Acta Scientific Pharmaceutical Sciences (ISSN: 2581-5423)

Volume 7 Issue 5 May 2023

Research Article

Formulation of Polyherbal Soap and of Its Physico-Chemical Evaluation

Prachi Bhimte[1], Prerana Sahu[1], Shashank Yadav[1], Shweta Sarparaj[1], Nemendra Sahu[1], Harish Sharma[2], Gyanesh Kumar Sahu[2]*

[1]*Rungta Institute of Pharmaceutical Sciences, Chhattisgarh, India*

[2]*Rungta Institute of Pharmaceutical Sciences and Research, Chhattisgarh, India*

***Corresponding Author:** Gyanesh Kumar Sahu, Professor and Dean, Department of Pharmacy, Rungta Institute of Pharmaceutical Sciences and Research, Bhilai, Chattisgarh, India.

DOI: 10.31080/ASPS.2023.07.0947

Received: April 10, 2023

Published: April 20, 2023

Abstract

Herbal Soap have become an item of global importance both biologically and economically. The usage of these herbal products has increased the quality, safety and efficacy. The present research has undertaken with the aim to formulate herbal formulation. Soaps are used for the topical application with herbal products against skin infection. Natural herbs are the main ingredients of herbal soap which are safer and beneficial than the commercial soaps. Antibacterial activity of leaf extracts of *Azadirachta indica*, *Ocimum tenuiflorum* and *Acacia concinna* has been evaluated individually and in combination by a previous study. This study aims to formulate a novel herbal soap using the combined extract of herbal drugs. This study also evaluates the physicochemical characteristics of the soap. Easy availability of plant and their effectiveness helps formulation with cost effective benefits with less or no side effects.

Keywords: Polyherbal Soap; *Azadirachta indica*; *Ocimum tenuiflorum*; *Acacia concinna*; Evaluation Parameters

Introduction

Introduction to herbal medicines

Depending on the recent discoveries done on medicinal plants, the use of herbal medicines has been enormously increased in worldwide. Plants comprehending with pharmacological active properties are in utilization since the existence of mankind as functional foods, medicines, cosmetics, dyes as well as in prevention, cure and treatment of various diseases. The extract produced from roots, stem, leaves and flowers possessing medicinal properties acts as a natural remedy for the disease or ailment [1]. The standards of the herbal medicines in pursuit of its safety and efficacy have still not matched by the synthetic drugs. As developing, the application of herbal plant extracts in the medicines is about eighty percent of the total world population [2,3]. It is regarded as one the primary health care measures for the treatment of various ailments especially in the developing countries [4,5]. This spectacular rise in the utilization of the herbal plant and well as it's extracts gave rise to a newer branch of medicinal science referred as 'Herbal Medicinal Products' These may be defined as the plant or part of plant used as a whole or as an extract for the treatment, prevention of disease or ailment to be utilized in the health care management [6]. These herbal medicinal products impart various properties such as anti-bacterial, anti-microbial, anti-inflammatory, anti-helminthic, anti-diabetic, antioxidant and many more. Thus, herbal medicine imparts various properties and can be used for the pharmaceutical formulation such soap, ailments, cream, gel [7].

As herbal products are in demand than synthetic products, following are some of the benefits of herbal products: -

- Lesser Side effects
- Better safety and efficacy

- Easily available
- Better compatibility with additives
- Potent therapeutic effect.
- Cost-friendly
- Greater are for selection
- No requirement of animal testing
- Better compatibility with all types of skin [8,9].

Skin is the part of the body which is susceptible to various microorganisms which leads to skin related disorders. Therefore, to protect the skin there is a need for cleanliness and hygiene in the exposed part of the body to protect our skin against various microorganisms [10]. The better and efficacious way is to use soap to remove all the foreign particles present in our body [11]. It helps in cleaning the skin also with anti-microbial properties. Various micro-organisms such as Staphylococcus aureus, Pseudomonas spp., Klebsiella pneumonia and Proteus vulgaris being the causative agents for various skin infections [12].

Soaps are defined as the cleaning 1343 agents–solid, liquid, semisolid powders which help in removing dust, dirt, micro-organisms, stains and for maintaining health and beauty [13]. The free fatty acids when reacted with an alkaline base by the process of saponification comprises of a soap [14]. Fatty acids such as lauric acid, palmitic acid, stearic acid help in imparting washing property of soaps. The soap industry is estimated to be about 186 billion US Dollars [15,16].

The origin of the basic soap can be traced back to the Egyptians when an alkaline plant was mixed with animal fats for the generation of crude soaps. Herbal soaps have gained importance in the recent years which include the extracts of various plant extracts incorporated in to the basic soap reaction [17]. It is reported that herbal antimicrobial soaps have been reported to have about 60-80% of the property to inhibit the growth of micro-organisms [9]. Production natural as well as handmade soaps have been a total artistry work involving various factors such as skill, ingredients, creativity and thoughts tend to produce a quality soap [18].

Qualities of soap are: -

- Ability of lather producing
- Color of the soap
- Fragrance of the soap
- Moisturizing ability
- Compatibility of the skin
- Storage Stability [19-21].

Herbal soaps can be defined as fatty acids in combination with alkali salts being derived from vegetable or plant origin containing natural fragrances or organic ingredients. The method of preparation is by two processes – hot process and cold process which involves the presence of base such as potassium hydroxide and sodium hydroxide along with the fatty acids to form soap. Cold process is usually preferable process by the artisans. The quality of the soaps is dependent on various factors such as type of alkali used, its hardness, foam height, solubility etc. [22].

Various types of oils are used depending upon the properties they impart such as: Olive oil, Castor oil, Sunflower oil, Palm oil, Rice bran oil, soybean oil etc. (Friedman., *et al*. 1996) [23]. Additives include anti-oxidants which help in suppression of the oxidation of fatty acids in the herbal soap bar. For instance: Rosemary extracts, tomatoes, fruits etc. [24]. Fragrance and coloring agent are also included (Burke, 2005). The aim of this study is to formulate an antimicrobial herbal soap containing various extracts incorporated into one [25].

Aim and Objectives

- Soaps are used as a modality for topical application of medicinal plants used in the treatment of skin infections.
- In herbal soaps, natural bioactive constituents with a variety of therapeutic activities are incorporated into basic soap medium.
- Natural herbs are the main ingredients of herbal soap which are safer and beneficial than the commercial soaps.
- This study aims to formulate a novel herbal soap using the above combined extract and to investigate its antibacterial activity [1,26,27].

Drug profile

Neem

Neem has been well known for its medicinal values in the ancient country. From the leaf to root. Neem tree drew attention

of natural products chemists by Ayurveda. During the last five decades considerable progress has been achieved regarding the biological and medicinal activities [27]. Its origin is mainly in the southeastern Asia commonly in Bangladesh, India, Pakistan and Nepal [28]. Various parts the plant such as leaves, barks, fruits, seeds and roots have developed the properties of antibacterial, antimicrobial, antipyretic etc [29].

Werner Fabret in their study tested the extracts of *Azadirachta indica* against 150 strains of bacteria from 7 different bacteria [30]. The minimum inhibitory concentration reached by 50% and 90% of the strains for the extracts of *A. indica* (stem bark)**.** Because of the crucial role *A. indica* in antibacterial activity further studies have also been carried out [22]. For a preliminary study it has been found that beta sitorol a phytochemical found in *A. indica* has a role in strengthening the immune system. Beta carotene in *A. indica* is well known for anti-bacterial property functioning against both gram positive and gram negative bacteria [8].

Figure 1: Various photograph of *A. indica* showing (a) a whole tree, (b) Flowers.

Tulsi

Tulsi is the realm of Ayurveda. Inferable from its antibacterial, antifungal and calming properties, tulsi benefits the skin by forestalling zits and skin break out [31]. It is an aromatic perennial plant of the family lamiaceae. It is native to the indian subcontinent. Tulsi is cultivated fopr religious and traditional medicine purposes and also essential oil [8,32].

Figure 2: Picture of Tulsi.

Methodology

Collection of materials/ingredients

Neem powder, tulsi powder, shikekai powder, ritha powder, coconut oil and rose water were purchased from the local market. Sodium hydroxide and distilled water was provided by the college itself. Following table 1 represent the list of ingredients used for the formulation of polyherbal herbal soap [32].

Figure 3: Pictures show various herbal drugs used in the formulation. (a) Neem (b) Tulsi (c) shikekai (d) Ritha (e) rose water.

Formulation of herbal soap

S. NO.	Ingredients	Quantity
1.	Coconut oil	100gm
2.	Sodium hydroxide	20gm
3.	Sodium lauryl sulfate	10ml
4.	Glycerin	10ml
5.	*Azardirachta indica*	4gm
6.	*Ocimum tenuiflorum*	1gm
7.	*Tinospora cordifolia*	1gm
8.	*Acacia concina*	2gm
9.	*Sapindus mukorossi*	3gm
10.	Stearic acid	1gm
11.	Ethanol	5ml
12.	Soft paraffin	0.7gm
13	Triethanaloamine	10ml
14	Rose water	qs

Table 1: Formulation of Herbal Soap.

- Weigh 100gm of coconut oil in 1000ml beaker and heat the oil for 5 min in water bath.
- Solution of sodium hydroxide is added to the oil and is stirred under homogenizer for 8-10 minutes.
- 10ml Sodium lauryl sulfate solution is added to the solution and is continuously stirred for 2 minutes.
- Add 10ml glycerin and stir it for 2-8 minutes.
- Further add all the herbal drugs to the solution:-
- Neem powder (4gm)
- Tulsi powder (1gm)
- Add the mixture of giloy (1gm), shikekai (2gm) and reetha (3gm)
- Stearic acid (1gm) is added to the solution for hardening.
- Add (5ml) ethanol and soft paraffin (0.7gm) and stir it for 5-8 minutes.
- Triethanolamine (10ml) is added to the solution as an emulsifier and is stirred to form a thick paste.
- Further rose water 9(q.s) is added.
- The mixture is kept under homogenizer for 30 minutes until molten mixture becomes homogenous.
- The semi-solid mixture is poured into mold and allowed to solidify [29].

Evaluation of physico-chemical properties of the formulation

Physical parameters

Physical parameters define the physical characteristics of the formulation. It generally discusses the Clarity and colour of the formulation. Following are the result of the formulation. The physical appearance of the soap was fine. Clarity is visible. The odour of the soap formulation was soothing [33].

Figure 4: Formulated herbal soap.

pH

Soap is always alkaline with a safe ph range. Anything above ph 11 is too harsh for the skin and will cause irritation. Anything below ph 6 will have no cleansing property. The pH of the prepared formulation was determined by using digital pH meter. The formulation were dissolved in 100ml of distilled water and stored for 2 hours. It was calibrated by pH meter [7,25,34].

Foam height

0.5gm of the sample of soap was taken dispersed in 25ml distilled water. Then transferred it into 100ml measuring cylinder,

volume was shaken up to 50ml with water. 25 strokes were given and stand till aq. Volume measured up to 50ml and measured the foam height above the aqueous volume [5,33].

Foam retension

25ml of the 1% soap solution was taken in to a 100ml graduated measuring cylinder. The cylinder was covered with hand and shaken 10 times. The volume of foam at 1 minute intervals for 4 min was recorded [33].

Figure 5: Application of Herbal Soap.

Result and Discussion

The physicochemical parameters of the prepared soap were determined. Parameters such as colour, odour, appearance characteristics as well as the ph. were found in the range 7.0 which is the desired ph. Other parameters such as foam height and foam retention were determined and showed good result. The soap shows good compatibility without any significant changes. The prepared formulation showing good physical characteristics. On the basis of evaluation studies the formulation provides excellent foaming property.

S. No.	Evaluation parameter	Readings
1.	PH	6.5-7
2.	Foam index	16.5
3.	Foam retention time	10.0 min

Table 2: Evaluation parameters.

Conclusion

Herbal Soaps are significantly superior than most of the conventional soap available in the market. Herbal soap serve as a good choice for people of all age with skin that is reactive to most synthetic chemical products. Naturally plants produce much number of secondary metabolites, these compounds shows huge medicinal value, so undoubtedly can be used. *A. indica* is an important medicinal herb and extensively used in Ayurveda, siddha, Unani and traditional medicine. Fruit, roots, bark, leaves, fruit and flowers are used in the drug preparation. Historically neem was used in ethnobotanical purpose. The neem soap contains the anti-bacterial and anti-microbial properties and thus is eco-friendly. Thus it is safe and effective and can be used on wider basis. The result used for the development of herbal soap formulation can be useful commercially.

Acknowledgement

The authors are thankful to the Rungta Institute of Pharmaceutical Sciences Bhilai for providing necessary facilities to carry out this work.

Bibliography

1. Sindhu RK., *et al*. "Formulation development and antimicrobial evaluation of polyherbal soap". *Plant Archives* 19.2 (2019): 1342-1346.

2. Alade PI and Irobi ON. "Antimicrobial activities of crude leaf extracts of Acalypha wilkesiana". *Journal of Ethnopharmacology* 39.3 (1993): 171-174.

3. Ameh AO., *et al*. "Synthesis and characterization of antiseptic soap from neem oil and shea butter oil". *African Journal of Biotechnology* 12.29 (2013).

4. Biswas K., *et al*. "Biological activities and medicinal properties of neem (*Azadirachta indica*)". *Current Science* (2002): 1336-1345.

5. Kareru PG., *et al*. "Antimicrobial activities of skincare preparations from plant extracts". *African Journal of Traditional, Complementary and Alternative Medicines* 7.3 (2010).

6. Wijetunge WM and Perera BG. "Preparation of liquid medicinal soap products using Adhatoda vasica (Adhatoda) leaf extracts". *International Journal of Multidisciplinary Studies* 2.2 (2015).

7. Afsar Z and Khanam S. "Formulation and evaluation of polyherbal soap and hand sanitizer". *International Research Journal of Pharmacy* 7.8 (2016): 54-57.

8. Ruckmani K., *et al*. "Formulation of herbal bath soap from vitex negundo leaf extract". *Journal of Chemical and Pharmaceutical Sciences* 974 (2014): 2115.

9. Liauw MY., *et al*. "Extraction of neem oil (*Azadirachta indica* A. Juss) using n-hexane and ethanol: studies of oil quality, kinetic and thermodynamic". *ARPN Journal of Engineering and Applied Sciences* 3.3 (2008): 49-54.

10. Vivian OP., *et al*. "Assessment of the physicochemical properties of selected commercial soaps manufactured and sold in Kenya" (2014).

11. Hassan KJ., *et al*. "Production of soap from neem seed oil and Acacia nilotica seed oil". *International Journal of Modern Organic Chemistry* 4.1 (2015): 70-84.

12. Heukelbach J and Feldmeier H. "Scabies". *The Lancet* 367.9524 (2006): 1767-1774.

13. Ikegbunam Moses N. "Antimicrobial activity of some cleaning products against selected bacteria". *International Research Journal of Pharmaceutical and Applied Sciences* 3.4 (2013): 133-135.

14. Kazeem O., *et al*. "Determination of some physical properties of castor (Ricirus communis) oil". *International Journal of Scientific Engineering and Technology* 3.12 (2014): 1503-1508.

15. Maithani A., *et al*. "*Azadirachta indica* (neem) leaf: A review." *Journal of Pharmacy Research* 4.6 (2011): 1824-1827.

16. Khanam Z., *et al*. "Neem oil". InGreen Pesticides Handbook (2017): 377-398.

17. Kole PL., *et al*. "Cosmetic potential of herbal extracts" (2005).

18. Mak-Mensah EE and Firempong CK. "Chemical characteristics of toilet soap prepared from neem (*Azadirachta indica* A. Juss) seed oil". *Asian Journal of Plant Science and Research* (2011).

19. Patel VR., *et al*. "Castor oil: properties, uses, and optimization of processing parameters in commercial production". *Lipid Insights* 9 (2016): LPI-S40233.

20. Phanstiel IV O., *et al*. "Synthesis of exotic soaps in the chemistry laboratory." *Journal of chemical Education* 75.5 (1998): 612.

21. Raskin I., *et al*. "Plants and human health in the twenty-first century". *TRENDS in Biotechnology* 20.12 (2002): 522-531.

22. Saikia AP., *et al*. "Ethnobotany of medicinal plants used by Assamese people for various skin ailments and cosmetics". *Journal of Ethnopharmacology* 106.2 (2006): 149-157.

23. Saller R. "Peppermint (Mentha x piperita), medicinal plant of the year 2004". *Forschende Komplementarmedizin und klassische Naturheilkunde= Research in complementary and natural classical medicine* 11.1 (2004): 6-7.

24. GHOLIVAND S. "Enzymatic esterification of dihydrocaffeic acid and evaluation of antioxidant activities of the synthesized alkyl-esters" (2019).

25. Warra AA., *et al*. "Cold-process synthesis and properties of soaps prepared from different triacylglycerol sources". *Nigerian Journal of Basic and Applied Sciences* 18.2 (2010).

26. Vietmeyer ND. "Neem: a tree for solving global problems". Report of an ad hoc panel of the Board on Science and Technology for International Development, National Research Council. National Academy Press; (1992).

27. Trevisan SC., *et al*. "Properties of mentha piperita: a brief review". *World Journal of Current Medical and Pharmaceutical Research* 3.1 (2017): 309-313.

28. Thakur L., *et al*. "Novel approaches for stability improvement in natural medicines". *Pharmacognosy Reviews* 5.9 (2011): 48.

29. Solanki R. "Treatment of skin diseases through medicinal plants in different regions of the world". *International Journal of BioMed Research* 2.1 (2011): 73.

30. Shahidi F. "Bailey's Industrial Oil and Fat Products, Industrial and Nonedible Products from Oils and Fats". John Wiley and Sons; (2005).

31. Chaudhari VM. "Studies on antimicrobial activity of antiseptic soaps and herbal soaps against selected human pathogens". *Journal of Scientific and Innovative Research* 5.6 (2016): 201-204.

32. WMANK W and Perera BG. "Preparation of medicinal soap products using the leaf extracts of Punica granatum (pomegranate)". *International Journal of Pharmacy and Biological Sciences* 6.2 (2016): 7-16.

33. Jithendran R and Gowri S. "Formulation and Evolution of Polyherbal Soap: A Review Article" (2021).

34. Ribeiro AS., *et al*. "Main benefits and applicability of plant extracts in skin care products". *Cosmetics* 2.2 (2015): 48-65.