



FORMULATION AND EVALUATION OF POLY HERBAL ANTIBIOTIC SOAP

B. Suhasini^{1*}, N. Pallavi², P. Soujanya³, M.A.Rashid⁴,
V. Vasudha⁵, M.Rahaman⁶

Article History: Received: 04.05.2023
08.07.2023

Revised: 14.06.2023

Accepted:

Abstract

Bacterial infections are most common among all ages of people, there is a need for new treatments to maintain healthy skin. Some herbal plants and their extracts were found antibacterial activity. The aim of the present study is to formulate antibiotic poly herbal soap by using melt and pour method, where all the extracts added to molten soap base and poured in soap moulds. The formulated soap was evaluated for various physicochemical parameters to know its characteristic features. Antibacterial activity of the soap was tested by Agar diffusion method against various microorganisms which cause skin infections and the results shown that it has good antibacterial activity. As the formulation done with various easily available medicinal plants, the soap will available at affordable price to protect skin from infections.

Keywords: Bacterial Infections, Hydroalcoholic, Microorganism, Diffusion.

^{1*} Assistant Professor, St. Pauls College of Pharmacy

^{2,3,4,5,6} Department of Pharmacology, St. Pauls College of Pharmacy Turkayamjal, Abdullapurmet, R.R.dist.Telangana, 501510.

Email: ^{1*} suhasini106@gmail.com

DOI: 10.31838/ecb/2023.12.s3.626

1. INTRODUCTION

Soaps are cleaning agents, used as first line defence against the microorganisms to protect the body. Now a days we are using no. of brand products to maintain beauty which are made by chemicals, one of that is synthetic soap. Long term usage of this soaps can lead to skin dryness, patches, spotting, irritation etc. Environmental pollution, food habits, life style, stress full life, lack sleep etc. are few reasons which are leading to cause dermal infections. To reduce side effect and improve the therapeutic effects, usage of natural herbs is necessary in beauty sector. India filled with number of medicinal plants which can cure skin diseases, protect the body from microorganisms. Herbal soaps are usually handmade and have 100% organic ingredients which impart only goodness to the skin and are safe for the environment too. Some herbs work well to naturally colour your products. Some herbs are wonderful for relaxing and stress relief. Other herb additives will provide benefits to the skin, such as reducing acne or soothing irritation. Plus, there are herbs that contain a variety of healthy minerals and vitamins that are very beneficial. Herbal soaps are made of organic natural substances; they result in smoothening and rejuvenating the skin. Even the fragrance of herbal soap relaxes the mind without affecting the environment. They will be devoid of artificial colour and aroma. Moreover, chemical soap shaves animal fat and lacks the essential oils from plant extract which give a natural and pleasing aroma. ^[1,2] Herbal soap preparation is a

medicine it contains anti-bacterial, anti-ageing anti-oxidant, and anti-septic properties It mainly uses parts of plants like seeds, rhizomes, nuts and pulps to treatment for an injury or disease or to achieve health. Herbal soap does not contain the artificial colours, flavours, fluorides etc. when compared to the content of commercial soap. Herbs are natural products mostly found in the treatment of almost all diseases and skin problems owing to their high medicinal value, cost-effectiveness, availability and compatibility. ^[3,4]

2. MATERIALS AND METHODS

Plant powder materials used are Ginseng, Turmeric, Amla, and Aloe vera and the soap base was collected from the local market in Hyderabad. **Extraction:** Collected plant materials each (100gms) were weighted, soaked in hydroalcoholic solution in 7:3 ratio over 72 hrs, extract was collected in a China dish and kept for evaporation, the semi solid extract was dried under desiccator. ^[5]

Formulation of soap: Soap was prepared by using melt and pour method, Glycerine soap base was taken and melt the soap base on the heating mantle, stearic acid, soft paraffin, ethanol, peppermint oil, lavender essential oil to the melted soap base. Add extractive products into the melted solution with continuous agitation for 30 minutes. Pour this solution into the soap moulds and freeze for 2-3 hours, soap was collected. ^[6]

Table: 1 Formulation of Anti-microbial Herbal Soap

s.no	Ingredients	Quantity	Uses
1	Soap base	Q. S	Lye
2	Ginger	1gm	Antimicrobial agent
3	Amla	1gm	Antiaging & antimicrobial agent
4	Turmeric	1gm	Antibacterial & Anti-ageing agent
5	Alovera	1gm	Anti-fungal & Anti-microbial agent
6	Ethanol	10ml	Antimicrobial agent

7	Stearic acid	0.7gm	Hardening agent
8	Peppermint oil	Q. S	Cooling
9	Soft paraffin	1gm	Reduces dryness of skin
10	coconut oil	5ml	Saponifying agent
11	lavender essence	Q. S	Perfume

Physical Evaluation

Organoleptic characters like shape, odour, colour, appearance was determined.

PH: The pH of the prepared soap was assessed by touching a pH strip to the freshly formulated soap and jointly by dissolving 1 gram in 10 ml water with the help of a pH meter.^[7]

Foam height: 0.5 grams of a sample of soap was taken and dispersed in 25 ml of distilled water. Then, transferred it in into a 100-measuring cylinder; the volume was made up to 50 ml of water. 25 strokes were given and stood till the aqueous volume measured up to 50 ml and measured the foam height, above the aqueous volume was measured.^[8]

Foam retention: 25 ml of the 1% soap solution was taken into a 100 ml graduated measuring cylinder. The cylinder was covered with a hand and shaken 10 times. The volume of foam at one-minute intervals for four minutes was recorded.^[9]

Irritation: It is carried out by applying soap on the skin for 10 minutes. If no irritation then it is considered a non-irritant product.^[10]

Determination of total fatty matter: TFM was estimated by reacting soap with acid in the presence of hot water and calculating the fatty acids obtained. 10 g of the formulated soap was dissolved in 150 ml of distilled water and heated. To this, 20 ml of 15% H₂ SO₄ was added while heating until a clear solution was obtained. Fatty acids that are present on the surface of the resulting solution are solidified by adding 7 g beeswax and heated again. Then, it was allowed to cake. The cake was removed and blotted to dry and weighed to obtain the TFM using the formula.^[11]

$\% \text{ TFM} = (\text{Weight of the cake} - \text{Weight of the wax}) \text{ in g} / \text{Weight of the soap in g} \times 100$ (26).

Determination of total moisture content: 5 g of sample was placed in a petri dish and dried for 2 h in the hot-air oven at 105°C. It was cooled and weighed after the heating. The difference in weight indicates the loss of moisture.^[12]

Water content = $m/M \times 100$

m = loss in mass of the material after drying

M = mass of sample taken.

Determination of percentage-free alkali: About 5 grams of sample was taken in a conical flask and added to it into 50ml of neutralized alcohol. It was boiled under reflux on a water bath for 30 minutes, cooled and 1ml of phenolphthalein solution was added it was then titrated immediately with 0.1N HCL.^[13]

Alcohol insoluble matter: 5gm of the sample was taken in a conical flask. Added to 50ml of warm ethanol and shaken vigorously to dissolve the solution was filtered through a tarred filter paper with 20 ml of warm ethanol and dried it at 105c for one hour. The weight of the dried paper was taken.^[14]

Percentage alcohol insoluble matter = $\text{Weight of the residue} \times 100 / \text{Weight of sample}$

High-temperature stability testing: Soap was allowed to stand at 50c for seven days and the stability of soap was observed during this period. The sample which was homogenous and stable after standing was indicated as stable and the sample in which crystals were roughened and the sample in which the precipitation was caused then the sample was said to be unstable.^[15]

Evaluation Of Antimicrobial Activity of Herbal Soap: The [agar -well diffusion]

standard cup plate technique was used to determine the antimicrobial activity by using Beef extract - 1g Peptone - 1g Sodium chloride - 0.5g Agar - 1.5g Purified water - 100ml. Medium was prepared by dissolving the specified quantity of the dehydrated medium in purified water by heating on a water bath and were dispensed in 100 ml volume conical flasks. The conical flasks were closed with cotton plugs and were sterilized by autoclaving at 121°C for 15 minutes. The contents of the conical flasks were poured aseptically into sterile Petri dishes are allowed to solidify. These sterilized Medias were used to subculture the bacterial culture.^[16]

Procedure: Each Petri dish was filled to a depth of 4-5 mm with a nutrient agar medium that was previously inoculated with suitable inoculums of suitable test organism, and then allowed to solidify. The Petri dish were specially selected with flat bottom and were placed on level surface so as to ensure that the layer of medium is in uniform thickness. The Petri dishes were sterilized at 160-170°C in hot air oven for 30 mins before use. Small sterile borer of uniform size was placed approximately at 10 cm height, having an internal diameter of approximately 6-8 mm and made of aluminium (or) stainless steel. Each plate was divided in to four equal portions along the diameter. To each portion one cylindrical cavity was made in medium with the help of sterile borer. Three cavities for test compounds and one cavity for the standard. The petri dishes were incubated at 37°C for 18 hours. Diameter of the zone of inhibition was measured and the average diameter for each sample was calculated.^[17]

3. RESULTS AND DISCUSSION

The anti-microbial herbal soap evaluation was performed successfully and tabulated in table no.1&2. The prepared herbal soap was shown in fig:1. The physicochemical parameters for herbal soap such as color, appearance, pH was determined. The formulations have a brown color with an aromatic odor and had a good appearance as well as the pH was found to be in the range of 6. Healthy skin has a pH of 5.4 to 5.9 and the prepared formulations pH was found to be neutral in nature and doesn't cause any irritation or sensitization to the skin. Other parameters like foam height, foam retention was also performed and showed good results. Alcohol insoluble matter was also evaluated successfully which was found to be 8.3 %, indicates that the prepared soaps were free from non-soap ingredients and soft soaps were produced which improves the overall quality of the soap. The antibiotic activities of herbal soaps were studied shown in fig:2, which showed significant zone of inhibition and acts effectively against bacteria on the skin and can be used to treat acne and bacterial infections on the skin. The prepared Soap had minimal matter insoluble in alcohol and the soap prepared was pure with minimal moisture content and with increased shelve life, it has high amounts of fatty acid (stearic acid) which imparts lubrication effect to the skin while washing, which was the basic criterion of good quality, future studies on given formulation can give better results against skin diseases.

**Fig:1****Organoleptic Parameters**

S. No	Parameters	Result
1.	Shape	Rectangular
2.	Colour	Brown
3.	Odour	Aromatic
4.	Appearance	Good

Table: 2**PHYSICAL EVALUATION**

PARAMETERS	RESULT
Ph	6
Foam height	4cm
Foam retention	1.5 cm per minute
Irritation	No irritation
Total fatty matter	35%
Moisture content	29.2%
Percentage free alkali	1.3%
Alcohol insoluble matter	8.4
High-temperature stability	Soap melts above 45 C

Table: 3**Determination of Total Fatty Matter:**

Weight of cake formed = 10.5g

Weight of soap = 10g

Weight of wax = 7g

TFM = $10.5 - \frac{7}{10} \times 100$

= 35%

Determination of Moisture Content:

Weight of sample taken = 5gm
 Weight of sample after drying = 3.54gm
 Loss on drying = $5 - 3.54 = 1.46\text{gm}$
 Water content = $\frac{m}{M} \times 100$
 $= \frac{1.46}{5} \times 100$
 $= 29.2\%$

Percentage Free Alkali:

$M_1V_1 = M_2V_2$
 $M_1 = \frac{0.1 \times 6.5}{10}$
 $M_1 = 0.065\text{M}$
 Strength of NaOH = Molarity x Molar mass
 $= 0.065 \times 40$
 $= 2.6 \text{ g/l}$
 1000ml of soap solution have free alkali = 2.6g
 100ml of soap solution have free alkali = $\frac{2.6 \times 100}{1000}$
 $= 0.26\text{g}$
 1g of soap have free alkali = 0.26g
 5g of soap have free alkali = $\frac{0.26 \times 5}{1}$
 $= 1.3\%$

Alcohol Insoluble Matter

Sample weight = 5gm
 Weight of filter paper before drying = 0.46gm [W1]
 Weight of filter paper after drying = 0.88gm [W2]
 % Alcohol insoluble matter = $\frac{\text{weight of residue}}{\text{weight of sample}} \times 100$
 $= \frac{0.88 - 0.46}{5} \times 100$
 $= \frac{0.42}{5} \times 100$
 $= 8.4$

Antimicrobial Activity: The microorganisms used are Propionibacterium, Bacillus subtilis, Staphylococcus aureus, Streptococcus are gram positive bacteria and Escherichia coli is gram negative bacteria Candida Albicans (fungus) were used to identify the

antimicrobial activity of the formulated soap against standard marked soap (star soap) Observation: The antibiotic activity was determined based on the measurement of the diameter of the zone of inhibition in mm, the values were recorded.

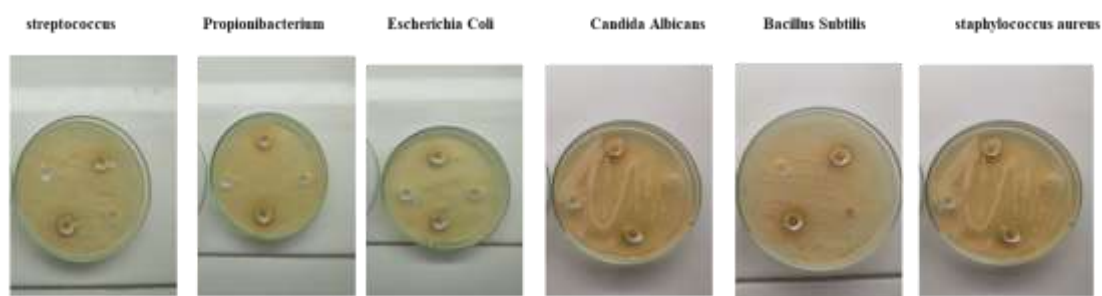


Fig: 2

4. CONCLUSION

The herbal soaps serve as good choice for people of all ages, prepared stable Polyherbal soap possessing potent antimicrobial activity against various micro-organisms such as E. coli and S. aureus, candida albicans. Formulation was found to be used for daily use and did not cause any skin irritation. The various oils in this soap formulation helped in providing specific activity to the

formulation possessing potent medicinal properties. Future study is needed to evaluate the antiacne properties of the prepared formulation.

Acknowledgement: We would like to express our special thanks to management of St. Pauls College of Pharmacy for providing all requirements to the project and our Principal, Professor Kiranmai Mandava, for continuous support and encouragement.

5. REFERENCES

1. Blessy Jacob, Formulation and Evaluation of Herbal Soap, A Journal of Pharmacology, 2021, Vol 9 Issue 2, Pgno.22.
2. L.V. Vigneswaran, Formulation and Evaluation of Polyherbal Soap, World Journal of Pharmaceutical and Medical Research, 2022, Vol 8 Issue 2, Pgno.170.
3. Rakesh K. Sindhu, Formulation Development and Antimicrobial Evaluation of Polyherbal Soap, Journal of Pharmacology, 2019, Vol 19 Supplement 2, Pgno.1342.
4. Dr S. Gowri, Formulation and Evaluation of Polyherbal Soap, International Journal for Research in Applied Science & Engineering Technology, 2021, Vol 9, Issue 10, Pgno.547.
5. Sarah Garner, Acne vulgaris, journal of pharmacology, 2012, Vol 379, Pgno 361.
6. B. Dreno, Female Acne- A different sub type teenager acne, Journal of the European academy of dermatology and venereology, 2011, Vol 66, Pg no 278.
7. Richart A, Acne and Propionibacterium Acne, 2004, Vol 22, Pgno 375-379.
8. Nasreen Jahan, Medicinal properties, phytochemistry and pharmacology of Withania somnifera: an important drug of Unani Medicine, Journal of Scientific and Innovative Research, 2016, Vol 5 Issue 4, Pgno.156.
9. G. Sucharita, Formulation and Evaluation of Poly Herbal Anti-Bacterial Soap, A journal of Pharmaceutical, 2020, Vol 10 Issue 8, Pgno.27165.
10. M. Uma devi, Aloe Vera: The miracle plant and its medicinal and traditional uses in India, Journal of pharmacognosy, 2012, Vol 1, Issue 4, Pgno118.
11. E. Ernst, Aloe vera a systematic review of its clinical effectiveness, British journal of general practice, 1999, Vol 49, Pgno 823.

12. G. sucharita, Formulation and evaluation of poly herbal anti-bacterial soap, a journal of pharmaceutical, 2020, Vol 10, Issue8, Pgno27165.
13. Soni Himesh Qualitative and Quantitative profile of curcumin from ethanolic extract of curcuma longa, international research journal of pharmacy, 2011, Vol 2, Issue 4, Pgno 180-184.
14. Shreya Talreja, A complete pharmacognostic review of amla, World Journal of Pharmacy and Pharmaceutical Sciences,2019, Vol8, Issue 4, Pgno 622.
15. Sini. G. Nath, Phytochemical Analysis, Antioxidant and Antibacterial Properties of Phyllanthus emblica leaf extracts against selected Bacterial isolates, International Journal of Science and Healthcare Research,2019, Vol 4, Issue 2, Pgno20.
16. Alfonso Valenzuela, Stearic acid ,2011, Vol 62(2), Pgno 131-138.
17. Annie Shirwaikar, Coconut Oil – A Review of Potential Applications, Hygeia Journal of Drugs and Medicines, Hygeia J. D. Med.October 2015-March2016, Vol-7, Pgno 34.
18. Padmini Shankar, Coconut Oil: A Review, Department of Health and Kinesiology, October 2013, Vol-24(5), Pgno 62.
19. Heather MA Cavanagh, Jenny M. Wilkinson, Lavender Essential Oil: A Review, March2005, Vol-10, Issue 1, Pgno35.
20. Savita, Medicinal Uses of Lavender Oil (Lavandula Latifolia) And Its Effect on Human Health, plant archives,2019, vol- 19, supplement 2, pg. no: 1163-1166.
21. Dirk W. Lachenmeier, Review: Safety Evaluation of Topical Application of Ethanol on The Skin and Inside the Oral Cavity, Journal of Occupational Medicine and Toxicology 2008, Pgno 1-16.
22. Witold Musial, Influence of Liquid of Corticosteroid Cream, Tropical Journal of Pharmaceutical Research, August2014; Vol 13(8), Pgno1233-1238.
23. Aishwarya Balakrishnan, Therapeutic uses of peppermint- A Review, Journal OF pharmaceutical sciences and Research,2015, Vol-7(7), Pgno. - 47-476.
24. Ashlesha Ghanwat, Formulation and evaluation of herbal soap, Current Trends in Pharmacy and Pharmaceutical Chemistry,2020, Vol 2(2), Pg no21-26.
25. Dr. L. V. Vigneswaran, Formulation and Evaluation of Polyherbal Soap, World Journal of Pharmaceutical and Medical Research,2022, Vol-8(2), pg- 170-173.
26. Gana Manjushak, Formulation and evaluation of herbal bath soap containing Methanolic extracts of three ayurvedic varnya herbs, Asian Journal of Pharmaceutical and Clinical Research,2019, Vol 12, Issue 11, Pgno 213-215.
27. G. Sucharita, V. Ganesh, B. Siva Krishna, S. Revathi, Dr. P. Venkatesh, Formulation and Evaluation of Poly Herbal Anti-Bacterial Soap,2020, Vol-10, Issue No- 8, Pgno27165.
28. Basera, Fabrication and Valuation of poly herbal soap Via Utilizing a Variety of Herbal Extracts, International Journal of creative Research thoughts (IJCRT), march 2022 Vol- 10, Issue 3,Pg no 187.