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Review Article

Review Article of Polyherbal Hand Wash

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ABSTRACT

Polyhedral hand wash formulations, which contain the advantageous qualities of several plant extracts, have been developed in response to the growing demand for natural and environmentally friendly personal care products. The creation and assessment of a polyhedral hand wash using herbal constituents like aloe Vera , neem, Tulsi , and tea tree oil are the main objectives of this work. These plants were chosen because of their hydrating, antibacterial, and skin-soothing qualities. To create a hand wash that was both mild and effective, the plant extracts were combined with perfumes, preservatives, and surfactants throughout the formulation process. The physicochemical characteristics of the finished product, such as pH, viscosity, and foam stability, were assessed. Zone of inhibition assays were also used to evaluate antibacterial efficacy against common infections including Staphylococcus aurous and E. coli. Tests for stability and skin irritation were also carried out to guarantee efficacy and safety. The findings showed that the polyhedral hand wash was a good substitute for chemical-based hand washes since it had outstanding antibacterial qualities and kept the skin hydrated. The promise of polyhedral formulations in personal hygiene products is demonstrated by this study, which offers a skin-friendly and sustainable option for regular hand hygiene.

INTRODUCTION

The world Maintaining good hand hygiene is crucial in the modern world to stop the spread of illnesses and to guarantee general health and wellbeing. Although chemical-based handwashes and sanitizers have long been common choices for personal hygiene, there is a growing trend toward herbal and natural alternatives as a result of growing worries about the possible negative effects of synthetic chemicals on the environment and skin. A promising answer to this demand has been found in polyhebral preparations, which blend extracts from several plant species with complimentary qualities. A polyhebral hand wash is a safer and more environmentally friendly option to traditional hand hygiene solutions since it uses the synergistic action of many herbs to

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deliver effective washing and skin care. It has long been known that certain herbal components, such aloe Vera, neem (Azadirachta indicia), Tulsi (Ocimum sanctum), and tea tree oil (Melaleuca alternifolia), offer therapeutic benefits. Aloe Vera, which has calming and hydrating properties, keeps skin from drying out after regular hand washing. With its strong antibacterial and anti-inflammatory qualities, neem works wonders against a wide range of germs and viruses. Tulsi, sometimes known as "holy basil," is commended for its antifungal and antibacterial properties, which support the general health of the skin. Tea tree oil, which has antibacterial qualities, is very good at getting rid of infections and is also kind to the skin. The purpose of this study is to create and assess a polyhebral hand wash formulation that blends various herbal elements to provide a hand hygiene product that is both effective and gentle on the skin. For the formulation process to produce a stable product with the required physical properties—such as the optimum pH, viscosity, and foam formation—the ideal combination of herbal extracts, surfactants, emulsifiers, preservatives, and natural scents must be chosen. Tests for the product's antibacterial efficacy, skin compatibility, and general consumer safety are part of the review process. The objective is to provide a premium, herbal-based hand wash that can satisfy the demands of contemporary consumers who want both tenderness and effectiveness. By fusing the advantages of various herbal constituents, this polyhebral hand wash aims to provide a substitute that not only guarantees good hand hygiene but also supports skin health, promoting long-term wellbeing in an environmentally friendly way. Many people agree that maintaining good hand hygiene is one of the best ways to stop the spread of infectious diseases and enhance general public health. The importance of hand washing in halting the spread of infections, such as influenza, COVID-19, and other infectious diseases is emphasized by the World Health Organization (WHO). Additionally, it has a key role in reducing infant mortality, especially during home birth deliveries, and preventing respiratory infections and infectious causes of diarrhea. Better hand washing habits may really have major health benefits, including better growth outcomes for kids under five, according to a 2013 study. Simple behavioral adjustments like washing your hands with soap could significantly lower the rates of childhood mortality in underdeveloped nations that are associated with respiratory and diarrheal illnesses. The death rate from these diseases might be reduced by about 50% with just these measures. [1] It has been demonstrated that encouraging hand washing can reduce diarrheal episodes by roughly a third, delivering benefits comparable to those of interventions like granting access to clean water in low-income regions. The influence of hand hygiene goes beyond reducing the spread of disease. In fact, just washing your hands with soap is responsible for 48% of the decreases in diarrheal episodes. This demonstrates how important good hand hygiene can be for public health, particularly in places with low resources. Because hand washing has so many health benefits, there is a growing need for hand hygiene solutions that work, and people are becoming increasingly interested in natural, skin-friendly formulas. Even while conventional soap and hand sanitizers are frequently used, they frequently include harsh chemicals that can irritate skin over time. Polyhebral hand wash formulations, which blend the antibacterial, calming, and skin-nourishing qualities of several herbs to offer a safer, more natural substitute for traditional solutions, have gained popularity as a result. Many people agree that maintaining good hand hygiene is one of the best ways to stop the spread of infectious diseases and enhance general public health. The importance of hand washing in halting the spread of infections, such as influenza, COVID-19, and other infectious

diseases is emphasized by the World Health Organization (WHO). Additionally, it has a key role in reducing infant mortality, especially during home birth deliveries, and preventing respiratory infections and infectious causes of diarrhea. Indeed, according to a 2013 study, better hand washing habits may have a number of positive health effects, including better growth outcomes for kids under five. One of the best and most economical ways to avoid infectious diseases, especially diarrhea and acute respiratory infections (ARI), is to wash your hands with soap. Children under the age of five are most likely to suffer from these illnesses, which are major sources of morbidity and mortality globally. With an estimated 1.8 million deaths per year, pneumonia, a serious ARI, is the main cause of death in this age range. Pneumonia and diarrhea together cause around 3.5 million infant deaths annually. A single vaccine or medical treatment cannot save as many lives as encouraging hand washing with soap, especially before meals and after using the restroom, according to UNICEF. According to estimates, frequent hand washing might minimize the number of fatalities from acute respiratory infections by about 25% and diarrhea deaths by about 50%. Across the world, hand washing with soap is a routine practice carried out in homes, schools, and communities. It has the potential to revolutionize public health results when incorporated into larger sanitation initiatives as part of water, sanitation, and hygiene (WASH) programs, especially in low-resource settings. Furthermore, since impetigo is spread by direct physical touch, hand washing aids in halting its spread. Access to safe, effective, and skin-friendly hand washing products is vital because of its critical role in halting the spread of illness. the significance of hand cleanliness and its longstanding connection to religious and cultural customs. Hand washing, especially with soap and water, is an essential aspect of food safety and personal hygiene. As an alternative to synthetic formulations, it's encouraging to see an attempt to develop a polyherbal hand wash.They took a hundred years to formulate.[2] Considering how sensitive skin can be to harsh chemicals in some synthetic soaps and hand washes, that seems like a considerate approach. It is more accessible and appropriate for a greater range of individuals, irrespective of their skin condition, because the polyherbal hand wash gel is formulated to be mild on the skin.[3]

Anatomy and physiology of skin:

The outermost organ of the body, the skin is composed of layers of tissues and cells that envelop and shield the interior organs. It protects the body from external factors like bacteria, UV radiation, toxins, and physical harm by acting as a physical barrier. In addition, the skin is essential for controlling body temperature, detecting outside stimuli, eliminating waste through perspiration, and producing vitamin D when exposed to sunshine. The outermost layer, the dermis, the middle layer, and the lowest layer, the hypodermis, make up its three primary layers.In summary, skin is a critical organ for general health and survival because it is necessary for protection, homeostasis, and sensory functions.

There are three layers:

a. Epidermis
b. Dermis
c. Subcutaneous Tissue

Epidermis: The skin's outermost layer, the epidermis is essential for both protection and feeling. It is composed of epithelial tissue and is further separated into five layers, each of which has a particular purpose. From the deepest to the outermost, these strata are:

1. **Stratum Basale (Basal Layer)**: This is the deepest layer of the epidermis. It has stem cells that divide continuously to create new keratinocytes, or skin cells. This layer also contains melanocytes, which generate melanin, the pigment that gives skin its color.
2. **Stratum Spinosum (Spiny Layer)**: This layer is made up of many keratinocyte layers joined by desmosomes, which are cell structures that aid in cell adhesion. The skin gets its strength and electricity from this layer.
3. **Stratum Granulosum (Granular Layer)**: Keratin-rich dead, flattened skin cells make up this outermost layer. Lipids that aid in the formation of a water barrier to stop dehydration are also produced by these cells.
4. **Stratum Lucidum (Clear Layer)**: This layer, which is made up of flattened, dead keratinocytes, is only present in thick skin (such as the palms of the hands and soles of the feet) and serves as an extra barrier.
5. **Stratum Corneum (Horny Layer)**:The outermost layer, composed of dead, flattened skin cells that are filled with keratin. This layer provides a tough, protective barrier that helps prevent water loss and protects the body from environmental damage.[4]

The dermis: It is the second, deeper layer of the skin, located above the hypodermis (subcutaneous tissue) and below the epidermis (outer layer). It is thicker than the epidermis and is mostly made up of connective tissue that contains collagen and elastin fibers, which give the skin its flexibility, strength, and structure.This layer is critical to the health and function of the skin because it houses important components like sweat glands, sebaceous glands (oil glands), hair follicles, blood vessels, and nerve endings. These anatomical features help the skin create oil, sense feelings, control body temperature, and promote hair growth. The structural integrity, sensibility, temperature regulation, and epidermis nutrition of the skin are all controlled by the dermis. It is essential for preserving the skin's suppleness and toughness and acts as a conduit for vital biological functions.

Subcutaneous layer: The lowest layer of the skin, known by another name, the hypodermis, is situated above the underlying muscles or bones and beneath the dermis. This layer is essential for preserving the general health of the skin and bodily processes. It acts as a bridge connecting the skin to the other bodily structures and is composed of connective tissue and fat.[5]

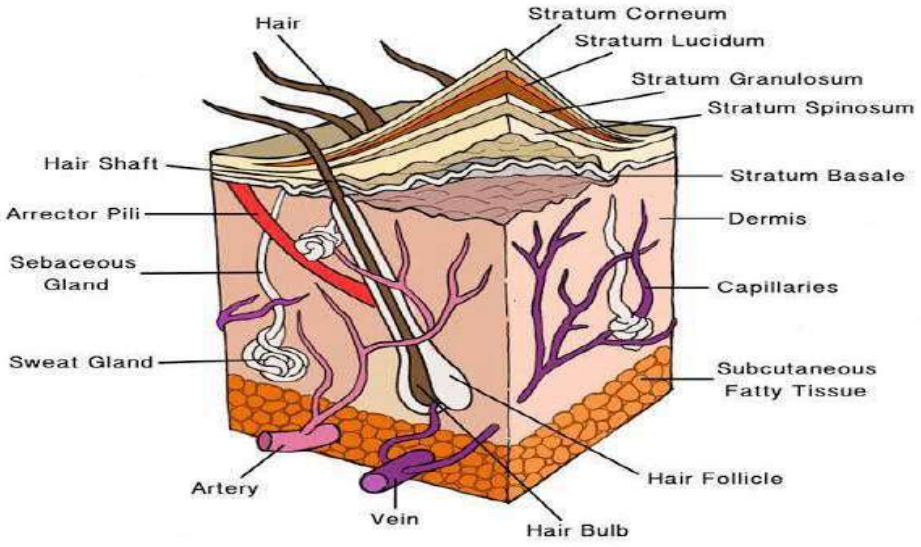

Fig.1

Reviews: -

Jain K. Patil

They are from Sharda School of Pharmacy, Pethapur Gandhinager, and they are developing and testing a polyherbal handwash.The goal of Aim K. Patil's research was to develop a new polyherbal hand wash gel that minimizes skin irritation while promoting hand cleanliness and preventing bacterial growth by utilizing Tulsi and Neem extracts along with other herbal constituents. The performance of the hand wash was assessed using a number of crucial factors, including color, aroma, pH, viscosity, foam height, antimicrobial activity, and a skin irritation test.The polyhedral formulation outperformed both synthetic and ordinary soap when the findings were compared to those of commercially available hand washes. It was appropriate for all skin types and was also very effective.The study emphasizes how herbal medicine can be used to create safe and efficient hygiene products, which can help to improve public health by lowering the use of dangerous chemicals in personal care products.[6] [7]

Zainab Irfan:-

In this study, Zainab Irfan and his colleagues at Brainware University in Barsat, Kolkata, used methanolic extracts of dried leaves from Coriandrum sativum (Coriander), Ocimum gratissimum (Sweet Basil), and Azadirachta indica (Neem) to create a polyherbal handwash. Triethanolamine, sodium lauryl sulfate (SLS), glycerine, methylparaben, lemon juice, aloe vera, lavender oil, and HPMC (hydroxypropyl methylcellulose) were among the other constituents. Since hands are a major source of bacterial transmission, the main objective was to develop a hand wash that would encourage personal hygiene and lessen the spread of infections.The polyherbal hand wash formulation was prepared in four batches for the investigation. The physical characteristics of these formulations, including stability, color, grittiness, pH, viscosity, and foam height, were evaluated. Furthermore, a variety of microorganisms, including Bacillus subtilis, Salmonella typhi, Escherichia coli, Staphylococcus aureus, Pseudomonas aeruginosa, Aspergillus niger, and Candida albicans, were tested for antimicrobial efficacy using the agar well diffusion method.In comparison to a typical commercial handwash, the results showed that the herbal handwash formulations, especially F3, had a pronounced zone of inhibition, indicating that they were extremely efficient against bacterial growth. This implies that hand washes with potent antibacterial qualities can be made using the extracts of these plants (coriander, basil, and neem). [8] [9]

Nikita P. Aware:-

The polyherbal handwash formulations were created and formulated by Nikita P. Aware and her team utilizing methanolic extracts from the leaves of Glycyrrhiza glabra (licorice), Azadirachta indica (neem), and Mimosa pudica. Numerous physical characteristics, including appearance, pH, viscosity, grittiness, spreadability, cleaning action, and foam height, were assessed for the formulations.The handwash formulations were tested using the agar diffusion method against common skin pathogens such as Bacillus subtilis, Staphylococcus aureus, Pseudomonas aeruginosa, and Escherichia coli in order to determine their antibacterial efficacy. Comparing the herbal handwash formulations to commercially available handwashes, the results revealed a considerable zone of inhibition, suggesting potent antibacterial properties.[10]

Dr. Satindra kumar and Dr. Anil kumar -

According to Drs. Satindra and Anil Kumar's research, there is a growing desire for natural medicines because people believe they are safer and have less negative effects than synthetic ones. The current work focuses on creating a novel polyherbal handwash using the methanolic extracts of Azadirachta indica (neem), Mimosa pudica, and Glycyrrhiza glabra (licorice). Herbal formulations are becoming more and more popular in the global market. Given that hands are a major source of microbial illnesses, the study highlights the need of hand washing as an essential component of everyday hygiene.Several assessment parameters were evaluated following the preparation of the polyherbal handwash formulations, including:

- **Physical characteristics** such appearance, viscosity, grittiness, spreadability, pH, foam stability, and cleaning action.
- **Antimicrobial** effectiveness against skin pathogens such as Bacillus subtilis, Pseudomonas aeruginosa, Staphylococcus aureus, and Escherichia coli was evaluated using the agar diffusion method.

According to the results, the herbal handwash formulations were very effective against germs because they showed a significant zone of inhibition. The herbal handwash proved equally effective to commercially available handwash formulations, suggesting that it might be produced on a large scale for commercial use.[11]

Shital Mahesh Rathi:-

The various formulations and benefits of polyherbal hand wash gels. By combining natural ingredients such as Neem (Azadirachta indica), Tulsi (Ocimum tenuiflorum), Mint (Mentha), Clove oil (Syzygium aromaticum), and others, it focuses on creating a more skin-friendly and environmentally-conscious alternative to traditional chemical-based hand cleansers.The appeal of polyherbal hand wash products lies in their natural composition, with the added advantage that many of these herbs have known medicinal properties. Neem, for example, has antibacterial and antifungal properties, while Tulsi is recognized for its antiseptic qualities. Additionally, using ingredients like Aloe Vera and Orange peel suggests a more gentle approach to cleansing, reducing potential irritation compared to synthetic options..In terms of application, the categorization of polyherbal hand wash into social, antiseptic, and surgical types suggests that these formulations can be tailored to different levels of germ protection. This could make them suitable for everyday use as well as more specialized needs, such as medical environments.[12]

Rajalakshmi M:-

Hand hygiene is important, especially since the skin is the body's first line of protection against infections. Keeping hands clean is essential to halting the transmission of illnesses because hands are frequently in close proximity to dangerous microorganisms.The goal of the project is to develop a hand wash that includes natural substances with antibacterial, antiviral, and antifungal qualities, such as aloe vera, turmeric, and tulsi (holy basil). Although these herbs have been used for millennia, their potential is currently being investigated in contemporary formulations such as hand washes. An essential component of consumer attraction is the hand wash's pleasant odor and appealing light green to emerald green hue, which were created as a solution. An essential component of product shelf life, stability testing also indicates that the formulation is stable under the evaluated conditions. Various techniques were used to test the hand wash's antibacterial effectiveness, and the results showed that it was successful in battling dangerous microorganisms.

According to this, aloe vera, turmeric, and tulsi together may offer a safe, all-natural substitute for artificial soaps and hand sanitizers that is also kinder to the skin.[13]

Mukesh Kanna P:-

According to this study, hand cleanliness is crucial for stopping the spread of infectious diseases, especially those brought on by dangerous bacteria that damage the skin. In order to address both hygiene and skin health, the project aims to create a polyherbal hand wash using a variety of herbal plants, including Ocimum basilicum (sweet basil), Hibiscus rosa-sinensis (Hibiscus), and Albizia amara (Arapp).In order to assess key characteristics like appearance, color, odor, pH, viscosity, foam height, and foam retention length, the researchers constructed three distinct formulations of the polyherbal hand wash. The product's usability and consumer attractiveness are largely determined by these features. While a hand wash formulation with a pleasing odor and a nice appearance enhances the user experience overall, one that foams effectively and holds its foam for longer may be more effective at cleaning.The agar plate method, which is a common technique for assessing a product's capacity to stop bacterial growth, was then used to examine the formulations' antibacterial efficacy. According to the findings, the polyherbal hand wash formulations significantly reduced the growth of common skin infections such as Staphylococcus aureus, Klebsiella pneumoniae, Escherichia coli, and Staphylococcus mutans. The polyherbal hand wash is a good choice for hand hygiene since the considerable zones of inhibition show that it may effectively destroy or stop the growth of dangerous bacteria.[14]

Rajkumar Tulsawani:-

This study In light of the continuing COVID-19 pandemic and the significance of practicing good hand hygiene in order to stop the spread of numerous infectious diseases, the study you are referring to examines the creation and assessment of herbal-alcohol-based hand sanitizers. Two herbal sanitizer formulations, HS1 and HS2, were examined by the researchers , which contained a blend of natural ingredients and alcohol to enhance antimicrobial activity.HS1 was formulated with *Zingiber officinale* (ginger), *Azadirachta indica* (neem), *Citrus limon* (lemon), and *Aloe vera*. HS2, on the other hand, substituted *Zingiber officinale* with *Ocimum sanctum* (holy basil). Both sanitizers were tested for their antiviral activity against the influenza A virus (H1N1) on MDCK cells, and the results showed impressive antimicrobial efficacy, with both formulations reducing microbial load by 99.99% within just 30 seconds of contact. This highlights the potent antimicrobial properties of the herbal ingredients used, combined with the alcohol base, in providing effective hand hygiene.In addition to their antimicrobial effectiveness, The alcohol-based sanitizers that the WHO recommends were contrasted with the sanitizers. It was discovered that the herbal sanitizers (HS1 and HS2) were more successful in lowering the microbial burden, and crucially, they did not cause skin irritation or dryness, which are common side effects of many commercial sanitizers. HS2, in particular, demonstrated superior antiviral activity and was rated more favorably by volunteers in terms of efficiency and sensory qualities, such as fragrance and skin feel.[15]

Indah Zahara-

This study highlights the antibacterial qualities of guava and soursop leaf extracts and shows how they can be combined to create a handwash formulation. It has long been known that guava

(Psidium guajava) and soursop (Annona muricata) have therapeutic qualities, especially their antibacterial and antioxidant capabilities. The antibacterial activity of soursop has been linked to the presence of substances such as alkaloids, acetogenins, and flavonoids, whereas guava leaves are abundant in tannins, flavonoids, and essential oils, all of which have antimicrobial qualities.The study assessed the handwash's chemical and physical characteristics, and the findings satisfied the SNI (Indonesian National Standard) requirements, a strong sign of the product's quality and safety. The handwash's brown hue, unique extract scent, pH of 10.00, and foam height of 100 mm—all crucial for efficient cleaning were some of its salient features. The handwash's ideal consistency, which ranges from 700 to 20,000 cPs with pseudoplastic flow qualities, makes it easy to apply without being overly thick or runny.Combining soursop and guava leaf extracts may be a natural and efficient hand hygiene substitute, according to the encouraging results. This formulation may present a compelling choice for anyone seeking mild, environmentally friendly, and plant-based substitutes for traditional chemical hand sanitizers and soaps.[16]

CONCLUSION:

Traditional Indian medicine suggests that mentha and Azadirachta indica may have therapeutic benefits. The assumption that natural therapies are safer and have fewer adverse effects makes them more acceptable. There is a growing demand for herbal formulations on the international market. An attempt has been made to create a herbal gel-based hand wash that contains extracts of Mentha and Azadirachta indica in varying quantities. Based on the results, it is determined that the gel formulation has good homogeneity and appearance. With no negative effects on human tissue, this initial in-vitro investigation showed that the herbal gel-based hand wash was just as effective against harmful germs in volunteer samples. Therefore, a new method of restoring antibiotic-resistant pathogenic organisms and ensuring safe and healthy living through germ-free hands can be found; while this method is not perfect, a significant number of improvements can be made.

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