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Review Article

# Cognizance, Formulation and Health Implications of Polyherbal Feminine Intimate Hygiene Wash

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ABSTRACT

Polyherbal feminine hygiene wash products have gained significant popularity in recent years due to their perceived benefits for women's intimate health. The Indian fast-moving consumable goods (FMCG) market is flooded with various brands of feminine hygiene washes. Maintaining a balanced vaginal ecosystem necessitates the use of active substances in these washes. Products marketed as medically oriented cleansers to healthcare professionals are classified as cosmetics. The widespread use of feminine wash (soap) among women of reproductive age aims to alleviate symptoms linked to vaginal infections, such as itching, burning sensations, vaginal discharge, and unpleasant odors. Vaginal infections impact a significant proportion, ranging from 10 to 75%, of women during their reproductive years, potentially stemming from yeast, bacteria, or parasites. Understanding the effects of ingredients in feminine hygiene wash formulations is crucial in managing these concerns. This paper aims to explore the cognizance, formulation and health implications associated with polyherbal feminine hygiene washes. It provides an overview of the formulation, ingredients, and claims made by these products. Additionally, it addresses the scientific evidence and potential risks linked to their use. The paper seeks to inform consumers, healthcare professionals, and policymakers about the key aspects of polyherbal feminine hygiene washes and their implications for women's health. In conclusion, this review provides a collective dataset regarding different chemical and polyherbal hygiene wash products available in the market, fostering a comprehensive understanding of these product's landscape. The findings underscore the need for informed decision-making and regulatory considerations in the usage of these products to ensure women's well-being.

## Introduction

Women commonly incorporate intimate hygiene products into their daily routines. However, there is an inadequate amount of scientific literature available for examining the impacts of these feminine intimate hygiene products on the vulvovaginal region and their potential impact on the stability of the vulvar microflora. The vulva serves as the primary defense mechanism protecting against urinary tract infections in women.[1] The vulvar skin exhibits distinct features compared to other areas of the skin, including variances in permeability, friction, and hydration levels. It undergoes a transformation from keratinized to non-keratinized mucosal epithelium over time.[2] The vulvar skin, with its large hair follicles and thin stratum corneum, is particularly sensitive to topical agents and can experience irritation in the vulvovaginal region. Moisture from urine and vaginal discharge, enzymes from residual stool, friction and heat are among the factors that can undermine the protective function of the vaginal barrier, potentially resulting in the occurrence of dermatitis and other skin-related conditions.[2,3] Vulvovaginal infections often manifest with symptoms that significantly impact a woman's quality of life.

Pharmaceutical treatments are already available that aim to clean the vulvar and vaginal region without necessarily changing its physiologic pH. In recent years, using feminine wash has become more common. The composition of

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feminine wash intended for daily use has to be carefully scrutinized in light of the potential for a safe vaginal wash with a different physiologic acidity to change the vaginal pH.[4] It has been claimed that marketing and advertising for these forms of vaginal hygiene products establish vaginal washing as both desired and in vogue for women. To attract women, vaginal hygiene products often incorporate in their names descriptors such as "clean" and "fresh". The marketing strategy frequently employs the concept of terms- clean, fresh and dry, which can be observed in various modern intimate hygiene products such as V-wash, Clean and Dry Intimate Wash, among others.[5] The problems of female genitalia may be further accentuated by the expanding market for vaginal hygiene products. Due to the abundance of multiple brands, the decision to purchase an effective product becomes challenging.

As per International guidelines, it is recommended to gently wash the vulva daily to maintain feminine hygiene and overall intimate health.[6,7] This practice aims to minimize unpleasant body odor and maintain the integrity of the vulvar skin as a protective barrier against infections. Regular cleaning of the vulva helps to prevent the accumulation of vaginal discharge, urine and fecal contamination. Given the delicate nature of this skin area, it is crucial to exercise gentle and appropriate washing care to maintain the health of the vulvar skin. Investigations of people repeatedly washing their skin with synthetic detergents and ordinary alkaline soaps have demonstrated that even little variations in the pH of the cleaning products have an impact on both the bacterial microflora and the pH of the surface of the skin.[8-10]

The intimate hygiene products have become more widely available recently. They provide cleanliness and odor control. However, some of these products tend to disturb the pH of the vulva, which in turn affects the natural microflora of the vulvovaginal area required for preventing infection.[5] However, according to *in-vitro* research, several immoderate vaginal treatments may disrupt the vaginal immunological barrier and disturb the normal vaginal flora by deteriorating beneficial *Lactobacillus* species, which are essential for preventing infection.[5,11,12]

The vaginal microbiome plays a significant role in women's health. It has garnered increasing attention, with research suggesting that disturbances in the vaginal microbiota can disrupt the growth of beneficial bacteria, alter the vaginal pH and compromise the vaginal immune barrier. Thus rendering women more susceptible to infections.[5] Although further investigation is required, but existing data indicates that specific vaginal hygiene products could potentially disrupt the vaginal microbiota, leading to adverse health effects. For vaginal cleansing, the products must be devoid of toxic chemicals.

## Evolution of Polyherbal Products

Polyherbal products, which combine multiple herbal ingredients, have a long history and have evolved over time. The utilization of polyherbal formulations can be traced back to ancient traditional medicinal systems like Ayurveda, Traditional Chinese Medicine (TCM) and traditional healing practices of diverse cultures.[13] For centuries, polyherbal formulations have been employed in traditional systems of medicine. Ayurveda, a holistic medical system from India, emphasizes the use of multiple herbs in formulations known as "rasayanas" and "vati."[14] Similarly, TCM utilizes synergistic combinations of herbs in formulas to achieve specific therapeutic effects. These ancient systems have recognized the concept of herb-herb interactions and the synergistic benefits of combining multiple herbs. Several historical texts and manuscripts provide evidence of polyherbal formulations. For example, the Ayurvedic text "Charaka Samhita" and the TCM classic "Shennong Ben Cao Jing" document numerous polyherbal formulas and their therapeutic applications.[15] These texts serve as references for traditional healers and lay the foundation for the development and evolution of polyherbal products.

With advancements in scientific research and technology, the understanding of the active constituents, mechanisms of action and interactions of herbal ingredients has expanded. This knowledge has led to the development of modern polyherbal products that are formulated on the basis of scientific evidence and standardized manufacturing processes. Modern research aims to validate the traditional use and explore new therapeutic applications of polyherbal formulations. As the popularity of polyherbal products grows, the need for quality assurance and regulatory standards has become crucial. Regulatory authorities, such as the World Health Organization[16] and various national regulatory agencies, have established guidelines and standards for the safety, quality and efficacy of herbal medicines, including polyherbal formulations. These standards help to ensure consistency, purity and good manufacturing practices in the production of polyherbal products. The increasing awareness and demand for natural and traditional healthcare products have contributed to the growth of the polyherbal product markets. Consumers are seeking alternative and complementary therapies, leading to a broader availability of polyherbal products in various forms, such as capsules, tablets, extracts and topical preparations.[17]

## Scientific Evidence and Research Studies

While polyherbal feminine hygiene washes have gained popularity, it is important to consider the scientific evidence supporting their efficacy and safety. Currently, the available scientific literature on these specific formulations is limited. Some herbal ingredients and

botanical extracts used in these washes have been studied individually for their properties and benefits. For example, tea tree oil has been investigated for its antimicrobial activity,[18] aloe vera for its moisturizing and anti-inflammatory effects[19] and chamomile for its soothing properties.[20] However, comprehensive studies on the specific formulations of polyherbal feminine hygiene washes are needed to validate their claimed benefits.

## Physiology of the Vulvovaginal Area

The vagina, a fibromuscular canal, runs from the vulva's external opening to the cervix. It consists of smooth muscles and is covered with non-keratinized epithelial cells. The thickness of this lining remains constant until menopause. The vagina is kept moist by mucus produced by the cervical and vestibular glands, as well as fluid secreted by the vaginal wall, ensuring the moisture of the vaginal folds.[21]

## The Vulvovaginal Area

The vulva serves as the primary defense mechanism against infections, safeguarding both the urinary tract and vagina. Although research on the microbiota of the external vulvar area is still in its nascent stages, maintaining a balanced microbiota is deemed vital for optimal vulvovaginal health. The innate defense mechanisms against vulvovaginal infections include the presence of normal vaginal microflora, the acidic pH of the vagina, and the discharge produced by the vagina.[1] Contaminants that contribute to odors and vulvovaginal infections often accumulate in the folds of the vulva. Factors such as increased moisture, sweating, menstruation, and hormonal fluctuations can disrupt the growth and balance of microbial species in the vulvar region, thereby promoting infections.

### *Microflora*

*Lactobacillus* sp. makes up most of the vaginal microbiota dominated by *Lactobacillus gasseri, L. crispatus, L. iners* and *L. jensenii*.[22] These microorganisms employ various mechanisms in establishing a balanced vaginal environment. These mechanisms include the production of lactic acid, which helps maintain a low pH in the vagina, as well as the secretion of bacteriocins. In order to survive, microorganisms also compete for receptors and nutrients, contributing to a healthy microbial ecosystem. Additionally, they support innate immunity through hormone cycling triggered by the release of glycogen and the continuous shedding of epithelial cells.[23-25] The species of *Atopobium*, *Corynebacterium*, *Anaerococcus*, *Peptoniphilus*, *Prevotella*, *Mobiluncus*, *Gardnerella* and *Sneathia* are only a few examples of *Lactobacillus* free vulval flora that can exist in healthy women.[23,26,27] Some of the most prevalent bacterial pathogens are *Escherichia coli*, *Pseudomonas aeruginosa*, *Klebsiella pneumoniae*, *Proteus mirabilis*, *Enterococcus faecalis* and *Staphylococcus aureus.*[28]

### *pH*

The indigenous microorganisms inhabiting the skin have a vital function in preserving the skin's natural pH, which is crucial for defense against invasive pathogenic organisms and diseases.[4] Throughout the menstrual cycle, the pH of the vulva is prone to fluctuations that lie between the pH levels of the epidermis (approx. pH 4.7) and the vagina, typically ranging from 3.8 to 4.2 (with an average pH of 3.5). Various factors, both endogenous and exogenous, contribute to these pH variations. Endogenous factors encompass elements such as humidity, perspiration, vaginal discharge, menstruation, urine and fecal contamination, vaginal folding, hereditary predispositions, and age. External factors include the use of soap, detergents, cosmetic products, lubricants, spermicides, tight clothing or sanitary pads causing occlusion, and the application of shaving and depilation products. Prolonged drying of the vulvar skin can cause a substantial decrease in pH levels. During normal conditions, the vaginal mucosa is rich in lactic acid, a metabolic by-product of anaerobic glucose metabolism regulated by estrogen. Lactic acid production plays a crucial role in maintaining the vaginal pH. Certain species, including *Lactobacillus* bacteria, have the ability to metabolize extracellular glycogen into lactic acid, contributing to the acidic environment of the vagina.[1]

### *Vaginal discharge*

It is the normal physiological process for women to experience vaginal discharge starting from a couple of years prior to the onset of puberty and persisting after menopause. The vaginal discharge comprises mucus and fluids produced by the vagina and cervix, along with shed epithelial cells from the vaginal walls and bacteria. During the menstrual phase of reduced estrogen levels, the discharge is thick and sticky, serving as a barrier against sperm entry. As estrogen levels rise in anticipation of ovulation, the discharge becomes clearer, more watery and stickier.[29,30]

## Vulvovaginitis

Given their closeness, the vagina and the vulva, which are typically inflamed together, are referred to as vulvovaginitis. A change in the color, quantity, or smell of vaginal discharge is one of the signs of inflammation, along with itching, a burning feeling, irritation, dyspareunia, or pain during sex and dysuria, or discomfort when urinating. Inflammation may be brought on by an infection or non-infectious factors that disrupt the usual flora in the vagina. Atrophic vaginitis in postmenopausal women and retained foreign objects, such as condoms or tampons, are examples of non-infectious etiologies.[31] A thorough speculum exam can typically rule them out since it will either reveal a retained foreign body that can be removed or a pale, smooth and glossy vaginal epithelium with atrophic vaginitis. Local estrogen creams are used as therapy for atrophic vaginitis.[32]

Bacterial vaginosis, candida vulvovaginitis, or trichomoniasis are usually invariably the causes of infectious vulvovaginitis. Trichomoniasis is a sexually transmitted disease (STD), while an imbalance in the natural vaginal flora causes bacterial vaginosis and candida vulvovaginitis. Other STDs, such as gonorrhea, chlamydia or mycoplasma, often result in cervicitis but sporadically also in vaginitis.

Bacterial vaginosis occurs when the quantity of lactobacilli declines, which causes the pH to rise and promotes the growth of other bacterial species like *Gardnerella vaginalis*.[33] Having a new relationship or several partners is a risk factor for contracting bacterial vaginosis. Although bacterial vaginosis does not colonize the male reproductive tract, it is not regarded as a sexually transmitted infection and is instead only attributed to a bacterial imbalance of the female reproductive system. Douching, the use of antibiotics and intrauterine devices are additional risk factors. Bacterial vaginosis normally gets worse after unprotected sexual activity and the discharge is typically thin, homogeneous, grey or off-white in color and it smells bad. The vulva is often unaffected and if there are any other symptoms, they point to a mixed infection.[34]

Candidiasis, also known as candidiasis vulvovaginitis. *Candida albicans*, which is typically found in small amounts in the vaginal flora, is the species of *Candida* that causes candidiasis. Diabetes mellitus, recent antibiotic usage, immunosuppression—which may be seen in the context of glucocorticoid treatment—and, finally, elevated estrogen levels—which can be brought on by concurrent use of oral contraceptives, estrogen medication, or pregnancy—are risk factors for candidiasis. The most obvious sign of candidiasis is severe itching. There may also be a thick, odorless vaginal discharge that resembles cottage cheese. Moreover, the vulva is frequently irritated, which results in burning, dyspareunia and dysuria.[35] Globally, approximately 138 million women experience recurrent vulvovaginal candidiasis annually, with an estimated range of 103 to 172 million. This condition has a worldwide annual prevalence of 3871 per 100,000 women, affecting a total of 372 million women over their lifetime. The age group of 25 to 34 years exhibits the highest prevalence at 9%. Projections indicate that by 2030, the number of women with recurrent vulvovaginal candidiasis each year could rise to nearly 158 million, resulting in approximately 20,240,664 additional cases based on current trends and an anticipated increase in the female population from 3.34 billion to 4.181 billion. In high-income countries, the economic impact from lost productivity could reach up to US$14.39 billion annually. Given the high prevalence, significant morbidity, and economic burden associated with recurrent vulvovaginal candidiasis (VVC), there is an urgent need for more effective solutions and enhanced quality of care for affected women.[36] VVC is regarded as the second most prevalent cause of vaginitis, following bacterial.[37]

Then, there is trichomoniasis. *Trichomonas vaginalis* is a protozoan that causes the sexually transmitted ailment trichomoniasis. The vaginal discharge is thin, purulent and foul-smelling and the burning and itching in the genital region are symptoms. Together with lower abdomen pain, dyspareunia, or pain during sex, dysuria, or frequent urination may also be present. The vulva and vaginal mucosa may exhibit erythema during the gynecological exam.[38] Infection frequently results in vaginitis among women or urethritis and prostatitis in men. Trichomoniasis is linked with adverse outcomes such as preterm delivery, low birth weight, and heightened infant mortality. Additionally, this infection increases susceptibility to conditions such as HIV/AIDS, as well as cervical and prostatic cancers.[39]

## Intimate Feminine Hygiene

Practices of feminine hygiene are influenced by a variety of variables, including personal choice as well as cultural and community norms. Although women commonly practice vaginal douching, there is insufficient scientific evidence to substantiate any health benefits linked to this practice. In fact, it has been suggested that douching may have negative effects on the innate immune system by disturbing the normal vaginal flora, thereby increasing the risk of infections. There are multiple risk factors associated with douching, including pelvic inflammatory disease, endometriosis and sexually transmitted diseases, to name a few.[40] Regularly washing the vulva is recommended to prevent unpleasant body odor by inhibiting the accumulation of vaginal discharge, perspiration, urine, and fecal matter. Vulvar cleaning solutions are not intended to treat infections, even if they may be a helpful addition to medical care. However, there has been an increasing trend in the use of personal hygiene products aimed at managing odor and promoting cleanliness. It is important to note that certain products may have an impact on the pH balance of the vulva, potentially disrupting the natural microflora that is essential for preventing infections in the vulvovaginal area.

## Significance of Intimate Feminine Hygiene

As the medical literature has not given intimate feminine hygiene enough attention, education should be a major concern. Variations in religious and cultural traditions are associated to variations in feminine hygiene habits. Although it should go without saying that proper feminine cleanliness is desirable and beneficial, no formal studies have examined the effects of vulvar hygiene on health. Special attention should be given to the formulation and testing of feminine wash products to ensure they are suitable for the sensitive vulvar area and do not lead to skin irritation or sensitization. It is essential for women to prioritize intimate hygiene by employing caution and utilizing well-designed, clinically tested products. These products should exhibit essential characteristics

like hypoallergenic, soap-free formulation, pH-friendly composition, gentle cleansing properties, and the absence of irritants to safeguard against dryness.

## Intimate Feminine Hygiene Wash

As much as we want to have a beautiful face, maintaining our intimate health and cleanliness is much more crucial. Every woman must use an appropriate intimate hygiene wash to avoid infections, odors, itching and other health risks of the intimate area. But, using a natural formula is always recommended, which is why a list of the top natural intimate hygiene products available in India has been provided here. Since soap alters the natural pH level of that area, it should not be used on intimate areas.[41] It is scientifically created to ensure total vaginal cleanliness and to support the body's natural vaginal balance. It helps to prevent unpleasant and abnormal odors, preserves the natural pH balance of the vagina and provides relief from vaginal itching and burning sensations.

Two types of feminine intimate hygiene wash are commercially available.

- Synthetic intimate feminine hygiene wash (categorized according to their chemical composition) (Table 1).
- Herbal intimate feminine hygiene wash (categorized according to their plant ingredients) (Table 2).

## Synthetic Feminine Hygiene Wash

These formulations involve the therapeutic utilization of various agents that are categorized into different groups based on their specific mechanisms of action.

- Bactericidal substances, for example, sodium benzoate.
- Fungicidal substances, for example, sodium benzoate.
- Antiseptic substances, for example, cocamidopropyl betaine.
- Antiperspirants, for example, propylene glycol.

## Polyherbal Feminine Hygiene Wash

Polyherbal feminine hygiene washes are cosmetic products that incorporate a combination of two or more herbal ingredients, including plant extracts and essential oils. Numerous plants have been scientifically demonstrated to offer advantageous effects on vaginal health (Table 3).

### *Advantages of polyherbal feminine hygiene wash over chemical feminine hygiene wash*

Nowadays, herbal vaginal washes are widely used for intimate hygiene as these products are believed to be safer and free from side effects. Chemical hygiene wash might provide instant relief from itchiness but they eventually end up damaging the sensitive skin and disturbing the normal microflora of vagina, causing skin dryness and itchiness, unusual vaginal discharge and eczema. To overcome such issues, it is best to switch to a polyherbal intimate hygiene wash which will make up for the loss of nutrients and nullify the damage way.

Polyherbal feminine hygiene washes offer several potential advantages over chemical-based feminine hygiene washes. Here are some key advantages:

- *Natural ingredients*

Polyherbal feminine hygiene washes are formulated with natural herbal ingredients and botanical extracts. These ingredients are often derived from plants and have a long history of traditional use for promoting health and well-being. By utilizing natural ingredients, polyherbal washes may offer a more holistic and gentle approach to feminine hygiene.

- *Mild and gentle*

Chemical-based feminine hygiene washes may contain harsh ingredients such as sulfates, fragrances and preservatives that can potentially irritate the delicate vaginal area. In contrast, polyherbal washes are typically formulated to be mild and gentle on the skin, reducing the risk of irritation and discomfort.

- *pH balance*

Maintaining a healthy vaginal pH is crucial for preventing infections and maintaining the natural vaginal flora. Polyherbal feminine hygiene washes often contain

**Table 1:** Marketed synthetic intimate hygiene washes

| *S. No.* | *Commercial product* | *Active ingredients* |
|---|---|---|
| 1 | Clean and Dry Feminine Intimate Wash | Cocamidopropyl betaine, triethanolamine |
| 2 | VWash Intimate Hygiene Wash | Lauryl sulphate, ammonium lauryl sulphate, cocamidopropyl betaine, triethanolamine |
| 3 | Clovia Botaniqa Daily Intimate Wash | Cocamidopropyl betaine, sodium gluconate |
| 4 | Apollo Pharmacy Feminine Intimate Wash | Triethanolamine, lauryl sulphate, cocamidopropyl betaine |
| 5 | Sebamed Feminine Intimate Wash | Cocamidopropyl betaine, sodium lauryl sulphate, lauryl glucoside |
| 6 | WOW Skin Science Cleansing Foaming Freedom Wash | Sodium lauryl sarcosinate, disodium cocoamphodiacetate, cocodiethanolamide, lactic acid, allantoin, sodium benzoate, potassium sorbate |
| 7 | Nykaa Naturals Ultra Fresh Intimate Hygiene Wash | Lactic acid, coco-glucoside, lauryl glucoside, cocamidopropyl betaine, triethyl citrate, Propylene glycol, PEG-150 distearate, phenoxyethanol, sodium gluconate, triethylene glycol |

**Table 2:** Marketed herbal intimate hygiene wash

| *S. No.* | *Commercial product* | *Key ingredients* |
|---|---|---|
| 1 | Alnavedic Arogita-V Hygiene Cleanser | *Aloe barbadensis*, tea tree oil, sea buckthorn oil |
| 2 | Sebamed Feminine Intimate Wash | *Aloe barbadensis,* chamomile extracts |
| 3 | Himalaya Intimate Wash | Tea tree oil, pongamia oil |
| 4 | St. Botanica Feminine Intimate Hygiene Wash | Rose water, tea tree, witch hazel |
| 5 | Sirona Natural Refreshing Intimate Wash | *Rhodiola Rosea*, olive oil, oud oil |
| 6 | Eve Care Classic Intimate Wash For Women | Lactic acid, milk protein, chamomile |
| 7 | Avon Simply Delicate Intimate Washes | Glycerin, *Chamomilla recutita*, *Quercusalba* |
| 8 | Eraser Priva- Hy Feminine Wash | Majuphal, aloe vera, paan, vitamin E, tea tree oil |
| 9 | VLCC Carev Intimate Daily Wash | Thyme leaves, tea tree oil, aloe vera, sea buckthorn oil |

ingredients known for their pH-balancing properties, helping to support the optimal acidic pH of the vagina (around pH 3.8–4.5).[42] This can promote a balanced vaginal environment and lower the risk of imbalances that may result in issues such as yeast infections or bacterial vaginosis.

- *Soothing and moisturizing effects*

Many herbal ingredients used in polyherbal washes, such as aloe vera,[43] chamomile[44] and calendula,[45] have soothing and moisturizing properties. These ingredients can help alleviate dryness, itching and irritation, providing comfort to the sensitive vaginal area.

- *Potential antimicrobial activity*

Some herbal ingredients in polyherbal washes, like tea tree oil[46] and neem,[47] have demonstrated antimicrobial properties. These ingredients may help control the growth of harmful bacteria and maintain a healthy vaginal microbiota, which is essential for vaginal health.

- *Herbal synergy*

Polyherbal formulations often combine multiple herbs that work synergistically, enhancing their overall efficacy.[48] The combination of different herbal ingredients can provide a broader range of benefits compared to single chemical compounds found in conventional washes.

## Formulation of Feminine Hygiene Wash

Products for intimate hygiene come under the category of cosmetics. This product provides protection against pathogens in the vaginal area, which causes infection and malodor.

## Common Ingredients

Commonly used ingredients in an intimate hygiene wash are as follows:

### *Detergents*

The surfactants have the ability to emulsify and remove grease and dirt from the skin. Different types of surfactants are used in the formulations to cleanse various skin types, such as laurel/laureth sulfates, triethanolamine lauryl sulfate, sodium lauryl sarcosinate and ammonium lauryl sulfate.[49] However, these surfactants can potentially cause irritation to the sensitive vulvar skin. Additionally, highly effective detergents can leave the skin feeling dry and rough and they can also strip the hair from sebum, resulting in dryness.

### *Foaming agents*

These ingredients are widely favored in various types of cleansing formulations, as there is a historical association between the effectiveness of any form of washing product and its ability to produce a foaming lather.

### *pH adjusters*

When formulating an intimate hygiene wash, the pH must be kept between 3.8 to 5, which is moderately acidic. *Lactobacilli* are known to provide natural protection to the vagina. They synthesize lactic acid from glycogen in the wall of the vagina resulting in an acidic environment with a pH of about 3.8. Transition to a neutral state invariably results in the colonization of facultative pathogens, which are almost always present in the vagina.[50] The substances used include triethanolamine and lactic acid.

### *Emulsifiers and surfactant*

Emulsifiers and surfactants play a vital role in ensuring consistent product quality. These components are widely used and essential in cosmetics and personal care products. Surfactants consist of molecules that have two components: Hydrophilic heads, which are attracted to water and hydrophobic tails, which repel water. By doing so, they can lessen the surface tension that prevents the mixing of materials like oil and water. Emulsifiers combine these two incompatible materials into an emulsion, which is a stable consistency that frequently has product qualities like a creamy texture. Every formulation needs both emulsifiers and surfactants to look and function consistently every time it is applied.

**Table 3:** Herbs used in treatment of vulvovaginal infections and in feminine wash formulations

| *S. No.* | *Plants* | *Common name* | *Hindi name* | *Families* | *Extract/Parts used* |
|---|---|---|---|---|---|
| 1 | *Aloe vera* (L.) Burm.f. | Aloe vera | Gheekwar | Liliaceae | Leaf pulp |
| 2 | *Melaleuca alternifolia* (Maiden and Betche) Cheel | Tea tree | Chai Ped | Myrtaceae | Leaf oil |
| 3 | *Hippophae rhamnoides L.* | Sea buckthorn | *Dalechuk* | Elaeagnaceae | Seed oil |
| 4 | *Rosa indica* L. | Rose | Gulab | Rosaceae | Petals |
| 5 | *Hamamelis virginiana* L. | Witch hazel | Vich Hajal | Hamamelidaceae | Leaf, bark and twigs |
| 6 | *Millettia pinnata* L. | Pongamia | Karanja | Fabaceae | Seed oil |
| 7 | *Matricaria chamomilla* L./ *Chamomilla recutita* L. | Chamomile | Babune | Asteraceae | Flower |
| 8 | *Rhodiola rosea* L. | *Olden root, rose root, arctic root* | Gulabi Root | Crassulaceae | Tumor |
| 9 | *Olea europaea* L. | Olive | Jaitoon | Oleaceae | Fruit oil |
| 10 | *Aquilaria khasiana* Hallier F. | Oud/oudh | Aguru | Thymelaeaceae | Wood oil |
| 11 | *Quercus alba* L. | White oak | Baanj/Shaahabaloot | Fagaceae | Bark extract |
| 12 | *Thymus vulgaris* L. | Thyme | Jangli Ajwain | Lamiaceae | Leaves |
| 13 | *Quercus infectoria* (G.) Olivier | Oak gall/ gull nuts | Majuphal | *Fagaceae* | Galls on oak tree |
| 14 | *Piper betle* L. | Betel | Paan | Piperaceae | Leaves |

Because of their ability to mix immiscible substances, skin care professionals utilize them to produce high-end luxury skincare solutions. Without them, cosmetic items may become inefficient and unacceptable for consumers.[51] Commonly used emulsifiers and surfactants are- lauryl sulfate and ammonium lauryl sulfate. The most common surfactant cocamidopropyl betaine, is responsible for causing allergic contact dermatitis.[52]

### *Additives*

Hygiene washes often incorporate various additional ingredients to enhance foaming or create the perception of a natural or herbal product. For instance, chelating agents like sodium gluconate may be included in order to effectively remove toxic metals from the vaginal area.[53]

## Role of Herbs and Botanical Extracts

The formulation of polyherbal feminine hygiene washes involves the utilization of various herbs and botanical extracts. These natural ingredients are believed to offer specific benefits for women's intimate health. This section explores the role of herbs and botanical extracts in polyherbal feminine hygiene washes, discussing their potential properties and contributions to product efficacy.

## Herbal Ingredients in Polyherbal Feminine Hygiene Washes

### *Aloe vera*

Aloe vera has hydrating and calming properties, which can provide relief from dryness, itching and irritation. It may help reduce inflammation and redness, promoting overall comfort.[54]

### *Tea tree oil*

Its antimicrobial properties are well-documented, exhibiting effectiveness against a range of microorganisms, including bacteria, fungi, and yeast. Its natural fragrance can help combat unpleasant odors associated with feminine hygiene.[46]

### *Sea buckthorn*

Sea buckthorn contains a rich profile of bioactive compounds, including vitamins, antioxidants, flavonoids and fatty acids, which contribute to its therapeutic properties. It is known for its moisturizing properties, which help alleviate dryness and maintain the natural moisture balance of the vaginal area. It demonstrates anti-inflammatory properties, aiding in the soothing and calming of irritated skin in the vaginal region. It has demonstrated antimicrobial properties against certain bacteria and fungi, which can help in maintaining a healthy vaginal flora and preventing infections. It has been shown to promote wound healing and tissue regeneration, which can be beneficial for any minor vaginal irritations or abrasions. The high antioxidant content in sea buckthorn helps neutralize free radicals, protecting the cells of the vaginal area from oxidative damage. It supports the integrity of the skin barrier, enhancing its protective function against external irritants and maintaining overall skin health in the intimate area.[55]

### *Rose extract*

Rose extract possesses moisturizing and soothing properties, contributing to vaginal comfort. It may help alleviate redness and irritation, promoting a healthy vaginal environment.[56]

### *Witch hazel extract*

Witch hazel extract is known for its astringent effects, which may help tighten and tone vaginal tissues. It may offer relief from inflammation and itching associated with certain vaginal conditions.[57]

### *Pongamia*

Pongamia harbors bioactive compounds like flavonoids, alkaloids, and terpenoids, which contribute to its therapeutic attributes. These include antimicrobial, anti-inflammatory, and wound-healing properties.[58]

### *Chamomile*

Chamomile has been traditionally used on the skin for its anti-inflammatory and soothing effects. It may help alleviate discomfort and promote a sense of relaxation.[59]

### *Arctic root*

Arctic root displays adaptogenic characteristics, aiding the body in adjusting to diverse physical and mental stressors. It is thought to bolster the body's resilience and capacity to manage stress. This plant is rich in bioactive compounds, such as phenolic compounds and flavonoids, which demonstrate antioxidant attributes. These antioxidants safeguard cells against oxidative stress, potentially promoting overall health and vitality. It may help reduce inflammation and alleviate symptoms associated with inflammatory conditions. Some studies suggest that Arctic root may have immune-modulating effects, potentially supporting the immune system's function and enhancing resistance to infections.[60]

### *Olive*

Olive oil is rich in fatty acids and has emollient properties, making it an effective moisturizer for dry or irritated skin in the intimate area. It includes polyphenols and vitamin E, both possessing antioxidant characteristics. These antioxidants work to shield the skin from oxidative harm and enhance its overall health. It can help soothe inflammation and irritation in the vaginal area. It can help improve the softness and smoothness of the skin, providing a conditioning effect to the intimate area. It has natural lubricating properties, which can help reduce friction and discomfort during sexual activity.[61]

### *Oudh*

It is a fragrant, resinous wood, highly valued for its aromatic properties.[62]

### *White oak*

White oak contains tannins, which contribute to its astringent properties. Astringents help tighten and tone tissues, potentially providing a tightening effect on the vaginal area. Certain compounds found in *Quercus alba*, such as quercitrin and ellagic acid, have demonstrated antimicrobial properties. These properties may help in supporting a healthy microbial balance by inhibiting the growth of pathogenic microorganisms in the vaginal area. These properties may help reduce irritation, redness and inflammation in the intimate area. It has been used traditionally for wound healing purposes. Its application in feminine hygiene may potentially promote healing and tissue regeneration in case of minor irritations or abrasions.[63]

### *Thyme*

Thyme contains compounds such as thymol and carvacrol, which exhibit strong antimicrobial properties. These attributes can effectively hinder the proliferation of bacteria and fungi responsible for infections or undesirable odors in the vaginal region. Thyme boasts an abundance of antioxidants, such as flavonoids and phenolic compounds, which safeguard cells from oxidative stress, thus upholding the vaginal area's overall health. Furthermore, thyme possesses soothing and anti-inflammatory qualities that aid in alleviating irritation, redness, and inflammation in the intimate region. Thyme has a pleasant aroma and can act as a natural deodorizer, helping to neutralize unpleasant odors in the vaginal area. Thyme is believed to have circulatory-stimulating properties, which can promote healthy blood flow and support the overall health of the vaginal tissues. Thyme is considered to have a balancing effect on the vaginal flora, helping to maintain a healthy microbial environment.[64]

### *Oak gall*

Oak gall is known for its astringent properties, which can help tighten and tone the vaginal tissues. It harbors tannins renowned for their antimicrobial properties, which can aid in both preventing and treating vaginal infections. Additionally, it may exert soothing and anti-inflammatory effects, thereby assisting in the reduction of irritation and inflammation in the intimate area. Due to its astringent properties, oak gall is believed to have a tightening and firming effect on the vaginal tissues.[65]

### *Betel*

Betel leaves are recognized for their array of beneficial properties, including antimicrobial, antidiabetic, antiulcer, anti-inflammatory, anticancer, antimutagenic, and antioxidant attributes.[66]

## Synergistic Effects and Formulation Considerations

The combination of various herbs and botanical extracts in polyherbal feminine hygiene washes aims to provide a synergistic effect, enhancing the overall efficacy of the product. Formulators carefully select and combine ingredients to ensure compatibility and maximize the desired benefits. Consideration is given to the concentration, extraction method and quality of herbal ingredients to maintain consistency and potency.

Herbs and botanical extracts play a significant role in the

formulation of polyherbal feminine hygiene washes. Their diverse properties, including antimicrobial, soothing, anti-inflammatory and moisturizing effects, are believed to contribute to maintaining vaginal health and overall comfort. However, additional research is required to confirm the advantages and potential hazards linked with these natural components. Rigorous quality control measures and standardized manufacturing processes are crucial to ensure the safety and efficacy of polyherbal feminine hygiene washes.

## Conclusion

With women becoming more concerned about their intimate health, intimate hygiene products have become a talk-of-the-town in the pharmaceutical and cosmetic industries, as women are extensively using them as part of their everyday cleaning practice. Today multiple such products are available in the market, which are prescribed for odor control and/or cleanliness, although few of them tend to change the usual pH and microflora essential for the prevention of vaginal infection. It is indeed essential to decide on the herbal combination that works well together to get the desired impact. Even though there is a wealth of published research on the interior vaginal environment, the exterior vulva and how maintaining intimate hygiene may impact it are the subjects of very little knowledge. To enhance personal intimate health and hygiene, emphasis should be on educating women and health care providers about the significance of and potential hazards related to female intimate cleanliness.

In order to promote intimate health, female hygiene products must be considered appropriate if they are gentle, hypoallergenic, clinically evaluated for the vulvovaginal area, does not disturb the natural microflora and pH of the vagina, thus, maintaining its moisture. External feminine washes are more widely accepted since internal washing or douching is associated with risks. Women can consider them as a beneficial additional treatment option while undergoing antibiotic therapy for vulvovaginal infections or for preventing such infections.

Women should be urged to adopt an external wash that has been carefully developed and clinically evaluated, delivering targeted antimicrobial and anti-inflammatory properties and other health advantages without having an adverse effect on the normal vulvovaginal skin and microflora. Herbal feminine intimate hygiene washes have less manufacturing cost and are more efficient, safe and affordable which is advantageous for economically weaker section of the population.

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