



Formulation And Evaluation Of Antioxidant Herbal Cream Using Moringa Extract

Authors: ¹ Mrs. Ankita Koshti, ² Ms. Diya Shah, ³ Ms. Avantika Dolaskar, ⁴ Mr. Ajit Doke, ⁵ Ms. Poonam Bramhane

¹ Assistant Professor, ² Student, ³ Student, ⁴ Student, ⁵ Assistant Professor

¹ Department of Pharmaceutics

Rasiklal M. Dhariwal Institute of Pharmaceutical Education and Research, Chinchwad, Pune

ABSTRACT

The present research focuses on the formulation and evaluation of an herbal cream incorporating Moringa oleifera leaf extract, known for its rich antioxidant, anti-inflammatory, and antimicrobial properties. Moringa oleifera, often referred to as the "miracle tree," contains bioactive compounds such as flavonoids, phenolics that are beneficial for skin health. The extract was obtained using alcoholic extraction, and a cream base was formulated using suitable emulsifiers and stabilizers. Various concentrations of the Moringa extract were incorporated to determine the most effective formulation. The cream was evaluated for physicochemical properties including pH, viscosity, spreadability, stability, and skin irritation potential. The optimized formulation demonstrated good stability, non-irritant properties, and significant antioxidant and antimicrobial effects. This study supports the potential of Moringa oleifera as a natural, effective, and safe ingredient in herbal cosmetic formulations aimed at improving skin health.

KEYWORDS: Moringa oleifera, antioxidant, herbal cream, phytochemicals, anti-aging, herbal skincare.

Introduction:

Skin aging is one of the visible precursors of aging and mainly caused by oxidative stress and the enhanced activation of proteolytic enzymes. In this study, we aimed to explore the prominent anti-aging activities of *M. oleifera* leaves. This study could provide molecular evidence for *M. oleifera* leaves as a natural source of anti-aging agents.

Moringa, often called the "miracle tree," is gaining attention for its powerful skincare benefits. Packed with vitamins, antioxidants, and minerals, moringa is renowned for combating signs of ageing, boosting collagen, and deeply hydrating the skin. Its oil and extracts detoxify, soothe inflammation, and revitalise the skin. Its antioxidant-rich profile protects the skin from environmental damage, while its nutrient content rejuvenates and nourishes.

Moringa leaves are known to have an antioxidant effect due to the presence of secondary metabolites like flavonoids and phenols. Moringa's antioxidant properties, rich in vitamins like A, C, and E, help reduce wrinkles by neutralizing free radicals, boosting collagen production, and protecting against oxidative stress, leading to firmer, healthier skin.

Wrinkles are lines that form on your skin. They're a natural part of your body's aging process. They appear as folds, creases or ridges. They're most often found on your face, neck and arms, but wrinkles can appear anywhere on your body. Skin disorders associated with photo damage from ultraviolet light include wrinkles, hyperpigmentation, tactile roughness and are more common in people with white skin compared with other skin types. Wrinkles are also associated with ageing, hormonal status. Wrinkles less than 1 mm in

width and depth are defined as fine wrinkles. Wrinkles may be caused by intrinsic factors and by extrinsic factors. These factors contribute to epidermal thinning, loss of elasticity, skin fragility, and creases and lines in the skin. The severity of photo damage varies with skin type, which includes skin colour and the capacity to tan. Wrinkles begin to appear, around thirty years old, around eyes and mouths and on foreheads and necks.

Free radicals, primarily caused by pollution and UV exposure, accelerate skin ageing. Moringa is rich in antioxidants like Vitamin C, Vitamin E, and flavonoids, which protect the skin by neutralizing these harmful molecules. This prevents wrinkles, fine lines, and dullness, leaving the skin firm and healthy. Antioxidant activity plays an important role in the protection against cell oxidation. In this sense, particularly, the antioxidant compounds found in Moringa leaves can be useful for the photoprotection against oxidative stress caused by UV exposure, which after prolonged exposure could lead to skin cancer.

Moringa oleifera L. is the most widely farmed, also native to many regions of Africa, Southeast Asia, and South America. The popularity of moringa as a miracle tree has been described in numerous studies that have been published in the past ten years. The plant is widely recognized for its nutritional value and its antioxidant, anticancer, and antinflammatory.

Moringa Oleifera

Biological source: These are the leaves consist of dried leaves of *M. oleifera* Lam.

Family: Moringaceae

Synonyms: The plant *Moringa oleifera* is known by several names throughout the world. The synonyms are given below. Latin – *Moringa oleifera*

Sanskrit – Subhanjana,

Hindi – Saguna, Sainjna

MORPHOLOGY The leaves are bipinnate or commonly tripinnate up to 45 cm long the leaflets are hairy, green and almost hairless on the upper surface. The twigs are hairy and green, these are compound leaves with leaflets of 1–2 cm long.

Chemical constituents: Different phytoconstituents such alkaloids, saponins, phenolic acids, tannins, steroids, flavonoids, glucosinolates, and terpenes are found in Moringa species. The moringa has high antioxidant activity mainly due to the flavonoids. The common flavonoids present in the moringa are rutin, quercetin, rhamnetin, kaempferol, and myricetin. The species' most prevalent glucosinolate is glucomoringin. Moringa leaves contain gallic acid as their major phenolic acid. The major carotenoid present in the leaves is lutein.



Moringa leaves:

Benefits of Moringa cream:

- 1) Its antioxidants protect the skin from damage caused by free radicals, reducing the signs of premature aging. Using our creams helps maintain a radiant and youthful complexion.
- 2) It provides intense hydration, creams moisturize without feeling heavy, leaving your skin soft and supple all day
- 3) Used as a moisturizer and spot remover.
- 4) Nourishes and moisturizes your skin.
- 5) Gives a glowing and rosy skin.
- 6) Moringa extract is sustainably harvested, respecting both nature and local communities.

By choosing this cream, you are making a positive choice for your skin and the planet.

Benefits of Moringa in skincare:

- 1) It is Rich in antioxidants
- 2) It shows Anti-aging Properties
- 3) It helps in Soothing and Anti-inflammatory
- 4) It helps Exfoliation
- 5) It gives Protection from Damage
- 6) It provides Hydration and Nourishment

Herbal Cream:

Oil in water (o/w) or water in oil (w/o) type semisolid emulsions that are meant for external application are commonly referred to as creams. It is applied to the outer or most superficial layer of the skin, and its main benefit is that it lasts longer at the application site. Moringa leaf is the only herbal ingredient we used in our formulation. Acne and pimples can be reduced using moringa.

Ideal properties of cream:

- 1) It should liquefy at body temperature. Spread easily on the skin.
- 2) Pleasant in appearance.
- 3) It should be non-toxic,
- 4) It should be non-irritant.
- 5) It should be non-inflammatory.

Advantages of cream:

- 1) Helps to reduce injury scars from the skin.
- 2) Helps individuals to reduce marks.
- 3) It also reduces blemishes from the skin.
- 4) The cream reduces under eye dark circles.
- 5) Acne may be reduced by use.
- 6) Melasma can be reduced by daily usage.

EXPERIMENTAL

Method of extraction of moringa extract:

Soxhlet extraction of dried leaves (SD50 and SD70):

- 1) The dried powdered leaves were separately placed into a thimble and were extracted with 50 and 70% ethanol (1:50, w/v) in a Soxhlet apparatus.
- 2) Extraction was carried out at five cycles/h until exhaustion for 20h.
- 3) The combined extract from each extraction system (except squeezing) was independently filtered through a Whatman No. 1 sludge paper.
- 4) The filtrate was dried under reduced pressure at 50 °C using a rotary vacuum evaporator.
- 5) The crude extract was weighed and kept in a tight container protected from light.



Fig no.1: Extraction of moringa leaves using Soxhlet assembly



Fig no.2:Evaporation of solvent

Formulation Table:**Table no.1: Formulation Table**

Ingredients	Batches		Role of ingredients
	M1	M2	
Petroleum jelly	3g	3.2g	Softening agent
Liquid paraffin	5.8ml	4ml	Softening agent
Borax	0.16g	0.16g	Emulsifying agent
Methyl paraben	0.036g	0.036g	Preservative
Propyl paraben	0.004g	0.004g	Preservative
Water	4ml	4.6ml	Aq. Phase
Moringa extract	2g	3g	Anti-oxidant
Rose oil	q.s	q.s	Perfume

Method of Preparation of cream:

In this petroleum jelly-borax type preparation borax reacts with the free fatty acids present within products soft soap that serves as the oil phase with an emulsifying agent. Containing petroleum jelly, mineral oil, paraffin etc, in the aqueous phase.

During formulation heated aqueous phase, addition of oily phase to aqueous phase, it results in aqueous phase,

- 1) Melt petroleum jelly, liquid paraffin and propyl paraben in order of increasing melting point.
- 2) Dissolve methyl paraben, water with borax at 75°C. add moringa leaves extract,
- 3) Filter it required. Add aqueous phase to oily phase with continuous stirring.
- 4) Cool with stirring at room temperature.
- 5) Add perfume to the preparation at room temperature.
- 6) Transfer the cream to the container while hot.



Fig: Prepared Formulation

Phytochemical Screening:

Flavonoids- These are a class of polyphenols, and quercetin is a notable example found in Moringa, known for its ability to bind metal ions and limit free radical production. Flavonoids are secondary metabolites.

Biological Activity: The presence of flavonoids in a plant extract can indicate potential biological activities, such as antioxidant or anti-inflammatory effects.

Identification test -

- 1) Alkaline reagent test
- 2) Shinoda test

Phenolic Acids: These compounds, such as chlorogenic acid, gallic acid, contribute to the antioxidant activity and offer various pharmacological benefits.

Identification test -

- 1) Litmus Test
- 2) Ferric Chloride Test

Evaluation test of Cream:

Evaluation of Herbal cream was as done according to the following parameters:

- 1) Physical evaluation: In this test, the cream's colour was examined, odour, texture, state.
- 2) Irritancy: Make a 1 cm² mark on the left dorsal surface. Then After applying the cream, the time was recorded. Then, for a period of up to 24 hours, it is examined for irritancy, erythema, and oedema, if any, and reported.
- 3) Washability: There was a modest quantity of cream applied on the hand and it is then washed with tap water.
- 4) pH: 0.5 g cream was taken and dispersed in 50 ml distilled water and then pH was measured by using digital pH meter.
- 5) Greasiness: Here the cream was utilised on the skin surface in the form of smear and checked if the smear was oily or grease-like.
- 6) Homogeneity: By visual and touch, the uniformity of the formulation was evaluated.
- 7) Viscosity: At a temperature of 25 °C and 2.5 RPM, the viscosity of cream was measured using a Brooke field.
- 8) Spreadability.: The time it takes for two glass slides to separate from cream is measured in seconds; the shorter the duration, the better the spread ability.
- 9) Test for microbial growth in formulated cream- The cream was tested for microbial growth using streak plate method agar media plates, then incubated at 37°C for 24 hours before comparison with the control

RESULT AND DISCUSSION

Analysis of Phytoconstituents:-

Table no 2:- Analysis of Phytoconstituents

Sr.no.	Test	Observation	Inference
1	1/3 Drops of NaOH + 2 ml of extract + few drops of HCL	Initially, a deep yellow colour appeared but it gradually became colourless upon adding HCL	flavonoids were present
2	Shinoda test 10drops of dil. HCL + piece of Magnesium + 1ml extract	deep pink colour	flavonoids were present
3	Litmus Test	Turn blue litmus paper red.	Phenolic acids were present
4	1ml extract + Ferric Chloride Solution	coloured complexes (red, blue, violet, or green)	Phenolic acids were present

Physical evaluation: In this test, the formulation's state, colour, odour, texture, and status were all examined

Table no.3:- Physical Evaluation

Sr. No	Specification	M1	M2
1	State	Semisolid	Semisolid
2	Colour	Greenish	Greenish
3	odour	Pleasant	Pleasant

Irritancy: Mark a 1cm² region on the left dorsal surface. After that, the cream was administered there, and the duration was recorded. Then, for a period of up to 24 hours, it is examined for irritancy, erythema, and oedema, if any, and reported. According to the result the formulation showed no sign of irritancy, erythema and oedema.

Table no.4: Irritancy

Sr. no	formulation	Irritancy effect
1	M1	No
2	M2	No

Washability:

Washability test was carried out by applying a small amount of cream on the hand and then washing it with tap water. Both formulations were easily washable.

Table no.5:- Washability

Sr. no	Formulation	Washability
1	M1	Easily washable
2	M2	Easily washable

pH: The results showed that the three formulations' PH values for FIH and F2H were closer to skin PH, allowing for safe application to the skin. The herbal preparation showed pH that was closer to what the skin needed. i.e., pH 6.8.

Table no.6:- pH

Sr. no	Formulation	pH
1	M1	6.3
2	M2	6.5

Viscosity: The viscosity was checked by Brookfield viscometer and was found to be as follows.

Table no.7:- Viscosity

Sr. no	Formulation	Viscosity
1	M1	2.8cps
2	M2	3.2cps

Greasiness: Here the cream was applied on the skin surface in the form of smear and checked if the smear was oily or grease-like. According to the results, we can say that the formulations were nongreasy.

Table no.8:- Greasiness

Sr. no	Formulation	Greasiness
1	M1	No greasy
2	M2	No greasy

Homogeneity: The formulation was tested for the homogeneity by visual appearance and by touch, appearance and touch was good.

Spread ability: The formulation was tested for the spread ability and was found spreadable.

Microbial test: Microbial testing of the formulated herbal cream showed no microbial growth, confirming its microbial safety.

CONCLUSION

The present study successfully formulated and evaluated a topical antioxidant cream incorporating Moringa oleifera leaf extract. The formulation demonstrated favorable physicochemical properties, including stability, spreadability, and pH compatibility with human skin. Phytochemical analysis confirmed the presence of potent antioxidant constituents such as flavonoids and phenolic compounds. Moringa-based cream shows significant free radical scavenging activity, indicating its potential in protecting the skin from oxidative stress and environmental damage. The findings support the use of Moringa oleifera as a natural, cost-effective, and safe alternative in cosmetic formulations for anti-aging and skin-protective benefits. In present study formulation M2 shows best results in all aspects.

REFERENCES

- 1) Anwar F, Latif S, Ashraf M, Gilani AH. 2007. Moringa oleifera: a food plant with multiple medicinal uses, *Phytother Res.* 21:17-25.
- 2) Asiedu-Gyekye II, Frimpong-Manso S, Awortwe C, et al. 2014. Micro- and macro elemental composition and safety evaluation of the nutraceutical Moringa oleifera leaves. *J Toxicol.* DOI: 10.1155/2014/786979.
- 3) BioresourTechnol 98: 232-236. Chuang PH, Lee CW, Chrou JY, et al. 2007. Anti-fungal activity of crude extracts and essential oils of Moringa oleifera Lam.
- 4) Posmontier B. The medicinal qualities of Moringa oleifera. *Holist. Nurs. Pract.* 2011; 25:80-87.
- 5) Mishra G., Singh P., Verma R., Kumar R.S., Srivastava S., Khosla R.L. Traditional uses, phytochemistry and pharmacological properties of Moringa oleifera plant: An overview. *Der Pharmacia Lettre.* 2011; 3:141-164.
- 6) Tejas G.H., Umang JH., Payal B.N., Tusharbinu D.R., Pravin T.R. A panoramic view on pharmacognostic, pharmacological, nutritional, therapeutic and prophylactic values of Moringa olifera Lam. *Int. Res. J. Pharm.* 2012; 3:1-7.
- 7) Zheng W., Wang S.Y. Antioxidant activity and phenolic compounds in selected herbs. *J. Agric. Food Chem.* 2001; 49:5165-5170.
- 8) Siddhuraju P., Becker K. Antioxidant properties of various solvent extracts of total phenolic constituents from three different agroclimatic origins of drumstick tree (Moringa oleifera Lam.) leaves. *J. Agric. Food Chem.*
- 9) Dubey D.K., Dora J., Kumar A., Gulsan R.K. A Multipurpose Tree-Moringa oleifera. *Int. J. Pharm. Chem. Sci.* 2013; 2:415-423.
- 10) Borel P., Preveraud D., Desmarchelier C. Bioavailability of vitamin E in humans: An update. *Nutr. Rev.* 2013; 71:319-331.
- 11) Sultana B, Anwar F, Ashraf M. Effect of extraction solvent/technique on the antioxidant activity of selected medicinal plant extracts. *Molecules.* 2009; 14: 2167-2180.
- 12) Anwar F, Latif S, Ashraf M, Gilani AH. Moringa oleifera: A Food Plant with Multiple Medicinal Uses. *Phytother Res.* 2007, 25-17-25.
- 13) Verma AR, Vijayakurral M, Mathela CS, Rao CV. In vitro and in vivo antioxidant properties of different fractions of Moringa oleifera leaves. *Food Chem Toxi-col.* 2009; 47: 2196-2201.
- 14) Dobrev H. Clinical and instrumental study of the efficacy of a new sebum control cream. *J Cosmetic Derma-tol.* 2006; 6:113-118.
- 15) Zhang L, Li W-hwa, Anthonavage M, Pappas A, Rossetti D, Cavender D. Melanocortin5 receptor and sebogenesis. *Euro J Pharmacol.* 2011; 660: 202-206.