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STUDIES ON EVOLUTION AND FORMULATION OF DIFFERENT TYPES OF HERBAL SOAPS USING *MORINGA OLEIFERA* OIL THROUGH THE MELT AND POUR METHOD

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ABSTRACT

The present study aimed to create and evaluate different types of herbal soaps using *Moringa oleifera* oil through the melt and pour method. These soaps were formulated with the intention to address various skin conditions such as eczema and acne, while potentially enhancing the immune response in affected skin areas. The formulations included *Moringa oleifera* oil, herbal powders, essential oils, fragrance oils (based on types like Lemon, Rose, Neem-Tulasi, Honey and Mogra), *Aloe vera* gel and Vitamin E.

The study's results indicated certain physical and chemical properties of the herbal soap formulations. For instance: The average moisture content of the soap was 6%. The pH level was measured at 8%. The foaming height reached 18cm, with a foam retention time of 5 minutes. Antimicrobial evaluation tests suggested that the herbal soap exhibited satisfactory results compared to standard antibiotics. These results suggest that the herbal soaps created in your study could be considered suitable for human skin. They may offer potential benefits in treating various skin infections and could be used for daily skincare routines. However, it's important to note that while your findings are promising, further studies or clinical trials may be needed to validate these results, ensure safety and confirm the efficacy of these herbal soaps on a larger scale and in various skin types.

Key words : *Moringa oleifera*, Herbal soap, Melt and Pour method.

Introduction

The skin, our body's outermost layer, serves as a primary defense against a myriad of infections (Gana Manjusha *et al.*, 2019). Constantly exposed to environmental stimuli, it shields us from the sun's rays, pollution, and viral threats, making it vulnerable to injury (Panich *et al.*, 2016). Damaged skin in its healing process often develops scar tissue, typically characterized by discoloration and depigmentation. For over 6,000 years, soaps have been integral in addressing different skin-related issues such as eczema, warts, acne, rashes, psoriasis and allergies. Originating from the ancient Babylonians, the creation of soap involved a blend of animal fats, wood ash and water, marking the advent of "soap" itself. Saponification, a fundamental method in

soap production, involves the reaction of fats or oils with a base or lye, leading to the distinction between solid soaps using NaOH and liquid soaps using KOH. However, chemical soaps are notorious for promoting skin irritation and dryness (Gillespie and Bamford, 2003). To mitigate the negative effects of synthetic chemicals, the avoidance of hazardous substances in soap formulations is preferred.

Ayurvedic cosmetics, also known as herbal cosmetics (Nielsen, 2016), integrate natural components that typically exhibit minimal to no adverse effects on the human body. Herbal preparations, featuring antibacterial and antifungal properties, derive from plant parts like leaves, stems, roots and fruits, serving to heal ailments and maintain well-being (Bornare Pratiksha *et al.*, 2021). In recent years, the shift towards plant-based natural

ingredients has replaced synthetic elements in skincare products, offering improved biological properties and fewer side effects associated with chemical counterparts. Noteworthy natural ingredients commonly found in skincare products include coconut oil, Neem oil, olive oil, turmeric, sandalwood, jasmine and lemon essence (Tanwar and Sachdeva, 2016; Mondal and Kolhapure, 2004; Joshi *et al.*, 2008; Luximon *et al.*, 2002; Souwalak *et al.*, 2004; Priya *et al.*, 2010 and Uphadek *et al.*, 2018). However, the comprehensive exploration of *Moringa oleifera* oil within this context remains relatively uncharted. Hence, this investigation aims to delve into the “Studies on Evolution and Formulation of Different Types of Herbal Soaps using *Moringa oleifera* oil.” This herbal soap formulation seeks to provide effective prevention against various skin-related issues without adverse side effects.

Moringa (Moringa oleifera), also known as the horseradish tree or drumstick tree, belonging to the family Moringaceae is a small deciduous tree native to tropical Asia, widely naturalized in Africa and tropical America. Its flowers, pods, leaves and even twigs are consumed as food. The leaves, particularly when young and raw, offer exceptional nutrition, being rich in iron, potassium, and vitamin C. Additionally, a horseradish-flavored condiment is crafted from the crushed roots of the tree.

Moringa oil is derived from the seeds and comprises numerous beneficial nutrients for health, hair care, and skin care: Vitamin E: Possessing anti-inflammatory properties, it supports healthy skin and hair, fortifies the body’s immune system, enhances cell function, and contributes to overall skin health. Vitamin A: Boosts collagen production in the skin by stimulating blood flow to the skin’s surface. Vitamin C and Phenols: Act as potent antioxidants, safeguarding DNA from free radicals, reducing fine lines and aiding in the repair of sun-induced skin cell damage. Cytocytokinins (zeatin): A robust plant growth hormone found in *Moringa* oil, promoting cellular growth and retarding the aging process by nurturing and supporting cell tissue. Fatty acids (high content of monosaturated oleic acid - omega 9): Enhance the skin’s natural protective barrier, retaining skin hydration, fullness, and a more youthful appearance (Uphadek *et al.*, 2018; Torondel, Belen *et al.*, 2014; Okiki *et al.*, 2017).

Materials and Methods

Collection of Materials

Soap base, Essential materials including *Aloe vera* gel, *Moringa* Essential oil, Lemon oil, Rose oil, Neem oil, soap dye, Neem powder, Tulsi Powder, Charcoal powder, Honey, and 99% Isopropyl rubbing alcohol in a spray



Plate 1 : Moringa plant with Fruits, Seeds and Seed Oil.

bottle to remove bubbles from the soap’s surface after pouring into molds sourced from the local market in Ichalkaranji.

Apparatus

Digital weighing balance. Double boiler for melting ingredients. Spoon for mixing. Silicon soap molds in various shapes and sizes (100gms). Cling wrap for packaging.

Formulation of Herbal Soaps

Lemon Herbal Soap (F1) : *Moringa oleifera* oil combined with Lemon oil for its antioxidant properties that combat free radicals, prevent premature aging, cleanse and nourish the skin. Lemon oil helps improve skin tone, clear infections, lighten dark spots and blemishes, reduce excess oiliness and act as a blackhead remover.

Rose Herbal Soap (F2) : *Moringa oleifera* oil paired with Rose oil known for its antibacterial properties



Lemon soap



Rose soap



Nim-Tulasi soap



Honey soap



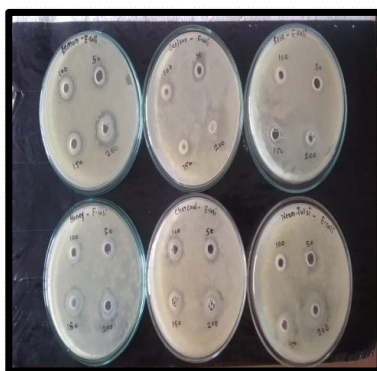
Mogra-Charcoal



Melting of ingredients



Molds



Test for anti microbial property



Working students

Plate 2 : Prepared Formulations of different Herbal Soaps.

effective in treating acne, reducing skin redness, and possessing anti-aging benefits.

Honey Herbal Soap (F3) : *Moringa oleifera* oil combined with honey for its deep moisturizing, hydration, and anti-aging properties. Honey serves as an effective pore cleanser, diminishes signs of premature aging, lightens scars and hyper pigmentation, relieves sunburn, and fights acne.

Neem-Tulsi Herbal Soap (F4) : *Moringa oleifera* oil with Neem-Tulsi powder and Neem essential oil. Neem's antibacterial properties combat acne-causing bacteria, control oil production, benefit sensitive skin,

provide antioxidants and Vitamin E for anti-aging treatment, remove dark spots, even skin tone, and address blackheads and whiteheads. Tulsi helps clear blemishes, prevent premature aging, and combat acne.

Mogra-Charcoal Herbal Soap (F5) : *Moringa oleifera* oil paired with Activated charcoal powder. Activated charcoal repairs, heals, and brightens skin texture, improves natural skin glow, evens skin texture by reducing pigmentation, itching, acne and pimples.

Common Ingredients in All Formulations

Aloe vera gel and Vitamin E are consistently used across all formulations for their moisturizing properties,

ability to alleviate skin itching, reduce infections, acne, blemishes, control fine lines, wrinkles and improve overall skin condition.

Benefits of Melt and Pour Method

- **Avoidance of Caustic Chemicals:** This method eliminates the need to handle caustic chemicals involved in traditional soap-making processes like cold processing.
- **Elimination of Curing Period:** Unlike cold-processed soaps that require a curing period, melt and pour soaps are ready to use immediately after remolding, saving time and allowing for instant use.

Procedure

- **Preparation of Soap Base:** Accurately weigh and cut the transparent soap base into approximately 1-inch chunks.
- **Melting the Soap Base:** Utilize the double boiler method to melt the soap base until it liquefies completely.
- **Addition of Ingredients:** While the soap base is melted, incorporate the herbal powder, Aloe vera gel, Vitamin E, Moringa oil, and essential oil, ensuring precise measurements while stirring continuously.
- **Pouring into Molds:** Carefully pour the liquid soap mixture into the soap molds, ensuring a smooth and even distribution. Spritz the surface of the soap with rubbing alcohol to eliminate any bubbles that may have formed.
- **Cooling Process:** Place the soap-filled molds in the refrigerator for approximately one hour to facilitate complete cooling and solidification.
- **Removal and Finalization:** Once cooled, remove the soap from the molds. The soap is now ready for use.

Evaluation of Prepared Formulations

- **Organoleptic Characteristics:** Assessment of appearance, aroma, color and taste of natural substances. Aids in identifying natural substance properties and assessing patient acceptability. Changes in color or odor may indicate formulation stability issues.
- **pH Determination:** Utilized a digital pH meter to measure the pH of all formulations. Formulations diluted in 100 ml of distilled water, refrigerated for two hours, then pH measured.

- **Skin Irritation Test:** Subjected the herbal soap composition to a skin irritancy test. Observed the formulation for 24 hours, checking for any irritancy or redness.
- **Anti Microbial Test:** Conducted against two bacteria *E. coli* and *Bacillus*, by disk diffusion method. In this method, nutritional agar medium plates were seeded with 100, 1 of suspension of each microbe, containing around 100–150 CFU/ml. After being dried and sanitized, filter paper discs (6 mm in diameter) soaked in 400 g of test solution were gently placed on the agar plates. The antibacterial activity of the extracts was assessed following a 24-hour incubation period at 37°C by measuring the diameter of the zone of inhibition in millimeters.
- **Test for Washing Capability:** Evaluated the ease with which the herbal soap could be washed off with water
- **Foam Ability:** Dissolved approximately 1.0 gm of herbal soap in distilled water and agitated for 10 minutes. Measured the foam height and calculated the mean from five consecutive experiments.
- **Foam Retention Time:** Measured the duration of soap foam retention after the same agitation process.
- **Moisture Content:** Determined the percentage of water in the soap by comparing the wet and dry weights after drying the sample in a dryer at temperatures of 100 to 150 degrees Celsius.
- **Stability Test:** Conducted a one-month stability test on the optimized formulation. Exposure to different conditions such as 40 °C, 2 °C, 75% RH, and 5% RH to assess chemical and physical stability over time. Stability tests align with guidelines like the International Conference on armonization (ICH) guidelines for stability testing of new drug substances and products.

Results and Discussion

The obtained results are summarized in Tables 1-3. Five soaps of 100g each is used for testing of different formulations.

- **pH Determination:** pH values of all formulations ranged from 8.5 to 9.0, which falls within the ideal pH range for soap (alkaline pH), ensuring compatibility with skin.
- **Skin Irritation Test:** No irritancy or redness

Table 1 : Composition of formulations.

S. no.	Ingredients	Formulation Code				
		F1(Lemon)	F2(Rose)	F3(Honey)	F4(Nim-Tulasi)	F5(Mogra-Charcoal)
1	Transparent soap base	94gm	94 gm	94 gm	94 gm	94 gm
2	Herbal powder	2 gm	2 gm	2 gm	2 gm	2 gm
3	Aloe vera gel	2 gm	2 gm	2 gm	2 gm	2 gm
4	Moringa seed oil	1 gm	1 gm	1 gm	1 gm	1 gm
5	Organ oil (vit. E)	0.5 gm	0.5 gm	0.5 gm	0.5 gm	0.5 gm
6	Essential oil (fragrance)	0.5 gm	0.5 gm	0.5 gm	0.5 gm	0.5 gm
Total	100 gm	100 gm	100 gm	100 gm	100 gm	

Table 2 : Evaluation of Prepared Formulations.

S. no.	Formulation No.	PH test	Skin Irritant	Antimicrobial activity	Wash ability	Foam forming ability	Retention time of foam	Moisture content
1	F1(Lemon)	8.5	Non-irritant	Present	Good	20 cm	6min.	5%
2	F2(Rose)	8.6	Non-irritant	Present	Good	20 cm	6min.	6%
3	F3(Honey)	8.5	Non-irritant	Present	Good	15 cm	5min.	6%
4	F4(Nim-Tulasi)	8.7	Non-irritant	Present	Good	18 cm	4min.	7%
5	F5(Mogra-Charcoal)	9.0	Non-irritant	Present	Good	15 cm	6min.	6%

Table 3 : Determination of Stability studies.

S. no.	Formulation No.	Appearance		Feel on application		Foam index		Moisture Content	
		Initial	After one month	Initial	After one month	Initial	After one month	Initial	After one month
1	F1(Lemon)	Pale yellow	Pale yellow	Smooth	Smooth	20 cm	20 cm	5%	6%
2	F2(Rose)	Pale Pink	Pale Pink	Smooth	Smooth	20 cm	20 cm	6%	7%
3	F3(Honey)	Pale Brown	Pale Brown	Smooth	Smooth	15 cm	15 cm	6%	7%
4	F4(Nim-Tulasi)	Pale Green	Pale Green	Smooth	Smooth	18 cm	18 cm	7%	8%
5	F5(Mogra-Charcoal)			Smooth	Smooth	15 cm	15 cm	6%	6%

was observed after a 24-hour evaluation period, indicating the formulations did not cause skin irritation.

- **Antimicrobial Activity:** Results of antimicrobial activity evaluations for all formulations are presented in Table 2.
- **Wash Ability Evaluation:** The soap's efficacy in cleaning was tested using wool yarn, results are detailed in Table 2.
- **Foam-Forming Ability:** All five soap formulations exhibited similar foam-forming ability in distilled water, with a foam height range of 15-20 cm, as detailed in Table 2.
- **Foam Retention Time:** The foam retention time for herbal soap formulation F3 was determined to be 6 minutes, consistent with other formulations as indicated in Table 2.

- **Moisture Content:** The moisture content across all five soap compositions, including formulation F3, was approximately 6%, as presented in Table 2.

- **Stability Studies:** Conducted stability tests according to ICH guidelines with modifications for accelerated testing. Assessed physical appearance, feel on application, foam index, and moisture content, results are detailed in Table 3.

This study aimed to create herbal soaps utilizing moringa oil, targeting antiwrinkle, skin whitening, anti-acne and moisturizing properties. The formulations were assessed to determine their effectiveness while preserving the phyto constituents responsible for antibiotic activities. Findings from the study indicate that the essential properties of the formulations, including their antibiotic activities, remained intact without degradation or

destruction. The evaluations conducted, aligning with ICH standards, encompassed various parameters such as appearance, pH, moisture content, foam formation, foam retention time and stability.

Moreover, the physical compatibility tests revealed no color changes, signifying compatibility between the moringa oil and other recipients utilized in the formulations. These results underscore the potential of herbal soaps containing moringa oil as promising formulations, exhibiting desirable properties and maintaining the integrity of their active constituents, contributing to their potential efficacy in skincare applications. These findings are in related with the findings of Uphadek *et al.* (2018), Torondel, Belen *et al.* (2014), Okiki *et al.*, (2017).

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