

Pharmaceutical Study of Acne Pacifying Herbo-mineral Cream- *Mugdha* Cream

Vandana Meena, Anand K. Chaudhary

Department of Rasa Shastra and Bhaishajya Kalpana, Faculty of Ayurveda, Institute of Medical Sciences, Banaras Hindu University, Varanasi, Uttar Pradesh, India

Abstract

Aim: Acne is the disease which agitates the face during the primary phase of life, i.e. pubescent to adulthood. In *Ayurvedic* has been quoted as *Mukhadushika* or *Yuvanpidika*. At present, acne is anticipated to affect 9.4% of the global population, making it the eighth most prevalent disease globally. The cosmetics available are not suitable to all the condition; it may worsen the condition, as well as conventional treatment, is having its own precincts. The present study was undertaken, to validate the ancient *Ayurvedic* wisdom in light with the present day knowledge. **Materials and Methods:** Thus, in this study, after observing all *Ayurvedic* literature and many clinical reports, total six drugs, namely *Shankha Bhasma*, extract of *Shalmali Kantak*, *Haridra*, *Manjistha*, *Nimba*, and *Rakta-chandan* were selected to prepare oil-in-water (o/w) herb-mineral cream formulation with the suitable combination of the oil phase and aqueous phase along with preservatives. It was subjected to various physiochemical parameters such as type of emulsion, pH, spreadability, rheological studies, viscosity, and primary skin irritation. **Results and Discussion:** The result obtained was shown that viscosity of cream was in the range of 27001-27089 cps which indicates that the cream is easily spreadable by small amounts of shear. The rheological study showed pseudoplastic flow behavior of cream. Type of emulsion cream was o/w type. Primary skin irritation test showed the absence of redness, edema, inflammation, or irritation during irritancy studies. **Conclusion:** Thus, the *Mugdha* cream prepared is safe for use and could be a better remedy to cure acne.

Key words: Acne vulgaris, *Ayurvedic*, cosmaceutical, cream, herbo-mineral, *Yuvanpidika*

INTRODUCTION

Beauty is not an inexplicable quality that lies only in the eye of the beholder. Every person desires to remain not only in good physical shape but fine-looking too. Beauty is a matter for joy forever. Unfortunately, acne is the disease which agitates the face during the primary phase of life, i.e., pubescent to adulthood, and if deserted or mistreated may give scar for lifetime, *Ayurvedic Acharyas* quoted it as *Mukhadushika* or *Yuvanpidika*. Acne is anticipated to affect 9.4% of the global population, making it the eighth most prevalent disease globally. Epidemiological studies have demonstrated that acne is most common in post-pubescent teens, with boys most recurrently affected, predominantly with more severe forms of the disease.^[1] It is not a life-threatening disease, but it is a distressing skin condition which can carry with it significant psychological disability. It is one of the most common diseases distressing humanity and has significant impact on quality of life.^[2] The primary factors involved in the formation of

acne lesions are increased sebum production, sloughing of keratinocytes, bacterial growth, and inflammation. *Propionibacterium acnes*, an anaerobic pathogen, plays an important role in the pathogenesis of acne by inducing certain inflammatory mediators.^[3]

Nowadays, public are more conscious regarding their facial magnificence and spend splendid amount of money either through commercials or conventional treatment basically steroids to become liberated from the situation. However, cosmetics are not suitable to all the condition; it may worsen the condition, as well as conventional treatment is having its own precincts. On being acknowledged with higher incidence of the problem and the limitations of the

Address for correspondence:

Dr. Vandana Meena, Department of Rasa Shastra and Bhaishajya Kalpana, Faculty of Ayurveda, Institute of Medical Sciences, Banaras Hindu University, Varanasi - 221 005, Uttar Pradesh, India. E-mail: vandanameena.bhu@gmail.com

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available medications, it is the need of the hour to uncover out an effective, safe, and reasonable therapy to manage this wearisome problem.

An Ayurvedic classic reveals a ray of hope as it is having exceptional approach to understand the disease in a holistic dimension. Ayurveda describes acne vulgaris as “TarunyaPitika^[4]” (the eruptions or pimples occurring on the face during adolescence) and “Mukhadusika^[5]” (one which spoils, vitiates, or disfigures the face). Ayurvedic treatise such as Bhavaprakasha and Charak Samhita enlists various herbs and formulations to treat acne (Tarunya Pitika) and claim them to be safe and efficacious. Observing all these points into consideration, the present preparatory herbo-mineral cream *Mugdha* Cream has been prepared. Selected plants were *Manjistha*, *Haridra*, *Nimba*, *Sariva*, *Rakta-chandan*, and *Shalmali kantak* including *Shankha Bhasma* as ingredients. These all herbs possess the property, i.e. antibacterial, antioxidants, anti-inflammatory, anti-androgenic and to improve texture, luster, as well it increases complexion. Various references were found in classical books of Ayurveda regarding these herbs for therapeutic benefit and for management of *Yuvanpidika*. For various skin disorders improvement, a variety of research articles are published in reputed national and international journals. By screening all these, the herbo-mineral cream (*Mugdha* cream) designed for treatment of *Yuvanpidika* (acne vulgaris). The main aim of the present work was to formulation and evaluation of the herbo-mineral Anti Acne face cream (*Mugdha* Cream).

MATERIALS AND METHODS

Procurement and authentication of raw material

The best variety of *Shankha*, *Manjistha* Root, *Nimba* Bark, and *Haridra* Kand, were procured from Gola Deenanath, Local *Ayurvedic* market of Varanasi, Uttar Pradesh. Whereas *Rakta-chandan* was purchased from m/s. P. Krishnan, 10/930, 931, Street market, Palayam Road, Calicut, Kerala. *Shalmali kantak* was collected from campus of Banaras Hindu University, Varanasi, Uttar Pradesh. Plant materials were authenticated from the Department of *Dravyaguna*, Institute of Medical Sciences, Banaras Hindu University (B.H.U.), Varanasi. A sample of Raw *Shankha* was authenticated from the Department of Rasa Shastra, Faculty of Ayurveda, Institute Medical Sciences, Banaras Hindu University, Varanasi.

Preparation of plant extract

A wide range of technology is available for the extraction of active components from medicinal plants. In our study, we have followed two methods of extraction, i.e., cold infusion^[6] method for *Shalmali* and decoction method^[7] for *Manjistha*, *Haridra*, *Nimba*, and *Rakta-chandan*. In general, cold infusion method is employed for extraction, because of

the presence of potent phytoconstituents, but the drawback of this method is lesser yield is obtained and time-consuming. As *Shalmali Kantak* is main ingredient and quantitative more in *Mugdha* cream, so, we have selected cold infusion method for *Shalmali Kantak*. In decoction method, comparatively more yield is obtained, but it is comparatively less potent than the extraction through cold infusion method. Hence, this method was used for other herbals, namely, *Manjistha*, *Haridra*, *Nimba*, and *Rakta-chandan*.

In the preparation of *Shalmali* extract, cold infusion method was followed, and it mainly involved three steps: First, preparation of coarse powder then preparation of infusion and finally evaporation of water. In the preparation of an extract of *Manjistha*, *Haridra*, *Nimba*, and *Rakta-Chandan* decoction method was followed and the whole process divided basically into three steps preparation of coarse powder of plant material, preparation of decoction of coarse powder, and removing the aqueous part of a decoction. During decoction preparation, the temperature was controlled in between 75 and 95°C.

Preparation of cream

Compositions of cream

Before preparing the final batch of the best cream, a set of techniques were endeavored (hit and trial basis) for better consistency, smoothness, fineness, and appearance. During hit and trial; the different base materials were employed in various proportions and thus, total seven batches were taken for trial [Table 1]. Ultimately, the best cream was selected on the basis of consistency, smoothness, fineness, and appearance. Then, that cream was prepared subsequently in three batches. During these trial batches, 7th batch had the good consistency, smoothness and fineness, comparative to others batches. Hence, the 7th batch was selected for the final preparation of cream [Table 1 and Graph 1].

Pharmaceutical process validation for cream formulation^[8]

In the pharmaceutical process of cream preparation first two phases were prepare, namely, oil phase and water phase. All oil soluble components (cetostearyl alcohol, liquid paraffin, stearic acid) were dissolved in the oil phase and aqueous extract of drugs including water-soluble components (methyl paraban, propyl paraban, triethanolamine, and propylene glycol) were dissolved in water. The aqueous and oil phase were heated up to 75°C. After maintaining the same temperature of both phases, the aqueous phase was added in portions to the oil phase with constant stirring until cooling of cream. The mixing was done till proper fineness and consistency of cream was obtained. The perfume of rose was added when temperature dropped to 45°C. The product obtained was *Mugdha* cream with pinkish red [Figure 1].

Table 1: Summary of different compositions of cream during trial

Ingredients	1 st trial	2 nd trial	3 rd trial	4 th trial	5 th trial	6 th trail	7 th trial
Stearic acid (%)	10	11	12	13	13.5	14	14
Propylene glycol (%)	5	7	8	8	8	8	8
Liquid paraffin (%)	2	2	2	2	2	2	3
Cetostearyl alcohol (%)	3.5	3	2.5	2.5	1.5	1.5	1.5
Triethanolamine (%)	3	2.5	2	2.5	1.5	1.5	1
Zinc oxide (%)	1	1	1	1	1	1	1
Citric acid (%)	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Propyl parabane (%)	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Methyl parabane (%)	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Water (%)	65	65	65	65	65	65	65
Drugs (%)	10	8	7	6	6	6	6

Analytical study of *mugdha* cream^[9,10]

The analytical study of cream was including viscosity, rheological studies, type of emulsion, and primary skin irritation test.

Viscosity

Viscosity of the formulation was determined by Brookfield Viscometer at 100 rpm, using spindle no 7.

Rheological studies

The formulated cream was found to be non-Newtonian. Take a fixed quantity 10gms of cream in a 10 ml beaker. Keep it impact for 1 h. The beaker was inclined to one side see whether the cream is liquefied or not. Beaker is shaken to and for continuous 5 min and checked whether consistency has changed or not. The beaker was again tilted and checked for pourability of the cream.

Type of emulsion

Final preparation of both emulsions (o/w or water-in-oil [w/o]) looks the same in appearance with naked eyes; therefore, certain tests are required to differentiate between them.

Dye test

The scarlet red dye is mixed with the cream. Place a drop of the cream on a microscopic slide covers it with a coverslip, and examines it under a microscope. If the disperse globules appear red the ground colorless. The cream is o/w type. The reverse condition occurs in w/o type cream, i.e., the disperse globules appear colorless in the red ground.

Dilution test

In this test, the fixed amount of emulsion was diluted with mineral oil and water. When o/w emulsion diluted with water,

will remain stable as water consists of the dispersion medium, but when it was diluted with oil, the emulsion broke as oil and water are not miscible with each other. O/w emulsion can easily be diluted with an aqueous solvent whereas water in oil emulsion can be diluted with a mineral oil.

Primary skin irritancy test

For skin irritancy study, mark an area (1 sq.cm) on the left-hand dorsal surface. The cream was applied to the specified area and time was noted. Irritancy, erythema, edema, were checked if any for regular intervals up to 24 h and reported.

DISCUSSION

Extraction is the first important step in the recovery and purification of active ingredients from plant materials. The aim of extraction process is to provide the maximum yield of substances and of the highest quality which consist of high concentration of target compounds. The efficacy of solvent extraction is affected by many factors such as the type of solvent, solvent concentration, time, temperature, pH, number of steps, liquid-to-solid ratio, and particle size of the plant material.^[10] We have followed two methods of extraction, i.e., cold infusion method for *Shalmali* and decoction method for *Manjistha*, *Haridra*, *Nimba* and *Rakta-chandan*. In the extracts preparation, different percentage of yield was obtained, extraction yield of plants were -*Shalmali kantak* 9%, in *Manjistha* 19.5%, *Haridra* 25%, *Nimba* 14.8%, and *Rakta-chandan* 22% was obtained. The different yield obtained is due to the hardness of material and procedure procured. The yield of *Nimba* and *Shalmali kantak* is least among all the plants taken due to the high content of fibrous part in *Nimba* and also due to the hardness and tough nature of the thorns of *Shalmali kantak*. The yield of *Haridra* was maximum due to its porous nature.

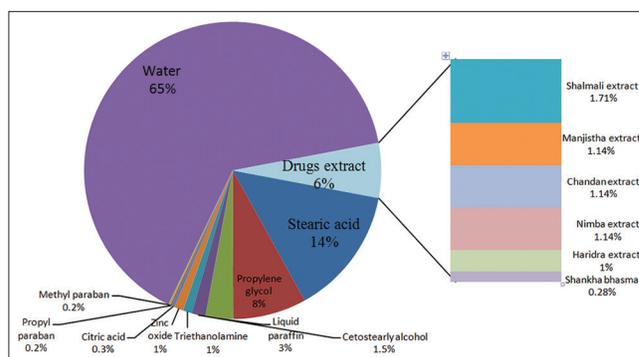


Figure 1: Preparation of cream

An exceptionally important parameter for emulsion products is their stability; however, the evaluation of emulsion stability is not trouble-free. Pharmaceutical emulsion stability is characterized by the absence of coalescence of dispersed phase, absence of creaming, breaking and retaining its physical characters such as elegance, odor, color, and appearance. The preparation of stable emulsion is critical for the efficient production of final dosage form. Here, various important parameters have been discussed that can affect emulsion stability, namely, stirring intensity, emulsifier concentration, water-oil ratio, mixing temperature, and mixing time. In cream preparation order of mixing the ingredients should be maintained, mixing should be done at maintained temperature, same temperature should be maintained during whole procedure (not exceed 75°C), mixing should be done with continuous stirring, and more mixing should be avoided as it may cause phase inversion.

The analytical study was conceded out with an analysis to know the particular chemical configuration of the raw, intermediate, and the final product and to point out the physicochemical changes and effect of dissimilar Samskaras (Shodhana, Jarana, Marana etc.) during the pharmaceutical dispensation. Hence, in this section, rationale behind getting of all analytical results will be discussed. Viscosity is one of the key attributes for semisolid dosage forms. Viscosity changes cause a significant impact on the release of cream. If the solubility and distribution of drug do not change along with the change of viscosity, there is reciprocal ratio between viscosity and the quantity of drug released.^[11] In the present formulation, the viscosity of cream was in the range of 27001–27089 cps which indicate that the cream is easily spreadable by small amounts of shear.

Rheological properties of processed creams depend on solid phase particle size. These properties can be created or modified by controlling the particle size distribution in the manufacturing process. Creams properties are also influenced by the fat fraction and the addition of thickeners.^[12] Hence, to understand and even improve the performance of creams processing, knowledge of both the cream flow behavior and other rheological properties is utmost necessary. In the present formulation, rheological behavior of the cream



Graph 1: Summary of final selected compositions of *Mugdha* cream

was studied and it has been confirmed that the cream had pseudoplastic flow behavior. All the formulations showed no thixotropic (shear thinning) characteristics.

Patients have different type of skin texture (oily and dry), so the choice of cream depends on skin conditions. The dry type of skin condition gets benefited by w/o type of cream while in oily type of skin condition it becomes more soothing with o/w cream. Hence, choice of type of emulsion becomes very crucial before using cream, so for confirmation of emulsion type performed dye test and dilution test and the result showed that the cream was o/w type of emulsion and which was superior for acne patients.

The skin irritation test indicated that the cream formulation was safe with respect to skin irritation and allergic sensitization. The cream was applied to the specified area and time was noted. Irritancy, erythema, and oedema was checked for regular intervals up to 24 h and reported. The results were shows no redness, edema, no inflammation, and no irritation reported during irritancy studies. These results indicate that the formulation was safe to use for skin.

CONCLUSION

Final prepared *Mugdha* Cream is easily spreadable by small amounts of shear, shown pseudoplastic flow behavior of cream. Type of emulsion of cream was o/w type. Primary skin irritation test showed, no redness, no edema, no inflammation and no irritation reported during irritancy studies so, the present *Mugdha* Cream is safe for use and may effective for Acne vulgaris.

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