REVIEW ON FORMULATION AND EVALUATION OF HERBAL SOAP

G.RVijayasankar[1]*, Nithya Abraham[2], Punitha Mary.A[3],M.Navaneetha Krishnan[4],M.Raghul[5]

1* Associate Professor, Department of Pharmaceutics, Vinayaka Missions College of Pharmacy, Vinayaka Mission's Research Foundation (Deemed University), Salem, Tamil Nadu, India.

2 Student, Bachelor of pharmacy, Vinayaka Missions College of Pharmacy, Vinayaka Mission's Research Foundation (Deemed University), Salem, Tamil Nadu, India

3 Student, Bachelor of pharmacy, Vinayaka Missions College of Pharmacy, Vinayaka Mission's Research Foundation (Deemed University), Salem, Tamil Nadu, India

4 Student, Bachelor of pharmacy, Vinayaka Missions College of Pharmacy, Vinayaka Mission's Research Foundation (Deemed University), Salem, Tamil Nadu, India

5 Student, Bachelor of pharmacy, Vinayaka Missions College of Pharmacy, Vinayaka Mission's Research Foundation (Deemed University), Salem, Tamil Nadu, India

Abstract

Bacterial and fungal skin infections are the most prevalent among people, necessitating immediate treatment as well as ongoing care to maintain healthy skin. Herbal plant extracts have long been known to have anti-inflammatory, antibacterial, and antifungal qualities, which have been studied and put into various forms for human use. An herbal soap formulation, for example, is used not only to treat microbial diseases, but also to use on a regular basis. The goal of this study is to create a herbal soap with *Vitex negundo, C. zedoria, B. flabellifer, Azadiracta indica, Ocimumtenuiflorum, Sapindus mukorossi, Acacia concinna,* and *Allanblackia* as the main ingredients. Investigate the antimicrobial properties of leaf extract, which is of ethnic and dermatological value. The antibacterial and antifungal activities of the designed soap were tested, and they were shown to be significantly higher than those of commercial antibacterial and antifungal soaps used as controls. The microbial strains utilised were crucial since human skin is vulnerable to infections caused by blisters, lesions, and other eruptions. The herbal formulation was then tested for pH, moisture content, foaming index, foam retention duration, saponification, TFM determination, ethanol soluble matterand antibacterial action using various concentrations of soap solution in comparison to a standard.

Key words: herbal soap, anti-microbial, formulation, evaluation

I -INTRODUCTION:

In herbal soap preparations, antibacterial and antifungal properties are found. It's manufactured mostly from plant components, including leaves, stems, roots, and fruits and it's used to treat injuries, ailments, and keep people healthy.This antimicrobial composition can be used topically in creams, lotions, gels, soaps, solvent extracts, and ointments. The majority of skin infections are caused by fungi, staphylococcus aureus, and streptococcus bacteria. Topically, the juice and extract from the plant leaves are used to cure skin problems like eczema, ringworm, and itching. Psoriasis diseases are treated with the succulent gel kind. The skin's epidermis is softened by the crude preparation of soapy botanicals, allowing for greater acne penetration and washing, as well as speedier healing and resolution.[1]

Soaps contain a mixture of vegetable and animal oils and fats as well as salts. Saponification is the most fundamental method of soap production. Saponification occurs when alkaline chemicals combine with free fatty acids in fats and oils to produce soaps. Soap can be made in two ways: the hot process and the cold process. Both require the presence of a base, such as potassium hydroxide or sodium hydroxide, as well as fatty acids. The type of alkali used, its hardness, foam height, solubility, and other characteristics all affect the soap's quality. Antioxidants are among the additives that aid in the inhibition of fatty acid oxidation in the herbal soap bar. Triacylglycerols (TGs) are key components of processed vegetable and animal fats. Cold saponification is preferred by craft soap makers because it allows for greater flexibility in the feedstock materials utilised as well as better retention of natural antioxidants, colour, and essential oil aroma in the finished product. Natural soaps sensory and chemical qualities are also influenced by the manufacturing procedure. The type of strong mineral base (alkali) used determines the final soap product's hardness and solubility.[2]

Any substance's antimicrobial activity is defined as its capacity to kill or impede the growth of germs. The human body relies on antimicrobial action to avoid illnesses and skin infections. Antimicrobial soaps, often known as antiseptic or medical soaps, are different from non-antimicrobial soaps. Skin sickness is caused by a range of bacteria, both gram-positive and gram-negative, that are deposited on the skin's surface. Bacillus subtilis, Staphylococcus aureus, and Pseudomonas aeruginosa are among these bacteria. Gram positive bacteria were clearly killed by lower soap concentrations than Gram negative

bacteria. The antimicrobial efficacy of numerous antiseptic and herbal market soaps was examined using the agar disc diffusion method against bacterial isolates found on the skin surface, such as Staphylococcus aureus, Bacillus subtilis, Escherichia coli, and Pseudomonas aeruginosa. The effectiveness of different soap solutions in suppressing or killing pathogenic bacteria will be determined by testing them on different pathogenic bacteria strains. In tests, antibacterial soaps killed 65 to 85 percent of microorganisms on human skin. soaps have been found to kill germs at a specific dose, as well as exhibit bacteriostatic activity and suppress bacterial development. When bacteria are eliminated from the body during washing, the prevalence and occurrences of skin illnesses are reduced .[3]

II- FORMULATION:

Azadiracta indica, Ocimumtenuiflorum, Sapindus mukorossi, and *Acacia concinna* powder were combined into a soap produced with basic glycerin soap and containing 1 gm of stearic acid and 0.70 gm of soft paraffin to obtain an extract. We weighed 1 gram of stearic acid, 0.70 gram of soft paraffin, and 5 mL of ethanol. First, 1 gm of stearic acid, 0.70 gram of soft paraffin, and 5 ml of ethanol were added to melted glycerin basic soap. With continuous agitation for 30 minutes, the extract was mixed into the melted solution until the molten mixture became uniform. The semisolid slurry was put into a mould and allowed to harden.[1]

The two solidified basic soaps were melted in a water bath after being broken down into smaller pieces.Based on the herbal content of commercial herbal bath soap, the weight of the Methanolic *Vitex negundo* leaf extract was estimated. The extract was taken in lower and greater quantities and mixed with 5 ml of ethanol in the melted soaps. In boiling water, 0.033 gm of stearic acid was added, mixed, and then added to the melted soap. To the melted glycerine soap, 0.033gm TiO_2 was added and mixed. 2 ml of lemongrass oil were added and whisked together. After that, 1 gm of sodium laurel sulphate was dissolved in 5 ml of distilled water and dropped into the mixture. After gently mixing the soaps for around 30 minutes, they were moulded into separate circular moulds. The soaps were left to firm up at room temperature until they were set, and any physical changes were noted.[4]

The basic saponification reaction occurs when an alkali (such as sodium hydroxide) reacts with any neutral fatty acid. In this synthesis (lye), coconut oil, castor oil, and sodium hydroxide were employed as neutral fatty acids in this synthesis. A beaker was filled with weighed amounts of coconut oil, castor oil, neem oil, and Mentha oil. In a separate beaker,

weigh rose petal extract and thoroughly mix in distilled water. Prepare the basic saponification process in a separate beaker by combining 6gm of NaOH with 10 ml of distilled water. Using a magnetic stirrer, thoroughly combine the extract solution with the lye solution. The extract and lye mixture were then poured over coconut oil, resulting in basic soap formation with constant stirring on a magnetic stirrer and no heating, resulting in the cold soap formation method. After that, the soap mixture was allowed to solidify before being stored at room temperature.[7]

During the soap-making process, the boiling method was used. In a 500 ml beaker, 20 ml of ethanol was added to the oil mixture. In the beaker, 4 gm of potassium hydroxide (KOH) was dissolved in 20 ml of water, and 20 ml of the extract was added. The mixture was cooked in an oven for an hour, with continuous stirring at regular time intervals to keep the temperature between 80 and 900 degrees Celsius. A small amount of distilled water was added every now and then to keep the contents of the flask from solidifying due to the evaporation of water and alcohol during heating. After a one-hour heating period. A saturated sodium chloride solution of 100 ml was added to the hot mixture, which was then allowed to cool. The soap wassalting outof the solution when the salt solution was added, and the soap that was created floated on the surface of the solution, which was then filtered and placed in the mould to dry.[8]

In a 1 litre beaker, 100 gm of *Allanblackia* fat was weighed. The oil was then heated before saponification began with the addition of 20 ml of 23.5 percent NaOH. Then, gradually add sixty (60.0) gm NaOH pellets while stirring until saponification is complete (the mixture is no longer oily). The soap was then grained out with eight grams of salt (NaCl) in a saturated solution. The soap was filtered through a linen cloth after being cleaned with water. It was air-dried before heating, and a small amount of water was added to soften it. After that, the molten soap was poured into moulds and left to cure.[11]

Three oil samples were tested for saponification using conventional methodology. In a separate beaker, 70.8 gm of lye was dissolved in 166.5 gm of water in a separate beaker. Following that, the lye solution was put into the oil beaker. After 0.5 gm of stirring, add three ethanolic extracts of H. indicus (1 gm), S. lappa (0.5 gm), and C. rotundus (0.5 gm) after 0.5 gm of stirring. After that, the beaker was cooked on low heat and thoroughly agitated for about 20–30 minutes, until the oil smell had gone away and a homogeneous solution had

formed. The mixture was poured into the soap moulds and allowed to cool to room temperature before solidifying.[12]

III- EVALUATION

Determination of pH[1,5,7,6,8,10,12,13]

In a 100 ml volumetric flask, ten grams of powdered soap were weighed and dissolved in distilled water. This was created in order to make a 10% soap solution. The pH of the 19 percent soap solution was measured using a pH meter. Two grams of finished soap were dissolved in ten millilitres of pure water, then swirled until the sample was completely dissolved.The pH of the manufactured soap was determined by applying a pH strip to the freshly created soap and using a digital pH metre to dissolve 1 g in 10 ml of water.The pH was calculated using a pH metre and pH paper. In nature, the pH was discovered to be basic.

Determination of foam retention and foam ability[1,5,6,7,8,10,9,12]

In a 100-ml measuring cylinder, 2gm of soap was dissolved in 50 ml of distilled water and violently agitated for 2 minutes. After allowing it to sit for 10 minutes, the foam's height was measured. This was done three times, and the average was calculated. Foam retention time relates to the amount of time that the soap's foam lasts. The foam interval was measured at roughly 5–10 minutes after repeating the above technique.

Antimicrobial test [1,4,5,6,7,8,10]

The method of agar well diffusion was used. A 24-hour culture of Staphylococcus aureus and Escherichia coli was seeded on a petri plate with 20 ml of Mueller Hinton agar. Five wells were made, one of which served as a control, while the remaining four were filled with varied concentrations of the extract. The plates were incubated for 24 hours at 370°C. The inhibitory zone was measured.As the culture medium, Mueller Hinton Agar (MHA) for bacteria and Sabouraud Dextrose Agar (SDA) for fungus were utilised as the culture medium.

The bore diffusion approach is used. E. coli was used as the microorganism. In this method, 1 g of soap was dissolved in distilled water to make a soap solution. The antibiotic utilised was Ciprofloxacin-5g, and various concentrations were created, including 5, 10, 20,

and 50 mg/ml. After that, the plates were incubated for roughly 24 hours at 37 degrees Celsius. The zone of inhibition was calculated.

Determination of total fatty matter (TFM)[5,6,7,8,12,13]

The total fatty matter test is performed by reacting soap with acid in the presence of hot water and quantifying the resulting fatty acids. Weighing around 10 g of finished soap and adding 150 ml of purified water and heating it. The soap was dissolved in 20 ml of 15% sulfuric acid and heated until a clear solution was achieved. The fatty acids on the surface of the resultant solution were consolidated and reheated by adding 7gm of bee wax. The set up was allowed to cool before being used to make a cake.

Determination of moisture content[5,6,7,8,12,13]

Moisture content determination refers to the quantity of moisture present in the soap sample. The lower the moisture concentration, the more stable the formulation. To determine the moisture content, 5–6gm of soap sample was weighed on a tarred china dish or crucible using an analytical weighing scale.The sample is then heated in a crucible for roughly 2 hours at a temperature of 101 degrees Celsiustransferred to a tarred china dish of known weight, and baked for an hour in a hot air oven at 100–105°C. The sample was then weighed alongside the tarred china dish in order to subtract the actual weight of the tarred china dish. To compute the percentage moisture content, the weight of the substance was recorded.

Total Alkali[5,6]

This was determined by titrating excess acid in the aqueous phase with a volumetric NaOH solution of known volume. One gram of finished soap was weighed, and 5 ml of ethanol was added, followed by 0.5 ml of 1 M H_2SO_4 solution and heating until the soap sample dissolved. Using phenolphthalein as an indicator, the test solution was titrated against 1.0 M NaOH. The total alkali was figured out.

Alcohol insoluble content[6,7,8,12]

In 50ml of hot alcohol, 5gm of soap sample was dissolved. With 20 ml of warm ethanol, the solution was filtered through tarred filter paper and dried at 105 ^{0}C for 1 hour. We measured the weight of dry filter paper.

Saponification value determination[7]

The amount of potassium hydroxide in mg needed to saponify one gram of fat or oil fully. In any case, it's defined as the average molecular weight of a fatty acid found in oil or fat. To determine the saponification value, 2 grams of soap sample were placed in a conical flask and 0.5 M KOH solution was added. In a hot water bath, this mixture was cooked to around 55 degrees Celsius while continually stirring. The temperature was then raised to 100 degrees Celsius, and the boiling process was continued for almost an hour. A phenolphthalein indicator and 0.5 M HCl were used in the titration. The pink colour disappearance is the end point noticed.

Determination of free acid content[8]

Using phenolphthalein as an indicator, the soap (6 gm) was dissolved in 70 ml of hot neutral alcohol and titrated with 2 M H_2SO_4.

Determination of chloride content[8,13]

After thoroughly dissolving the sample (5.0 gm) in distilled water, it was precipitated with 10 ml of a 20% calcium nitrate solution. Quantitatively, the mixture was transferred to 250 ml volumetric flasks and marked with distilled water. It was then filtered, and 100 ml of the filtrate was added to 10 mL of a 20% potassium chromate solution, which was then titrated to a greenish yellow colour with a 0.1 M silver nitrate solution.

Cleaning efficiency by thumb impression test[12]

Thumbs of hands exposed to various environments were gently placed on a sterile nutritional agar medium plate at the appropriate distance. The impressions of one thumb rinsed with medicinal soap and the other thumb washed with control soap were then placed separately and carefully on the same nutrient agar medium plate, avoiding thumbprint convergence. After a 24-hour incubation period at 37°C, the behaviour of microbial growth on the plates was examined.[12]

REFERENCE:

1. AshleshaGhanwat, SachinWayzod and VanjireDivya. Formulation and evaluation of herbal soap. Current trends in pharmacy and pharmaceutical chemistry.2020;2(2):21-26.
2. Cilla MS, de Mello Innocentini MD, Morelli MR, Colombo P. Geopolymer foams obtained by the saponification/peroxide/gelcasting combined route using different soap foam precursors. Journal of the American Ceramic Society. 2017 Aug;100(8):3440-50.
3. Saidin S, Jumat MA, Amin NA, Al-Hammadi AS. Organic and inorganic antibacterial approaches in combating bacterial infection for biomedical application. Materials Science and Engineering: C. 2021 Jan 1 ;118:111382.
4. Kandasamy Ruckmani, Rengasamy Krishnamoorthy, Subramani Samuel, Henry Linda Jeeva Kumari. Formulation of Herbal Bath Soap from Vitex negundo Leaf Extract. Journal of chemical and pharmaceutical science; 2014;2;95-99.
5. Devipriya Nisha P,Nivetha L, Deepak Kumar U. Formulation, development and characterization of herbal soap using borassus flabellifer and curcuma zedoria. International journal of pharmaceutical sciences review and research,2021;69(2);134-139.
6. Mohammed Haneefa K.P, Shilpa NM, Junise V, Ajith Chandran. Formulation and evaluation of medicated soap of Ixora coccinea root extract for dermal infections. Journal of pharmaceutical sciences and research,2019;11(8);3094-3097.
7. Rakesh K. Sindhu, Mansi Chitkara, Formulation development and antimicrobial evaluation of poly herbal soap,2019;19(2);1342-1346.
8. B. S. Shuaibu, I. I. Nkafamiya and B. W. Tukura**.** Production of medicated soap from the bark extract of vitex doniana tree.FUW Trends in science & technology journal, 2018:3(2): 843-846.
9. NM Wijayawardhana, MMDU Cooray, DI Uluwaduge, etal. Development of a herbal soap using selected medicinal plants and evaluation of its antimicrobial activityKDUIRC 2020:paper ID 166: 252-256.
10. BornarePratiksha S, Deokar Trupti D,Shinde Aishwarya A, Musmade Dipak S. Formulation and evaluation of herbal neem soap. International journal of medicine research,2021;6(1):09-12.

11. Joseph Adubofuor, Wilfred Sefah and James Henry Oldham , Nutrient composition of AllanblackiaPaviflora seed kernels and oil compared with some plant fats and oils and application of the oil in soap preparation, Journal of Cereals and Oil seeds ,2013;4(1); 1-9.
12. Ganamanjusha k, BalakrishnaiahP,Syamala R, Mounik N, Ravi Chandra T, Formulation and evaluation of herbal bath soap containing methanolic extracts of three ayrvedicvarnya herbs. Asian journal of pharmaceutical and clinical research,2019;12(11);213-215.
13. E. E. Mak-Mensah and C. K. Firempong, Chemical charecteristics of toilet soap prepared from neem (Azandira indica A.Juss) seed oil. Asian Journal of Plant Science and Research, 2011, 1 (4):1-7.