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FORMULATION AND EVALUATION OF HERBAL MOISTURIZER

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Abstract :- Herbal moisturizer they are safer, more effective, and have less negative effects than synthetic products, herbal cosmetics have attracted a lot of interest. The goal of the current study was to create and assess a herbal moisturiser that included active components like vitamin C, kojic acid, niacinamide, and vitamin B12 in addition to leaf extracts from Moringa oleifera and Mangifera indica. Stearic acid, cetyl alcohol, glycerin, and liquid paraffin were among the appropriate excipients used in the emulsification process to create the moisturiser. Plant extract and active ingredient concentrations were varied to create three formulations (F1, F2, and F3).Physicochemical characteristics of the produced formulations, including appearance, pH, spreadability, homogeneity, washability, viscosity, microbiological stability, and occlusivity, were assessed. Every formulation had a decent spreadability, an appropriate pH, a smooth texture, and an acceptable look. Formulation F2 showed the highest occlusivity factor, best spreadability, optimal viscosity, and superior cosmetic acceptability of all batches. Throughout the investigation, there was no evidence of microbiological contamination, phase separation, or irritation. The results indicate that the herbal moisturiser is safe and effective for topical use and has good moisturising, antioxidant, and skin-brightening qualities.

Index terms **:** Herbal moisturizer, Moringa oleifera, Mangifera indica, Niacinamide, Vitamin C, Kojic acid, Skin hydration.

Introduction :-

The skin, which covers almost the whole external surface and serves as the body's first line of defence against dangerous environmental elements, is the outermost and most vital organ. In addition to assisting to regulate body temperature, feeling, and immunological processes, it shields the body from microbes, ultraviolet (UV) radiation, toxins, pollutants, and excessive water loss. The skin frequently gets dry, rough, dull, dehydrated, and prone to early ageing and pigmentation as a result of continuous exposure to sunshine, pollution, dust, chemicals, and weather variations. Thus, keeping adequate skin hydration and protection is crucial for the appearance and functionality of healthy skin.

Topical formulations known as moisturisers are intended to enhance skin hydration, preserve moisture equilibrium, and stop transepidermal water loss from the skin's surface. They enhance the smoothness, elasticity, softness, and look of the skin while creating a protective layer on the epidermis. Creams, lotions, gels, ointments, and emulsions are common forms of moisturisers. Creams are favoured among various dosage forms due to their non-greasy nature, ease of application, aesthetic appeal, and improved patient compliance.

Because they are safer, more effective, more affordable, and have less side effects than synthetic cosmetics, herbal cosmetics and natural skincare products have become incredibly popular throughout

the world in recent years. Artificial preservatives, perfumes, and harsh chemicals are frequently found in synthetic skincare formulas, which can cause irritation, allergic responses, skin sensitivity, and long-term negative effects. However, naturally occurring phytoconstituents such flavonoids, tannins, phenolic compounds, vitamins, alkaloids, glycosides, proteins, and essential fatty acids are found in herbal preparations and offer both medicinal and aesthetic advantages to the skin.

Since ancient times, traditional medical systems have employed medicinal plants to treat skin diseases, wound healing, inflammation, pigmentation, acne, and age-related ailments. Antioxidant, antibacterial, anti-inflammatory, moisturising, anti-aging, and skin-rejuvenating qualities are offered by herbal cosmetics made from extracts of medicinal plants. Researchers have been motivated to create herbal skincare formulas with improved efficacy and safety due to the rising demand for natural and environmentally friendly cosmetics.

Often referred to as the drumstick tree or miracle tree, Moringa oleifera is a member of the Moringaceae family and is found throughout tropical and subtropical regions. Its extensive phytochemical content makes it one of the most important plants in terms of nutrition and medicine. High concentrations of calcium, potassium, proteins, amino acids, flavonoids, polyphenols, antioxidants, and vitamins A, C, and E can be found in moringa leaves. Significant antioxidant, antibacterial, anti-inflammatory, wound-healing, and moisturising properties are possessed by these bioactive components. Moringa's antioxidant properties aid in scavenging free radicals that cause oxidative stress and early ageing of the skin. Additionally, moringa extract promotes collagen formation, nourishes the skin, increases moisture, and shields skin cells from environmental harm.

Mangifera indica, or mango, is another medicinal plant with nutritional and dermatological benefits. It is a member of the Anacardiaceae family. Bioactive substances such mangiferin, flavonoids, carotenoids, tannins, vitamin C, vitamin A, and polyphenols can be found in mango leaves, peel, pulp, and seeds. These phytochemicals have anti-aging, anti-inflammatory, antibacterial, anti-oxidant, and skin-rejuvenating properties. Mango extracts increase skin softness and elasticity while shielding the skin from UV ray damage and oxidative stress. Because of their moisturising and skin-protective qualities, chemicals produced from mangos are being employed more and more in the pharmaceutical and cosmetic industries.

Because Moringa oleifera and Mangifera indica extracts contain a variety of bioactive chemicals, they may have synergistic medicinal and cosmetic effects. Together, the extracts can increase skin hydration, strengthen antioxidant defence, lower inflammation, nourish the skin, and guard against dryness and early ageing. Additionally, the stability and efficacy of cosmetic compositions may be enhanced by such herbal mixtures.

Enhanced moisturising, antioxidant, skin-brightening, anti-aging, and protective properties may result from combining these active substances with herbal extracts. Thus, the goal of the current study was to create and assess a herbal moisturiser that included extracts from Moringa oleifera and Mangifera indica in addition to vitamin C, kojic acid, niacinamide, and vitamin B12.

Numerous physicochemical and stability parameters, such as appearance, colour, odour, homogeneity, pH, spreadability, washability, viscosity, irritancy, microbiological stability, and occlusivity, were assessed for the produced formulations. The goal of the study was to create a stable, safe, effective, and aesthetically pleasing herbal moisturiser that could be applied topically to help hydrate, nourish, and protect the skin.

Scientific Classification of Moringa Oleifera and Mangifera indica :-

Kingdom :	Plantae
Clade :	Tracheophytes
Clade :	Angiosperms
Clade :	Eudicots
Clade :	Rosids
Order :	Brassicales
Family :	Moringaceae
Genus :	*Moringa*
Species :	*Moringa oleifera*

Kingdom :	Plantae
Clade :	Tracheophytes
Clade :	Angiosperms
Clade :	Eudicots
Clade :	Rosids
Order :	Sapindales
Family :	Anacardiaceae
Genus :	*Mangifera*
Species :	*M. indica*

Table no. 1 :Scientific Classification of Moringa Oleifera and Mangifera indica

Fig no :-1. Moringa Oleifera

Fig no-2 . Mangifera Indica

MATERIALS AND METHOD

Materials

- Active Ingredients
- Moringa oleifera extract
- Mangifera indica extract
- Vitamin C
- Niacinamide
- Kojic acid
- Vitamin B12

Excipients

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

Method of Extraction :-

Ethanol was used in the maceration process to extract the powdered leaves of Moringa oleifera and Mangifera indica. For 72 hours, about 25 g of powdered material was steeped in ethanol with sporadic shaking. Concentrated extract was obtained by filtering the mixture through Whatman filter paper and muslin fabric, then evaporating the filtrate.

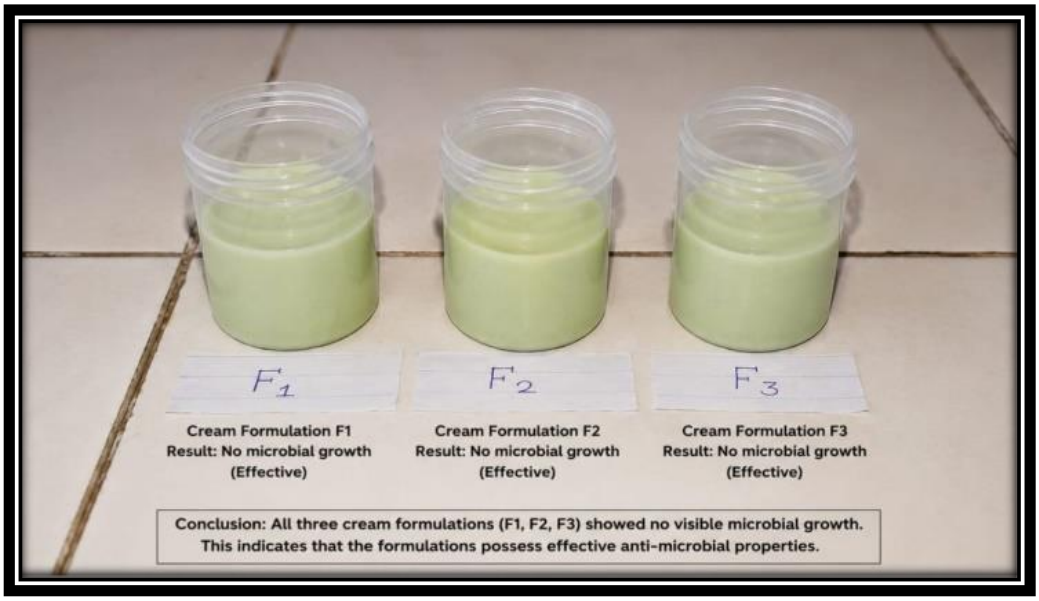

Fig 3 :- Maceration moringa and mangifera

Fig no 4 Moisturizer of moringa and mangifera

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

Procedure :-

Collection of Moringa oleifera Leaves

↓

Cleaning and Washing of Leaves

↓

Shade Drying of Leaves

↓

Powdering of Dried Leaves

↓

Extraction by Maceration using Ethanol

↓

Filtration of Extract

↓

Concentration of Extract

↓

Preparation of Oil Phase

(Stearic acid + Cetyl alcohol + Liquid paraffin)

↓

Heating of Oil Phase to 70°C

↓

Preparation of Water Phase

(Purified water + Glycerin + Preservatives)

↓

Heating of Water Phase to 70°C

↓

Addition of Water Phase into Oil Phase

↓

Continuous Stirring

↓

Formation of Cream Base

↓

Cooling Below 40°C

↓

Addition of Active Ingredients

(MoringaExtract + Vitamin C + Niacinamide + KojicAcid + Vitamin B12)

↓

Uniform Mixing

↓

Adjustment of Final Weight with Water

↓

Filling into Suitable Containers

↓

Evaluation of Moisturizer Formulation

Formulation Table :- FORMULATION TABLE :-

Table no- 2 :- Moringa Formualtion of table

Ingredient	F1	F2	F3	Role
1) Moringa Extract and Mango 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.Organolepticevaluation :-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 occlusivitytest :-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/607 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 fluxvia 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 *MORINGA OLEIFERA* 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 5-Organoleptic evalution test.

2.Washability :-

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

Fig 6:-Washability test

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

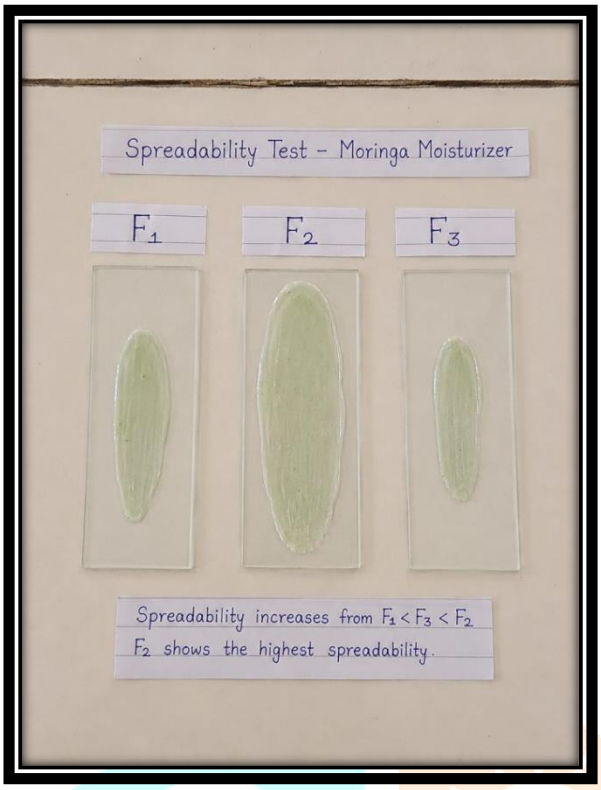

Fig 7-Spreadability test

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 3-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 8 :-pH test

Table no 4:-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 5-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 9 :-Brookfield Viscometer

7.Microbial Stability :-

Fig 10–Micribial stability test

Table no 5:- Observation table for bacterial growth

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

8.In Vitro occlusivityTest :-

Fig 11 :-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%

Conclusion :-

A herbal moisturiser combining extracts from Moringa oleifera and Mangifera indica, together with active components like vitamin C, kojic acid, niacinamide, and vitamin B12, was effectively developed and assessed in this study. Every formulation demonstrated acceptable physicochemical characteristics, such as stability, smooth texture, appropriate pH, and high homogeneity. Throughout the investigation, there were no signs of irritation or microbiological contamination.

F2 had the best moisturising performance of all the formulations in terms of viscosity, spreadability, consistency, stability, and occlusivity effect. According to the study's findings, the created herbal moisturiser can be utilised as a safe, stable, and efficient herbal cosmetic formulation for skin-brightening, antioxidant protection, hydration, and nourishment.

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