

HERBAL SOAP FORMULATION FROM MORINGA OLEIFERA WITH VARIOUS  
EVALUATION STUDIES

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<https://doi.org/10.5281/zenodo.18440842>**How to cite this Article:** Yogesh Gansing Chavhan, Bhumika Eknath Pawar, Janhavi Sudhir Patil, Ritesh Shekhar Deshmukh, Mehul Sunil Nikumbh, Mr Satish B. Bramhne. (2026). Herbal Soap Formulation From Moringa Oleifera With Various Evaluation Studies. International Journal of Modern Pharmaceutical Research, 10(2), 46–51.**ABSTRACT**

Herbal soaps formulated using medicinal plant extracts are increasingly preferred due to their natural origin, skin compatibility, and therapeutic benefits. Moringa oleifera is a well-known medicinal plant rich in antioxidants, vitamins, and antimicrobial compounds, making it a suitable ingredient for herbal soap formulation. This review highlights the formulation approaches of Moringa oleifera-based herbal soaps, phytochemical properties, evaluation parameters, and comparative studies with conventional soaps. Emphasis is placed on physicochemical, antimicrobial, antioxidant, and stability evaluations to assess product quality and efficacy. This review provides consolidated information useful for researchers and formulators involved in herbal cosmetic development.

**KEYWORDS:** Herbal soap, Moringa oleifera, formulation, evaluation studies, antimicrobial activity, antioxidant properties.**INTRODUCTION**

Herbal soaps are cosmetic cleansing agents prepared using plant-based oils, extracts, and bioactive compounds without the addition of synthetic surfactants or harsh chemicals. These soaps offer advantages such as biodegradability, minimal skin irritation, and therapeutic benefits, making them suitable for sensitive skin. The growing awareness of the harmful effects of synthetic cosmetic ingredients has increased consumer demand for herbal and natural personal care products worldwide.<sup>[3,4]</sup>

Moringa oleifera, commonly known as the drumstick tree, belongs to the family Moringaceae and is widely cultivated in tropical and subtropical regions. Almost all parts of the plant, including leaves, seeds, and pods, possess nutritional and medicinal value. Due to its antimicrobial, antioxidant, anti-inflammatory, and moisturizing properties, Moringa oleifera has gained attention as an active ingredient in herbal cosmetic formulations, particularly soaps.<sup>[5,6]</sup>

**1. PHYTOCHEMICAL PROFILE OF MORINGA OLEIFERA**

The biological activity of Moringa oleifera is attributed

to its rich phytochemical composition, including flavonoids, phenolic acids, alkaloids, saponins, vitamins, and minerals. These compounds play a crucial role in protecting skin from oxidative stress and microbial infections. The leaves of Moringa oleifera are especially rich in quercetin and kaempferol, which exhibit strong antioxidant properties beneficial for skin health.<sup>[7,8]</sup>

Moringa seed oil contains high levels of oleic acid, palmitic acid, and linoleic acid, which contribute to excellent moisturizing and emollient properties. These fatty acids enhance skin hydration, improve barrier function, and prevent dryness, making moringa oil suitable for soap base formulation.<sup>[9,10]</sup>

**2. FORMULATION OF HERBAL SOAP USING MORINGA OLEIFERA**

Herbal soap formulation typically involves the saponification process, where vegetable oils or fats react with alkali to produce soap and glycerin. In moringa soap formulations, extracts or oils from leaves or seeds are incorporated to impart medicinal properties. Ethanolic or aqueous extracts are commonly used due to their ability to preserve bioactive compounds.<sup>[11,12]</sup>

Cold process soap making is widely preferred for herbal formulations because it minimizes thermal degradation of heat-sensitive phytoconstituents. The addition of *Moringa oleifera* extract during the cooling phase ensures

maximum retention of antioxidant and antimicrobial activity. Natural additives such as essential oils may also be incorporated to enhance fragrance and therapeutic efficacy.<sup>[13,14]</sup>



### 3. EVALUATION STUDIES OF HERBAL SOAP

#### 3.1 Physicochemical Evaluation

Physicochemical evaluation is essential to assess the quality, stability, and safety of herbal soaps. Parameters such as pH, moisture content, total fatty matter, foam height, and foam stability are commonly evaluated. Herbal soaps formulated with *Moringa oleifera* have been reported to exhibit pH values within acceptable limits, ensuring compatibility with skin and minimizing irritation.<sup>[15,16]</sup>

Foam stability and cleansing efficiency are important consumer-related parameters. Studies indicate that moringa-based soaps show satisfactory foaming properties due to the presence of fatty acids and natural saponins. Adequate moisture content also contributes to improved shelf life and reduced cracking of soap bars.<sup>[17,18]</sup>

#### Physicochemical Evaluation Parameters of *Moringa oleifera* Herbal Soap

##### 1. Determination of pH

The pH of herbal soap is determined to assess skin compatibility and safety. A 1% w/v soap solution is prepared by dissolving a weighed amount of soap in distilled water. The pH is measured using a calibrated digital pH meter at room temperature. A pH range of 5.5–7.5 is considered suitable for topical application, as extreme pH values may cause skin irritation or dryness. *Moringa oleifera* herbal soaps generally exhibit pH

values within acceptable cosmetic limits.<sup>[46,47]</sup>

##### 2. Moisture Content

Moisture content determines the hardness, shelf life, and microbial stability of soap. A known weight of soap sample is dried in a hot air oven at 105 °C until a constant weight is obtained. The percentage loss in weight represents the moisture content. Lower moisture content improves product stability and prevents microbial growth, while excessive moisture may cause soap softening and cracking.<sup>[48,49]</sup>

##### 3. Total Fatty Matter (TFM)

Total fatty matter is an important quality parameter that indicates the cleansing efficiency and skin conditioning property of soap. TFM is determined by acidifying the soap solution and extracting fatty acids using organic solvents such as petroleum ether. Higher TFM values indicate better moisturizing and mild cleansing properties. Herbal soaps with higher TFM are considered superior in quality compared to low-TFM synthetic soaps.<sup>[50,51]</sup>

##### 4. Foam Height and Foam Stability

Foam height and stability are evaluated to assess cleansing performance and consumer acceptability. A known quantity of soap solution is shaken in a graduated cylinder for a fixed time, and foam height is measured immediately. Foam stability is determined by measuring

foam height after a specified interval. *Moringa oleifera* herbal soaps show satisfactory foam formation due to the presence of natural fatty acids and saponins.<sup>[52,53]</sup>

### 5. Hardness Test

Soap hardness is evaluated to determine mechanical strength and durability during use. The test is performed by applying pressure manually or using a penetrometer to assess resistance to deformation. Adequate hardness ensures slower wear and longer shelf life. The presence of palm oil and controlled moisture content contributes to acceptable hardness in moringa herbal soaps.<sup>[54,55]</sup>

### 6. Alcohol-Insoluble Matter

Alcohol-insoluble matter represents non-soap substances such as fillers or impurities present in soap. The soap sample is dissolved in hot ethanol, filtered, and the residue is dried and weighed. Lower alcohol-insoluble matter indicates higher purity and better quality of the soap formulation.<sup>[56,57]</sup>

### 7. Free Alkali Content

Free alkali content is measured to ensure the soap does not cause skin irritation. The soap solution is titrated with standard acid using phenolphthalein as an indicator. Excess free alkali indicates incomplete saponification and may cause skin damage. Properly formulated *Moringa oleifera* herbal soaps show negligible free alkali content.<sup>[58,59]</sup>

### 8. Rancidity Test

Rancidity testing is performed to detect oxidative degradation of fats and oils in soap. The peroxide value or Kreis test is commonly used to assess rancidity. The presence of natural antioxidants in *Moringa oleifera* helps prevent oxidative deterioration, thereby enhancing product stability and shelf life.<sup>[60,61]</sup>

### 3.2 Antimicrobial Activity

The antimicrobial activity of *Moringa oleifera*-based herbal soaps is evaluated against common skin pathogens such as *Staphylococcus aureus*, *Escherichia coli*, and *Pseudomonas aeruginosa*. Agar well diffusion and minimum inhibitory concentration methods are commonly employed. Results indicate that moringa soap formulations exhibit significant antimicrobial effects compared to plain

soap bases.<sup>[19,20]</sup>

The antimicrobial efficacy is attributed to bioactive compounds such as isothiocyanates, flavonoids, and phenolics present in *Moringa oleifera*. These compounds disrupt microbial cell membranes and inhibit bacterial growth, making the soap effective for maintaining skin hygiene and preventing infections.<sup>[21]</sup>

### 3.3 Antioxidant Activity

Antioxidant activity is evaluated using assays such as DPPH and ABTS radical scavenging methods. Moringa-enriched herbal soaps demonstrate strong antioxidant activity, which helps neutralize free radicals and protects skin from oxidative damage. This property contributes to anti-aging and anti-inflammatory effects.<sup>[22,23]</sup>

### 4. STABILITY AND SAFETY STUDIES

Stability studies are conducted to evaluate the physical appearance, pH, fragrance, and consistency of herbal soaps under different storage conditions. *Moringa oleifera*-based soaps have shown good stability with minimal changes over time. Safety assessments, including skin irritation and patch tests, indicate that these soaps are non-irritant and safe for regular use.<sup>[24,25]</sup>

Chemical stability is evaluated by monitoring rancidity, oxidative degradation, and loss of bioactive compounds during storage. The presence of natural antioxidants in *Moringa oleifera* helps retard lipid oxidation, thereby enhancing product stability. Microbial stability testing ensures that the soap remains free from microbial contamination throughout its shelf life. These results support the suitability of moringa-based soaps for long-term storage under normal conditions.<sup>[44,45]</sup>

### 5. COMPARISON WITH COMMERCIAL SOAPS

Comparative studies between moringa herbal soaps and commercial synthetic soaps reveal that herbal formulations offer superior antioxidant and antimicrobial benefits. Although commercial soaps may show higher foaming due to synthetic surfactants, herbal soaps provide better skin nourishment and environmental sustainability due to their biodegradable nature.<sup>[26,27]</sup>



**Ingredient Composition of *Moringa oleifera* Herbal Soap**

Ingredient	Typical Quantity (% w/w)	Function in Soap Formulation
Coconut oil	25–30	Provides cleansing action and rich foam; contributes to hardness of the soap bar
Olive oil	20–25	Acts as a natural moisturizer; improves skin conditioning and mildness
Palm oil	15–20	Enhances structural integrity and durability of the soap
Sodium hydroxide (NaOH)	q.s. (as required)	Alkali used for saponification of oils into soap
<i>Moringa oleifera</i> leaf extract	3–5	Imparts antimicrobial, antioxidant, and skin-protective properties
<i>Moringa oleifera</i> seed oil	5–8	Acts as an emollient; improves moisturizing and nourishing effect
Distilled water	10–15	Solvent for alkali and facilitates saponification process
Glycerin (in situ)	—	Formed during saponification; provides humectant and moisturizing effect
Essential oil (e.g., lavender/tea tree)	0.5–1.0	Enhances fragrance and adds mild therapeutic properties
Natural colorant (optional)	q.s.	Improves visual appearance without affecting skin safety

**6. Role of Natural Additives in Moringa Soap Formulation**

Apart from *Moringa oleifera* extracts, natural additives such as glycerin, honey, aloe vera gel, and essential oils can be incorporated into herbal soap formulations to enhance moisturizing, soothing, and antimicrobial properties. These additives improve skin hydration, reduce transepidermal water loss, and enhance consumer acceptability of the final product.<sup>[30,31]</sup>

**7. Skin Compatibility and Dermatological Benefits**

*Moringa oleifera*-based herbal soaps exhibit excellent skin compatibility due to the presence of natural antioxidants and fatty acids. These components help maintain the skin’s natural lipid barrier, reduce inflammation, and protect against environmental stressors. Regular use of moringa soap may help manage skin conditions such as acne, eczema, and mild fungal infections.<sup>[32,33]</sup>

**8. Environmental and Economic Advantages**

Herbal soaps formulated with *Moringa oleifera* are biodegradable and environmentally safe compared to synthetic soaps containing petrochemical surfactants. The cultivation of moringa is cost-effective and sustainable, making it an economically viable raw material for small-scale and rural cosmetic industries. This supports eco-friendly production and promotes green chemistry principles.<sup>[34,35]</sup>

**G. Standardization and Quality Control Challenges**

Despite the benefits of herbal soaps, variability in phytochemical content due to differences in plant source, harvesting time, and extraction methods poses challenges in standardization. Establishing quality control parameters such as extract fingerprinting, batch-to-batch consistency, and stability profiling is essential for commercial acceptance and regulatory approval.<sup>[36,37]</sup>

**10. Regulatory Considerations for Herbal Soaps**

Herbal soaps are regulated under cosmetic guidelines in many countries. Compliance with regulatory standards

such as labeling requirements, safety assessments, microbial limits, and stability testing is necessary before commercialization. In India, herbal soaps fall under cosmetic regulations governed by the Drugs and Cosmetics Act, ensuring consumer safety and product quality.<sup>[38,39]</sup>

### 11. Consumer Acceptability and Sensory Evaluation

Sensory evaluation parameters such as color, fragrance, texture, lather quality, and after-wash feel significantly influence consumer preference. Studies indicate that moringa herbal soaps show good consumer acceptance due to their natural color, mild fragrance, and non-drying effect on the skin. Sensory analysis complements physicochemical evaluation in determining product success.<sup>[40,41]</sup>

### 12. Future Prospects and Research Scope

Future research should focus on nano-encapsulation of *Moringa oleifera* extracts to enhance stability and controlled release of bioactive compounds in soap formulations. Additionally, clinical studies and long-term safety evaluations can further validate the therapeutic claims and promote wider industrial adoption of moringa-based herbal soaps.<sup>[42,43]</sup>

### CONCLUSION

Herbal soap formulation using *Moringa oleifera* offers a natural, safe, and effective alternative to synthetic soaps. The presence of bioactive phytochemicals enhances antimicrobial, antioxidant, and moisturizing properties, contributing to improved skin health. Evaluation studies confirm that moringa-based soaps meet acceptable physicochemical and safety standards. Further research focusing on large-scale production and clinical evaluation may promote wider commercial application of *Moringa oleifera*-based herbal soaps.<sup>[28,29]</sup>

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