



Research Article

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PHYTOCHEMICAL AND PHYSICOCHEMICAL ANALYSIS OF NALPAMARADI SOAP

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ABSTRACT

Herbs have been used for medicinal and cosmetic purposes since ancient times due to their easy availability and efficacy. Herbal products are safer for long-term and short-term use as they are time-tested. Plant-based formulations described in classical texts of Ayurveda are gaining popularity these days due to their validation with respect to modern technology. In Sahasrayogam, it is mentioned that Nalpamaradi taila is best for hair and skin conditions. This study aimed to analyse Nalpamaradi soap with reference to phytochemical, physicochemical and antimicrobial properties. The ingredients used in Nalpamaradi taila were analysed with special reference to their Guna, Karma, etc., along with their chemical compositions, given their effect on the skin. Most of the drugs in the Nalpamaradi taila have tridosha shamaka property, which is beneficial in maintaining skin health. Research studies on the chemical constituents present in the ingredients of Nalpamaradi soap have shown a positive effect on skin health and skin diseases. The study showed that it possesses a good amount of lather and Total Fatty Matter that provides rehydration and a sense of cleaning to the skin due to the presence of coconut oil and olive oil. Nalpamaradi soap exhibited antimicrobial properties since Haridra-like drugs have krimigna action. There were no heavy metallic compounds found in the trail soap. Hence, it can be concluded that Nalpamaradi soap can be a better choice for maintaining dermal health.

Keywords: Ayurveda, Cosmetics, Derma health, Herbal soap, Nalpamaradi taila

INTRODUCTION

Herbs have been used for medicinal and cosmetic purposes since ancient times due to their easy availability and efficacy. Invention and discoveries of specific molecules have hampered the popularity of herbal usage in between; however, witnessing the side effects of the chemicals in the short term and long term, now the world is looking towards herbs for their therapeutic requirements and for cosmetic purposes too. Herbal products are safer for long-term and short-term use as they are time-tested. Hence the emphasis at the present hour has been laid on the spectacular growth of herbal and ayurvedic products. People are aware of the ingredients in cosmetic products, the benefits of plant products, and the harmful effects of chemical ingredients. The presence of chemical ingredients in cosmetic products has made people reconsider suitable alternatives to suit their requirements.

Due to the increasing awareness and importance of cleanliness and healthiness, the use of herbal products is also increasing, and hence herbal products have finally made their appearance in packaged form in the domestic markets, as cosmetics and personal care preparation like soaps, shampoos, liquid soaps, detergent bars, floor cleaners, liquid detergents, etc. These products not only create a sense of well-being but also impact the users' quality of life through their wide range of applications.

Soap is a common cleansing agent known to mankind for many decades. It is not just treated as a beauty enhancer but also as an antimicrobial substance. Many authors have defined soap in different ways. Warra¹ regarded it as any cleaning agent manufactured in granules, bars, flakes, or liquid form obtained

from reacting salt of sodium or potassium of various fatty acids of natural origin (salt of non-volatile fatty acids). Soap can also be said to be any water-soluble salt of fatty acids containing eight or more carbon atoms².

In herbal soap, natural bioactive constituents with various therapeutic activities are incorporated into a primary soap medium. Natural herbs are the main ingredients of herbal soap which is safer and more beneficial than commercial soap³. In the current study, the drugs that have beneficial actions on the skin were selected, and the same was analysed.

Plant-based formulations described in classical texts of ayurveda are gaining popularity these days due to validation with respect to their modern technology. Soaps are one of the modern-day cosmetics used for maintaining and enhancing the beautification of the skin. So, herbs mentioned in the formulation of the trichology aspects of Ayurveda are considered.

It is mentioned in Ayurvedic texts that if a person does not undergo purification of the body like Vamana (therapeutic emesis), Virechana (therapeutic purgation), etc., he is prone to Kushta (skin disease) diseases, as the peripheral end of the romakupa (hair follicle) will get clogged due to the accumulation of toxins. Moreover, this risk is higher due to exposure to an air-conditioned environment. Hence cleansing these romakupa by selecting appropriate herbs is the need of the hour. In Sahasrayogam, it is mentioned that Nalpamaradi taila benefits Kandu, Visarpa, and Kustha⁴. Hence the current study aimed to analyse Nalpamaradi soap with reference to phytochemical, physicochemical, and antimicrobial properties. The ingredients used in Nalpamaradi taila were also analysed with particular

reference to their guna, karma, etc., along with their chemical compositions, given their effect on the skin.

MATERIALS AND METHODS

Preparation of the Soap: There were two components for preparing Nalpamaradi bathing soap.

Ingredients of Nalpamaradi taila

Haridra (<i>Curcuma longa</i>)	1530 ml
Parpata (<i>Fumaria parviflora</i>)	1530 ml
Tila (<i>Sesamum indicum</i>)	768 ml
Nyagroda (<i>Ficus benghalensis</i>)	15 gm
Udumbara (<i>Ficus racemosa</i>)	15 gm
Ashwattha (<i>Ficus religiosa</i>)	15 gm
Plaksha (<i>Ficus lacor</i>)	15 gm
Haritaki (<i>Terminalia chebula</i>)	15 gm
Bibitaka (<i>Terminalia bellirica</i>)	15 gm
Amalaki (<i>Emblca officinalis</i>)	15 gm
Rakta Chandana (<i>Pterocarpus santalinus</i>)	15 gm
Ushira (<i>Vetiveria zizanioides</i>)	15 gm
Kusha (<i>Desmostachya bipinnata</i>)	15 gm
Manjishta (<i>Rubia cordifolia</i>)	15 gm
Choraka (<i>Angelica glauca</i>)	15 gm
Agaru (<i>Aquilaria agallocha</i>) ⁴	15 gm

Other ingredients that were required for making soap were taken in quantity sufficient:

1. Coconut oil
2. Olive oil
3. Distilled water
4. 100 percent pure lye
5. Drops of essential oils

Method of preparation of soap

First, coconut oil was taken into the heating vessel and placed on a low flame. As it melted, lye solution was added to it. With a spatula, the solution was stirred slowly. This solution was taken off the flame and set aside to cool for 15-20 minutes. Olive oil and Nalpamaradi taila were added slowly with slow stirring. When the temperature reached 120 to 130 °F (49 to 54 °C), an immersion blender was placed on the side of the heating vessel. The blender was set to low while the mixture was stirred, moving in circles. The blender was immersed in the solution to avoid air bubbles. Blending and stirring were continued for 10 to 15 minutes so that the soap had reached a trace. This happened when the oils and lye solution thickened. The heating vessel was covered, and a slow flame was maintained for 50 minutes. The flame was put off, and the heating vessel was allowed to cool down till the temperature of the mixture dropped 180 °F (82 °C) below. Then the mixture was poured into the soap mould. The upper surface was smoothed with the spatula. Mould was tapped on the surface to remove the air bubbles. When it was cooled, they were taken out and packed.

Table 1: Pharmacological properties of the drugs present in the trial soap as mentioned in the classical textbooks of Ayurveda.

Ingredient	Guna	Rasa	Virya	Vipaka
Haridra (<i>Curcuma longa</i>)	Ruksha Laghu	Tiktha Katu	Ushna	Katu
Parpata (<i>Fumaria parviflora</i>)	Laghu	Tiktha	Sheeta	Katu
Tila (<i>Sesamum indicum</i>)	Guru Snigdha	Madhura Kashaya Tiktha	Ushna	Katu
Nyagroda (<i>Ficus benghalensis</i>)	Guru Ruksha	Kashaya	Sheeta	Katu
Udumbara (<i>Ficus racemosa</i>)	Guru Ruksha	Kashaya	Sheeta	Katu
Ashwattha (<i>Ficus religiosa</i>)	Guru Ruksha	Kashaya Madhura	Sheeta	Katu
Plaksha (<i>Ficus lacor</i>)	Guru Ruksha	Kashaya	Sheeta	Katu
Haritaki (<i>Terminalia chebula</i>)	Laghu Ruksha	Kashaya Madhura Amla	Ushna	Madhura
Bibitaka (<i>Terminalia bellirica</i>)	Ruksha Laghu	Kashaya	Ushna	Madhura
Amalaki (<i>Emblca officinalis</i>)	Ruksha Laghu Sara	Amla Kashaya Tiktha	Sheeta	Madhura
Rakta Chandana (<i>Pterocarpus santalinus</i>)	Guru Ruksha	Tiktha Madhura	Sheeta	Katu
Ushira (<i>Vetiveria zizanioides</i>)	Laghu Snigdha	Tiktha Madhura	Sheeta	Madhura
Kusha (<i>Desmostachya bipinnata</i>)	Laghu Snigdha	Kashaya Madhura	Sheeta	Madhura
Manjishta (<i>Rubia cordifolia</i>)	Guru Ruksha	Kashaya Tiktha Madhura	Ushna	Katu
Choraka (<i>Angelica glauca</i>)	Laghu Ruksha	Katu Tiktha	Ushna	Katu
Agaru (<i>Aquilaria agallocha</i>)	Tikshna Laghu Snigdha	Katu Tiktha	Ushna	Katu

Table 2: Effect of the drugs on Doshas and their actions

Ingredient	Doshagnata	Karmukata
Haridra (<i>Curcuma longa</i>) ⁵	Pitta Kapha Shamaka	Kandu, Krimi, Kushta, Shithapitta, Varna Vikara, Twakroga, Vrana
Parpata (<i>Fumaria parviflora</i>) ⁶	Pitta Kapha Shamaka	Jwara, Trishna, Sangrahi, Daha, Ruchikara, Glani, Chardigna, Raktapitta, Madakara, Bhrama,
Tila (<i>Sesamum indicum</i>) ⁷	Vata Shamaka	Balya, Kesha Vikara, Twakroga, Stanyavardhaka, Vrana, Dantaroga, Grahi, Deepana, Alpamutrala, Medhya, Snehana, Shula, Artavajanana, Vata Vyadhi, Vrana, Amavata, Agnimandya, Atisara
Nyagroda (<i>Ficus benghalensis</i>) ⁸	Pitta Kapha Shamaka	Varnya, Mutra Sangrahaniya, Sthambhana
Udumbara (<i>Ficus racemosa</i>) ⁹	Pitta Kapha Shamaka	Mutrasangrahi, Vrana, Varna Vikara, Daha, Trishna, Bhagna, Sthambhana, Madhumeha, Kshudhanashaka, Trishna, Shrama, Shotha, Atisara, Raktapitta, Raktapradaranashaka, Shwethapradaranashaka
Ashwattha (<i>Ficus religiosa</i>) ¹⁰	Pitta Kapha Shamaka	Vrana, Varna Vikara, Yonivyapat, Daha, Visha Roga, Aruchi, Shotha, Raktapitta, Atisara, Vatarakta
Plaksha (<i>Ficus lacor</i>) ¹¹	Pitta Kapha Shamaka	Mutrasangrahi, Vrana, Vrana Shotha, Raktapitta, Daha, Visarpa, Madhumeha, Raktadosha, Yonivyapat, Atisara, Pravahika, Raktapradaranashaka, Visarpa
Haritaki (<i>Terminalia chebula</i>) ¹²	Tridosha Shamaka	Rasayana, Medhya, Netra Roga, Anulomana, Arshas, Chardigna, Hridya, Lekhana, Jwara, Vibandha, Swasa, Kasa, Madhumeha, Arshas, Kushta, Netra Roga, Shotha, Krimi, Shula, Agnimandya
Bibitaka (<i>Terminalia bellirica</i>) ¹³	Tridosha Shamaka	Netra Roga, Kesha Vikara, Chardigna, Krimi, Swarya Bhedhana, Kasa, Mukha Roga, Shotha, Visarpa, Mutradosha, Ashmari
Amalaki (<i>Emblica officinalis</i>) ¹⁴	Tridosha Shamaka	Rasayana, Madhumehagna, Jwara, Vrusya, Daha, Chardigna, Shopha, Ruchikara, Medoroga, Bhagna, Sandhanakara, Kesha Vikara, Netra Roga, Jwara, Raktapitta, Pandu, Kamala, Shukrabalya, Daha, Shopha, Kesha Vikara
Rakta Chandana (<i>Pterocarpus santalinus</i>) ¹⁵	Pitta Kapha Shamaka	Netra Roga, Varna Vikara, Vrusya, Vrana, Ahladakara, Trishna, Raktapitta, Jwara, Chardigna, Visharoga, Daha, Kasa, Krimi
Ushira (<i>Vetiveria zizanioides</i>) ¹⁶	Vata Pitta Shamaka	Trishna, Daha, Mutrala, Jwara, Chardigna, Visharoga, Visarpa, Vrana, Madhumeha, Swedahara, Dourgandhya, Pachana, Kushta, Raktapitta
Kusha (<i>Desmostachya bipinnata</i>) ¹⁷	Tridosha Shamaka	Mutrala, Ashmari, Trishna, Bastiroga, Pradarashaka, Stanyajanana
Manjishta (<i>Rubia cordifolia</i>) ¹⁸	Pitta Kapha Shamaka	Varna Vikara, Rakta Shodhaka, Swarya, Visharoga, Shotha, Netra Roga, Kushta, Madhumeha, Vrana, Yonivyapat, Arshas, Jwara, Raktatisara, Twakroga, Visarpa, Shotha, Karna Roga
Choraka (<i>Angelica glauca</i>) ¹⁹	Vata Kapha Shamaka	Hrudya, Sanjnasthapaka, Krimi, Kandu, Kushta, Vrana
Agaru (<i>Aquilaria agallocha</i>) ²⁰	Vata Kapha Shamaka	Twakroga, Karna Roga, Akshivikara, Kushta, Kasa, Hikka, Shwasa, Shotha

Most of the drugs in the Nalpamaradi taila have tridosha shamaka property, which is beneficial in maintaining skin health. Most of the drugs possess actions like Kushtahara, Twak rogahara (useful in skin diseases), varna vikara (pigmentation disorders), Kandu (itching), etc.

RESULTS AND DISCUSSION

The effect of some of the chemicals that are present in the ingredients of the Nalpamaradi soap on the skin are as follows:

- Agaru (*Aquilaria agallocha*) contains the essential oil that yields several agarofurans, sesquiterpene alcohols and spirosesquiterpene alcohols²¹. Another study concluded that 'According to the disk diffusion test results, it may be possible to propose that *A. agallocha* roots should have medicinal use, especially against *E. faecium*, *L. monocytogenes* ATCC 7644, *B. subtilis* DSMZ 1971, *C. albicans* DSMZ 1386, *S. epidermidis* DSMZ 20044 and *S. aureus* ATCC 25923'²²
- A cream prepared from the methanolic extract of Red Sandalwood's heartwood and *Curcuma longa* rhizomes showed 95.46% inhibition of oedema²³.
- A clinical study on Amalaki (*Emblica officinalis*) proved the superior anti-skin ageing efficacy, including lightening skin colour, enhanced skin elasticity and hydration, and skin wrinkle reduction²⁴.
- Another study on *Terminalia chebula* results demonstrates that functionally important responses occur in the epidermis and are not restricted to the dermal layer. Our findings thus suggest mechanisms by which *Terminalia chebula* may

strengthen full-thickness skin architecture for treating skin ageing and/or chronic wounds²⁵.

All the above studies indicate the efficacy of the chemical constituents present in the ingredients of Nalpamaradi soap on skin health and diseases.

After preparing the soap, it was sent to the laboratory for the physicochemical, heavy metal, and antimicrobial efficacy assessments.

Table 3: Physicochemical parameter analysis of the trial soap

Particulars	Result	Limits
Description	Cream colour soap with a characteristic odour	Cream colour soap with a characteristic odour
Lather (ml)	440	NLT 200
Mush (g/50 cm ²)	8.97	NMT 15
Free caustic alkali (% by mass)	Absent	NMT 0.005
Freedom from grittiness	Complies	Passes the test
Freedom from cracking	Complies	Passes the test
Cleaning efficiency	Complies	Passes the test
Total fatty matter (% by mass)	42.87	NLT 40

(Reference IS 13498)

The soap with the higher lather lasts longer and, more importantly, cleans the skin more gently. Nalpamaradi soap consists of a good amount of froth apart from other qualities like mush, Free caustic alkali, freedom from grittiness and cracking, and cleaning efficiency. Total fatty matter (TFM) is one of the most critical indicators of soap quality, and the higher the TFM, the better quality of the soap. A higher concentration of fatty acids has good effects on the skin by providing rehydration and a sense of cleansing. Nalpamaradi soap has yielded 42.87% of TFM, which is an acceptable value. From the above, it is evident that the trial soap fulfils the required parameters.

Table 4: Presence of metals in the soap

Parameters	Results
Copper. (as Cu) ppm	Not detected
Iron (as Fe) ppm	Not detected
Nickel (as Ni) ppm	Not detected

It is a known fact that the heavy metals in the soap would pose a health risk. Hence, this trial soap was made to detect the presence of heavy metals like Copper, Iron, and Nickel. With the above report, it is evident that Nalpamaradi soap does not contain any heavy metals and is safe for use.

Table 5: Antimicrobial efficacy of the Nalpamaradi soap

Particulars	Limits	Results
Total Aerobic Microbial Count (TAMC) CFU/gm/ml	<1000	180
Total Yeast and Mould count (TYMC) CFU/gm/ml	<100	<10
Pathogen Detection		
<i>Escherichia coli</i>	Absent	Absent
<i>Staphylococcus aureus</i>	Absent	Absent
<i>Pseudomonas aeruginosa</i>	Absent	Absent
<i>Candida albicans</i>	Absent	Absent

(Reference: IS 14648 method)

By the above parameters, it is evident that the Nalpamaradi taila possesses an antimicrobial effect and passes the results of the BI standards for a soap.

Drugs like Haridra, Haritaki, Rakta Chandana, and Choraka have krimigna properties, and the same is expressed in the form of antimicrobial action of the Nalpamaradi soap. As the skin is exposed to many pathogens and allergens in the external atmosphere on a day-to-day basis, this antimicrobial property of the soap will be beneficial in minimizing and preventing infectious skin issues.

CONCLUSION

Beautiful and healthy skin has been the desire of every man for ages. Skin is at risk of many health issues as it is exposed to various polluting factors. Hence, it is rightly mentioned in Charka Samhita that if a person does not undergo periodic purifications, mala will accumulate in the romakupa and, in due course of time, causes many integumentary and non-integumentary disorders. Soaps that benefit the skin are needed in the current situation. At the same time, enhancement of the complexion and beautification should also be taken care of. Ingredients that are present in the Nalpamaradi soap will fulfil both criteria. Soap does have an antimicrobial effect as it contains drugs that have Krimigna action. It is devoid of heavy metals, which is a better indicator for any soap that needs to be used in the long term. It also passes all the physicochemical tests, including lather and cleaning efficiency. Its total fatty matter is also above the prescribed levels. Hence Nalpamaradi soap can be a better cosmetic product to

enhance the glow of the skin and will have preventive effects from skin infections and allergies.

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