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FORMULATION AND EVALUATION OF POLYHERBAL FACE TONER

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ABSTRACT

The use of products with chemicals has gone up really fast and this can cause a lot of skin problems like irritation, dry skin, allergies and damage to sensitive skin over time. Because of these effects people are getting more interested in skincare that is herbal and natural. This study was about making and testing a face toner that's herbal made from natural things like papaya powder, beetroot powder and other herbal things that are good for the skin because they have can calm the skin and renew it.The face toner was made by mixing these things together and it was checked for things like what color it is how it smells, the pH level if it is clear if it is the same all over what the spray is like if it is sticky how long it takes to dry if it irritates the skin and if it is stable when it is at room temperature. The results showed that the face toner worked well it had a pH looked good was not sticky dried fast and did not irritate the skin. The testsfor stability showed that the face toner stayed the same when it was stored without any changes in how it looked or felt. The study said that herbal face toner is a safe alternative to skincare products that have chemicals and it helps to keep the skin healthy and feel fresh.

KEYWORDS: Face Toner, papaya leaf powder, herbal cosmetic, spray formulation, herbal formulation evaluation.

INTRODUCTION

Structure of skin

The skin is the outer covering of the human body and is the largest organ in the body. It protects the internal organs and helps the body function properly. The skin is a soft, flexible

organ that covers the entire body. It acts as a barrier between the body and the outside environment. Skin helps in regulating body temperature and prevents excessive water loss from the body. It also provides sensations such as touch, pain, pressure, and heat through sensory receptors. In addition, the skin plays an important role in the synthesis of vitamin D and maintenance of overall body health.[1]

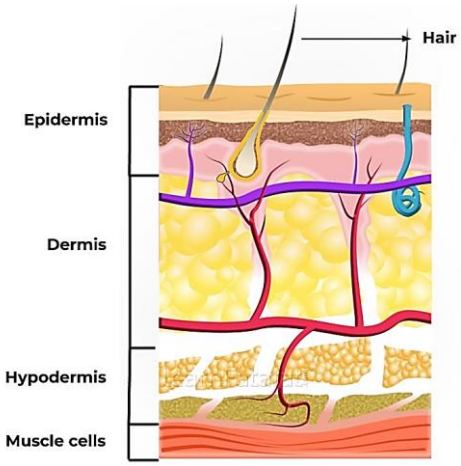

Fig. No. 1: Skin.

Human Skin Consist of

A. Epidermis
B. Dermis
C. Hypodermis (Subcutaneous Layer)

A. Epidermis

- Outermost layer of the skin.
- Protects the body from germs, dust, and water loss.
- Contains melanin, which gives skin its colour.
- Protects against UV rays from sunlight
- Produces new skin cells
- Thickness of this layer is About **0.05 mm to 1.5 mm**[2]

B. Dermis

- Provides strength and elasticity
- Helps regulate body temperature
- Gives sensation like pain, touch, pressure, and heat

C. Hypodermis

- Stores fat (energy reserve)
- Provides insulation
- Cushions internal organs
- Attaches skin to muscles and bones
- It is primary composed of adipose tissue.
- It serves as reserve energy supply.[2,4]

Herbal Cosmetics

Because of less side effects the herbal products having more demand and they are easily available. In these days, in cosmetic preparations the use of herbal ingredient was increased because they are less toxic and have more effective than synthetic. In these days, looking attractive, good- looking and beautiful than original age, is directly influenced on the demand of cosmeceuticals in the market.[5]

Herbal Face Toner

Toner is water based totally liquid which contains energetic components to cleanse the skin, keeping skin pH stable, shrink pores and grant an immediately glow. Before washing your face, it removes the dirt and impurities which are stuck on pores of skin. When brought to daily routine of skin treatment and used regularly, it having major positive impact on the appearance and ageing skin. It has an antioxidant property which hydrates the skin.[6]

Effect Of Toner on the Skin

After cleansing of the face, the leftover makeup was eliminated by the toner, act as a secondary cleansing agent, which prepare the skin for nourishment. Alcohol-based and non-alcohol based are two categories of toner, it is used for oily, sensitive and combination type of skin.

Types of Toners

Skin fresheners or bracers

It is a mild kind of toner. a toner that contains glycerine (a humectant) and water. The skin's surface is moisturised by humectant. The most common example of it is rosewater. It works best for skin types that are typical, dehydrated, and sensitive.

Skin tonics

Skin tonics are typically stronger and contain water, a humectant component, and a small amount of alcohol (up to 20%). Orange blossom water is a fantastic illustration of a skin tonic. It is okay to use skin tonics on oily skin.

Acid toner

These are a powerful type of toner that frequently includes alpha hydroxy acid and/or beta hydroxy acid. The most often utilised alpha hydroxy acids for exfoliating the skin's surface are glycolic, lactic, and mandelic acids. The most often used beta hydroxy acid is salicylic acid, which is effective for exfoliating the skin's deeper layers.

Astringents

The strongest type of toner is an astringent, which contains a lot of alcohol (20–60%), water, antibacterial compounds, and a humectant. These can harm and irritate the skin since they employ a lot of alcohol, which can eliminate the skin's extra protective lipids.[7]

ADVANTAGES OF FACE TONER

1. The pH of the skin must be balanced in order to maintain healthy skin.
2. Herbal toners are helpful in pore-tightening.
3. It reduces the visibility of blackheads and acne.
4. It hydrates the skin can leave the skin looking smooth and moisturized.
5. Enhancing absorption: Before using other Skincare products, using a herbal toner can assist to improve their absorption and increase their effectiveness.

DISADVANTAGES OF FACE TONER

1. The skin becomes dry and flaky when using toners that include alcohol.
2. Excessive use could irritate the skin. that is, edoema and redness.

DRUG PROFILE

1. PAPAYA LEAF

Synonym: Papaw, Pawpaw

Biological Name: Carica papaya Linn.

Family: Caricaceae

Chemical Constituents: Alkaloids (carpaine, pseudocarpaine), Flavonoids, Tannins, Saponins, Glycosides, Vitamins A, C, E, and enzymes like papain.

Fig. No. 5: papaya leaf.

Uses

- Used in skin care and herbal cosmetics (face masks, toners, creams)
- Used as antioxidant and anti-inflammatory agent.[9]

2. BEETROOT

Synonym: Table beet, Garden beet, Dinner beet, Red beet, Golden beet

Biological Name: Beta vulgaris L

Family: Amaranthaceae

Chemical Constituents: Betalains, ascorbicacid, carotenoids, polyphenols, flavonids, saponins,

Fig No. 6: beetroot.

Uses

- Stimulate collagen synthesis
- Improving skin elasticity and reducing the appearance of fine line wrinkles
- Promotes healthy- and fresh-looking skin.[10]

3. THE FLAME OF THE FOREST

Synonym: Butea frondosa

Biological Name: Butea monosperma

Family: Fabaceae

Chemical Constituents: Flavonoids (butein, butin, coreopsin), glycosides (butrin and isobutrin), tannins, sterols like β-sitosterol, and triterpenoids such as lupeol.

Fig. No. 7: flame of the forest.

Uses

- Skin tightening
- Fights pimples
- Skin soothing.[11]

MATERIALS AND METHODS

Table No. 1: Ingredients Used.

Sr No.	Name of Ingredients/Excipients	Name of Supplier
1.	Papaya leaf Powder	Lebroid Health Catre Pvt. Limited, Indore
2.	Beetroot Powder	V Retail Basement, S.C.O 21, Shiv Complex, Springfield colony, Faridabad
3.	Butea Monosperma Powder	SA Herbal Bioactives LLP, Pithampur District-Dhar
4	Propylene glycol	Research-Lab fine chem Industry, Mumbai
5	Glycerine	Research-Lab fine chem Industry, Mumbai
6.	EDTA	Research-Lab fine chem Industry, Mumbai
7.	Sodium Benzoate	New Model Chemical Corporation 89 Princess street, Mumbai
8.	Rose Water	Research-Lab fine chem Industry, Mumbai

Table No. 2: Equipments.

Sr No.	Equipments
1.	Conical Flask
2.	Measuring Cylinder
3.	Pair of tongs
4.	Beaker

5.	Water Bath
6.	Hot Plate
7.	Stirrer
8.	Weighing Balance
9.	Spatula
10.	Funnel
11.	Pipette

EXPERIMENTAL WORK

1 Method of preparation

➢ **Procurement of Herbs**

The ingredients used in the formulation of the herbal face toner were procured from different authenticated sources. Papaya leaf powder was obtained from Lebroid Health Care Pvt. Limited. Beetroot powder was purchased from V Retail, located at Basement, S.C.O 21, Shiv Complex, Springfield Colony, Faridabad. Butea monosperma powder was procured from SA Herbal Bioactives LLP. Propylene glycol, glycerine, EDTA, and rose water were obtained from Research-Lab Fine Chem Industry, while sodium benzoate was purchased from New Model Chemical Corporation located at 89 Princess Street, Mumbai.

➢ **Preparation of Face Toner**

- Preparation of Aqueous Phase: Take a clean beaker add 15-18ml of distilled water, add EDTA and stir until completely dissolved then add sod. Benzoate and mix well
- Preparation of Humectant Phase: In another beaker mix glycerine and propylene glycol then gradually add beetroot powder and mix to form a smooth slurry.
- Add papaya leaf powder and butea monosperma powder in Aqueous Phase.
- Add Humectant phase in Aqueous phase slowly while stirring continuously.

➢ **Addition of Rose water and Volume adjustment**

➢ **Transfer Toner into Spray Bottle**

- Transfer The Toner into Sterilized Spray Bottles to Protect It from Light and Store in Room Temperature..[15,16]

2 Formulation table

Table No. 3: Different Formulation of Herbal Face Toner.

Ingredient	Function	Batch F1	Batch F2	Batch F3	Batch F4	Batch F5
Papaya Leaf powder	Anti-oxidant	3ml	2ml	3ml	1.5ml	3ml
Beetroot powder	Brightening and colouring agent	0.6gm	1gm	2gm	0.6gm	0.5gm
Butea monosperma powder	Anti-microbial and Soothing	1.5gm	1gm	2gm	0.9gm	1.5gm
Glycerine	Humectant and Moisturizer	0.6ml	1.5ml	4ml	1.5ml	2ml
Propylene Glycol	Humectant and co-solvent	1.5ml	2ml	2ml	1.5ml	2ml
Sod. Benzoate	Preservative	0.15gm	0.15gm	0.15gm	0.15gm	0.15gm
EDTA	Chelating agent and stabilizer	0.03gm	0.03gm	0.05gm	0.06gm	0.01gm
Rose water	Fragrance and Cooling	7.5ml	7ml	5ml	6ml	8ml
Distilled water	Vehicle	Q.S.	Q.S.	Q.S.	Q.S.	Q.S.
Total Quantity		45ml	45ml	45ml	45ml	45ml

Fig. No. 6: Different Batches.

3. Evaluation of toner

1. Physical Evaluation

Colour is an important physical evaluation parameter of a herbal face toner because it affects the product's appearance and consumer acceptance. The colour of the toner generally depends on the herbal ingredients, and additives used in the formulation. Odour evaluation is carried out to determine the characteristic smell and acceptability of the herbal face toner. The fragrance of the toner usually comes from natural herbal ingredients. Odour is important for freshness. We observed the colour, Odour, and the of the herbal face toner's organoleptic properties.[17]

2. PH of Formulation

The pH of the prepared face toner was determined using a calibrated pH meter. About 10 mL of the toner sample was taken in a clean beaker, and the pH meter was calibrated using standard buffer solutions before analysis. The electrode was immersed into the toner sample, and the reading was allowed to stabilize. The pH value displayed on the meter was then recorded. After completion of the test, the electrode was washed with distilled water. The ideal pH range for a face toner is between 4.5 and 5.5, which is considered suitable and safe for skin application.[18]

3. Spray Volume

The spray volume of the herbal face toner was determined by taking a clean and dry measuring cylinder or beaker. The spray bottle was filled with the prepared herbal face toner, and the spray pump was primed by pressing it 2–3 times to ensure uniform spraying. The bottle was then held upright at a fixed distance, and the toner was sprayed 10 times into the measuring cylinder. After spraying, the total volume of toner collected was measured carefully. The average spray volume was then calculated by dividing the total collected volume by the number of sprays. [21]

Spray Contains 0.15 – 0.20 ml Per Spray

Range: 0.10 ml – 0.20 ml per spray

4. Skin Irritation

The dorsal skin of the left hand was sprayed with a small amount of the prepared face toner and observed for a certain period of time to check for any signs of skin irritation or allergic reaction. The results indicated that no redness, inflammation, itching, or irritation was observed on the skin, showing that the formulation was safe and suitable for topical application.[19]

5. Stickiness

A small quantity of the prepared face toner was applied on the skin surface, usually on the dorsal side of the hand. The formulation was gently spread and allowed to dry naturally for a few minutes. After drying, the skin surface was touched lightly with fingers to check for any sticky or tacky feel. The toner was evaluated for its non-sticky nature and smooth feel on the skin. A good face toner should dry quickly without leaving excessive stickiness or residue.[5] The stickiness test was performed by spray face toner on hand and check stickiness of all 5 batch.

6. Drying Time

A small amount of the prepared face toner was sprayed onto the back of the hand and spread smoothly across the skin. The time it took for the product to dry fully after being applied was noted and measured using a stopwatch. The toner was checked for its ability to dry quickly without leaving any tacky or sticky residue on the skin. A high-quality face toner should dry in a short amount of time and leave the skin feeling refreshed and non-greasy after use.

Ideal range: 45 – 60 sec

The Formulation Was Sprayed 3 Times on A Tile to Check for Calculation of Time Taken for The Formulation to Dry.[20]

7. Stability Test

The stability study of the prepared face toner was carried out to evaluate its physical and chemical stability during storage. The formulation was stored in tightly closed containers at different temperature conditions such as room temperature and refrigerated conditions for a specified period. During the study, the toner was observed periodically for changes in colour, odour, pH, clarity, precipitation, and phase separation. The formulation was considered stable if no significant changes were observed throughout the storage period.[2]

RESULT AND DISCUSSION

1. Physical Evaluation

Table No. 4: Physical Evaluation Observation.

Sr No.	Parameter	F1	F2	F3	F4	F5
1.	Colour	Pink	Pink	Dark Pink	Pink	Pink
2.	Odour	Pleasant	Pleasant	Pleasant	Pleasant	Pleasant

The physical evaluation of the five formulations (F1–F5) was carried out by observing their colour and odour characteristics. The results showed that formulations F1, F2, F3, and F5 had a pink colour, while formulation F4 showed a dark pink colour. In terms of odour, formulations F1, F2, and F3 had a pungent smell, whereas formulations F4 and F5 had a pleasant odour. These observations indicate that there were slight variations in the physical appearance and smell among the formulations, which may be due to differences in the concentration of ingredients used in each formulation.

2. PH

Table No. 5: PH Observation.

Sr No	Formulation	PH	Result
1.	F1	6	Fail
2.	F2	5	Pass
3.	F3	5.5	Pass
4.	F4	4.5	Pass
5.	F5	4.9	Pass

The PH of all three formulation F3, F4 and F5 was found to be closure to skin PH and indicating that they can be used safely on the skin.

Ideal range of Face toner: 4.5 – 5.5

3. Spray Volume

Table No. 6: Spray Volume.

Sr No.	Formulation	Spray Volume	Observation
1.	F1	0.18 ml	Dense spray
2.	F2	0.16 ml	Slightly heavier
3.	F3	0.9 ml	Non-uniform Spray
4.	F4	0.11 ml	Fine Spray
5.	F5	0.12 ml	Fine Spray

The spray volume test was carried out to evaluate the spray pattern and amount of toner delivered from each formulation. Formulations F1 and F3 produced a non uniform, while F2 showed a slightly heavier spray pattern. Formulations F4 and F5 produced a fine and uniform spray, indicating better atomization and easy application on the skin. Hence, F4 and F5 were considered more suitable for facial toner use.

4. Skin Irritation Test

Table No. 7: Skin Irritation Test.

Sr No.	Formulation	Observation
1.	F1	Slightly Irritation
2.	F2	Slightly Irritation
3.	F3	No Irritation
4.	F4	No Irritation
5.	F5	No Irritation

The skin irritation test was performed to evaluate the safety of different herbal face toner formulations on the skin. Formulations F1 and F2 showed slight irritation after application, indicating mild skin sensitivity. In contrast, formulations F3, F4, and F5 showed no signs of

irritation such as redness, itching, or inflammation. Therefore, F3, F4, and F5 were considered safer and more skin-friendly formulations for topical use.

5. Stickiness

Table No. 8: Stickiness Observation.

Sr No.	Formulation	Result
1.	F1	Sticky
2.	F2	Sticky
3.	F3	sticky
4.	F4	Non-sticky
5.	F5	Non-sticky

The stickiness test was performed to evaluate the feel of the toner after application on the skin. Formulations F1, F2, and F3 showed a sticky nature, which may cause discomfort during use. In contrast, F4 and F5 were found to be non-sticky and provided a smoother skin feel. Therefore, F4 and F5 were considered more suitable and user-friendly formulations for facial application.

6. Drying Time

Table No. 9: Drying Time Observation.

Sr No.	Formulation	Drying Time
1.	F1	47 sec
2.	F2	66 sec
3.	F3	74 sec
4.	F4	50 sec
5.	F5	53 sec

The drying time test was carried out to determine the time required for each toner formulation to dry after application. Among all formulations, F1 showed the fastest drying time of 47 seconds, while F3 took the longest time of 74 seconds. Formulations F4 and F5 showed moderate drying times with good skin feel and spreadability. Hence, F4 and F5 were considered suitable for convenient facial application. Ideal range: 45 – 60 sec

7. Stability Test

Table No. 10: Stability Observation.

Sr No.	Formulation	Colour	Odour	Clarity	Result
1.	F1	Change (Orange brown)	Pungent	Cloudy	Unstable
2.	F2	Change (Reddish brown)	pungent	Cloudy	Unstable
3.	F3	Change (Crimson red)	pungent	Slightly hazy	Unstable
4.	F4	Change (Dark pink)	Pleasant	Slightly hazy	Moderately Stable

5.	F5	No change (pink)	Pleasant	Clear	Stable

The stability test was carried out by storing the toner at room temperature (37^0 C) and observing it for any physical changes. The stability study of the polyherbal face toner showed that F1, F2, and F3 were unstable due to colour change, pungent odour, and cloudy appearance. F4 was moderately stable because it showed slight colour change and haziness but remained acceptable. F5 was found to be stable as no significant changes in colour, odour, or clarity were observed.

CONCLUSION

The present study was carried out to formulate and evaluate a polyherbal face toner using natural ingredients such as papaya leaf powder, beetroot powder, Butea monosperma powder, rose water, glycerine, and other excipients. Five formulations (F1–F5) were prepared and evaluated for parameters including physical appearance, pH, spray volume, skin irritation, stickiness, drying time, and stability. The evaluation results showed that formulations F4 and F5 had pleasant odour, suitable pH, non-sticky nature, and no skin irritation. Among all formulations, F5 showed the best overall performance with good spray characteristics, acceptable drying time, and excellent stability without any significant changes in colour, odour, or clarity during storage. In contrast, F1, F2, and F3 showed instability, stickiness, and slight irritation. Among all the formulations, batch F5 showed the most satisfactory results with suitable pH, pleasant odour, non-sticky nature, absence of skin irritation, acceptable drying time, and excellent stability during storage. Therefore, formulation F5 was considered the most suitable and effective polyherbal face toner formulation for cosmetic application.

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