tests. Testing for sexually transmitted infections, such as gonorrhoea, chlamydia and trichomoniasis, is usually offered to people being tested for BV [17].

Treatment of BV

- Metronidazole or clindamycin
- Metronidazole 500 mg orally twice daily for 7 days
- Metronidazole 0.75% gel 5g (applicator full) intravaginal once daily for 5 days
- 2% clindamycin vaginal cream once daily for 7 days
- Metronidazole is preferred for topical treatment. Clindamycin is an alternative.
- For patients who are not pregnant, oral metronidazole is the treatment of choice. In pregnant patients, topical treatments are preferred because of the potential for systemic effects with oral medications [18,19].
- Women should not use latex products (e.g. condoms or diaphragms) to prevent pregnancy because the cream can make latex weaker.
- Another option for the treatment of bacterial vaginosis is a single oral dose of secnidazole 2 g. Because only one dose is needed, secnidazole may improve patient compliance.
- It is not recommended that sex partners be treated.
- Metronidazole vaginal gel should be used to treat vaginitis during the first trimester of pregnancy, although treatment during pregnancy has not been shown to reduce the risk of pregnancy complications. To avoid endometritis, doctors may give prophylactic oral metronidazole prior to elective termination of pregnancy to all patients or only to those testing

positive for bacterial vaginosis.

- With treatment, symptomatic bacterial vaginosis usually resolves within a few days, but recurrences are common. Ongoing suppressive antibiotics may be needed for frequent recurrences (current infection and at least 2 previous episodes within the last 12 months). In patients with recurrent bacterial vaginosis, suppressive therapy with metronidazole gel twice a week for 16 weeks can be considered.

Material and Method

This is a review paper. All the information has been taken from the various books, articles, reviews and guidelines published by the CDC, WHO, NIH, etc.

Conclusion

Bacterial vaginosis is caused mainly by Gardnerella vaginalis, which produces vaginal fluid with a pH above 4.7 and a fishy odour when mixed with KOH solution (whiff test). Bacterial vaginosis is diagnosed by the clue cells. It may be associated with previous STDs, vaginal discharge, multiple sexual partners and spontaneous abortion. It is important to identify women with these risk factors as soon as possible because of the likelihood of bacterial vaginosis in pregnant women. This can prevent problems and ensure a good pregnancy [20].

Conflict of Interests

The author declare no conflicts of interest regarding the publication of this Paper.

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