

"FORMULATION AND EVALUATION OF MORINGA OLEIFERA MOISTURIZER"

¹Nandini Sutar, ²Shubhangi Jadhav, ³Mubina Shaikh, ⁴Dr. Mahesh Thorat, ⁵Dr. Dhanraj Jadge.

¹Student, ²Student, ³Student, ⁴Associate Professor, ⁵Principal

Womens college of pharmacy, Peth-Vadgaon.

ABSTRACT :-

The goal of the current study was to create and assess a herbal moisturiser that included extract from Moringa oleifera leaves along with vitamin C, kojic acid, niacinamide, and vitamin B12. Because herbal cosmetic treatments are safer, more effective, and have less adverse effects than synthetic products, they are extensively used. For skin care applications, Moringa oleifera's antioxidant, anti-inflammatory, antibacterial, anti-aging, and moisturising qualities are advantageous.

Stearic acid, cetyl alcohol, glycerin, liquid paraffin, preservatives, and purified water were used in the emulsification process to create the moisturiser cream. Different quantities of active substances were used to create three formulations (F1, F2, and F3). The organoleptic characteristics, homogeneity, pH, spreadability, washability, viscosity, irritancy, microbiological stability, and in-vitro occlusivity of the produced formulations were assessed.

Every formulation demonstrated good homogeneity and stability along with acceptable physicochemical attributes. F2 had the best spreadability, viscosity, and occlusivity factor (61.36%) of all the formulations, suggesting that it had the best moisturising potential. According to the study's findings, Moringa oleifera extract can be effectively added to a stable herbal moisturiser formulation for topical use.

Index terms :- Moringa oleifera, Herbal moisturizer, Vitamin C, Niacinamide, Kojic acid, Skin hydration, Antioxidant.

1. INTRODUCTION :-

The largest and outermost organ in the human body, the skin acts as the first line of defence against dangerous environmental elements like UV radiation, pollution, microbes, toxins, and physical trauma. It is essential for preserving body temperature, limiting excessive water loss, and shielding internal tissues from harm. Dryness, roughness, inflammation, early ageing, and pigmentation of the skin can result from prolonged exposure to environmental stressors, severe weather, dust, and

chemicals. Therefore, maintaining healthy skin function and look requires regular skin care and skin hydration.

Topical medicines known as moisturisers are used to boost the skin's moisture content and stop transepidermal water loss. They support the preservation of skin's flexibility, smoothness, elasticity, and softness. By keeping water in the stratum corneum, moisturisers enhance hydration and provide a barrier over the skin's surface. Because they are non-greasy, readily spreadable, aesthetically pleasing, and appropriate for everyday use, cream-based moisturisers are frequently chosen. Moisturisers may also offer other advantages like nourishment, skin restoration, anti-aging properties, and defence against oxidative stress, depending on their composition.

Due to growing knowledge of the negative consequences of synthetic cosmetics, herbal cosmetics have become incredibly popular in recent years. Herbal formulations are said to be more affordable, eco-friendly, biocompatible, and safer. Alkaloids, flavonoids, tannins, glycosides, phenolic compounds, vitamins, minerals, and antioxidants are among the many bioactive components found in medicinal plants that have both medicinal and cosmetic qualities that are advantageous for skin care applications. Herbal components naturally nourish the skin while lowering the risk of allergic reactions and irritation that are frequently linked to synthetic chemicals.

Because of its nutritional and therapeutic value, *Moringa oleifera* has garnered significant scientific interest among medicinal plants. *Moringa oleifera*, also referred to as the drumstick tree or miracle tree, is a member of the Moringaceae family. Nearly every part of the plant has therapeutic significance, including the leaves, seeds, flowers, pods, and roots. Vitamins A, C, and E, proteins, amino acids, minerals, flavonoids, and polyphenols are all abundant in *Moringa oleifera* leaves. These components have anti-aging, anti-inflammatory, wound-healing, antioxidant, antibacterial, and moisturising properties. *Moringa* leaves contain antioxidants that help shield the skin from oxidative damage brought on by free radicals, which are mostly to blame for early ageing and skin degradation.

Moringa oleifera's antioxidant qualities aid in reducing reactive oxygen species and enhancing skin health. Its antibacterial qualities aid in preventing microbial infections and the development of acne, while its anti-inflammatory activity lessens skin irritation, redness, and swelling. *Moringa*'s vitamins and vital nutrients promote hydration, collagen production, skin nourishment, and the repair of damaged skin cells. As a result, *Moringa oleifera* leaf extract is regarded as a superior herbal component for pharmaceutical and cosmetic skin care products.

Apart from *moringa* extract, a number of active compounds are frequently utilised in cosmetic formulations to improve the appearance of skin and offer therapeutic advantages. Strong antioxidants like vitamin C promote the production of collagen, increase skin suppleness, lessen pigmentation, and shield skin from oxidative damage. Additionally, it lessens dullness and improves the complexion. A naturally occurring skin-lightening agent, kojic acid helps lessen hyperpigmentation, dark patches, acne scars, and uneven skin tone by preventing the formation of melanin. Vitamin B3, or niacinamide, lowers inflammation, minimises enlarged pores, controls excess oil production, improves skin barrier function, and improves skin texture. Skin regeneration, healing, and general health are all supported by vitamin B12.

Moringa oleifera extract may have synergistic effects with vitamin C, kojic acid, niacinamide, and vitamin B12, including increased moisturising action, antioxidant protection, skin whitening, anti-aging advantages, and better skin nourishing. In addition to lessening pigmentation and dryness, such a composition may help preserve healthy, smooth, moisturised, and radiant skin.

The creation and assessment of a herbal moisturiser cream comprising *Moringa oleifera* leaf extract, vitamin C, kojic acid, niacinamide, and vitamin B12 is the main objective of this study. A variety of physicochemical characteristics, such as appearance, colour, odour, homogeneity, pH, spreadability, washability, viscosity, microbiological stability, irritancy, and in-vitro occlusivity, were assessed for several formulations made with appropriate excipients. The goal of the project is to create a herbal moisturiser that is safe, effective, stable, and aesthetically pleasing for topical use. Researchers are investigating medicinal plants for cosmetic formulations due to the growing demand for natural and herbal skin care products in the pharmaceutical and cosmetic industries. Compared to synthetic formulations, herbal moisturisers have a number of advantages, including hydration, nourishment, defence against oxidative damage, and less adverse effects.

Thus, the creation of a herbal moisturiser based on *Moringa oleifera* may offer a more efficient, affordable, and secure option for managing skin care.

❖ **Scientific Classification :-**

- Kingdom :- Plantae
- Clade :- Tracheophytes
- Clade :- Angiosperm
- Clade :- Eudicots
- Clade :- Rosids
- Order :- Brassicales
- Family :- Moringaceae
- Genus :- Moringa
- Species :- *Moringa oleifera*
- Binominal name :- *Moringa oleifera*



Fig 1 :- Moringa Flower



Fig 2 :- Pods



Fig 3 :- Moringa seeds
of *Moringa oleifera*



Fig 4:-:- Foliage



Fig 5 :- MORINGA OLEIFERA LEAF

2. MATERIALS AND METHODS

Materials

Active Ingredients

- Moringa oleifera extract
- Vitamin C
- Niacinamide
- Kojic acid
- Vitamin B12

Excipients

- Stearic acid
- Cetyl alcohol
- Liquid paraffin
- Glycerin
- Methyl paraben
- Propyl paraben
- Purified water

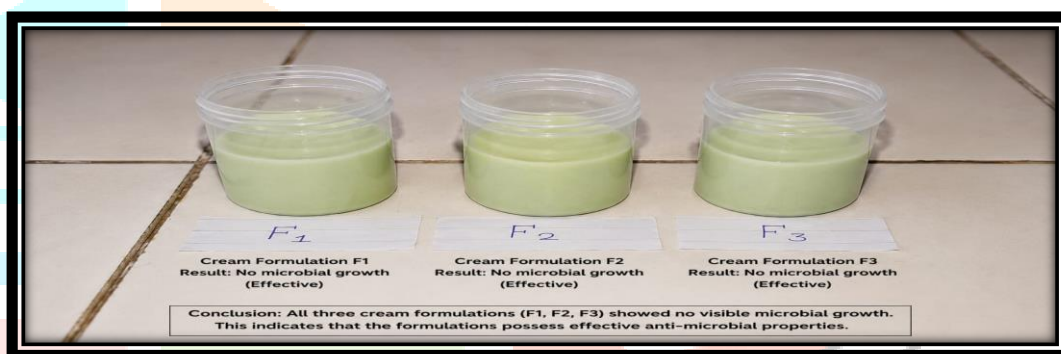
Extraction Method :-

Maceration Method :-

Moringa oleifera leaves were harvested from the Hupari region and shade-dried for 14 days. The dried leaves were ground into a powder and extracted using the maceration process with ethanol. For 72 hours, 25 g of powdered leaves were steeped in ethanol while being shaken periodically. Whatman filter paper and muslin cloth were used to filter the mixture. Concentrated extract was obtained by evaporating the filtrate.

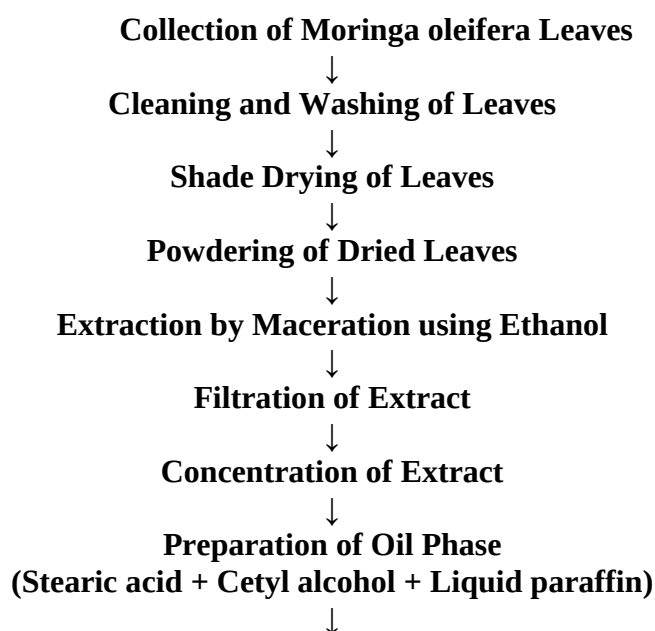


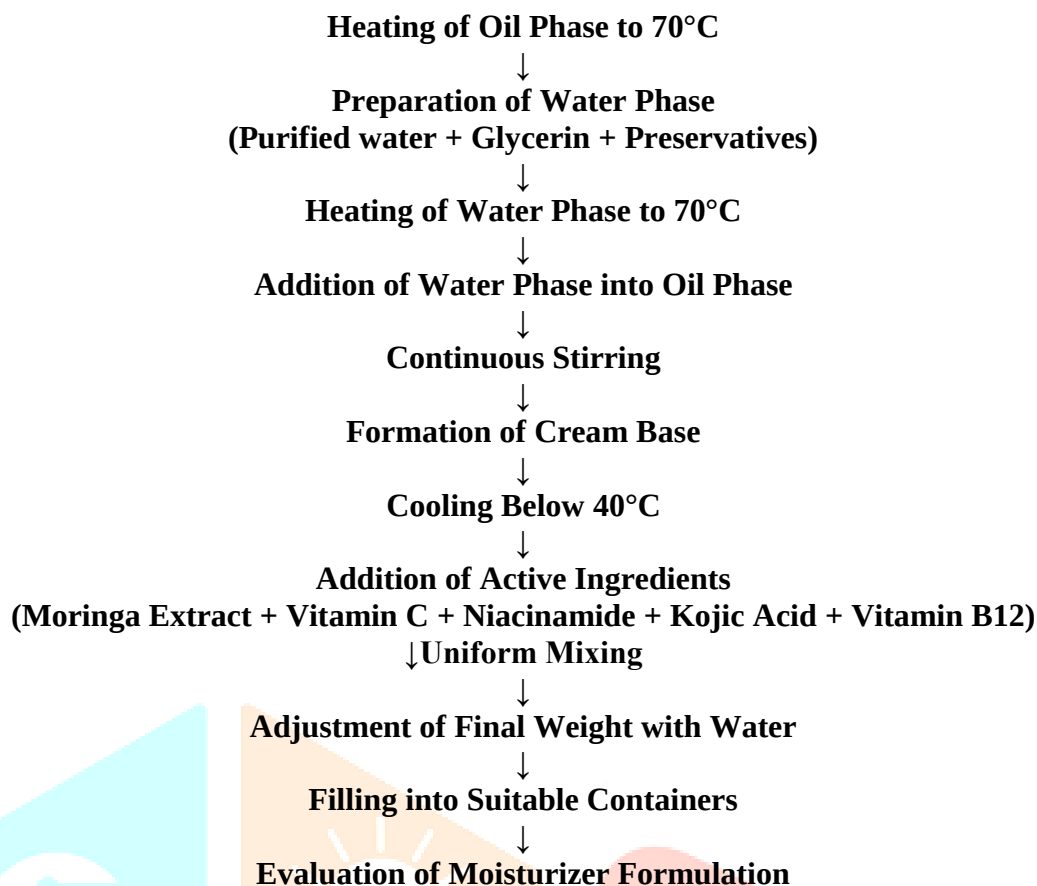
Fig 6..Maceration Extraction using Ethanol



Formulation of Moisturizer :- The emulsification procedure was used to make the moisturiser cream.

Procedure :-





FORMULATION TABLE :-

Table no- 1 :- Moringa Formulation of table

	Ingredient	F1	F2	F3	Role
1)	Moringa Extract	1ml	2ml	3ml	Herbal active
2)	Stearic acid	3g	3g	3g	Thickener
3)	Cetyl alcohol	1g	1g	1g	Stabilizer
4)	Liquid Paraffin	3ml	2.5 ml	2g	Emollient
5)	Glycerin	2.5 g	2.5 g	2.5 g	Humectant
6)	Niacinamide	1 g	1.5 g	2 g	Brightening
7)	Vitamin C	0.5 g	1 g	1 g	Antioxidant
8)	Kojic acid	0.25 g	0.5 g	0.5 g	Anti -Pigmentation
9)	Methyl Paraben	0.1g	0.1 g	0.1 g	Preservative
10)	Propyl Paraben	0.025 g	0.025g	0.025 g	Preservative

11)	Purified water	q.s. to 50	q.s. to 50 g	q.s. to 50 g
				Vehicle

3. EVALUATION TEST :-

1.Organoleptic evaluation :-Involves rating its colour and texture [9]. More specifically, the presence of foreign particles, texture, smell, and clarity were assessed. By rubbing them between two fingers, the grittiness and stickiness were assessed

2.Washability :-

The ease of washing the cream with water was evaluated manually .

3.Spreadability :- The area that a topical application distributes after being applied to the skin of the affected areas is referred to as spreadability; shorter intervals indicate better spreadability [9]. To create a consistent film thickness, the mixture was placed and compressed between two glass slides. After that, a 10 g weight was inserted to the pan, and a line that was fastened to a hook was used to draw the top plate. The spreadability (S) is computed using the formula [9], and the time it takes for the upper glass slide to move 10 cm over the lower plate is noted

Formula :- $S = M * L / T$

Where,

S – Spreadability

M-Weight tied to upper glass slide

L-Length moved on glass slide

T-Time taken

4.Irritancy Test :-

This test establishes the skin irritation properties of manufactured formulations [9]. Draw a 1-square-centimeter slice on the left-hand dorsal surface. After applying the cream to the specified area, the amount of time was noted. For up to 24 hours, erythema, irritation, and oedema were evaluated and documented on a regular basis [9]. Albino rabbits were used in a different kind of skin irritation test. These animals were kept in separate cages and provided with fresh food and water during the test period. The fur on their necks and thighs was shaved 24 hours before to the test to create an adequately large test area. The test location was briefly cleaned with surgical spirit. Cream was then applied to the test area. The test location was observed for erythema and oedema for 24, 48, and 72 hours following application [9]. Animal studies of irritation should be conducted before human research. The produced product could be applied to healthy human volunteers to assess its safety for topical usage after it showed high compliance in animal testing [9]. Skin irritancy testing should ideally involve both human and animal subjects because many chemicals are toxic to rabbits but not to humans, and vice versa [9].

5.Determination of pH :-

A conventional digital pHmeter can be used to measure the cream's pH at room temperature by diluting a suitable amount of the formulation with a suitable solvent in a beaker [9]. Before using the pH meter, it is recommended to calibrate it using a standard buffer solution at pH 4 and pH 7 [9]. In the meantime, the pH of a topical medication should be between 4.5 and 6.5, which matches the pH of the skin, according to Maha et al. (2018). Both an excessively acidic and an excessively alkaline pH can cause skin irritation [9].

6. Viscosity :-

The viscosity is used to assess the consistency stability of the formulation and, consequently, forecast the behaviour of the material over time [9]. The viscosity of prepared creams can be determined using the Brookfield Viscometer [9]. The Brookfield viscometer's correction factors are multiplied by the dial reading to determine viscosity values. Kinetically unstable emulsions, where free-moving droplets clash and seem to merge, are indicated by increased viscosity during storage.

7. Microbial Stability :- The microbial contamination test was used to assess the formulations' microbial stability. After preparing the bacteria and yeast culture medium, it was autoclaved for 20 min at 125 C, and then 20 mL of the culture medium was poured into a sterile Petri dish. The Petri dishes were then inoculated with 0.2 g of each formulation in the center of each plate, and incubated for 3 days at 37 C or 25 C, depending on the inoculated microorganisms. Plates were removed after the incubation period and tested for microbial growth, which indicates contamination .

Activity :-

In Vitro occlusivity test :- The occlusivity of the formulations was evaluated using the occlusion factor. When compared to the reference, there is no occlusion impact when the occlusion factor is zero ("0"); the highest occlusion factor, "100," denotes total surface coverage by the topical formulation [150,151]. Higher occlusion effect creams provide more wet, malleable skin that retains its moisturising properties [9].

Ten grams of distilled water were added to each beaker, which had a diameter of 3.2 cm and a height of 4.6 cm. Next, 200 mg of the sample (Cosmetics 2022, 9, 61 13 of 19) was evenly dispersed over Whatman filter paper (0.45 pore size) covering the open end. The beakers were then kept at 37 2 C/60 7 5% RH for 48 hours. To ascertain the water flux, the in vitro occlusivity of all formulations, prototype formulations, and the negative control where the filter paper was left exposed were examined. The following is how the occlusion factor F was calculated:

$$F = A - B / A * 100$$

Where

A = Water flux via uncovered filter (percent water loss)

B = Water flux via filter when covered by test preparation (percent water loss)

4. RESULT AND DISCUSSION:

1. **Organoleptic evaluation :-** The formulated moisturizer containing Moringa oleifera extract showed good organoleptic properties with smooth texture, pleasant odor, excellent homogeneity, and acceptable appearance suitable for topical application.

ORGANOLEPTIC EVALUATION OF MOISTURIZER CONTAINING <i>MORINGA OLEIFERA</i> EXTRACT		
Sr. No.	Parameter	Observation
1.	Color	Light greenish cream
2.	Odor	Pleasant and characteristic
3.	Appearance	Smooth semisolid cream
4.	Texture	Soft and homogeneous
5.	Consistency	Good
6.	Greasiness	Non-greasy
7.	Feel on application	Smooth and moisturizing
8.	Washability	Easily washable
9.	Homogeneity	No lumps observed
10.	Phase separation	Absent

Fig 7-Organoleptic evaluation test.

2. Washability :-

The ease of washing the cream with water was evaluated manually .



Fig 8:-Washability test

3. Spreadability :- Spreadability was determined using glass slide method

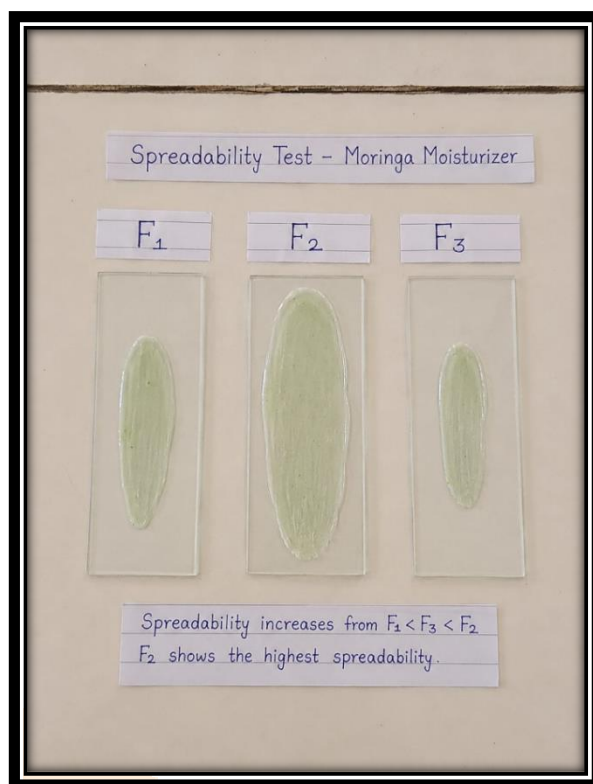


Fig 9:-Spreadability test

Formula :- $S = M * L / T$

Where,

S – Spreadability

M-Weight tied to upper glass slide

L-Length moved on glass slide

T- Time taken

4. Irritancy test :-

Table no 2:-Observation table for irritancy

Observation	F1	F2	F3
1. Irritation	NO	NO	NO
2. Redness	NO	NO	NO
3. Edema	NO	NO	NO

5.Determination pH :-



Fig 10:-pH test

Table no 3:-Observation table for pH

Batch	pH
F1	5.6
F2	6.5
F3	6.0

6.Viscosity :-

The viscosity of the prepared moisturizer formulations was determined using a Brookfield Viscometer at room temperature. The viscosity values indicated that all formulations possessed suitable consistency for topical application. Among all the batches, F2 showed optimum viscosity with good spreadability and stability. No phase separation or instability was observed during storage.

Table no 4-Viscosity Observation Table: -

F1	21500 cps
F2	24800 cps
F3	23200 cps

The viscosity is used to assess the consistency stability of the formulation and, consequently, forecast the behaviour of the material over time. The viscosity of prepared creams can be determined using the Brookfield Viscometer. The Brookfield viscometer's correction factors are multiplied by the dial reading to determine viscosity values. Kinetically unstable emulsions, where free-moving droplets clash and seem to merge, are indicated by increased viscosity during storage.



Fig 11:-Brookfield Viscometer

7. Microbial Stability :-

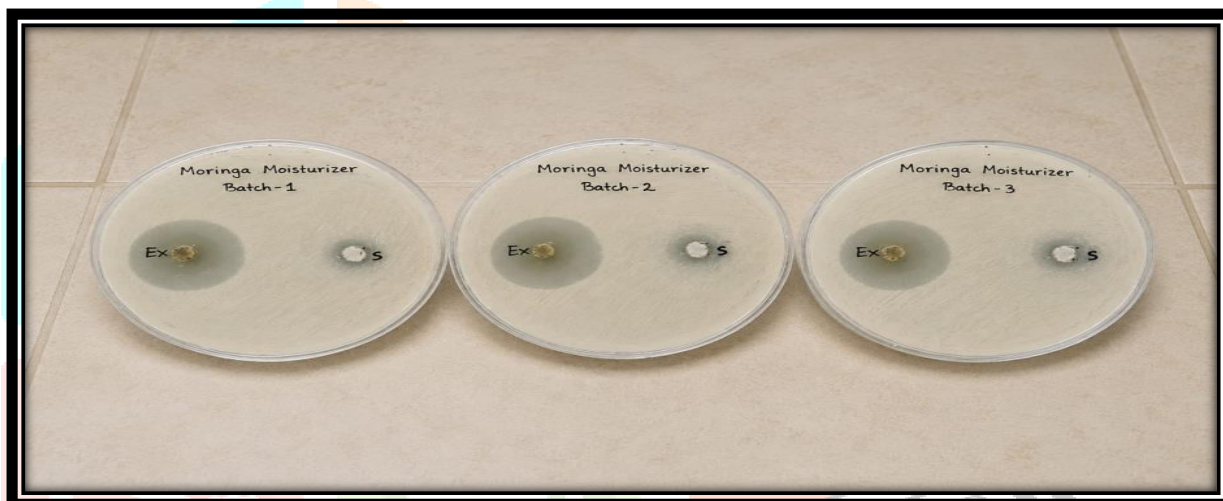


Fig 12 –Micribial stability test

Table no 5:- Observation table for bacterial growth

Batch	Bacterial Growth	Fungal Growth	Observation
F1	Absent	Absent	Stable
F2	Absent	Absent	Stable
F3	Absent	Absent	Stable

8. In Vitro occlusivity Test :-

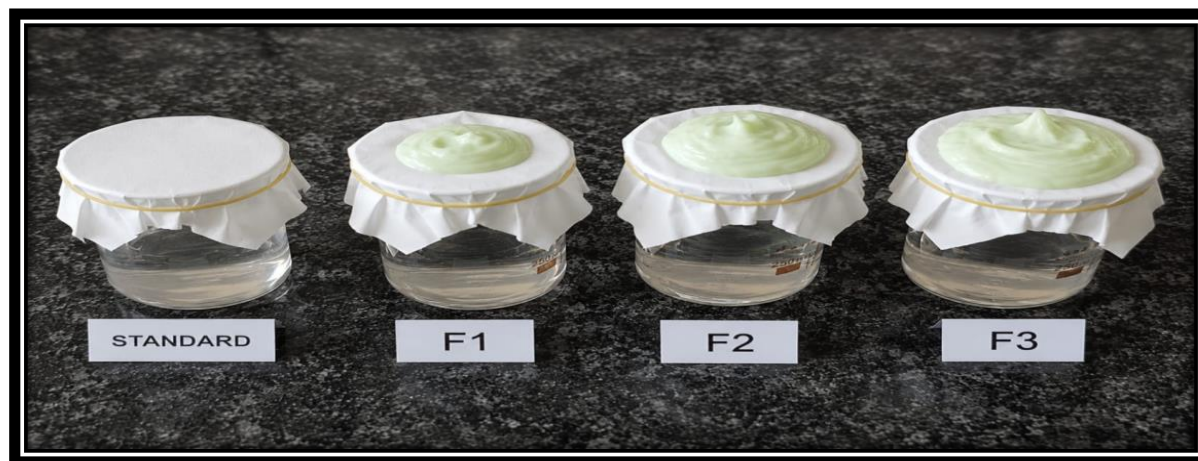


Fig 13:-In-vitro occlusivity test

Table no 6:- Observation and result of in-vitro occlusivity test

Formulation	Initial weight	Final weight	Water loss	Occlusivity Factor	Occlusivity Effect
Standard	161.04	145.20	15.84	0	Least
F1	161.04	150.85	10.19	35.66	Good
F2	161.04	154.92	6.12	61.36	Excellent
F3	161.04	152.40	8.64	45.45	Very Good

F2 showed highest occlusion factor 61.36%

4. CONCLUSION

A herbal moisturiser containing Moringa oleifera extract, vitamin C, kojic acid, niacinamide, and vitamin B12 was successfully formulated and evaluated in this study. All formulations demonstrated satisfactory physicochemical properties, such as smooth texture, acceptable pH, good homogeneity, washability, and spreadability; the phytochemical constituents present in Moringa oleifera contribute to antioxidant and skin nourishing activities; the prepared formulations were found to be stable and non-irritating. As a result, the developed herbal moisturiser can be regarded as safe, stable, and effective for skin hydration and protection.

5. REFERENCE :-

- Sharma P, Patel R, Singh A. Development and assessment of herbal moisturizing cream containing Moringa oleifera extract. International Journal of Pharmaceutical Sciences and Research. 2023;14(5):210-221.
- Ali A, Akhtar N, Khan MS, Rasool F, Iqbal FM, Khan MT, et al. Evaluation of moisturizing activity of cream prepared with Moringa oleifera leaf extract using biophysical methods. Journal of Medicinal Plants Research. 2013;7(8):386-391.
- Fahey JW. Scientific evidence regarding nutritional and medicinal applications of Moringa oleifera. Trees for Life Journal. 2005;1:5.
- Flynn TC, Petros J, Clark RE, Viehman GED. Clinical aspects of dry skin and role of moisturizers in skin care. Clinical Dermatology. 2001;19:387-392.
- Anwar F, Latif S, Ashraf M, Gilani AH. Medicinal importance and nutritional benefits of

Moringa oleifera. Phytotherapy Research. 2007;21:17-25.

- 6) Nizioł-Łukaszewska Z, Furman-Toczek D, Bujak T, Wasilewski T, Hordyjewicz-Baran Z. Application of Moringa oleifera extracts as bioactive cosmetic ingredients. Dermatology Álvarez-Román R, Silva-Flores PG, Galindo-Rodríguez SA, Huerta-Heredia AA, Vilegas W, Paniagua-Vega D. Antioxidant and moisturizing properties of topical formulations containing Moringa oleifera leaf extract. South African Journal of Botany. 2020;129:404-411. Research and Practice. 2020;2020:8197902.
- 7) Smith AB, Jones CD. Herbal cosmetic moisturizers and their applications in skin care preparations. International Journal of Pharmaceutical Sciences. 2023;15(2):120-128.
- 8) Verma AR, Vijayakumar M, Mathela CS, Rao CV. Evaluation of antioxidant activity of various fractions obtained from Moringa oleifera leaves. Food and Chemical Toxicology. 2009;47:2196-2201.
- 9) Singh BN, Singh BR, Singh RL, Prakash D, Dhakarey R, Upadhyay G, et al. Protective antioxidant and anti-quorum sensing activities of Moringa oleifera. Food and Chemical Toxicology. 2009;47:110-116.
- 10) Nambiar VS, Parnami S. Organoleptic standardization of traditional recipes prepared using Moringa oleifera leaves. TFL Journal. 2008;3:2-6.
- 11) Manguro LOA, Lemmen P. Study of phenolic compounds present in Moringa oleifera leaves. Natural Product Research. 2007;21:56-68.
- 12) Lodén M, Andersson AC, Lindberg M. Effect of moisturizing cream on skin barrier improvement in atopic dermatitis patients. British Journal of Dermatology. 1999;140:264-267.
- 13) Mawazi SM, Ann J, Othman N, Khan J, Alolayan SO, Althagfan SS, Kaleemullah M. Historical background, preparation methods, characterization, and uses of moisturizers: A review. Cosmetics. 2022;9(3):61.
- 14) Álvarez-Román R, Silva-Flores PG, Galindo-Rodríguez SA, Huerta-Heredia AA, Vilegas W, Paniagua-Vega D. Antioxidant and moisturizing properties of topical formulations containing Moringa oleifera leaf extract. South African Journal of Botany. 2020;129:404-411.

