



Development of a Natural Lotus Petals And Neem Leaves Facial Toner For Skin Revitalization

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ABSTRACT :

Herbal face toners are skin care products made with botanical extracts that helps to clean, refresh, glow and keep the tonicity of the skin. As a result, it can be stated that herbal face toner is more effective than synthetic face toners in terms of ingredients and effectiveness on facial skin. *Nelumbo Nucifera* [Lotus petals] is widely used in traditional medicine and cosmetics due to its various activities like skin-whitening and Anti-wrinkle. It contains flavonoids, phenolic compounds that support for soothing and emollient activities.

Azadirachta indica [Neem leaves] has been traditionally valued for its various activities on skin, the major role is Anti-acne, Anti-inflammatory, Anti-oxidant and Anti-microbial by presence of chemical constituents of nimbin, nimbidin, catechins, beta-sitosterol and tannins. The combination of lotus petals and neem leaves suggest a multifunctional toner. The popular advantages of herbal cosmetics are they are non-toxic in nature. The primary goal of making herbal face toner is to maintain skin's pH and these can be used daily for restoring the skin texture.

KEYWORDS: Toner, lotus, neem, Anti-Inflammatory, Anti-microbial, Anti-aging, Anti-wrinkle.

1.1 Introduction

Modern cosmetics science has shifted from surface- level beauty to deep cellular health, positioning the facial toner as critical tool for skin care. Facial toners are aqueous cosmetic preparations generally applied after cleansing to remove residual impurities, balance the skin surface, and prepare the skin for better absorption of subsequent skincare products. Anatomically, human skin is complex, multi-layered shield consisting of protective epidermis, the penetrative dermis, and the deep hypodermis. Daily cleansing often disrupts stratum corneum, throwing off the skin's pH weakening its protection. A skin renewing face toner acts as a molecular bridge, instantly restoring the skin's acid mantle and temporarily softening the lipid barrier so the active nutrient can penetrate deep into the living tissue. By bridging clinical dermatology with cutting edge phytochemistry, creates a powerful molecular synergy that drives potent botanical actives deeper into the skin matrix, a toner is infused with *Nelumbo nucifera* [lotus petals] and *Azadirachta indica* [neem leaves] works far beneath the surface. The low molecular weight activities in this formulation travel through the epidermal layers to reach the deeper dermis, where the skin's structural engine operates. The antioxidants and flavonoids from lotus petals protect the core collagen and elastin fibers from environmental breakdown, maintaining skin elasticity and youthfulness. Concurrently, neem's active terpenes travel into the deeper hair follicles and sebaceous gland (oil), balancing sebum production and neutralizing acne-causing bacteria. Ultimately, this specific herbal combination transforms the traditional toner from a basic fluid into an advanced cellular catalyst that purifies, protects, and restores the skin from its deepest structural layers .

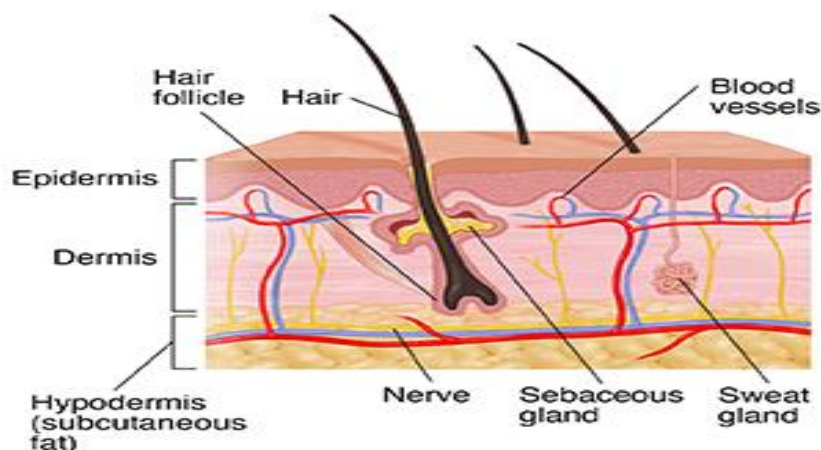


FIG:1 Structure of Skin

The facial region remains mostly uncovered and therefore encounters solar radiation, dust, pollutants and microorganisms daily, which can disturb sebum balance and hydration. The facial skin consists of three main layers: the epidermis, dermis, and hypodermis. The outermost layer, the stratum corneum, acts as a protective barrier that prevents excessive water loss and protects against external irritants. However, this barrier can be easily affected by harsh chemicals, improper cleansing, and environmental stress, leading to conditions such as dryness, acne, dullness, pigmentation, and premature aging. Maintaining the integrity of the skin barrier and its natural pH (approximately 4.5–5.5) is essential for healthy skin function. The slightly acidic pH of the skin, often referred to as the “acid mantle,” plays a crucial role in inhibiting the growth of pathogenic microorganisms, regulating sebum production, and maintaining enzymatic activity required for barrier repair. Disruption of this pH balance may result in increased microbial colonization, inflammation, dryness, and impaired skin barrier function. Therefore, cosmetic products such as facial toners are important in restoring and maintaining the skin’s physiological pH, improving skin texture, and supporting overall skin health. In general, an ideal facial toner is formulated to have a pH close to that of the skin (around 4.5–5.5) to ensure compatibility, minimize irritation, and preserve the natural acid mantle.

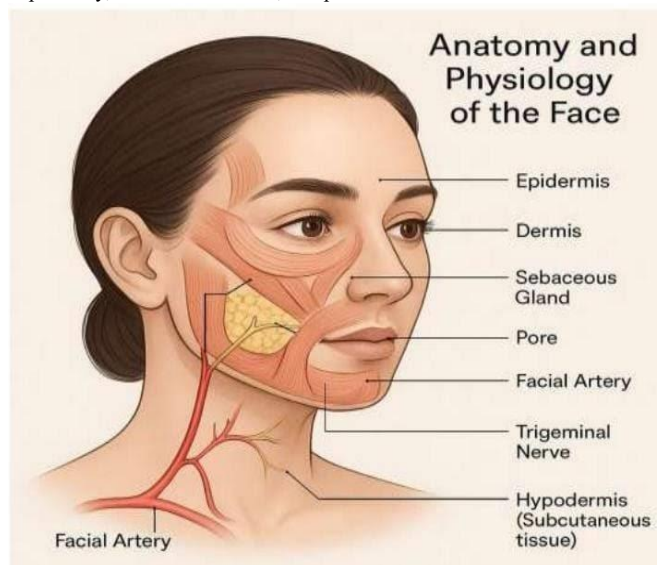


FIG-2 Anatomy of Face

Medicinal plants are valuable sources of naturally occurring phytoconstituents such as flavonoids, phenolic compounds, tannins, alkaloids, terpenoids, and other secondary metabolites. These constituents may contribute to several biological activities that are beneficial in cosmetic applications, including antioxidant, antimicrobial, anti-inflammatory, and skin-protective effects. Oxidative stress and microbial contamination are among the major factors associated with various common skin concerns such as acne, irritation, and aging. Therefore, the incorporation of plants possessing antioxidant and antimicrobial properties into topical cosmetic formulations may provide additional functional benefits while maintaining the desired cosmetic characteristics of the product.

Lotus [*Nelumbo Nucifera*] has traditionally been valued for its various activities on skin, its major role is anti-wrinkle and skin-whitening. The skin whitening property is due to the presence of tyrosinase present in extract inhibiting wrinkle activities due to the presence of elastase and DOPA oxidase inhibition.

It also acts as anti-acne due to its antibacterial property; it reduces the pigmentation of skin and improves complexion which gives soothing and emollient activity.

Azadirachta indica A. Juss. [family Meliaceae], commonly known as neem, is widely used in traditional Indian medicine. Its leaves contain azadirachtin, nimbin and quercetin investigated for antimicrobial activity. Different parts of the neem plant have traditionally been used in India and other regions for various medicinal and personal-care purposes. Neem leaves contain several classes of phytoconstituents and have been investigated for antimicrobial, anti-inflammatory and antioxidant activities. Reviews of neem in dermatology have described its traditional and modern relevance in skin care and topical applications.

The incorporation of neem leaf extract into a facial toner therefore provides an interesting approach for developing an herbal cosmetic preparation. The present work focuses on the formulation and evaluation of an herbal facial toner containing neem leaf extract and suitable cosmetic excipients.

The combination of *Azadirachta indica* leaves and *Nelumbo nucifera* petals provides a rational basis for developing a multifunctional herbal facial toner. Neem can contribute antimicrobial, antioxidant, and soothing properties, whereas lotus petals can provide antioxidant and skin-conditioning benefits. The combination may therefore offer complementary effects, with the formulation intended to cleanse and refresh the skin, maintain skin pH balance, reduce excess oiliness, and provide protection against oxidative stress while supporting a healthy and radiant skin appearance.

The prepared formulations are evaluated using physicochemical and cosmetic parameters including organoleptic properties, pH, homogeneity, pourability, skin irritation, spreadability, skin conditioning, washability, viscosity, specific gravity, light exposure and stability studies.

Although neem and lotus have individually been investigated for their pharmacological and cosmetic properties, there is a need to explore their combined incorporation into a facial toner and evaluate the characteristics of the resulting formulation. Therefore, the present study was undertaken to formulate and evaluate a herbal facial toner containing *Azadirachta indica* leaf extract and *Nelumbo nucifera* petal extract. The study aims to develop a unique herbal cosmetic preparation with potential cleansing, refreshing, antioxidant, antimicrobial, and skin-revitalizing properties and to evaluate its physicochemical and formulation characteristics.

The proposed herbal facial toner may provide a natural approach to routine skincare by combining the complementary properties of neem and lotus in a convenient topical dosage form.

1.2 Herbal Cosmetics

Plant extracts are used as functional components in their extracts as active or functional ingredients. These preparations have considerable popularity and growing acceptance due to preference for botanical origin".

Plant materials may provide several classes of phytoconstituents, including:

Alkaloids

Flavonoids

Tannins

Beta-sitosterol

Catechins

Terpenoids

Nimbin

Nimbidin

Their levels affect the antioxidant and conditioning behavior in the finished product.

For this toner, authentication of material, solvent selection, compatibility with the aqueous base, preservation, pH adjustment and stability were considered.

1.3 Facial Toner

Toner is used after cleansing to Depend on its composition, a toner may provide refreshing, conditioning, brightening and moisturizing effects

Ideally it should have suitable pH, clarity, odour and skin compatibility with good pourability.

In this study, pH, homogeneity, pourability, irritation, skin conditioning, stickiness and washability were evaluated.

1.4 Method of Preparation

Preparation of lotus petals extract

Collect fresh and sterile lotus flower, separate the lotus petals carefully, wash it thoroughly with distilled water. Shade dried it at room temperature until its complete moisture removes.

5 g of shade-dried lotus petal powder was weighed.

Powder was macerated in 100 mL 70% ethanol in round bottom flask.²²²

Close the flask properly to minimize solvent evaporation.

Heat it until it boils and evaporate, when ethanol travel into condenser and dripped into lotus powder material.

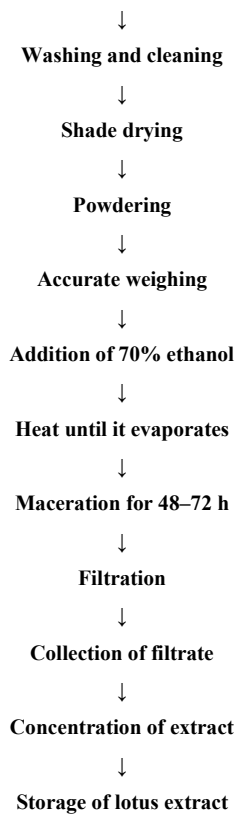
Keep the mixture for approximately 48–72 hours at room temperature.

After completion of maceration, filter the mixture through Whatman filter paper.

Collect the filtrate in a clean container.

The concentrated lotus extract is transferred to a ambered coloured container and stored in a cool place, protected from light, until further use.

Collection of lotus petals

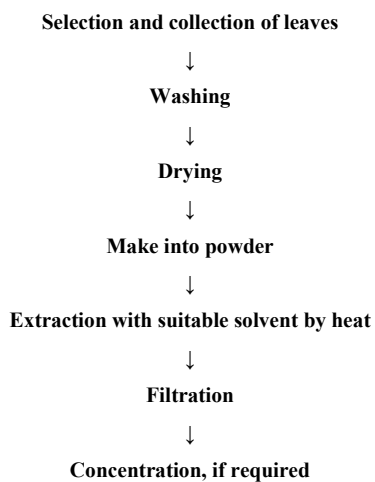


Preparation of Neem Leaf Extract

Fresh and healthy neem leaves are selected and thoroughly washed with water to remove dust and foreign bodies. The leaves are dried under suitable conditions and subsequently powdered.

The powdered neem leaves are subjected to an appropriate extraction process using a suitable solvent by heat. After extraction, the extract is separated from the plant residue by filtration. The obtained extract may be concentrated, if required, and stored under suitable conditions until further formulation.

General steps



↓
Storage of neem extract

1.5 Role of Ingredients**Neem Extract**

Neem extract is the principal herbal component of the formulation. It provides the botanical active constituents responsible for the intended herbal facial - toner properties.

Glycerin

Glycerin used as humectant in cosmetic formulations to improve moisturized skin feel.

Propylene Glycol

Propylene Glycol used as co-solvent and maintain the uniformity in the formulations.

Methyl Paraben

Methylparaben is used as a preservative in many cosmetic formulations to extend the shelf life of products. Its inclusion helps protect the formulation by stopping harmful bacterial attack.

Jasmine Fragrance

Jasmine fragrance is added for odour masking and improve the sensory acceptability of the preparation.

Distilled Water

Distilled water acts as the principal aqueous vehicle of the facial toner.

REVIEW OF LITERATURE
2.1 Introduction

Review of literature is an essential component of research work because it provides information regarding previously conducted studies, established scientific findings, formulation approaches, evaluation methods and the research gap associated with the proposed work.

The present study deals with the formulation and evaluation of a herbal facial toner containing neem (*Azadirachta indica*) leaf extract and lotus petals (*Nelumbo nucifera*). Therefore, the literature was reviewed with particular emphasis on the phytochemical composition of neem and lotus, its antimicrobial and antioxidant properties, dermatological applications, skin conditioning, soothing, topical formulations and evaluation of herbal cosmetic preparations

2.2.1 Saleem et al. (2018)

Saleem and co-workers published a comprehensive review of *Azadirachta indica*, describing its phytochemical profile, bioactive compounds and pharmacological properties. The authors reported that neem contains several classes of phytoconstituents, including alkaloids, steroids, flavonoids, terpenoids, fatty acids and carbohydrates. Various parts of the plant have traditionally been used for several health-related applications, including dermatological conditions. The review also discussed the antioxidant, antimicrobial and anti-inflammatory potential of neem and highlighted the importance of its diverse bioactive constituents.

Relevance to present study:

The study supports the selection of neem as the principal herbal ingredient for development of a topical facial-care preparation.

2.2.2 Alzohairy (2016) and subsequent antimicrobial literature

Neem has attracted considerable scientific attention because of its broad antimicrobial potential. Investigations have demonstrated activity of different neem-derived preparations against several bacterial and fungal organisms. The antimicrobial properties have been associated with diverse phytochemicals present in different plant parts.

Neem-derived compounds have therefore been investigated for possible applications in dermatology, oral care, infectious disease research and topical preparations.

Relevance to present study:

The antimicrobial potential of neem provides a scientific basis for investigating neem leaf extract in a facial cosmetic preparation intended for routine skin care.

2.2.3 Dwivedi et al. (2021)

A review specifically focused on the dermatological applications of neem discussed its traditional use and modern scientific evidence. The authors reported that *A. indica* contains more than 300 structurally diverse compounds and possesses several biological activities, including antibacterial, antifungal, antiviral, anti-inflammatory, antioxidant and antiseptic properties. The review also described various neem-based formulations and novel delivery systems designed to improve topical delivery.

Relevance to present study:

This literature establishes the dermatological relevance of neem and supports further development of neem-containing topical preparations.

2.2.4 Mukherjee et al. (2009) – *Nelumbo nucifera*

Mukherjee and co-workers conducted an extensive review of *Nelumbo nucifera* covering its phytochemistry, traditional uses and pharmacological properties. Different parts of lotus, including flowers, leaves, rhizomes and seeds, were reported to contain several classes of phytoconstituents such as alkaloids, flavonoids, glycosides, triterpenoids, steroids and polyphenolic compounds. The review also reported several biological activities of lotus extracts, including antioxidant, antibacterial, antifungal and anti-inflammatory activities.

Relevance to present study:

The phytochemical richness and reported biological activities of *Nelumbo nucifera* support the use of lotus petals as a herbal ingredient in the facial toner, particularly for its potential antioxidant and skin-soothing contribution.

2.2.5 Wu MJ, et al. (2009) Antioxidative Effect

Research on *Nelumbo nucifera* has demonstrated antioxidant potential in different parts of the plant. For example, studies on lotus extracts have investigated their ability to scavenge free radicals and inhibit oxidative processes. Research on lotus leaves also identified antioxidant components and demonstrated free-radical-scavenging activity of certain extract fractions.

Relevance to present study:

The antioxidant potential reported for *N. nucifera* supports the incorporation of lotus petal extract into the proposed facial toner, where antioxidant activity may contribute to protection of the skin from oxidative stress.

METHODOLOGY

3.1 PREPARATION OF LOTUS PETALS EXTRACT

Accurately weigh 10 g of dried and powdered lotus petals.

Transfer the powdered material into a clean, dry conical flask.

Add 100 mL of 70% ethanol.

Close the flask properly to minimize solvent evaporation.

Keep the mixture for approximately 48–72 hours at room temperature.

After completion of maceration, filter the mixture through Whatman filter paper.

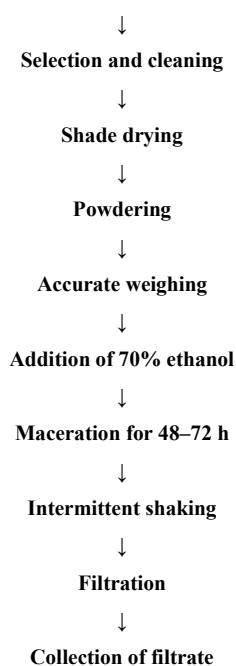
Collect the filtrate in a clean container.

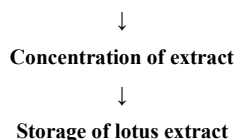
The filtrate may be concentrated at a controlled temperature using a rotary evaporator or by gentle evaporation, depending on the intended formulation.

The concentrated lotus extract is transferred to a suitable container and stored in a cool place, protected from light, until further use.

Flow chart for preparation of lotus petal extract

Collection of lotus petals





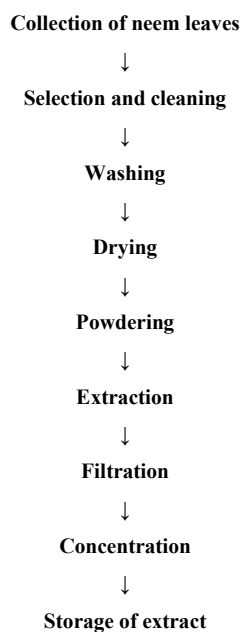
3.2 Preparation of Neem Leaf Extract

The powdered neem leaves were subjected to extraction using a suitable extraction procedure. The plant material was treated with the selected solvent under appropriate conditions to extract the desired phytoconstituents.

After completion of extraction, the mixture was filtered to separate the plant residue from the extract. The obtained filtrate was concentrated, whenever required, under controlled conditions.

The prepared neem extract was stored in a suitable, well-closed container until further use in the formulation.

Flow chart for preparation of neem extract



3.3 Preliminary Phytochemical Screening

Preliminary phytochemical screening was carried out to identify the major classes of phytoconstituents present in the prepared neem extract.

The extract was subjected to qualitative chemical tests for different phytochemical groups such as alkaloids, carbohydrates, proteins, flavonoids, tannins, phenolic compounds, saponins, steroids and terpenoids.

3.3.1 Test for Carbohydrates – Molisch's Test

Procedure

A small quantity of the plant extract was taken in a test tube and a few drops of Molisch's reagent were added. Concentrated sulphuric acid was carefully added along the side of the test tube to form a separate layer.

Observation

Formation of a violet or purple ring at the junction of the two layers indicates the presence of carbohydrates.

Result

A positive Molisch's test indicates the presence of carbohydrates in the extract.

3.3.2 Test for Flavonoids

A suitable portion of the extract was subjected to a standard qualitative test for flavonoids.

Observation

Development of characteristic colour indicated the possible presence of flavonoids.

3.3.3 Test for Tannins

A portion of the extract was treated with a suitable ferric salt solution.

Observation

Development of blue, green or violet coloration indicates the possible presence of tannins and phenolic compounds.

3.3.4 Test for Alkaloids

The extract was subjected to a suitable alkaloid-specific reagent.

Observation

Formation of a characteristic precipitate indicates the possible presence of alkaloids.

3.3.5 Test for Terpenoids

The extract was subjected to a suitable qualitative test for terpenoids.

Observation

Development of reddish brown colour at the reaction interface indicates the possible presence of terpenoid constituents.

3.4 Formulation of Herbal Facial Toner

Four different formulations were prepared and coded as F1, F2, F3 and F4.

The formulations contained lotus petal and neem leaves extract along with glycerin, propylene glycol, methyl paraben, jasmine fragrance and distilled water.

INGREDIENTS	F1	F2	F3	F4
Lotus	2ml	3ml	5ml	6ml
Neem	2ml	3ml	5ml	6ml
Propylene Glycol	3ml	3.5ml	4ml	4.5ml
Methyl Paraben	0.2	0.24	0.30	0.30
Jasmine Fragrance	1 drop	1-2 drop	2-3 drop	2-3 drop
Glycerine	3ml	3.5ml	4ml	4.5ml
Distilled water	Q.s to 30ml	Q.s to 30ml	Q.s to 30ml	Q.s to 30ml

Table 1: Formulation Design

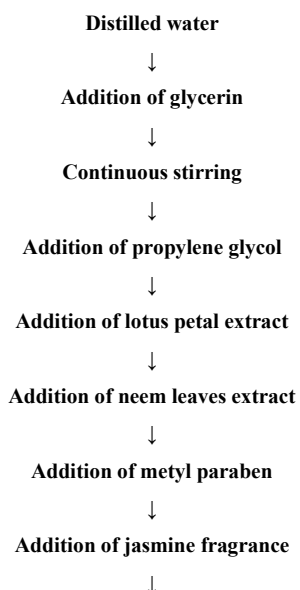
3.5 General Procedure for Preparation of Facial Toner

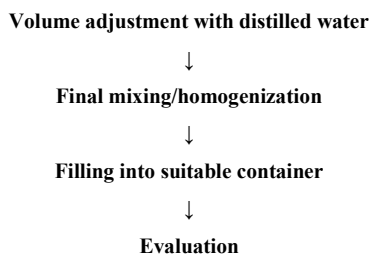
The required quantity of distilled water was taken in a clean beaker. Glycerin was added gradually with continuous stirring to obtain uniform distribution. Propylene glycol was incorporated into the formulation with continuous mixing. Lotus petal extract was then added. After continuous stirring neem leaves extract were incorporated and stir until it gets uniformity. Methyl paraben has been added to the formulation as a preservative. At last, the jasmine fragrance is added to prevent the unpleasant odour of formulation.

The volume was adjusted with distilled water to the required final volume. The formulation was mixed thoroughly until a uniform preparation was obtained.

The prepared formulations were transferred into suitable clean amber bottle and stored under appropriate conditions until evaluation.

Flow chart for preparation of facial toner





3.6 Evaluation of Herbal Facial Toner

The prepared formulations were evaluated using the following parameters:

1 Colour

The colour of each formulation was observed visually under suitable lighting conditions and recorded.

2 Odour

The odour of each formulation was evaluated by smelling the preparation and assessing its acceptability.

3 Clarity

The formulation was examined visually against a suitable background to determine its clarity and the presence or absence of visible particulate matter.

4 Texture

The texture of the formulation was evaluated by observing its appearance and skin feel after application.

5 Homogeneity Test

The formulations were examined for uniformity by visual inspection.

The preparation was checked for:

Uniform distribution of ingredients

Presence of lumps

Presence of foreign particles

Phase separation

Sedimentation

Visible instability

A formulation showing uniform appearance without visible separation was considered homogeneous.

6. Determination of pH

The pH of the prepared herbal facial toner was determined using a calibrated digital pH meter.

Procedure

A suitable quantity of formulation was transferred into a clean beaker. The pH meter was calibrated using appropriate standard buffer solutions. The electrode was immersed into the sample and the pH was recorded after stabilization.

The pH measurement was performed for each formulation.

Importance

pH is an important parameter for topical cosmetic preparations because extreme pH values may cause skin discomfort or irritation.

7. Pourability Test

Pourability represents the ease with which a liquid formulation can be transferred from its container.

Procedure

A measured quantity of the formulation was transferred from its storage container under standardized conditions. The ease and uniformity of flow were observed.

The formulation should possess sufficient fluidity to allow convenient dispensing without excessive dripping or difficulty in pouring.

8. Spreadability Test

Spreadability indicates the ability of a formulation to distribute uniformly over the skin surface.

Procedure

A small quantity of formulation was applied to the skin surface and gently spread using the fingertips.

The ease with which the formulation spread over the surface was observed and recorded.

A good facial toner should spread easily and produce a uniform layer without excessive stickiness.

9. Skin Irritation Test

The prepared formulation was evaluated for possible skin irritation.

Procedure

A small quantity of the formulation was applied to a suitable small area of skin according to the approved laboratory procedure. The area was observed for signs of irritation such as:

Redness

Itching

Burning

Swelling

Rash

The observations were recorded at predetermined intervals.

Interpretation

Absence of visible redness, swelling or other irritation indicates acceptable skin compatibility under the conditions of the test.

10 Washability Test

Washability indicates the ease with which the formulation can be removed from the skin.

Procedure

A small quantity of the formulation was applied to the skin and subsequently washed using water.

The ease of removal was observed.

Interpretation

A formulation that can be removed easily without leaving excessive residue is considered to have good washability.

11 Determination of Viscosity

Viscosity represents the resistance offered by the formulation to flow.

Procedure

The viscosity of each formulation was determined using a brook field viscometer under standardized experimental conditions.

The spindle, rotational speed, temperature and sample quantity were maintained consistently for comparison among formulations.

The viscosity value was recorded in suitable units.

Importance

Viscosity influences:

Pourability

Spreadability

Application characteristics

Sensory properties

Physical stability

12 Specific Gravity Test

Specific gravity of a liquid preparation gives idea about the density. It is indicative of concentration of solutes in solvent.

The molecular information can be assessed in a non-invasive way by determining the specific gravity.

Toner was prepared and its specific gravity was noted as 1.05, indicating a slightly denser than water which showed acceptable physical nature of facial toner.

RESULTS

4.1 PREFORMULATION STUDIES

TEST NAME	NEEM RESULT	LOTUS RESULT
1.Test for phenols	N.A	Phenol confirmed
2.Test for flavonoids	N.A	Flavonoids confirmed
3.Alkaline test	Neem extract may be present	Lotus extract may be present
4.Lead acetate test	N.A	Lotus extract Confirmed
5.Fehlings test	Neem extract may be present	N.A

6. Molisch test	Neem extract may be present	N.A
7. Salkowski test	Neem extract may be present	N.A
8. Ferric chloride test	Neem extract confirmed	N.A

Table 2: Preformulation Studies

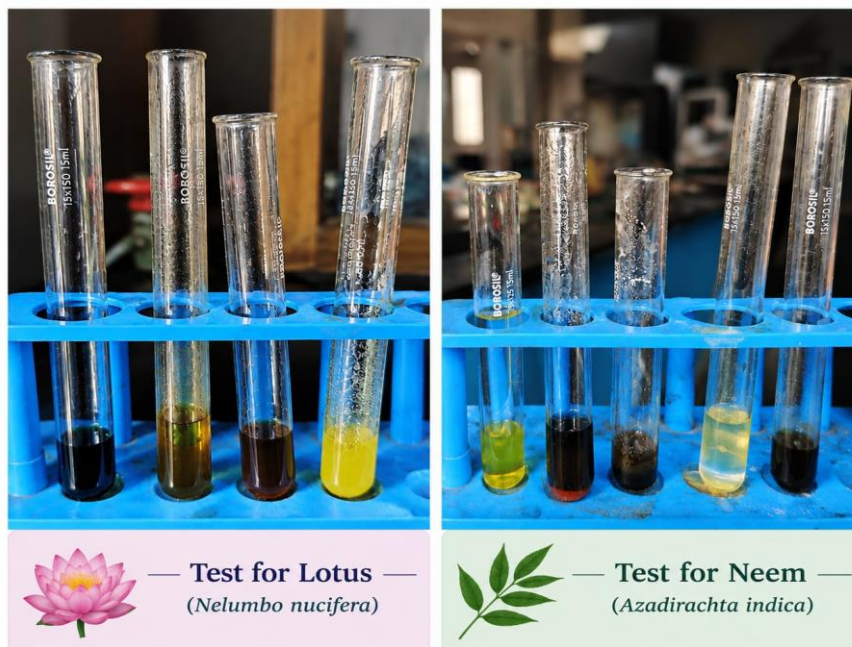


FIG:3 Pre-formulation Test of Lotus Extract And Neem Leaves

2 Organoleptic Evaluation

The formulations were visually examined for colour, odour, clarity and texture.

FORMULATION	COLOUR	ODOUR	CLARITY	TEXTURE
F1	Golden-yellow	Jasmine	Cloudy	Liquid
F2	Golden-yellow	Jasmine	Cloudy	Liquid
F3	Golden-yellow	Jasmine	Cloudy	Liquid
F4	Golden-yellow	Jasmine	Cloudy	Liquid

Table 3: Organoleptic Evaluation



FIG:4 Formulation Of Toner

3 Homogeneity

FORMULATION	HOMOGENICITY
F1	Turbid
F2	Turbid
F3	Homogenous
F4	Homogenous

Table 4: Homogeneity Evaluation

4 pH Determination

FORMULATION	pH VALUE
F1	5.56
F2	5.11
F3	5.47
F4	4.56

Table 5: pH Evaluation

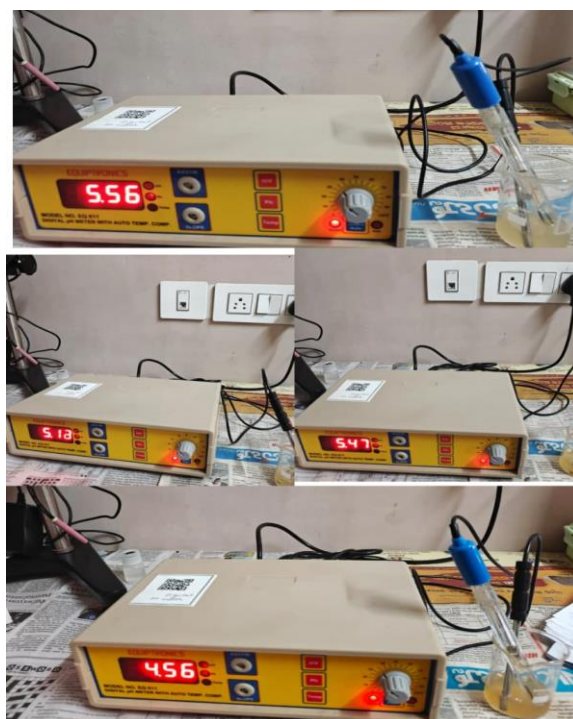


FIG:5 pH Evaluation Of Toner Formulation By Digital pH Meter Method

5. Pourability

Pourability was evaluated by observing the ease with which the formulations could be dispensed from their containers.

FORMULATION	POURABILITY
F1	Pourable
F2	Pourable
F3	Pourable
F4	Pourable

Table 6: Pourability Evaluation

6 Spreadability

Spreadability was evaluated to determine the ease with which the formulation could be distributed over the skin surface.

FORMULATION	SPREADIBILITY
F1	Spreadable
F2	Spreadable

F3	Spreadable
F4	Spreadable

Table 7: Spreadability Evaluation**7 Skin Irritation Test**

The prepared formulations were evaluated for their skin compatibility according to the experimental procedure followed during the study.

The formulations were observed for visible signs of irritation such as redness, itching, swelling or burning sensation.

FORMULATION	REDNESS	SWELLING	ITCHING	OVERALL OBSERVATION
F1	Absent	Absent	Absent	Non-irritant
F2	Absent	Absent	Absent	Non-irritant
F3	Absent	Absent	Absent	Non-irritant
F4	Absent	Absent	Absent	Non-irritant

Table 8: Skin irritation Evaluation**8 Washability**

Washability was evaluated by observing the ease of removal of the formulation from the skin using water.

FORMULATION	WASHABILITY
F1	Washable
F2	Washable
F3	Washable
F4	Washable

Table 9: Washability Evaluation**9 Viscosity**

FORMULATION	VISCOSITY (m, pas)
F1	3.17
F2	3.67
F3	3.83
F4	3.97

Table 10: Viscosity Evaluation**10 Specific Gravity**

FORMULATION	SPECIFIC GRAVITY
F1	1.02
F2	1.03
F3	1.05
F4	1.04

Table 11: Specific Gravity**DISCUSSION****5.1 Discussion of Organoleptic Properties**

Organoleptic evaluation is an important preliminary assessment for facial toner. because appearance, colour, odour and texture influence consumer acceptability.

The prepared formulations showed a golden yellow, which can be attributed mainly to the incorporation of lotus petal and neem leaf extract. The formulations exhibited a pleasant odour due to the incorporation of jasmine fragrance.

The formulations were also visually examined for clarity and texture. The absence of undesirable visible particles, excessive turbidity or phase separation indicated satisfactory physical appearance.

The results are consistent with previous studies on herbal topical formulations, where colour, odour, appearance and texture were used as important preliminary quality parameters. Published studies on lotus and neem-based topical formulations have also reported acceptable physical characteristics following formulation.

5.2 Discussion of Homogeneity

Homogeneity is an important quality attribute because all components of a formulation should be uniformly distributed throughout the preparation. In the present study, F1, F2, F3 and F4 showed satisfactory homogeneity. No significant lumps, sedimentation or visible phase separation were observed. The satisfactory homogeneity may be attributed to adequate mixing of lotus and neem extract with the aqueous vehicle and the incorporation of glycerin and propylene glycol as formulation aids.

Similar evaluation of herbal topical formulations has included homogeneity as an important parameter for determining the physical quality of the finished product.

5.3 Discussion of pH

pH is an important parameter in the development of facial cosmetic preparations. A formulation with an unsuitable pH may cause discomfort or irritation when applied to the skin.

In the present study, the pH of each formulation was determined using a calibrated digital pH meter. The values obtained for F1–F4 were compared to determine their suitability for topical facial application.

The actual experimental pH values should be interpreted together with the skin-irritation observations. A formulation showing a suitable pH together with absence of irritation provides better evidence of acceptable topical compatibility.

The variation in pH between formulations, if observed, may be related to differences in the concentration of neem extract and other formulation components.

5.4 Discussion of Pourability

Pourability is particularly important for a facial toner because the product is generally intended to be dispensed easily from its container.

All four formulations demonstrated satisfactory pourability. This indicates that the formulations possessed suitable flow characteristics for convenient dispensing.

The presence of water as the major vehicle contributed to the fluid nature of the toner, while glycerin and propylene glycol could influence the viscosity and flow properties.

A facial toner should ideally be sufficiently fluid to permit easy application without excessive dripping or difficulty in dispensing.

5.5 Discussion of Spreadability

The prepared formulations showed good spreadability over the skin surface.

Good spreadability is desirable because a toner should distribute uniformly over the intended facial area without requiring excessive rubbing. The formulation should provide adequate contact with the skin while maintaining acceptable sensory characteristics.

The presence of glycerin and propylene glycol may have contributed to the smooth application and skin feel of the formulation.

The observed results support the suitability of the developed formulations for topical cosmetic application.

5.6 Discussion of Skin Irritation

Skin compatibility is an essential consideration in the development of cosmetic preparations.

The prepared formulations were evaluated for visible signs of irritation such as redness, swelling, itching or other adverse skin reactions. No significant signs of irritation were observed under the conditions of the study.

This observation suggests acceptable skin compatibility of the tested formulations under the experimental conditions.

Previous studies involving topical lotus and neem formulations have also evaluated skin irritation and reported acceptable skin compatibility.

However, the absence of irritation in a preliminary formulation study should not be interpreted as proof of universal safety for all users.

5.7 Discussion of Washability

The prepared formulations showed good washability.

Good washability is desirable because excessive residual material on the skin may produce an undesirable sticky or greasy sensation. The aqueous nature of the facial toner facilitated easy removal using water.

The presence of water-soluble or water-compatible formulation components also contributed to the satisfactory washability of the preparation.

5.8 Discussion of Viscosity

Viscosity influences the flow, pourability, application and sensory characteristics of a liquid cosmetic preparation.

The viscosity of F1–F4 was determined under controlled conditions. The values obtained were compared among the formulations.

Any variation in viscosity may be associated with differences in the concentration of lotus extract, neem extract, glycerin and propylene glycol. Increasing the concentration of viscous excipients can alter the resistance of the formulation to flow.

The viscosity should therefore be considered together with the pourability and spreadability results. A formulation intended as a toner should maintain sufficient fluidity for easy dispensing and application.

5.9 Discussion of Specific Gravity

Specific gravity was determined as an additional physicochemical characterization parameter.

The specific gravity values provide information regarding the relative density of the prepared formulations compared with water.

Differences between formulations may occur due to changes in the concentration of neem and lotus extract and other dissolved formulation components.

The specific gravity results, when considered along with viscosity and appearance, contribute to the overall physicochemical characterization of the herbal facial toner.

5.10 Discussion of Light Exposure Study

The prepared formulations were subjected to light exposure to investigate visible changes in their physical characteristics.

The formulations were observed for changes in colour, odour, clarity and phase separation.

No significant undesirable changes were observed under the conditions used for the study. This indicates that the formulations demonstrated satisfactory physical behaviour during the light-exposure period.

However, longer-term photostability assessment and chemical analysis of marker compounds would be required to establish detailed photostability.

SUMMARY

The present study was undertaken with the objective of formulating and evaluating a herbal facial toner containing lotus (*Nelumbo nucifera*) petal and neem (*Azadirachta indica*) leaf extract.

Lotus petal has been traditionally been valued for its various activities on skin, the extract is having chemical constituents with various activities such as skin brightening, antiwrinkle and antiacne effects.

Neem leaves were selected as the herbal ingredient because of their traditional use in skin care and the presence of various phytoconstituents associated with biological activities such as antimicrobial, antioxidant and anti-inflammatory effects.

Four formulations, namely F1, F2, F3 and F4, were prepared using different concentrations of lotus petals and neem leaf extract along with suitable cosmetic excipients such as glycerin, propylene glycol, methylparaben, jasmine fragrance and distilled water.

The prepared formulations were subjected to various evaluation tests to assess their quality and suitability as facial cosmetic preparations. The evaluation included organoleptic characteristics, homogeneity, pH, pourability, spreadability, skin irritation, skin-conditioning properties, washability, viscosity, light exposure and stability studies.

The formulations exhibited satisfactory physical characteristics and were found to be homogeneous with acceptable appearance and odour. The prepared formulations also demonstrated satisfactory pourability, spreadability and washability. No significant signs of skin irritation were observed under the conditions of the preliminary skin-compatibility study.

Preliminary phytochemical screening of the extracts was performed to identify different classes of phytoconstituents. The findings provided supportive evidence for the presence of various phytochemical groups reported in neem.

The physicochemical evaluation of the formulations provided useful information regarding their pH, viscosity and specific gravity. Light exposure and stability evaluation were also performed to assess the physical stability of the formulations.

On the basis of the overall evaluation, the formulation exhibiting the most desirable combination of physical appearance, homogeneity, physicochemical properties, skin compatibility and stability can be selected as the optimized formulation.

Thus, the present study demonstrates the feasibility of developing a lotus and neem-based herbal facial toner using simple formulation techniques and commonly used cosmetic excipients. The developed formulation may serve as a promising herbal cosmetic preparation for facial skin care.

6.1 Final Statement

“Formulation and Evaluation of Herbal Facial Toner Containing Lotus Petal and Neem Leaf Extract” represents a simple and practical approach toward the development of a plant-based facial cosmetic preparation. The study combines the traditional relevance of lotus and neem with modern formulation and evaluation techniques and provides a foundation for further research into herbal facial-care products.

CONCLUSION

The present study successfully developed a herbal facial toner containing *Nelumbo nucifera* (lotus petal) and *Azadirachta indica* (neem leaf) extracts. Four formulations (F1–F4) were prepared and evaluated for their physicochemical and cosmetic properties. The formulations showed acceptable appearance, pourability, spreadability and washability, with no visible signs of irritation during the preliminary skin-compatibility assessment.

The pH, viscosity and specific gravity values varied among the formulations, reflecting differences in their composition. Overall, the findings demonstrate the feasibility of incorporating lotus petals and neem leaves extracts into a facial toner using a simple formulation approach. Further studies involving long-term stability, microbial evaluation and controlled skin studies are recommended to establish its efficacy and safety more comprehensively.

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