Nutritional Ingredients for Women's Health: Probiotics and Urogenital Healthcare

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When it comes to urogenital health, many people think about sexual health and fertility. However, keeping a healthy urogenital tract is important, regardless of sexual activity levels or interest in becoming pregnant.

Urogenital Health and Vaginal Flora
The urogenital tract is an organ system of the urinary tract and reproductive organs. Its health is delicately maintained by multiple types of colonizing beneficial bacteria. Although the vaginal flora can vary among individuals, *Lactobacillus* species dominate in healthy women.

Other common beneficial bacteria include *Proteobacteria* (e.g., *Escherichia coli*), *Actinobacteria* (e.g., *Bifidobacteria*), and *Fusobacterial* and *Bacteroidetes*. These indigenous bacteria originally come from the intestinal tract via the rectum, and colonize in the vagina. They utilize multiple mechanisms to prevent other harmful organisms from invading, colonizing, and infecting the urogenital tract, helping maintain optimal vaginal and bladder health.

Microflora and Defense Mechanisms

Maintenance of an Acidic Environment
Many good bacteria, including *Lactobacilli*, produce lactic acid from glucose and other sugar molecules. Lactic acid can lower the vaginal pH to 4.5, which can effectively inhibit the colonization of unwanted organisms such as *Candida*, the main cause of yeast infections.

The secretion of lactic acid, however, can fluctuate with estrogen levels. In a normal menstrual cycle, lactic acid production peaks at mid-cycle, when estrogen production is the highest, and decreases when estrogen levels are low. Thus, for some women, the risk of urogenital imbalance and infection maybe higher when lactic acid secretion is limited.

Hydrogen Peroxide Production
Some *Lactobacillus* and other strains produce hydrogen peroxide to eliminate anaerobic pathogens including *Garnerella vaginalis* and *Neisseria gonorrhoea*. Anaerobic bacteria are adapted to proliferate in oxygen-deficient environments, and they are often not equipped to fight a powerful oxidizing agent such as hydrogen peroxide.

Hydrogen peroxide can also modulate the immune response by activating peroxisome proliferator-activated receptor gamma (PPARy) and by reducing the activity of a NF-kB-responsive element. [iv]

Bacteriocin Production
Beneficial bacteria may produce proteinaceous molecules called bacteriocins. Bacteriocins act as narrow-spectrum antibiotics for unwanted organisms and are structurally, functionally, and ecologically diverse. These diverse molecules can inhibit the growth and proliferation of harmful bacteria by interfering with cell wall and membrane production and function, and various cell-signaling cascades. [iii], [iv]

Biosurfactants
Microorganisms often form a biofilm, an aggregation of organisms, in which cell walls adhere to each
other or to the contacting surface to help the organisms reside and colonize. Many endogenous organisms, such as Lactobacilli, can produce biosurfactants that can interfere with the formation of these biofilms that are formed among harmful microorganisms.

**Immune Modulation**

Good bacteria can modulate immune responses against pathogens by increasing immune-stimulating molecules such as hydrogen peroxide, G-CSF, and defensins. They can also stimulate IL-8-mediated neutrophil recruitment and other mediators. These molecules and mediators can initiate proper immune responses to fight against unwanted pathogens and prevent them from causing an imbalance in the urogenital tract. [v] [vi] [vii]

**Urogenital Imbalance and Symptoms**

The delicate balance of microflora in the urogenital tract can easily be disrupted by many factors, such as changes in hormonal levels, stress levels, diet, environment, pollution, and adherence and colonization of unwanted organisms.

When healthy microflora are disturbed, there may be an unhealthy vaginal discharge that creates an unpleasant odor, burning, itching, or irritation. In some cases, immediate medical attention is required. Listed below are the common causes of urogenital imbalance and associated symptoms.

**Vaginitis**

The term vaginitis is generally used to describe any inflammation of the vagina. The main cause of vaginitis is bacterial and yeast infections, but it is also caused by physical trauma or allergy to chemicals and pollutants, including latex and spermicide.

**Yeast Vaginitis or Yeast Infection**

Yeast infection or Candida vaginitis is caused by several species of fungi and accounts for 85 to 90% of infections. Although small amounts of fungi are normally found in the vagina and do not cause any problems, when they overgrow, they can lead to symptoms such as itching, redness, and/or a thick white or yellow cottage cheese-like discharge.

The main cause of the overgrowth is thought to be antibiotic use, since this can disrupt healthy microflora, making it easier for fungi to overgrow. More than 75% of women experience yeast vaginitis in their lifetime.

**Bacterial Vaginosis or Bacterial Infection**

Bacterial vaginosis is a bacterial infection that can be caused by an overgrowth of unwanted bacteria such as Gardnerella, Atopobium, and Prevotella. The overgrowth is initiated by many factors, including antibiotic use, medications, diet, and hormonal changes. For example, during the menstrual cycle, a fluctuation in estrogen can cause changes in lactic acid production and vaginal pH, which may allow some unhealthy bacteria to overgrow.

Symptoms of bacterial vaginosis include a fishy odor, irritation, burning sensation during urination, and a thin, whitish-gray discharge. Bacterial vaginosis is the most common form of vaginal infection and affects 10 to 30% of women at any given time. [viii]

**Urinary Tract Infections**

UTI is a bacterial infection of the urinary system, including the kidneys, ureter, bladder, and urethra. The most common cause of UTI is the spreading of unwanted bacteria from the rectum or the vagina into the urinary tract—spreading into the bladder and sometimes into other parts of the urinary system.

Symptoms of UTI include cloudy or off-smelling urine, burning sensation during urination, frequent urination, and pain, tenderness, or pressure around the bladder. More than 50% of women have at least one episode of UTI, and many of them experience multiple infections throughout their lifetime.

**Probiotics: Maintaining a Healthy Urogenital Tract**

As discussed in the earlier sections, urogenital health heavily depends on the state of vaginal microflora. The delicate balance between beneficial and undesirable microorganisms can be easily disrupted by various factors, such as hormones, stress, antibiotic and medication exposure, poor personal hygiene, and diet, causing many health problems. So, what can women do to support healthy microflora?

Numerous clinical and preclinical studies have shown that probiotics, particularly those with urogenital tract-specific strains of probiotics, can help maintain healthy flora while preventing the overgrowth of harmful pathogens. Urogenital probiotics can replenish normal bacteria, especially when the growth and colonization of these beneficial bacteria are compromised, thus preventing or suppressing yeast and bacterial infections.

Although there are numbers of indigenous strains of bacteria that exist in the urogenital tract, scientific studies have indicated that Lactobacillus rhamnosus GR-1 and Lactobacillus reuteri RC-14 have many of the ideal characteristics for women’s health probiotics, including safety, oral
availability, activity against both gram-positive and gram-negative pathogens, spermicide survivability, and the production of factors that can efficiently induce balanced microflora in the urogenital tract.

**Clinical Studies: Lactobacillus rhamnosus GR-1 and Lactobacillus reuteri RC-14**

**Yeast Vaginitis or Yeast Infection**

Sixty-four premenopausal women ages 16 to 46 years diagnosed with yeast vaginitis were randomly assigned to a single dose of the antifungal drug fluconazole supplemented with either Lactobacillus rhamnosus GR-1 and Lactobacillus reuteri RC-14, or placebo, for 28 days. Symptoms of yeast vaginitis included itching and a burning sensation, and pain during urination and sexual intercourse. At the end of the study, subjects supplemented with probiotics showed a significantly higher cure rate (87.5%) than those with placebo (50%) (p=0.001). Further, the gram stain Nugent-score analysis revealed “normal” vaginal microflora in a higher number of subjects in the probiotic group (75%) compared to the control group (34.4%) (p=0.011). Thus, oral supplementation of Lactobacillus rhamnosus GR-1 and Lactobacillus reuteri RC-14 may enhance the effectiveness of an antifungal agent by promoting colonization of healthy microflora in the urogenital tract.

**Bacterial Vaginosis or Bacterial Infection**

In a randomized, double-blind, placebo-controlled study, 125 premenopausal sub-Saharan African women (ages 18 to 44 years) with clinical symptoms and signs of bacterial vaginosis were randomly assigned to one oral dose of antibiotics daily for seven days plus either oral Lactobacillus strains GR-1 and RC-14 or placebo capsules twice daily for 30 days, starting on the first day of antibiotic treatment. The initial symptoms included vaginal irritation, discharge with a fishy odor, high Nugent scores, and positive bacterial vaginosis blue test results. After 30 days of intervention, 88% of the antibiotic/probiotic group showed normal Nugent scores and negative blue tests, while only 40% of the antibiotics/placebo group achieved the same outcome (p=0.001). Nobody in the antibiotic/probiotic group was diagnosed with bacterial vaginosis, but 12% of them had intermediate stages. In comparison, 30% of the antibiotics/placebo group had bacterial vaginosis, and another 30% of them had intermediate stages. No adverse events were reported during the study.

Petricic et al. have tested the effects of oral Lactobacillus strains GR-1 and RC-14 on 72 postmenopausal women with Nugent scores between 4 and 6 on initial vaginal swabs. These subjects were randomly assigned to either probiotic capsules containing lyophilized Lactobacillus strains GR-1 and RC-14, or placebo, once daily for 14 days. After 14 days of intervention, 60% of the probiotic group showed a significant reduction in the Nugent score by at least two grades, while only 16% of the placebo group achieved this outcome (p=0.0001). The median difference in the Nugent scores between baseline and the final endpoint was 3 in the intervention group and 0 in the control group (p=0.0001). No adverse events were reported during the study. [ix]

These results show that oral supplementation with Lactobacillus rhamnosus GR-1 and Lactobacillus reuteri RC-14 can safely and effectively support a healthy urogenital tract in people with risks of developing bacterial vaginosis.

**Urinary Tract Infections**

The recurrence rate of UTI was tested in women who received either Lactobacillus rhamnosus GR-1 or placebo suppositories immediately after the completion of a standard three-day antibiotic course. During the six-month intervention period, the GR-1 group had a recurrence rate of 21%, while the placebo group had a 47% recurrent rate. No adverse events were reported in these subjects. Similarly, a randomized, double-blind trial tested the effects of Lactobacillus rhamnosus GR-1 on UTI recurrence rates. Supplementation of Lactobacillus rhamnosus GR-1 weekly for one year significantly reduced UTI recurrence rates by almost fourfold.

Thus, urogenital-specific probiotic supplementation may help enhance overall urogenital health as well as help avoid potential infections in the urinary tract and reproductive organs.[xii]

**Conclusion**

Urogenital infections and other imbalances continue to cause significant morbidity in our society. The development of therapies such as antibiotics has been helpful for relieving the symptoms, but has not been successful in reducing the rate of infections or preventing these conditions. Recent scientific research has suggested that probiotics, particularly those formulated with urogenital-specific strains of probiotics such as Lactobacillus rhamnosus GR-1 and Lactobacillus reuteri RC-14, are safe and effective prophylaxis for maintaining healthy urogenital microflora and overall health in the urogenital tract.

References:


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