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Formulate and Evaluate Moringa Oliefera Flower Extract for Its Therapeutic Use as A Face Toner.

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Abstract

In recent years, there has been a significant rise in the demand for herbal-based cosmetics due to increasing awareness of the harmful effects associated with synthetic skincare products. This study focuses on the formulation and evaluation of a natural face toner using the extract of Moringa oleifera flowers, renowned for their rich content of antioxidants, flavonoids, and anti-inflammatory compounds. The flowers were subjected to ethanol-based Soxhlet extraction to obtain bioactive constituents. The toner was prepared by blending Moringa oleifera extract with complementary natural ingredients including aloe vera, rose water, glycerin, and ethanol. Five formulations (F1–F5) were developed and evaluated based on various physicochemical and biological parameters such as pH, surface tension, phytochemical composition, stability, and skin compatibility.

Phytochemical screening confirmed the presence of beneficial constituents such as flavonoids, saponins, steroids, and cardiac glycosides. Among all formulations, F2 was found to be optimal, showing appropriate pH (4.10), low surface tension (1.59 sec), non-irritancy, and excellent skin conditioning effects. The product demonstrated good thermal and photostability and passed the leakage test. Overall, the formulation offers a safe and effective natural alternative for skincare, particularly for toning and hydrating the skin.

Key words: Tonner, Moringa oliefra flowers, Rose water, Aloe vera

1. Introduction:

The usage of natural ingredients and additions in cosmetics and personal care products has increased in recent years due to growing health consciousness. (1) Native to India, Moringa oleifera (M. oleifera) has been popular in tropical and subtropical regions in recent decades because of its rich nutritional values in proteins, lipids, amino acids, minerals, and vitamins. On the other hand, the Complex diverts a number of chemical components, such as nitrile glycosides, glucosinolates, flavonoids, and phenolic acids from

Moleifera in its many pharmacological activities – Anti- oxidant, Anti-bacterial, Anti- inflammaty. Therefore, M oleifera has received increasing attention in recent years. (2) From ancient days, People are

usually available resources to enhance their beauty. It is known that cosmetics are the products used to enhance & Impart beauty to user. In earlier days, naturally available ingredients were generally used as cosmetics but with the passage of time and improvement in science, several chemicals come into existence that is said to impart or enhance beauty, thus used as cometic. Using these chemical-based products Can import beauty for a particular time, but it harms our Skin when used for a long time May harmful effects have been noticed due to usage of chemical-based products thus now days cosmetics industry mainly focused on herbal products[3].

Moringa oleifera, commonly known as miracle tree is renowned for its high nutritional Content & medicinal properties. The flowers of moringa oleifera are a rich in antioxidants anti-inflammatory compounds and essential vitamin that Can Skin health. By harnessing these properties M Oleifera flower extract can be developed into a face toner to potentially skin tone, reduce Inflammation & provide hydration. [4]

This study aims to formulate and evaluate a natural face tonner utilizing M oleifera flower extract for it's a therapeutic benefit. By incorporating the antioxidant, anti-inflammatory and anti -microbial properties of the M oleifera the tonner is intended to promote skin hydration, smooth inflammation and provide a gentle yet effect.

Growing consumer interest in natural skin care –

Shift towards natural products – consumers are increasingly seeking skincare products with natural, plant-based ingredients due to cancers about synthetic chemicals and their potential side effects. It can help balance the skins PH and tighten pores while providing hydration and nourishment. [5]

Objective of research:

1. To analyze the phytochemical composition of Moringa oleifera flowers, including the presence of antioxidants, flavonoids, and essential oils.
2. To evaluate the antimicrobial and anti-inflammatory properties of flower extracts for potential medicinal applications.
3. To determine the nutritional value of Moringa oleifera flowers, focusing on vitamins, minerals, and amino acid content.
4. To explore the potential of Moringa oleifera flowers as a natural ingredient in functional foods or herbal teas.
5. To assess the environmental and economic feasibility of cultivating Moringa oleifera flowers for commercial use in sustainable agriculture.

Ideal qualities of Tonner:

1. Hydrating and Refreshing – It should provide moisture and a soothing effect on the skin, especially for dry or sensitive skin types.

2. Antioxidant-Rich – Packed with natural antioxidants from Moringa oleifera to help fight free radicals and reduce signs of aging.

3. Anti-inflammatory and Calming – Helps reduce redness, acne, and irritation due to its natural anti-inflammatory properties.

4. Non-comedogenic and Lightweight – Should not clog pores and must absorb easily without leaving a greasy residue.

5. Natural and Chemical-Free – Ideally formulated without alcohol, parabens, synthetic fragrances, or harsh chemicals, using organic moringa extract.

Adavantages:

1. Rich in Antioxidants: Moringa flowers contain antioxidants like flavonoids and vitamin C, which help fight free radicals and reduce signs of aging.
2. Anti-inflammatory Properties: It can soothe irritated or sensitive skin, reducing redness and inflammation.
3. Hydrating: Many formulations include hydrating agents, and moringa itself may help retain moisture.

Disadvantages:

1. Potential Allergic Reaction: Some people may experience irritation or allergies, especially with sensitive skin.
2. Short Shelf Life (If Homemade): Natural toners without preservatives may spoil quickly.
3. Limited Scientific Backing: While traditional medicine supports its use, there is limited scientific research specifically on moringa flower toner.
4. Fragrance Sensitivity: Moringa flowers have a scent that could irritate people sensitive to fragrances.

Materials and methodology:

A proper method has to be carried out while formulating the herbal face tonner

1. Selection of active ingredient.

2. Collection of active ingredient.

3. Extraction method of Moringa oliefra flower

4. Formulation of herbal face tonner

5. Evaluation of herbal face tonner

6. Result.

Active ingredients used in herbal face tonner:

1) Moringa oleifera flower:

Fig 1.3 Moringa oleifera flower

Synonyms:

- Drumstick tree flower
- Horseradish tree flower

Biological Source:

The flowers of Moringa oleifera belong to the family Moringaceae. They are obtained from the Moringa oleifera Lam. tree, which is widely cultivated in tropical and subtropical regions.

Morphological Features:

- The flowers are small, white to cream-colored, and fragrant.
- They have five unequal petals and are bilaterally symmetrical.
- The flowers grow in axillary panicles or clusters.
- Each flower has a yellowish-green calyx with five sepals.
- They bloom throughout the year in favorable climates

Chemical Constituents:

Flavonoids (e.g., kaempferol, quercetin)

Alkaloids

Phenolic compounds

Essential oils

Amino acids (including essential amino acids)

Vitamins (A, C, and E)

Minerals (calcium, potassium, iron)[21]

Uses:

- Has anti-inflammatory, antioxidant, and antimicrobial properties.
- Used in traditional medicine for treating infections, inflammation, and digestive issues.Anti-aging properties

2) Rose water:

Fig 1.4 Rose water

Synonyms:

Gulab Jal

Aqua Rosae

Biological Source:

Rose water is obtained by steam distillation of the fresh petals of various species of Rosa, mainly: Rosa damascene (Damask rose)

Rosa centifolia (Cabbage rose)

Morphological Features:

Color: Colorless to pale pink liquid

Odor: Characteristic sweet, floral fragrance of roses

Taste: Slightly sweet

Texture: Watery consistency

Chemical Constituents:

Volatile oils (Essential oil of rose, mainly containing geraniol, citronellol, and nerol)

Flavonoids (antioxidants)

Phenolic compounds (gallic acid, quercetin)

Terpenes (linalool, farnesol)

Uses:

- Used as a toner, cleanser, and moisturizer
- Soothes irritated skin and reduces redness
- Anti-aging properties.

3) Aloe vera:

Fig 1.5 Aloe vera

Synonyms:

Ghrita Kumari
Indian Aloe
True Aloe

Biological Source:

Aloe vera is obtained from the leaves of Aloe barbadensis Mill., belonging to the family Asphodelaceae (formerly) Liliaceae

Morphological Features:

Habit: Perennial, succulent herb.
Leaves: Thick, fleshy, lance-shaped, with serrated margins and a greenish-gray color.
Flowers: Yellow to orange, arranged in a raceme.
Stem: Short and covered by leaf bases.
Roots: Fibrous and shallow.
Gel: Transparent, mucilaginous content found inside the leaves

Chemical Constituents:

Anthraquinones: Aloin A & B, Emodin, Aloe-emodin
Polysaccharides: Acemannan, Glucomannan
Vitamins: A, C, E, B-complex
Minerals: Calcium, Magnesium, Zinc, Iron
Enzymes: Amylase, Lipase, Catalase
Saponins, Amino Acids, and Sterols

Uses:

- Anti-inflammatory & analgesic properties
- Antimicrobial & antifungal properties
- Cosmetic Uses:
- Skin hydration & anti-aging [22]

EXCIPIENT PROFILE:

5) Ethanol _____

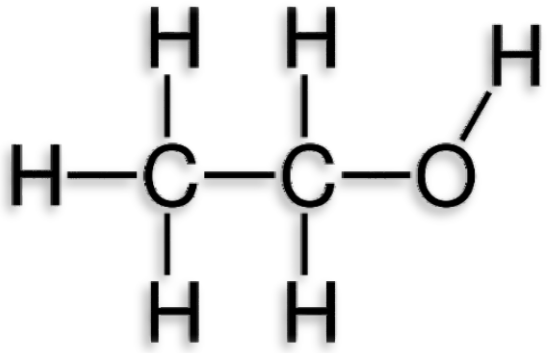


Fig.3.3: Chemical structure of ethanol

- **PROPERTIES OF ETHANOL**

Molecular Formula	C_2H_6O
Molecular Weight	46.07 g/mo
IUPAC NAME	Ethanol
Functional category	Solvent; antimicrobial; preservative;

Physical state	Clear liquid
Appearance	Colorless liquid
Odor	Mild, rather pleasant, like wine
Solubility	Miscible
Vapour Pressure	59.3mmHg at 20^0C

Boiling point	78^0C
Melting point	-114.1^0C
Density	0.790 at 20^0C

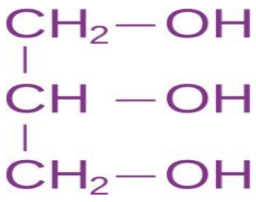
Uses:

- Ethanol is used in the manufacture of drugs, plastics, lacquers, polishes, plasticizers, and cosmetics.
- Ethanol is used in medicine as a topical anti-infective, and as a antidote for ethylene glycol.

Advantages:

- Ethanol fuel is cost effective compare to other biofuels.
- Ethanol helps to reduce global warming.
-

6. GLYCERIN:



Structure of glycerol

PROPERTIES OF GLYCERIN

Molecular Formula	**$C_3H_8O_3$**
Molecular Weight	192.09g/mol

IUPAC NAME	Propane-1,2,3-triol
Functional category	Solvent, sweeten, Humectant

Color	Colorless
Odor	Odorless
Melting point	18^0C
Boiling point	290^{0C}
Flash point	177^0
Viscosity	1400mPas
pH	6-7
Specific gravity	$1.260^{50/4}$

USES:

- Use as a solvent, humectants, plasticizer, emollients, sweetener, coating for paper, antifreeze for automobile and fluid for gas meters
- It is also used to make nitro glycerol, cosmetics soaps , liqueurs , inks , lubricants ,glues and medication. [24]

Extraction method :

We gathered fresh Moringa oliefra flower from Turkewadi in Kolhapur, Maharashtra. Clean distilled water is
used to wash these leaves until all of the dust has been removed. All of these flower are dried in the shade
after being cleaned. The Soxhlet extraction method was used to carry out the extraction. The 25gm finely ground moringa oliefra flower were firmly packed in a separate Soxhlet extractor. 250 ml of ethanol were utilized

as the extraction solvent. This method involved using an evaporator to evaporate the liquid to a dryness at 60 degrees Celsius with lowered pressure.

Soxhlet apparatus

Pure extraction of Moringa oliefra flower

Formulation table :

Sr. No	Ingredients	F1	F2	F3	F4
1.	Moringa oleifera flower	2ml	14ml	5ml	10ml
2.	Aloe vera	15ml	10ml	12ml	9ml
3.	Glycerin	10ml	15ml	16ml	11ml
4.	Rose water	23ml	11ml	16ml	20ml

Preparation of face tonner :

The extracts and excipients needed for the formulation were first gathered.

Next, the components were measured in a beaker using the prescribed formula.

In the beaker, all of the ingredients were combined.

After the homogenous mixture was created,

The formulation was put into the spray bottle, and after a predetermined amount of time,

The stability was to be assessed.[28]

Final preparation

EVALUTION PARAMETERS

A) P^{H-}

pH testing is used in herbal toners to determine their acidity or alkalinity levels. This information is important because it helps ensure that the toner is within the desired pH range for optimal skin health and effectiveness. The 25ml formulation was placed in a beaker with graduations and the calibrated pH metre was placed in the formulation for a period, and the measurement was taken.

B) SURFACE TENSION –

They can determine if the toner will go across the skinan even layer or if it will form patches or droplets. Obtaining this knowledge is essential in ensuring correct toner use and a consistent experience for the user.The formulation was collected using the stalagmometer,and the surface tension was determined.

C) SKIN IRRITAION –

The dorsal skin of the left hand was sprayed with a small amount of the toner and kept there for a while; the results indicated that the skin was not inflamed.

D) TEMPERATURE VARIATION

The formulation was exposed to different temperatures at 45^0 C and 10^0 C for 1months to check the stability.

E) LIGHT EXPOSURE TEST

The product is placed in its actual packaging at direct sunlight/in light chamber for 48hrs to check any discoloration of the product.

H) LEAK TEST

Delayed leak test: Aerosol containers with precise weights were kept at room temperature for one months. one months later, the containers are weight once more. The in a of difference weight is the indicator of container leakage.

RESULT-

SR.NO	PARAMETERS	FORMULATION
1	P^H	4.10
2	Surface tension	Water=42sec Moringa oliefera =1.46 sec
3	Skin irritation	No irritant
4	Skin conditioning	Smooth hydrated
5	Temperature variation	No changes
6	Light exposure test	No changes
7	Leak test	No leakage
8	Stickiness	Sticky in nature

Conclusion -

The study successfully formulated a herbal face toner using Moringa oleifera flower extract, which exhibited favorable physicochemical characteristics and skin compatibility. The preformulation and phytochemical evaluations confirmed the presence of various active phytoconstituents, particularly flavonoids and antioxidants, that contribute to its therapeutic benefits. Among the five developed formulations, F2 emerged as the most promising based on its optimized pH, suitable surface tension, and positive skin effects such as hydration and non-irritation.

The toner not only maintained stability under different storage conditions but also retained its integrity upon light exposure and temperature variations. The results validate the potential of Moringa oleifera flower extract as a valuable natural ingredient in cosmetic formulations. Its incorporation into a face toner harnesses its antioxidant, antimicrobial, and anti-inflammatory properties, making it a compelling alternative to synthetic skincare products.

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