

# "Development and Assessment of an Antioxidant-Rich Herbal Face Pack with Bacopa monnieri Powder"

<sup>1</sup> Bhintade Charushila P, <sup>2</sup> Adsul Tejaswini D, <sup>3</sup> Bandgar Rupali D, <sup>4</sup> Darunde Snehal L

<sup>1,2,3,4</sup>Department of Pharmacology, Dattakala College of Pharmacy, Bhigwan

\*\*\*

**Abstract:** Human skin is becoming increasingly susceptible to aging and conditions such as atopic dermatitis, leading to various skin issues such as dermatitis and acne. These problems are often triggered by environmental pollution, allergies, and an upsurge in microorganisms. Consequently, there is a growing trend towards the use of herbal preparations to address these concerns. According to Ayurveda, skin problems are often attributed to blood impurities. Thus, the aim of this study is to develop and evaluate a cosmetic herbal face mask formulated with naturally derived ingredients to promote radiant skin. This face mask incorporates ingredients such as Neem powder, Multani mitti, agarwood, green tea, milk powder, and almond powder. The formulations were assessed for factors including sensory irritation, physicochemical properties, stability, and resistance to microbial contamination and mild irritation. Through this research, efforts were made to create an ideal face mask suitable for all skin types.

**Key Words:** Bacopa monnieri, Aging, Herbal remedies, Antioxidant, Cosmetic herbs, Face mask, Neem powder .

## • Introduction

The rising popularity of herbal cosmetics for skin treatment is driven by their well-established advantages in achieving radiant skin. These cosmetics play a role in cleansing, enhancing, and beautifying the skin. Among adolescents, common skin concerns include acne, blackheads, pimples, and dark circles, which can arise from various factors such as toxin accumulation in the bloodstream, dietary imbalances, hormonal changes, unhealthy habits, stress, and exposure to environmental pollutants.<sup>[1]</sup>

Maintaining healthy and clear facial skin is essential for overall well-being. Herbal face packs have emerged as effective solutions for addressing various skin concerns. These packs, known as Mukha Lepa in Ayurveda, are typically applied as a paste or liquid, requiring a gentle application and a waiting period of 10 to 20 minutes before removal through evaporation. They are beneficial for treating pigmentation, scars, blemishes, and acne, while also promoting facial blood circulation. Herbal face packs, containing natural herbs, are simpler to use, more convenient, and less likely to cause adverse effects.<sup>[2][3][4][5]</sup>

Herbal face packs are available in three primary forms: plastic masks with wax or latex bases, gel masks (hydrocolloid masks), and dry clay masks. Desirable characteristics of herbal face packs comprise a smooth paste texture, non-toxic nature, stability in both physical and chemical aspects, pleasant fragrance, absence of gritty particles, and effectiveness in addressing concerns such as acne, blackheads, dark circles, and other skin imperfections.<sup>[6][7]</sup>

The benefits of herbal face packs include their lack of adverse effects, widespread use of herbal ingredients, soothing properties on the skin, prevention of premature aging, skin nourishment, removal of dead skin cells, and relief from problems such as pimples, dark circles, and blackheads. However, occasional redness, irritation, and inflammation are potential drawbacks associated with herbal face packs.<sup>[8][9][10]</sup>

## Review of literature-

Table 1- Review Of Literature

Authors	Year	Main Points
Tejal P et al	2013	The earliest archaeological evidence of cosmetics dates back to around 4000 BC in Ancient Egypt. Today, the modern cosmetics industry is a multi-billion-dollar market encompassing a wide range of products such as eye makeup, facial. The cleansing systems, nail polish, lotions, lipsticks, and skincare items earliest archaeological evidence of cosmetics was found in Ancient Egypt. <sup>[11]</sup>

Christian Surber et al	2016	Skin reflects a person's origin, lifestyle, age, and health status. The cosmetic and pharmaceutical industries provide a vast array of skincare products and procedures. These skincare products are crucial in health and nursing care, frequently utilizing advanced technologies. <sup>[12]</sup>
Sachin Somwanshi et al	2017	Cosmetics are used for cleansing, beautifying, and promoting attractiveness. Historical use of herbs for skin care. Face skin indicates individual health, requiring balanced nutrition. Ayurvedic facial therapy with herbal pastes. <sup>[13]</sup>
M. Surya et al	2021	Cosmetics are employed for cleansing, beautification, and enhancing attractiveness. Historically, herbs have been utilized for skincare. The condition of facial skin reflects overall health, necessitating balanced nutrition. Ayurvedic facial treatments often involve the use of herbal pastes. <sup>[14]</sup>
Khan AD et al	2019	The variety of cosmetic products encompasses toothpaste, shampoo, mascara, lotions, perfumes, and more. Makeup specifically refers to coloured products designed to change one's appearance. <sup>[15]</sup>
Chaudhari KS et al	2017	Bacopa monnieri plant has various medicinal uses. Contains bioactive compounds like saponin, flavonoids, and glycosides. Valuable for the pharmaceutical industry for drug preparation. <sup>[16]</sup>
Russo A et al Kar A et al	2005 2017	Bacopa monnieri contains bioactive compounds like sapogenin, flavonoids, and glycosides. The saponins are believed to be responsible for most of the pharmacological actions. <sup>[17][18]</sup>
Ravikumar et al	2022	Herbal face packs deliver essential nutrients, enhance facial radiance, and support skin well-being. Various skin conditions may necessitate tailored herbal face packs. These packs enhance blood circulation and supply vital nutrients for skin nourishment and Rejuvenation. <sup>[19]</sup>
Kiran S. Kudale et al	2017	Face packs improve blood circulation and rejuvenate the skin, helping to maintain its texture and elasticity while reducing wrinkles, acne, pimples, and dark circles. However, they may cause skin irritation. Aging is a significant concern, and antioxidant counteract free radicals that damage skin cells, slowing down the aging process. <sup>[20]</sup>
Akhila Xavier et al	2022	Face packs enhance blood circulation, rejuvenate and preserve the texture and suppleness of the skin. They address concerns such as wrinkles, acne, pimples, and dark circles, although there may be worries about skin irritation. Antioxidants play a crucial role in preventing skin cell damage and delaying the aging process. Face packs improve blood circulation, rejuvenate skin, and maintain texture. <sup>[21]</sup>

● **MATERIAL AND METHOD**

**Pharmacognostic Investigation:**

● **Plant Material:**

*Bacopa monnieri* (flowers) were chosen as the plant material for the current investigation based on the ethnomedical data and literature review.<sup>[22,23,24]</sup>

● **Plant Collection and Authentication of Plant Material:**

In the month of January 2024 in around Akluj Solapur district Maharashtra, India, fresh flowers of *Bacopa monnieri* were collected. A plant was authenticated by a plant taxonomist from the Shankarrao Mohite Mahavidyalaya Department of Akluj.

- Analytical Pharmacognosy:**  
**Macroscopic Characterization:**

*Bacopa monnieri* was subjected to macroscopic studies which comprised of organoleptic characteristics of the drug.<sup>[24]</sup>

- Quantitative Micromorphology**

1) Length 2) Width 3) L.S.

The head of the flower was observed and carefully peeled off, looking inside the plant. The stamen was detached, and the surface of the anther was observed under the microscope. The top of the stigma was drawn carefully. The ovary was cut open and observed under a microscope. These factors were assessed by established WHO recommendations and are thought to be extremely helpful in the quality control of crude medication.<sup>[24,25]</sup>



**Fig 1:** L.S. of *Bacopa monnieri* flower



**Fig 2:** Dried *Bacopa monnieri* flower

**Table 2-** Taxonomical classification of *Bacopa monnieri*

Kingdom	Plantae
Phylum	Angiosperms
Class	Eudicots
Subclass	Viridiplantae
Order	Lamiales
Family	Plantaginaceae
Genus	Bacopa
Species	<i>Bacopa monnieri</i>

**Table 3-** Plant Material and uses

Ingredient	Common Name	Scientific Name	Family	Uses
<i>Bacopa monnieri</i>	Brahmi	<i>Bacopa monnieri</i>	Plantaginaceae	High in antioxidants beneficial for skin health. Delays skin aging, prevents premature aging, and enhances the overall tone and texture of the skin.
Multani Mitti	Fuller's Earth	Solum Fullonum	Euphorbiaceae	Cleanses skin by removing dirt and pollutants. Removes excess sebum and oil. Boosts radiance. Treats & sunburn.
Agarwood	Agarwood, Oud	Aquilaria malaccensis	Thymelaeaceae	Helps to reduce the appearance of fine lines, wrinkles, and other signs of aging. It has natural fragrance.

Milk Powder	-	-	-	Concentration of vitamins and minerals beneficial for skin health. Skin lightening properties. Acts as a skin purifier. Removes contaminants like blackheads and whiteheads. Abundant in lactic acid, naturally cleanses and brightens skin.
Neem Powder	Neem	Azadirachta indica	Meliaceae	Filters blood and promotes wound healing through antibacterial properties. Heals skin ailments, and allergies.
Green tea	Green tea	Camellia sinensis	Theaceae	It has properties such as antibacterial, astringent, anti-aging, brightening, anti-inflammatory, skin protection.
Almond powder	Almond	Prunus Amygdalus	Rosaceae	Rich in Vitamin E and retinol, making skin soft, supple, and smooth. Anti-aging properties reduce wrinkles and fine lines. Beneficiary for skin health.

**Table 4-** Composition of herbal face pack

Sr. No.	Constituents	Quantity
1	<i>Bacopa monnieri</i>	40gm
2	Multani Mitti	20gm
3	Agarwood	20gm
4	Milk Powder	10gm
5	Neem Powder	10gm
6	Green tea	5gm
7	Almond powder	5gm



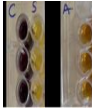




**Fig 3-** Plant Materials

All the herbal ingredients were dried and finely ground using a size reduction mill. Each herbal powder required for the face mask preparation was accurately weighed with a digital balance. The quantities and composition of the ingredients are detailed in the composition section of the herbal face pack.

- **Mixing:** All these high-quality materials were thoroughly blended using a mixer to create a fine, uniform powder.
- **Sieving:** This fine powder was passed through a sieve with mesh size 100 to obtain a sufficiently fine powder.
- **Collection and Storage:** The powder mixture was collected in an appropriate container, stored, and used as the basis for evaluation criteria.

**Evaluation Of Herbal Face Pack** -<sup>[28,29,30,31]</sup>

**Table 5:** Evaluation Of Herbal Face Pack

Evaluation Aspects	Details	Test
Organoleptic Parameters	The organoleptic parameters evaluated include its colour, odour, appearance, texture and smoothness.	
Physiochemical Evaluation a) pH	Measured by digital pH Meter. The average value was noted.	
b) Loss on Drying	Procedure- 1) Place 1.5 grams of the powdered drug into a pre-weighed, flat, and thin porcelain dish. 2) Dry the dish in an oven set to 100°C ± 5°C. 3) Cool the dish in a desiccator and record the weight loss, which is typically noted as the moisture content.	
c) Ash Content	Procedure-1) Ignite the crucible and weigh it. 2) Add approximately 2 grams of the powdered drug to the crucible. 3) Place the crucible on a pipe clay triangle supported by a retort stand. 4) Heat the crucible with a burner until vapours nearly stop, then increase the heat until all carbon is burned off. 5) Cool the crucible in a desiccator.	
d) Particle Size Determination	Procedure- 1) Arrange a standard sieve set with the coarsest sieve on top and the finest at the bottom. 2) Weigh 50 gm of the sample and place it on sieve no 10. 3) Secure the sieve set on a sieve shaker and shake for 20 min. 4) Collect the sample retained on each sieve onto separate papers and weigh them. 5) Record the weight retained on each sieve.	
Determination of anti-oxidant activity	Evaluated for free radical scavenging ability using DPPH (1,1-Diphenyl-2-Picryl-Hydrazyl) free radicals. 100µL of each test compound (dissolved in water) was mixed with 100µL of 0.1% methanolic DPPH at various concentrations (1000µg/ml). Mixture incubated for 30 min in the dark. Observation recorded for colour change from purple to yellow.	
Determination of anti-bacterial activity	All the samples tested on nutrient agar medium against, Escherchia coli (Gram-negative), Staphylococcus aureus Gram-positive) & Proteus Valgaris (Gram-negative) of organisms using disc-diffusion method.	
Phytochemical Screening	The aqueous extract of the herbal face pack evaluated for the presence of different phytoconstituents as per the standard procedures.	
Irritancy Test	Applied specific quantity of prepared face pack on dorsal hand & recorded application time. examined irritation, erythema, and edema at regular intervals up to 24 hours.	
Stability Studies	Change in colour, odour, texture and smoothness was observed at mentioned conditions of stability except pH. Showed a slight change in pH of formulation at 400.	

## Results-

### 1. Organoleptic parameters-

Table 6: Organoleptic parameters

Sr.no.	Parameter	Observation
1	Colour	Greenish to Brownish
2	Odour	Earthy
3	Appearance	Smooth
4	Texture	Fine
5	Smoothness	Smooth

### 2. Physicochemical Evaluation-

Table 7: Physicochemical Evaluation

Sr.no	Parameter	Observation
1	PH	5.5
2	LOD	3.4%
3	Ash content	5.7%
4	Particle size	149±5.44mm

### 3. Antibacterial activity-

Table 9: Antibacterial activity

Sr.no.	Concentration	Staphylococcus Aureus	Escherichia Coli
1	100ug/ml	2 mm	1 mm
2	200 ug/ml	5 mm	6 mm
3	300 ug/ml	8 mm	6 mm
4	400 ug/ml	9 mm	2 mm
5	500 ug/ml	10 mm	7 mm
6	Standard	11 mm	20 mm

### 4. Rheological evaluation-

Table 10: Rheological evaluation

Sr.no.	Parameter	Observation
1	Tapped density	0.75 g/ml
2	Bulk density	0.66 g/ml
3	Angle of repose	0.72
4	Hausner's ratio	1.23
5	Carr's index	20%

### 5. Phytochemical Screening-

Table 11: Phytochemical Screening

Sr. No	Parameter	Observation
1	Flavonoids	+
2	Alkaloids	+
3	Glycoside	+
4	Saponin	+
5	Volatile oil	+
6	Phenol	-
7	Carbohydrates	-

### 6. Irritancy test-

Table 12: Irritancy test

Sr. No	Parameter	Observation
1	Irritation	No
2	Erythema	No
3	Edema	No

### 7. Stability Studies-

Table 13- Stability Studies

Sr. No	Parameter	Observation
1	Colour	No Change
2	Odour	No Change
3	pH	5.5
4	Texture	Fine
5	Smoothness	Smooth

## DISCUSSION-

Quantitative measurements were made, individual particles recognized, and chemical and microscopic properties were examined. The formulation's consistent pH of very slightly alkaline was in keeping with normal skin physiology. Regarding the angle of repose, the flow attribute has been classified in compliance with Indian Pharmacopoeia norms.

## CONCLUSION-

The dry powders in the combined pack exhibited suitable flow properties for the face pack. According to an organoleptic investigation, the pack smells well and is smooth. The trial participants require non-toxic therapies for a range of skin conditions. Herbal face packs are considered a long-lasting and efficient way to improve the appearance of skin. The advantage of using herbal cosmetics is that many of their substances.



- **References:** A comprehensive list of references cited throughout the review article is provided, including key studies, clinical trials, and review articles in the field of cancer pharmacology.

1. Sharma Sujata, Baldi Ashish. Herbal Cosmetics: Used for Skin and Hair. *Inventi Rapid: Cosmeceuticals*, 2012(4): 1-7, 2012.
2. Amit A. Shimpi, Arvind S. Pawara. A Review on Herbal Face Pack. *Research Journal of Pharmacology and Pharmacodynamics*.2022;14(3):146-0.
3. Grace, X.F, Vijetha, R.J, Shanmuganathan, S. and Chamundeeswari, D., 2014. Preparation and evaluation of herbal face pack. *Adv J Pharm Life Sci Res*, 2(3), pp.1-6.
4. Yadav, N. and Yadav, R., 2015. Preparation and evaluation of herbal face pack. *International Journal of Recent Scientific Research*, 6(5), pp.4334-4337.
5. Priya, R., Anand, K. and Rasika, D., 2017. Preparation and evaluation of herbal anti-acne face pack. *World J Pharm. Res*, 6(6), pp.1000-10.
6. Pal, R.S., Pal, Y. and Wal, P., 2017. In-house preparation and standardization of herbal face pack. *The Open Dermatology Journal*, 11(1).
7. Londhe, S.S., Joshi, A.A., Sapkale, G.N. and Bhosale, M.G., 2021. Formulation and Evaluation of Clay Face Pack. *International Journal of Pharmaceutical Investigation*, 11(4).
8. Singh, S. and Maury, S., 2022. FORMULATION AND EVALUATION OF HERBAL FACE PACK FOR ACNE PRONE SKIN.
9. Redasani, V.K., Baid, K.J. and Yadav, D.J., 2020. FORMULATION AND EVALUATIONS OF HERBAL FACE PACK.
10. Dave, P., Patel, G., Patel, D., Patel, B., Patel, D., Chakraborty, G.S. and Jani, R., 2022. Formulation and Evaluation of Herbal Face Scrub containing *Coffea arabica* Linn, *Myristica fragrans*, and *Lens culinaris* as an Antioxidant and Antiseptic Activity. *International Journal of Drug Delivery Technology*, 12(3), pp.1183-1186.
11. Tejal, P., Nishad, D., Amisha, J., Umesh, G., Desai, K.T. and Bansal, R.K., 2013. Cosmetics and health: usage, perceptions and awareness. *Bangladesh journal of medical science*, 12(4).
12. Surber, C. and Kottner, J., 2017. Skin care products: What do they promise, what do they deliver. *Journal of tissue viability*, 26(1), pp.29-36.
13. Sachin B. Somwanshi et al. Formulation and evaluation of cosmetic herbal face pack for glowing skin. *Int. J. Res. Ayurveda Pharm*. 2017;8(Suppl 3):199-203 <http://dx.doi.org/10.7897/2277-4343.083199>
14. Surya, A.P. and Kurniawan, A., 2021. The effect of product quality and perceived price on customer satisfaction and loyalty: Study on halal cosmetic products in Indonesia. *International Journal of Economics, Business and Management Research*, 5(04), p.2021.
15. Khan, A.D. and Alam, M.N., 2019. Cosmetics and their associated adverse effects: A review. *Journal of Applied Pharmaceutical Sciences and Research*, pp.1-6.
16. Chaudhari KS, Tiwari NR, Tiwari RR, Sharma RS. Neurocognitive Effect of Nootropic Drug *Brahmi (Bacopa monnieri)* in Alzheimer's Disease. *Ann Neurosci*. 2017 May;24(2):111-122. [\[PMC free article\]](#) [\[PubMed\]](#) [\[Reference list\]](#)
17. Russo A, Borrelli F. *Bacopa monniera*, a reputed nootropic plant: an overview. *Phytomedicine*. 2005 Apr;12(4):305-17. [\[PubMed\]](#) [\[Reference list\]](#)
18. Kar A, Pandit S, Mukherjee K, Bahadur S, Mukherjee PK. Safety assessment of selected medicinal food plants used in Ayurveda through CYP450 enzyme inhibition study. *J Sci Food Agric*. 2017 Jan;97(1):333-340. [\[PubMed\]](#) [\[Reference list\]](#)
19. Ravikumar, A., Sriraman, H., Saketh, P.M.S., Lokesh, S. and Karanam, A., 2022. Effect of neural network structure in accelerating performance and accuracy of a convolutional neural network with GPU/TPU for image analytics. *PeerJ Computer Science*, 8, p.e909.
20. Somwanshi, S.B., Kudale, K.S., Dolas, R.T. and Kotade, K.B., 2017. Formulation and evaluation of cosmetic herbal face pack for glowing skin. *Int. J. Red. Ayurveda Pharm*, 8(3), pp.199-203.
21. Mukherjee, P.K., Kumar, V., Kumar, N.S. and Heinrich, M., 2008. The Ayurvedic medicine *Bacopa monnieri*—From traditional use to scientific assessment. *Journal of ethnopharmacology*, 120(3), pp.291-301.
22. Mukherjee, P.K., Kumar, V., Kumar, N.S. and Heinrich, M., 2008. The Ayurvedic medicine *Bacopa monnieri*—From traditional use to scientific assessment. *Journal of ethnopharmacology*, 120(3), pp.291-301.
23. Gupta, G.K., Chahal, J. and Bhatia, M., 2010. *Bacopa monnieri* (L.): Old and new aspects. *J Pharm Res*, 3(11), pp.2610-2614.
24. Islam, M.A., Mondal, S.K., Islam, S., Shorna, A., Nourin, M., Biswas, S., Uddin, M.S., Zaman, S. and Saleh, M.A., 2023. Antioxidant, cytotoxicity, antimicrobial activity, and in silico analysis of the methanolic leaf and flower extracts of *Bacopa monnieri*. *Biochemistry Research International*, 2023.

25. Singh, M.V. and Prajapati, V.K., Pharmacognostical Screening of Blue Flowered Variety of *Bacopa monnieri* Linn.-A Phytocentric Overview.
26. Chukwuma, E.C., Soladoye, M.O. and Abdus Salaam, K.R.P., 2014. Taxonomic value of the leaf micro-morphology and quantitative phytochemistry of *Bacopa monnieri* 20(1), pp.3-8.
27. Suarna, I.W. and Wijaya, I.M.S., 2021. Butterfly pea (*Bacopa monnieri* L.: Plantaginaceae) and its morphological variations in Bali. *Journal of Tropical Biodiversity and Biotechnology*, 6(2), p.63013.
28. Yadav, N. and Yadav, R., 2015. Preparation and evaluation of herbal face pack. *International Journal of Recent Scientific Research*, 6(5), pp.4334-4337.
29. Grace, X.F., Vijetha, R.J., Shanmuganathan, S. and Chamundeeswari, D., 2014. Preparation and evaluation of herbal face pack. *Adv J Pharm Life Sci Res*, 2(3), pp.1-6.
30. Aglawe, S.B., Gayke, A.U., Mindhe, S.A. and Rane, V.G., 2018. Formulation and evaluation of herbal face pack. *Int J Pharm Biol Sci*, 8, pp.49-52.
31. Priya, R., Anand, K. and Rasika, D., 2017. Preparation and evaluation of herbal anti-acne face pack. *World J Pharm. Res*, 6(6), pp.1000-10