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Formulation and Evaluation of Herbal Soap Using Dragon Fruit-A Review

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Abstract
For generations, people have utilized herbal soap, a mild and natural cleaning solution, to enhance the health and well-being of their skin. With an emphasis on the antibacterial, anti-inflammatory, and skin-protective qualities of herbal soap, this research seeks to provide an overview of the body of research on these therapeutic qualities. A thorough examination of several herbal extracts that are frequently used to make soap, like neem oil, dragon fruit pulp and aloe vera, shows that they have the ability to protect against skin infections, relieve irritations, and moisturise the skin. The benefits of herbal soap for various skin problems, such as dermatitis, eczema, and acne, are also covered in the article. According to the research, using herbal soap as an adjuvant therapy can help manage a variety of skin conditions and preserve healthy skin. Prospects for future investigation and consequences for the creation of herbal soap.

Keywords: Herbal soap, Dragon fruit, Skin, Anti-oxidant, Anti-microbial

Introduction

Soaps are cleansing agents widely used for maintaining personal hygiene. Many commercially available soaps contain synthetic surfactant and additives that may cause dryness, irritation, or allergic reactions upon prolonged use. In contrast, herbal soaps are formulated using natural oils and plant extracts, offering both cleansing action and therapeutic benefits. Antioxidants are substances capable of preventing or delaying oxidative damage by neutralizing free radicals, whereas antimicrobial agents inhibit or destroy the growth of pathogenic microorganisms such as bacteria and fungi. With the increasing global preference for natural and safe cosmetic products, herbal soaps with proven antioxidant and antimicrobial activities have gained importance in cosmetic science and pharmaceutical research.

Skin:

The body's greatest sense organ is the skin. It collects sensory information from the environment and acts as a barrier to safeguard the body's organs. It also helps to maintain the body's temperature. at a sensible quantity. There are various unique cells and structures under the skin. The three layers are the dermis, epidermis, and hypodermis[1]. According to a WHO research, skin diseases account for an astounding 34% of all occupational disorders. Data from 2020 showed that the number of skin disease-related deaths in India was 17,857, or 0.21% of all deaths. Thus, The best course of action to address the situation is to include potentials of herbs in the recipe which have fewer adverse effects and offer beneficial treatment alternatives that are safer and less invasive. Thus, the creation of medicinal herbal

teas is the main emphasis of this endeavor. soap that uses the active potentials of many plants, producing it soap that is both antibacterial and antioxidant that may be used regularly soap for bathing.

Soap:

A fatty acid salt called soap is utilized in many lubricating and cleaning goods. Surfactant soaps are typically used for bathing, washing, and other kinds of cleaning services.[2] Soaps are used to wash away debris, such as dust microbe that draws out odors from the body[3]. Toxic mercury is typically present in commercial soap. polymers, bisphenol, barium, aluminum, and other substances that enter the body through internal organs from the chemicals vaporization as well as skin absorption with unfavorable side consequences.[4]

Types of soaps:

Natural/Herbal soap: Herbal soap is a type of soap made with natural ingredients, such as herbs, essential oils, and plant extracts, that gently cleanses and nourishes the skin promoting overall skin health.

liquid soap: Liquid soap is a type of soap that comes in a liquid form, often used for hand washing and body cleansing, and can be gentle on the skin while effectively cleaning and moisturizing.

Moisturizing soap: Moisturizing soap has a moisturizing agent that helps moisturize your hands as you wash them. Frequent hand washing every day can dry out your hands, but it's necessary. Some examples of moisturizing agents in these soaps are aloe, cocoa butter, and Shea butter.

Antibacterial Soap: Antibacterial soap contains antimicrobial agents like chloroxylenol, Benzalkonium chloride. It has become increasingly popular because it kills all the bacteria.

Chemical-Free Soap: Chemical-free soap uses natural plant-based ingredients like Shea butter, essential oils, and coconut oil, avoiding harsh synthetics such as sulfates, parabens, and artificial fragrances, making them gentle for sensitive skin, moisturizing, better for the environment.

Foam Soap: Foaming hand soap is just liquid soap pushed through a unique dispenser to give it the foam texture. One of the benefits of foam hand soap is that it provides more of a lather, making it easier to wash hands. In addition, foam soaps also produce anti-bacterial and moisturizing effect.

Bar Soap: Bar soap is a solid form of soap that dispenses a light, airy foam, often used in hand-washing, and is designed to be gentle on skin while effectively cleaning with a reduced amount of product.

Herbal soap: Herbal soap is a natural, plant-based soap made with botanical extracts, essential oils, and herbs that offers gentle cleansing, nourishment, and therapeutic benefits, free from harsh chemicals, synthetic fragrances, and artificial additives found in conventional soaps, making it ideal for sensitive skin and holistic wellness.

The majority of commercial soaps on the market today have chemical ingredients that have antibacterial action and may be able to depilate skin infections. Soaps and detergents are considered disinfectants that are necessary for everyday hygiene routines. Cleansing agents such as soaps, can be liquid, solid, semisolid, or powdered. Commercial soap is typically composed of harmful substances such as plastics, Aluminum Barium, Mercury, and Bisphenol, among others. These substances are vaporized and absorbed through the skin, both of which have detrimental side effects on the body.

The usage of herbal medicine has increased dramatically in the last several years. It is believed that around 80% of the world's population uses herbal plant extracts in their medicines, both in developed and developing nations. It is recognized as one of the main medical treatments, particularly underdeveloped

nations, for a variety of illnesses. The field of medicinal research known as "Herbal Medicinal products" emerged as a result of astounding increase in the use of herbal plants and their extracts.

Dragon fruit is used in traditional Asian medicine to prevent and treat ailments (Sofowora et al. 2013). The pulp and the peels have high water content, are rich in fibers. They contain several nutrients, including a significant amount The number of vitamins, minerals, and antioxidants (Nurliyana et al. 2010; Perween et al. 2018). The dragon fruit plant has long days. It is a member of the family Cactaceae and genus Hylocereus (Morton 1987).

Systemic classification of Dragon fruit:

Domain: Eukaryota
Kingdom: Plantae (Haeckel 1866)
Subkingdom: Tracheobionta
Super division: Spermatophyta (Seed plants) (Willkomm 1854) Division: Magnoliophyta (Flowering plants) (Cronquist et al. 1966) Class: Magnoliopsida (Dicotyledons) (Cronquist et al. 1966) Subclass: Caryophyllidae (Takhtajan 1966)
Order: Caryophyllales (Jussieu 1789 ex Berchtold and Presl 1820)
Family: Cactaceae (Cactus family) (Jussieu 1789)
Subfamily: Cereoideae (Schumman 1898 published in Schumann 1899)
Tribe: Hylocereae (Buxbaum 1958)
Genus: Hylocereus (A. Berger) (Britton and Rose 1909)

Pharmacognostical profile of Dragon fruit:

Common names: Red dragon fruit, Red pitaya, strawberry pear.
Biological source: The dried or fresh parts (fruit, peel, stem, flowers, seeds) of the plant Selenicereus polyrhizus.
Family: Cactaceae
Chemical constituents: The plant is rich in various bioactive compounds, including:

- Pigments: Betalains (specifically betacyanins like betanin, phyllocactin, and their isomers, which give the red color), carotenoids (lycopene, beta-carotene), and anthocyanins.
- Phenolic Compounds: Flavonoids (quercetin, myricetin, rutin, catechin, isorhamnetin), phenolic acids (gallic acid, vanillic acid, p- coumaric acid, caffeic acid, chlorogenic acid), and tannins (condensed and hydrolyzable).

- Other Compounds: Alkaloids, saponins, terpenoids (triterpenoids like β-amyrin, αamyrin), steroids, polysaccharides (pectin, oligosaccharides), essential fatty acids (linoleic and omega-3 fatty acids in seeds), vitamins (C, B1, B2, B3, E, A), and minerals (iron, magnesium, calcium, potassium).

Uses:

- rich in anti-oxidant.
- Used as an anti-inflammatory, anti-microbial, wound healing agent, antidiabetic, anticancer, cardioprotective and Hepatoprotective.

Anti-oxidant activity:

Hylocereus polyrhizus is rich in betalains and other bioactive compounds such as vitamins and phenolic compounds that exert relevant antioxidant properties and, for these reasons, are related to the prevention of several human diseases. The oil results from the seeds, and the peel is also an essential source of antioxidant compounds. The peel of H. undatus possesses more flavonoids than the flesh[14,15,16,17].

Anti-microbial effects:

In a study to investigate the antimicrobial effect of red pitaya peels, Tenore et al.[18]found that the extract has efficient in vivo and in vitro effects against several microorganisms, such as Escherichi coli and P. aeruginosa.

Sushmitha et al.[19] investigated the effects of H. undatus seeds in Gram-negative and Gram-positive bacterial species and found that the minimum inhibitory concentration is 50 µL for Staphylococcus aureus and Escherichia coli. Tenore et al.[20] also found antimicrobial activity for hexane, chloroform, and ethanol extract of the skin of H. undatus and showed inhibition of the growth of Gram- negative and Gram-positive bacteria.

Extract of the peel and fruit of the red dragon fruit can also exert anti- fungal actions against Rhizoctonia solani, Candida albicans, Aspergillus flavus, Botrytis cinerea, Fusarium oxysporum, and Cladosporium herbarum[20].

Anti-inflammatory effects:

Besides the antioxidant actions, dragon fruit can also exert anti- inflammatory actions. Saenjum et al.[13] found anthocyanins (cyanidin 3- glucoside, delphinidin 3-glucoside, and pelargonidin 3-glucoside) in the pulp and peel of pitaya red. The authors found that the pulp enriched with the first anthocyanin (cyanidin 3-glucoside) inhibited the synthesis of reactive oxygen and nitrogen species, cyclooxygenase-2 (COX-2), and inducible nitric oxide synthase (iNOS), in in vitro models and without resulting in cytotoxicity.

Methods of herbal soap formulation:

Herbal soaps are commonly prepared using three techniques:

1. Cold Process Method

In this method, oils are combined with an alkaline solution under controlled temperature conditions. Herbal extracts are added at the tracing stage. The soap requires a curing period of approximately four to six weeks.

2. Hot Process Method

This technique follows a similar process to the cold method but involves heating to accelerate

saponification. It reduces curing time and allows faster use of the soap.

3. Melt and Pour Method

A ready-made soap base is melted and mixed with herbal extracts and essential oils. This method is safe, simple, and suitable for laboratory- scale formulation without direct handling of alkali.

Evaluation parameters:

Color and shape: The naked eye was used to examine the color and shape.

Odor: To test the formulation's scent, a preparation was applied to the hand and a perfume scent was detected.

pH: To measure the pH of the freshly made soap, one way was to touch a pH strip to it and another way was to dissolve one gram in ten milliliters of water using the digital pH meter's assistance.[21]

Foam Height: A sample of 0.5 grams of soap was obtained and mixed with 25 milliliters of distilled water. After that, put it in a 100 ml measuring cylinder and increased the volume to 50 ml in water. There were 25 blows administered, and they continue until up to 50 ml of aqueous

Foam Retention: A 100 ml graduated measuring cylinder was filled with 25 ml of the 1% soap solution. Ten times, the cylinder was shaken while being covered with hands. The amount of foam after four minutes at one- minute intervals was noted.[21]

Irritation: To treat it, wash your skin with soap for ten minutes. It is regarded as a non-irritating product if there is no irritation.[22]

Conclusion:

Studies show that pitaya has beneficial potential for human health, having antioxidant, anti-inflammatory, anti-diabetic, anti-bacterial, and anti- cancer effects. Using a cold process approach, the obtained poly herbal soap was created with antibacterial and antioxidant properties. The antioxidant and antibacterial qualities may show signs because acemannan is present.

The additional clinical research Using this mixture can improve the use of poly herbal soap. The primary factor that makes poly herbal soap have the advantage of being chemical-free and superior to synthetic soaps.

Therefore, the prepared poly herbal soap in this study work has anti- oxidant and anti-microbial properties that make it useful for a beauty regimen.

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