Formulation and Evaluation of Herbal Anti-acne Cream using Moringa leaves

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Abstract:

The leaves of *Moringa oleifera L*. contain phenolic, alkaloid, and flavonoid components that have antimicrobial properties. One of the bacterial agents responsible for acne is Staphylococcus epidermidis. The goal of this study is to compare bacteriostatic ability of the extracts and cream for S. epidermidis bacteria and to cream formula that may fulfils the physical properties of a good cream. Using the maceration process and 90% ethanol, moringa leaves were extracted over the following 24 hours. Tests for organoleptic properties, consistency, pH, fluidity, stickiness, and spread were used to evaluate cream physically.

Key words: Moringa leaves; acne; ethanol

Introduction:

Bacterial activity, such as Staphylococcus epidermidis, can lead to acne. The current standard of care for acne is antibiotic therapy, which can cause skin irritation and lead to resistance over time. The plant moringa is commonly used as a vegetable or animal feed. Moringa leaves are known to have an antibacterial effect due to the presence of secondary metabolites like flavonoids, alkaloids, and phenols. Previous studies on ointment formulations including Moringa leaf extract indicated an antibacterial efficacy against the acne-causing Propionibacterium species. Staphylococcus aureus is significantly suppressed by the Moringa leaf ethanolic extract in cream preparations at concentrations of 5, 10, and 15%. The anti-acne cream formulation used in this research was created using an ethanol-based Moringa leaf extract to treat acne.

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:

- It should liquefy at body temperature.

- Spread easily on the skin.
- Pleasant in appearance.
- It should be non-toxic.
- It should be non-irritant.
- It should be non-inflammatory.

Advantages of cream :

- Helps to reduce injury scars from the skin.
- Helps individuals to reduce marks.
- It also reduces blemishesh from the skin.
- The cream reduces under eye dark circles.
- Acne may be reduced by use.
- Melasma can be reduced by daily usage.

Moringa leaves:

Synonyme :

Donaldsonia baker, Hyperanthera forsk

Biological source:

It contains leaves which are derived from the plant *Moringa oleifera L*.

Family:

Moringaceae

Fig. MORINGA LEAVES

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.

Cultivation and collection:

There are two main methods for cultivating *Moringa oleifera*: sowing and cutting. While vegetative propagation is common in India, Indonesia, and some parts of West Africa, seeds are traditionally preferred in Sudan. When seeds are readily available and human labour is limited, transplanting requires the selection of the seeds, but the flexibility to transplant seedlings allows flexibility in field planting even when it requires additional work and expense. Within two weeks, seeds will begin to germinate at a maximum depth of 2 cm. Transplanting the seedlings is possible when they are about 30 cm tall (3-6 weeks after germination) when seeding is planned in a nursery. Depending on the variety, there are between 3000 to 9000 seeds per kg, with an ideal storage germination rate of between 80 and 90 %. However, if seeds remain at room temperature and high relative humidity, their viability drops, and after three months, their germination rate decreases to 7.5%. When seeds are hard to get by or when labour is not a limitation, cutting is preferred. Hard woodcuttings from adult trees that are planted during the rainy season with a third of them buried in the ground develop roots that are noticeable in size in a short period of time. If allowed to grow naturally, the *moringa oleifera* tree can reach 3 metres in height in just three months and 12 metres in just a few years. Since the tree vigorously grows back after being cut, pruning or pollarding is commonly used to enhance lateral branching and give the tree a bush-like appearance to make harvesting easier. However, as there are few literature studies on the effective management of Moringa oleifera, practical experiments are required. The plant's interesting elements are its leaves and seeds. Therefore, when planting Moringa oleifera trees, the geographical distribution is planned to make it easier to carry out the necessary management and harvesting procedures.

Geographical source :

The monogeneric genus Moringa contains thirteen different species of the Moringaceae family, including *M. arborea*, which is native to Kenya; *M. rivae*, which is native to Kenya and Ethiopia; *M. borziana*, which is native to Somalia and Kenia; *M. pygmaea*, which is native to Somalia; *M. longituba*, which is native to Kenia, Ethiopia, and Somalia; M. sten

Uses:

1. It is used to treat the asthma.
2. It is used to treat the diabetes.
3. Also used to increase breast milk production.
4. It is used in arthritis.
5. It is used to treat cancer.
6. Used to treat diarrhea.
7. It is used to treat acne.
8. Additionally used to treat various skin infections.
9. It is useful in constipation.
10. Used in epilepsy.

Method:

Tools:

Glassware, analytical weight scales, rotary evaporator, pH meter, viscometer, moisture analyzer, incubator, autoclaves, and other supporting tools.

Material:

Moringa leaf, Ethanol,

Method of extraction:

Extraction of *Moringa leaves*

The maceration process was used to extract the Moringa oleifera L. 90% ethanol is used as a solvent in this maceration technique. Weighing 40 g of Moringa leaf powder served as the extraction process. This powder is then transferred to a maceration vessel filled with 70% ethanol, stirred for 2 minutes, and then the vessel is tightly closed with aluminium foil. 24 hours were given for the above solution.

Extraction of moringa leaves

Formulation table:

Ingredients	Quantity(F1)	Quantity(F2)	Uses
Bees wax	3.2 g	3.2 g	Emulsifying agent
Liquid paraffin	10 ml	10 ml	Emulsifying agent
Borax	0.16 g	0.16 g	Emulsifying agent
Water	6.6 ml	6.6 ml	Vehicle
Moringa leaves extract	2 g	3g	Antibacterial
Methyl paraben	0.036 g	0.036 g	Preservative
Propyl paraben	0.004 g	0.004 g	Preservative
Perfume	q.s.	q.s.	Flavouring agent

Table no.1

Method of preparation :

In this beeswax-borax type preparation borax reacts with the free fatty acids presents within beeswax and products soft soap that serves as a the oil phase with an emulsifying agent. Containing bees wax, 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 bees wax, 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.

Formulation

Evaluation of Cream:

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

1. Physical evaluation: In this test, the cream's color was examined, odor, 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 edema, if any, and reported.
3. Wash ability: 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. Viscosity: At a temperature of 25 °C and 2.5 RPM, the viscosity of cream was measured using a Brooke field viscometer.
6. Spreadability: The spreadability was measured by the number of seconds it took for two slides to separate from a layer of cream that was sandwiched between them while being subjected to a specific load. The shorter the time it took for the two slides to separate, the better the spreadability. Two sets of glass slides of standard dimension were taken. Then one slide of suitable dimension was taken and the cream formulation was placed on that slide. Then other slide was placed on the top of the formulation. Then a weight or certain load was placed on the upper slide so that the cream was uniformly compressed between the two slides to create a thin layer. The extra formulation that had adhered to the slides was scraped off once the weight was removed. The upper slide was allowed to slip off freely by the force of weight tied to it. The time taken by the upper slide to slip off was noted.

   Spread ability = m×1/t

   Where,

   S= spread ability in gm.cm/sec.

   M = standard weight which is tied to or placed over the upper slide

   l = length of glass slide

   t = time taken in seconds.
7. Phase separation: Prepared cream was stored in a covered container away from light at a temperature of 25 to 100 °C. Phase separation was then monitored for 30 days, 24 hours a day. The phase separation was observed to vary in any way.
8. 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.
9. Dye test: The cream is combined with the scarlet red colour. Examine the cream under a microscope after placing a drop of it on a microscope slide and covering it with a cover slip. The cream is of the o/w kind if the dispersed globules are red and the ground is colourless. In contrast, the dispersed globules in w/o type cream seem colourless on the red background.
10. Homogeneity: By visual and touch, the uniformity of the formulation was evaluated.

11. After feel: Emolliency, slipperiness, and the quantity of residue left behind after applying a predetermined amount of cream were evaluated.

Result and discussion

Evaluation result of the formulation is given below.

Note – F1H – formulation no. 1, F2H – formulation no. 2

1. Physical evaluation:

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

Sr. No	Specifications	Limits	
		F1H	F2H
1	State	Semisolid	Semisolid
2	Color	Yellowish	Yellowish
3	Odour	Characteristic	Characteristic

Table 2: Organoleptic Characters of Herbal Cream

2. Irritancy :

Mark a 1-cm2 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 edema, if any, and reported. According to the result the formulation showed no sign of irritancy, erythema and edema.

Sr. No	Formulation	Irritant Effect	Erythema
1	F1H	Nil	Nil
2	F2H	Nil	Nil

Table 3: Irritancy Study observations

3. 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.

Sr. No	Formulation	Washability
1	F1H	Easily Washable
2	F2H	Easily Washable

Table 4: Washability Observations

4. pH :

The results showed that the three formulations' PH values for F1H 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.

Sr. No	Formulation	pH
1	F1H	6.2
2	F2H	6.3

Table 5: pH Observation Table

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

Formulation	Viscosity
F1H	20000cps.
F2H	22000cps.

Table 6: viscosity observation table

6. 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 non-greasy.

Sr. No	Formulation	Greasiness
1	F1H	Non greasy
2	F2H	Non greasy

Table 7: Greasiness observation table

7. Dye Test :

The cream is combined with the scarlet red colour. Examine the cream under a microscope after placing a drop of it on a microscope slide and covering it with a cover slip. The ground was colourless, and the dispersed globules were scarlet.

8. Homogeneity :

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

9. After feel:

Emolliency, slipperiness, and the quantity of residue left behind after applying a predetermined amount of cream were evaluated.

Conclusion:

- The ethanolic moringa leaf extract has a high concentration that inhibits Staphylococcus epidermis from growing. Moringa leaf ethanolic extract used as an acne cream has antimicrobial properties. Cream made from The ethanolic moringa leaf

extract is safe to use.

- It doesn't show the skin irritability test. The herb moringa is not only good for your skin, but it also gives your body vital minerals. Use this herb regularly to maintain good skin and a strong body. The Moringa oleifera exhibits interesting characteristics that may be useful to be used topically in wintertime sebum production that is undesired and ultimately unpleasant oiliness. Numerous skin conditions, such as psoriasis and acne, are thought to be connected to oxidative stress.
- As a result, it is proposed that Moringa oleifera might have an effect on acne vulgaris. Only creams enriched with antioxidants, phenolic compounds, vitamin A, and vitamins B increased the water content of the stratum corneum and were found to be considerably effective after application of M. oleifera leaf extract. As a result, M. oleifera leaf extract is a naturally occurring, highly efficient component for enhancing skin hydration. It can also be used to supplement other treatments for dry skin.

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