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Review Paper

A Comprehensive Literature Review on Herbal Paper Soap and Their Efficiency

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ABSTRACT

This review highlights herbal paper soap as an eco-friendly, portable, and biodegradable alternative to traditional soaps. Made from water-soluble sheets with herbal extracts, it dissolves quickly, forms lather, and effectively removes dirt and microbes. Tagetes erecta L (African marigold) enhances its antibacterial, antifungal, and skin-nourishing properties. Overall, herbal paper soap is a sustainable, affordable, and skin-friendly solution for maintaining hygiene and environmental protection

INTRODUCTION

Maintaining cleanliness is crucial to avoid illnesses caused by bacteria and germs. Soap is crafted from natural fats or oils combined with an alkali such as sodium hydroxide, and it is utilized for both washing and skincare. Various oils are selected based on the specific qualities desired in the soap, such as effects on softness or whitening. From a chemical perspective, soap is an alkaline metal salt derived from long-chain fatty acids, usually created through the saponification process

of fats or oils like tallow, coconut, or palm oil using sodium or potassium hydroxide. Paper soap is a lightweight, dry sheet that quickly dissolves in water, generating foam suitable for handwashing. Its compact and convenient nature makes it ideal for outdoor settings or travel due to its portability. In contemporary soap manufacturing, fats and alkalis are primarily used, with the cold process being the most prevalent method, although some manufacturers continue to use the traditional hot process. Practicing hand hygiene is critical to

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curbing the transmission of germs and infections since hands are a significant pathway for this spread. Washing hands with soap and water is an effective way to diminish viruses and other microbes. Soap, which is formulated from natural oils or fats and an alkali, functions as a cleansing agent by eliminating dirt and bacteria. Paper soap is a novel, lightweight, and portable option that dissolves quickly in water, allowing for convenient handwashing in any location. Herbal paper soap merges cleansing and antimicrobial functions with natural herbal extracts that additionally moisturize and nourish the skin. According to the WHO and CDC, enhancing handwashing practices by as much as 40% can considerably decrease the spread of diseases. In comparison to conventional soaps, paper soaps reduce waste, provide better germ control, and are well-suited for travel usage. The skin acts as the body's primary defence against pathogens but is continually subjected to environmental factors that may cause harm. Given that hands often come into contact with germs during daily activities, soap is vital for safeguarding health. When soap is mixed with water, it cleanses both skin and surfaces. However, in hard water, soap can produce scum instead of lather, resulting in waste and residue on fabrics. Herbal paper soap strips are cost-effective, simple to use, and appropriate for individuals of all ages, offering a hygienic and convenient solution for hand cleaning. The pandemic has been a significant issue globally for several years, including in India. This crisis is caused by a virus commonly referred to as COVID-19. According to the World Health Organization (2020), individuals who come into contact with surfaces contaminated by droplets from infected persons can also be at risk of contracting COVID-19. The swift transmission of the virus can be attributed to the high number of asymptomatic cases. One of the preventive measures involves handwashing with soap and water, as approximately 98% of disease

transmission occurs through hands. Soap can be created by combining sodium or potassium salts with animal oils or vegetable fats. The skin serves as the body's outer layer, acting as the primary defence against various pathogens. Since the skin interacts with the environment, it is continually subjected to various external stimuli, leading to potential damage. Consequently, damaged skin often results in scar tissue, and since hands are frequently exposed to pathogens in everyday tasks, soap is formulated to help combat various microbes. Soap is defined as the potassium or sodium salt of a long-chain carboxylic acid (fatty acid) with cleansing properties when mixed with water. It consists of a strong base (NaOH) and a weak acid (carboxylic acid), making a soap solution in water basic in nature. Throughout history, people have utilized medicinal plants for therapeutic purposes. Different parts of medicinal plants, such as leaves, stems, and roots, have been employed as natural remedies to address a wide range of ailments. Although many plant-based treatments have been supplanted by synthetic options, Ayurvedic products are still recognized for their efficiency and safety. Numerous herbs reveal antioxidant, antibacterial, cytotoxic, antimicrobial, hypotensive, anti-diuretic, anti-inflammatory, anti-spasmodic, anti-diabetic, anti-haemorrhagic, and anti-helminthic properties, all of which contribute high nutritional value. Due to their substantial medicinal benefits, affordability, accessibility, and compatibility, the integration of natural products into formulations can help treat almost all illnesses and skin problems. The active compounds that confer therapeutic advantages to these plants are extracted and incorporated topically into creams, soaps, oils, and ointments to address skin issues such as acne, eczema, wounds, and ringworm, as well as for cosmetic and antimicrobial applications. The benefits of these plants are harnessed in various formulations intended for both medicinal and cosmetic uses.



Therefore, the current research aims to develop an innovative drug delivery system through herbal medicated paper soap strips that will effectively foam on the affected area, facilitate faster drug delivery, be cost-effective, easy to use, and effectively treat topical fungal infections. (1-6)

Paper soap:

The primary objective of our study is the production of paper soap sheets. Paper soap is a slim sheet of soap. It acts as an anionic surfactant utilized with water for cleaning and washing purposes. The soap comprises a substrate, a cleansing composition, and a holder. The cleansing composition is absorbed into the substrate to create a dry cleanser-impregnated substrate, which is covered to prevent exposure and evaporation of the cleansing agent, since the cleanser-impregnated substrate remains dry. The holder securely holds at least one stack of dry and cleanser-impregnated substrates. When a substrate is extracted from the holder and exposed to water, it dissolves, releasing the cleansing composition to dissolve in the water for cleaning purposes. It is compact, affordable, and user-friendly. The paper utilized in paper soap is eco-friendly. When the paper dissolves in water, even if disposed of, it remains biodegradable and disposable. Washing hands with soap is crucial, as it has been shown to eliminate germs and bacteria effectively. The paper soaps are created from glycerine, which acts as a plasticizer. This research aimed to identify the formulation of paper soap using coconut oil and castor oil with the addition of glycerine, as well as to evaluate the quality of the disposable hand soap. The soap sheet allows for hand washing by effectively destroying 99.9% of bacteria by simply adding water right before use. Each travel pack contains 10-20 thin sheets, with each sheet intended for a single handwashing session, making it convenient. The study employed a laboratory experimental approach along with descriptive

analysis. These biodegradable sheets present numerous advantages. The paper soap is compact and easy to transport, with only a few tablets needed to wash hands, providing disinfection and cleaning, which is a great ally for maintaining hygiene. Paper soaps are particularly well-suited for travellers. Designed with travel needs in mind, these soaps are highly effective and convenient. For quick hand washing anywhere at any time, carry these global mart paper soaps for a hygienic journey. These paper soaps come in attractive packaging and shapes, packed in travel-friendly, easy-to-carry tubes. They are lightweight and thin, becoming effective in warm water. The paper soap is very straightforward to use; the addition of moisture prevents dry hands, while its fragrance helps keep the sink area tidy and makes it more appealing in urban areas, especially for children, although they are less favoured in rural settings. (7-10)

Why herbal soap paper?

Herbal soap, crafted from natural plant extracts, essential oils, and herbs, is mild on the skin, providing antibacterial, antifungal, moisturizing, and antioxidant advantages while being environmentally friendly and devoid of harsh chemicals. Why *Tagetes erecta* L used in Preparation of paper soap? *Tagetes erecta* L, also referred to as marigold or African marigold, is incorporated into herbal paper soap because of its many beneficial qualities and its compatibility with soap formulations.

1. Antibacterial and Antifungal Qualities: This plant possesses compounds like flavonoids and essential oils that inhibit the growth of bacteria and fungi, making the soap effective for hygiene maintenance.

2. Anti-inflammatory and Calming Effects: It alleviates irritated skin and helps diminish



inflammation, making it suitable for sensitive or acne-prone skin.

3. Natural Antioxidants: Tagetes erecta L contains antioxidants that shield the skin from free radical damage, thus slowing down the aging process of the skin.

4. Healing Properties: Its antimicrobial and antiseptic characteristics assist in the healing of minor cuts, wounds, and insect bites.

5. Aroma and Visual Appeal: The inherent fragrance of the plant lends a delightful sent to the soap, enhancing the overall experience for the user.

Morphological Applications of Tagetes erecta L:

1. Flowers: The vibrant orange or yellow blooms are abundant in essential oils and carotenoids, which are extracted for use in skincare products.

2. Leaves: These leaves harbour medicinal qualities that can help alleviate skin infections and reduce inflammation.

3. Roots: Recognized for their antifungal capabilities, they inhibit the proliferation of harmful microbes. The petals of Tagetes erecta L in herbal paper soap can full fill various functions. (11-13)

Utilization of Tagetes erecta L petals in herbal paper soap:

1. Natural Dye Tagetes erecta L petals can serve as a natural dye, providing a bright yellow-orange colour to the soap.

2. Antimicrobial Benefits The petals possess antimicrobial properties due to compounds like thiophenes, which may help inhibit the growth of bacteria on the skin.

3. Anti-Inflammatory Properties The petals exhibit anti-inflammatory characteristics that may aid in soothing and calming irritated skin.

4. Visual Appeal Incorporating Tagetes erecta L petals can enhance the visual attractiveness, offering a natural and herbal appearance to the paper soap.

5. Skin Advantages The petals may also offer additional skin advantages, including:

- Antioxidant effects to shield the skin from damage
- Anti-aging benefits that may diminish fine lines and wrinkles
- Calming properties to alleviate skin irritation

Using Tagetes erecta L Petals in Herbal Paper Soap To include Tagetes erecta L petals in herbal paper soap:

1. Thoroughly dry the petals to prevent moisture from impacting the soap.
2. Grind the dried petals into a fine powder.
3. Combine the powdered petals with other herbal components and the soap base.
4. Utilize a suitable binding agent to create the paper soap. (14-16)

Mechanism of herbal soap paper:

Dissolving in Water: Upon exposure to water, the herbal paper soap sheet swiftly disintegrates due to its delicate composition and soluble components.

Creating Lather: The surfactants contained in the soap diminish surface tension and generate foam or lather when it is rubbed between the hands.

Elimination of Dirt and Germs: The lather captures impurities, oils, and microorganisms from the skin's surface, which are then washed away with water, leaving the skin clean.

Effect of Herbal Ingredients: The herbal extracts included (such as neem, aloe vera, or tea tree oil) offer antibacterial, antifungal, moisturizing, and soothing properties, ensuring protection and nourishment for the skin.

Evaporation and Skin Care: Once rinsed, water evaporates, leaving behind herbal residues that



form a light protective layer to maintain the skin's softness and refreshment.



Fig. 01 Mechanism of Herbal paper soap

Benefits of paper soap-

- **Lightweight:** means very little weight, making it easy to carry, handle, or transport, it is small and easy to carry in a pocket or bag without adding extra weight.
- **Convenient to use:** it is easy, practical, and comfortable to use without difficulty or extra effort, you can quickly wash your hands anytime, anywhere, without needing a soap dish or large water supply. It means user-friendly and hassle-free.
- **Soft on the skin:** refers to a product that is gentle, non-irritating, and comfortable when applied to the skin, it contains natural oils and herbal extracts that cleanse without causing dryness, redness, or irritation. It means kind and gentle to the skin.
- **Easy to transport:** that can be carried or moved from one place to another without difficulty, it is thin, lightweight, and can fit in a pocket or bag, making it ideal for travel.
- **Environmentally friendly:** a product or practice that does not harm the environment and is safe for nature, it is often biodegradable, made from natural ingredients, and reduces chemical

pollution. It means safe for the environment and ecofriendly.

- **Affordable:** is reasonably priced and within one's financial means. people can buy it without spending too much money. It means cost-effective or easy to buy.

• Decomposable and compostable:

Decomposable - that can naturally break down into simpler substances through the action of microorganisms, water, or air, it breaks down naturally after use without leaving harmful residues, breaks down naturally.

Composable - that can break down under composting conditions to form nutrient-rich soil or compost, it can be added to a compost pile and contribute to healthy soil, breaks down into useful soil nutrients. (17-22)

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