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Formulation and Evaluation of Herbal Acne Facewash

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Abstract: *Acne vulgaris is the most common chronic inflammation disorder that occur when oil cells and dead skin cells blocked the hair follicles. From ancient we believe that the herbal medicine is safer and has low side effect as compare to the synthetic medicine. Herbal therapeutic industry is the oldest cure method of disease and also seen in Vedas. The aim work is to developed and evaluate multi-herbal formulation for acne vulgaris containing the drug such as bel Patra (Aegle mermelos), neem (Azadirachta indica), and ghritkumari (Aloe vera). These plants have good anti-inflammatory, anti-microbial, anti-oxidant and anti-fungal property and as reported in the literature.*

Keywords: Face wash, acne, herbal, natural ingredient

I. INTRODUCTION

The Indian herbal drug industry is considered to be one of the oldest systems of medical care in the world. Its roots can be traced back to ancient India, where the use of herbs for medicinal purposes was mentioned in the Vedas, an ancient religious text. Ayurveda and Unani, two ancient healing methods, utilized herbs and natural products to address various health conditions. Despite being perceived as a recent trend by Western medical practitioners, plant extracts are still commonly used in most prescribed medicines today

Cosmetics:

They are substances that come into contact with various parts of the human body, such as skin, hair, nails, lips, and teeth. It helps improve or change the appearance of the human body, mask body odour, and protect and condition the skin. Cosmetics can also be applied to the mucous membranes of the mouth and teeth to cleanse and Flavors them

Herbal cosmetics:

They are also known as Phyto-cosmetics or botanical cosmetics, are personal care products that incorporate plant extracts, herbs, and botanicals to promote skin, hair, and overall well-being.

Acne: It is a common chronic skin disease involving blockage or inflammation of pilosebaceous unit.

Types of acne:

1. Whiteheads
2. Blackheads
3. Papules
4. Pustules (pimples)
5. Nodules
6. Cyst

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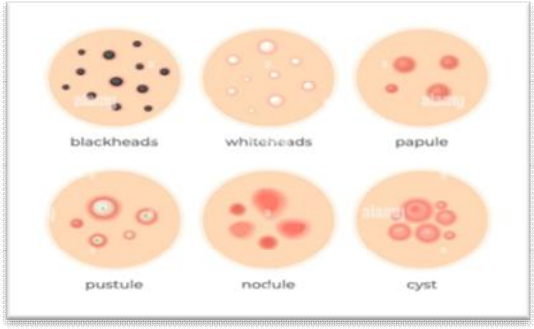

Fig 1. Types of acne

Face wash:

A face wash is a facial care product used to remove makeup, dead skin cells, oil, dirt, and other types of contaminants from the skin on your face. This helps open pores and prevent skin conditions such as acne. Cleansers can be used as part of skin care along with toners and moisturizers.

Advantages of face wash:

• Helps remove dead skin cells and replace old skin cells with new skin cells.
• Keeps skin fresh and healthy.
• Adds radiance to the skin.
• A mixture of dead skin cells and excess sebum can clog pores and lead to acne, pimples, and an utterly tired look. By exfoliating your pores regularly, you can avoid all the above skin problems.

Properties of face wash:

• Peeling promotes blood circulation, promotes skin regeneration and rejuvenation.
• Facial pores and oily skin are caused by excessive sebum secretion from the sebaceous glands
• Must be stable and good looking
• Softens when applied to the skin.
• Should spread easily without pulling.
• Should not feel greasy or sticky when applied.
• The cream residue must not become viscous after the water evaporates.

Uses of face wash:

• Treatment of acne
• Removal of traces of daily make-up.
• Cleansing of the skin.
• Anti-Aging.
• Bath and Renewal for clean, glowing skin.
• Stimulates skin cell renewal and regeneration.

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API Drug Profile:

1.Bael Leaf:

Fig 2. Bael leaf

Synonym: Aegle marmelos L.

Biological source: It consists of dried leaves of plant of Aegle marmelos L.

Family: Rutaceae.

Chemical constituent: carotenoids, phenolics, alkaloids, pectin, tannins, coumarins, flavonoids, and terpenoids

Uses:

1. Bael is extremely efficient against skin infections, treats various skin conditions, and promotes skin health because it has anti-bacterial characteristics.
2. It contains a variety of antioxidants, which play a crucial role in skin health by fighting free radicals and reducing oxidative stress.
3. Bael contains chemicals called tannins, flavonoids, and coumarins. These chemicals help to reduce swelling.

2. Neem:

Fig 3. Neem

Synonym: Margosa, nimtree or Indian lilac

Biological source: Neem consists of the fresh or dried leaves and seed oil of Azadirachta indica

Family: Meliaceae

Chemical constituent: nimbolinin, nimbin, nimbidin, nimbidol, sodium nimbinate, gedunin salannin, and quercetin

Uses:

1. Antiseptic
2. Neem is a natural healer, so it can soothe and calm irritated skin. Neem-containing face washes can help reduce redness and irritation while also leaving skin feeling peaceful
3. Neem-based face cleansers have a lot of antimicrobial qualities.
4. This not only clears up acne but also shields skin from aggressors outside that could harm it. In this approach, acne-causing bacteria are both treated and kept from growing

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3.Turmeric:

Fig 4. Turmeric

Synonym: Haldi
Biological source: Turmeric is obtained from the dried rhizomes of the plant Curcuma longa
Family: Zingiberaceae
Chemical constituent: Curcuminoids; curcumin (diferuloylmethane, the primary constituent responsible for yellow color of turmeric), desmethoxycurcumin, and bisdemethoxycurcumin.

Uses:

1. Turmeric is an amazing ingredient for skin care. It can resolve a number of skin problems, including acne, skin darkening, skin pigmentation, rashes etc. It has been used since ages to boost the health and glow of the skin.
2. Turmeric works wonderfully for skin brightening and lightening. Plus, it contains an anti-oxidant compound known as curcumin, and curcumin comes with multiple skin benefits. It fights off acne, acne scars, and also reduce skin pigmentation.
3. C. longa possesses multiple pharmacological activities, including antioxidant, antimicrobial, anti- inflammatory, anti-carcinogenic, anticoagulant, antidiabetic and immunological.

4.Aloe vera:

Fig 5. Aloe vera

Synonym: Aloe barbadensis, Aloe humilis Blanco, Aloe indica Royle, nomen nudum, Aloe perfoliata var
Biological source: Aloe is the dried latex of leaves of various species of Aloes
Family: Liliaceae
Chemical constituent: Barbalin, isobarbolin, and saponins
Properties:

1. Aloe has an antioxidant property that prevents skin cell damage. It has a moisturizing effect on dry skin and help reduce irritation of skin.
2. Aloe vera has many skins benefits right forms making your skin glow to keeping it soft Apart from having medicinal properties, aloe vera is stacked with a lot of nourishing benefits as well

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Excipient Profile:

1.Honey:

Fig 6. Honey

Synonym: Madhu

Biological source: Honey is a sugary substance/secretion deposited in the honey comb by the hive bee Apis mellifera.

Family: Apidae

Uses:

• Thickening agent

• Antioxidant.

2. Xanthan gum:

Fig 7. Xanthan gum

Synonym: Corn Sugar Gum

Biological source: Xanthan gum is an anionic biopolymer produced by the bacterium Xanthomonas campestris.

Family: Pseudomonadaceae

Uses:

• Stabilizers

• Thickening Agent

3. Glycerin:

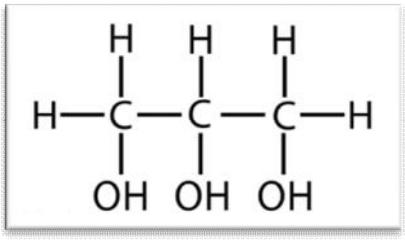

Fig 8. Glycerine

IUPAC Name: propane-1,2,3-triol

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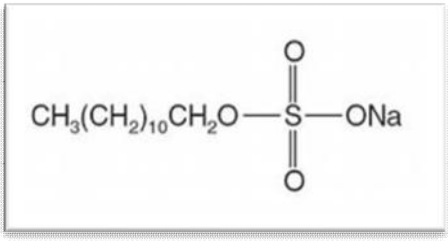
Chemical formula: C3H8O3

Uses:

• Antimicrobial properties

• Help promote the health of damaged skin and speed up the healing process

4. Sodium lauryl sulphate:



IUPAC Name: sodium dodecyl sulphate

Chemical formula: NaC12H25SO4

Uses:

• Foaming Agent

• Helps remove makeup and dirt as a cleaning agent.

• It helps fight bacteria, and make skin more permeable.

Preformulation study:

Preliminary Test:

Sr.no	Test	Observation
1	Test for Alkaloids: Hager's Test – Few drops of Hager's reagent was added to 2-3ml of filtrate.	Presence of alkaloids is indicated by formation of yellow precipitate.
2	Test for Glycoside: Keller killiani test – Take 2ml extract, add glacial acetic acid, one drop 5% of FeCl3 & conc. H2SO4.	Reddish brown colour appears at junction of the two liquid layers and upper layers appears bluish green.
3	Test for Saponins: Foam test – Shake the drug extractor dry powder vigorously with water.	Persistent foam observed.
4	Test for Carbohydrate: Molisch's test – A few mg of the residue was placed in a test tube containing 0.5 ml of water, and it was mixed with 2 drops of Molisch's reagent. To this solution, 1ml of concentrated sulphuric acid was added from the side of the inclined test tube, so that the acid formed a layer beneath the aqueous solution without mixing.	If a red brown ring appears at the common surface of the liquids, carbohydrates are present.
5	Test for amino acids: Ninhydrin Test – The Ninhydrin reagent is 0.1% w/v solution of Ninhydrin in n-butanol. A little of this reagent was added to the test extract.	No violate purple colure is developed, if amino acids are Absent.
6	Test for Steroids: The development of a greenish colour	The development of a greenish colour.

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	when 2ml of the Organic extract was dissolved in 2ml of chloroform and treated with sulphuric and acetic acids indicates the presence of steroids.	Steroids are present.
7	Test for protein: Xanthoproteic test – A little residue was taken with 2ml of water and 0.5ml of concentrated nitric acid was added to it.	Yellow colour is obtained, if proteins are present.
8	Test for Tannin: Ferric chloride test – A 5%w/v solution of ferric chloride in 95% alcohol was prepared. Few drops of this solution were added to a little of the above filtrate solution.	If dark green or deep blue colour is obtained, tannins are present.

Table no.3: Phytochemical tests of crude drug.

Sr.no	Preliminary Test	Result
1	Alkaloid	++
2	Glycoside	+
3	Saponins	++
4	Carbohydrates	+
5	Amino acid	_
6	Steroid	+
7	Protein	+
8	Tannin	++

Table no.4: Results of Preliminary test.

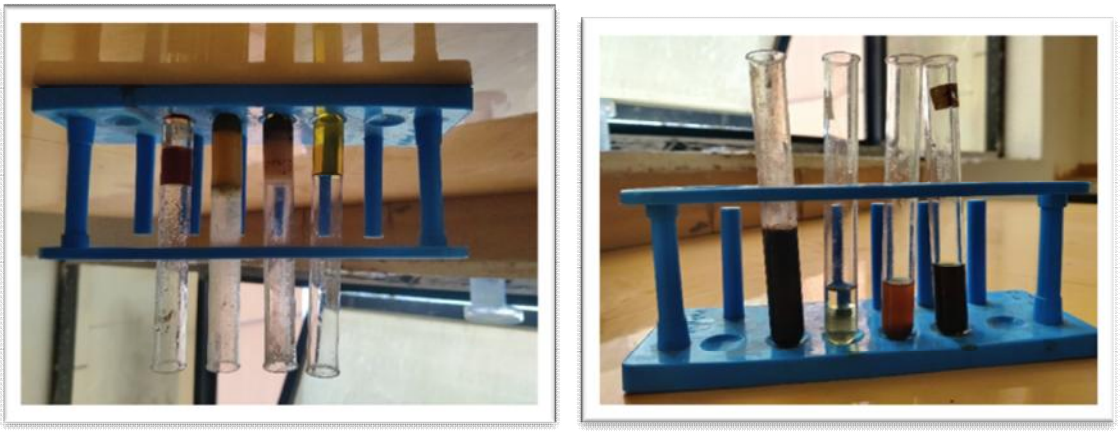

Fig 9. Observation of Preliminary Test.

Ash Value:

The residue remaining after incineration is the ash content of the drug. (inorganic salts of carbonates, phosphates, silicates of sodium, potassium, calcium and magnesium) are known as ash content

Ash value is a criterion to judge the identity OR purity of the crude drug

Ash value = Ash weight/Weight of sample x 100

=0.23/3x100

=7.6%

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Moisture content:

The moisture content is the amount of water present in a material, often expressed as a percentage of the material's weight or as a ratio of water to the dry mass of the material.

Moisture content = weight of sample before drying - weight of sample after drying

=35.645-35.262

=0.383

%moisture content =

5gm of drug content = 0.38

100 gm of drug content = 0.38/5x100

=7.6%

Extract Value:

Extractive values quantify the number of active constituents extracted from a plant material using a specific solvent.

Weight of drug= 5gm

Weight of empty porcelain dish= 50.54gm

Weight of porcelain dish with extract = 75.55gm

Weight of porcelain dish with dry extract =52.45gm

Weight of dried extract= 52.45- 50.54

=1.88

25ml aq. Extract gives= 1.88

100ml aq. Extract gives= 1.88x100/25

=7.54 gm

Foamability:

Foamability refers to the capacity or ability of a substance or formulation to generate foam when mixed with water.

Fig 10. Ash value

Fig 11: Extract value

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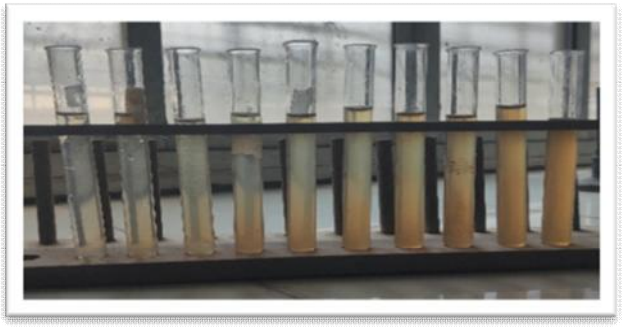

Fig 12. Foamability

Methods:

Preparation of Herbal extracts:

The herbs collected from the plants are washed under running water and are dried in indirect sunlight. Then converted into coarse powders and sieved through sieve no. 60 mesh. Then the extracts were prepared by decoction method and the prepared extracts were stored in well closed containers.

Decoction Process:

Decoction is a method of extraction by boiling plant material to dissolve the chemicals of the material. It is the most common preparation method in various herbal-medicine systems. In that firstly Take 10 gm of powdered crude drug was added in the 50 ml of water, and place in a hot water bath fir boiling. This procedure is carried out for 15 mins. After 15 mins the volume is reduced to the ¼ th the original. Then it is cooled and filtered. This method is used for the extracting the water soluble and Heat stable constituents.

Fig 13. Decoction of bael leaf

Fig 14. Filtration of extract

Preparation of Formulation:

Using anti- acne gel benefits in various ways. Most people believe it eliminates the skin's pores, removes extra sebum, and reduces acne and pimples. That's true, but safe and mild anti-pimple gels or lotions can provide much more. Here are several reasons why you should try it right away, especially if you are struggling with acne or pimples:

1. It helps in reducing excessive oil production from skin cells.
2. It prevents irritation and skin discoloration.

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3. It exfoliates the skin's dead cells and encourages the production of new skin cells.
4. Usually, it works well with various skincare products.

Preparation of Gel Base:

Xanthan gum weighed and dissolved in water and kept overnight for soaking. Once the Xanthan gum is swollen stirring should be done to mix the Xanthan gum to form the gel.

Composition of developed Formulation:

Sr No.	Ingredients	Formulation		
		F1	F2	F3
Step 1- Gel Base				
1	Xanthan gum	0.7gm	0.9gm	1gm
2	Distilled Water	40ml	40ml	40ml
Step2- Formulation of Herbal gel				
3	Beal Leaves	3ml	3ml	3ml
4	Neem	1ml	1ml	1ml
5.	Turmeric	1ml	1ml	1ml
6	Aloe vera	1.5ml	1.5ml	1.5ml
7	Honey	1.5ml	1.5ml	1.5ml
8	Sodium lauryl sulphate	0.1gm	0.1gm	0.1gm
9	Glycerine	1ml	1ml	1ml
10	Vitamin E	1.5ml	1.5ml	1.5ml
11	Jasmine oil	q. s	q. s	q. s

Table no.5: Formulation table

Procedure:

1) Take 40 ml of prepared gel base and Add 3ml of bael leaves extract in it.
2) Take 1ml of neem leaves extract, 1 ml turmeric extract and1.5ml aloe vera gel, add in above solution stir it well.
3) Add 1.5ml honey in it as a humectant.
4) Add 1.5 ml glycerine in it which work as moisturizing agent.
5) Add jasmine oil as a perfuming agent
6) Then next add 1.5ml of Vitamin E as preservatives stir it well.
7) Then next add SLS as a foaming agent all this ingredient mix it well.

Fig 15. Formulation

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Evaluation Test for Anti-Acne Gel:

The prepared formulation evaluated for following tests.

Physical Appearance:

The physical appearance of the formulation Was checked visually which comprised.

• Colour:

The colour of the formulations was checked out against white background.

• Odour:

The odour of the face washes was checked by manually.

• Consistency:

The consistency was checked by applying on skin.

• Homogeneity:

Homogeneity was tested by visual inspection after allowing them to set in a container. They are evaluated for their appearance and presence of aggregates.

• Greasiness:

The greasiness was assessed by the application onto the skin.

• Wash ability:

Formulations were applied on the skin & then ease & extent of washing with water were checked manually.

Foamability: Take 1 gm of sample and add 5 ml water and shake for 10 sec and check the foam formulation

• Viscosity:

Viscosities of formulated gels were determined using Brookfield viscometer spindle 7 at 50 rpm and 25°C. The corresponding dial reading on the viscometer was noted. Then the spindle was lowered successively

Observation Table

Sr.no	Formula	Viscosity
1	F1	5495 cp
2	F2	7239 cp
3	F3	9314 cp

Table no.6: Viscosity

Fig 16. (F1)

Fig 17. (F2)

Fig 18. (F3)

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• Determination of the pH:

An amount of 20mg of the formulation was taken in a beaker and was subjected to the pH measurement using a digital pH meter within 24hrs. of manufacture. The range of pH should be 4–6.

Sr.no	Formula	pH
1	F1	5.53
2	F2	5.56
3	F3	5.18

Table no.7: Determination of the pH

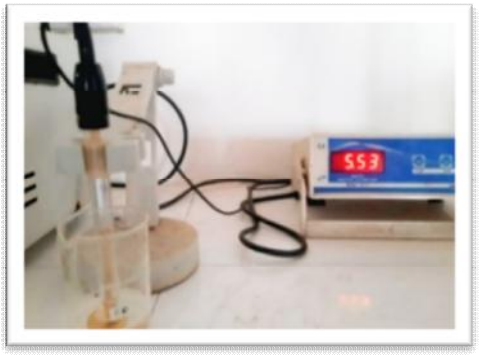

Fig 19. (F1)

Fig 20. (F2)

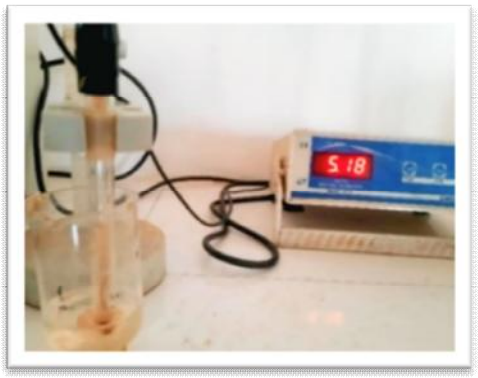

Fig 21. (F3)

• Spreadability Test:

The spreadability of samples was determined by taking 0.25gm of gel formulation was placed on a glass slide over which are second glass plate was placed. A weight of 100g was allowed to rest on the upper glass slide for 5min. Spreadability refers to the area covered by a fixed amount of gel sample after the uniform spread of the sample on the glass slide. Measure the Diameter of cream which is spread on slide.

Spreadability (S) = M*L/T

Length (cm) moved on a glass slide

T = Time taken (sec)

M = weight (gm) tied to upper glass slide

Formula = S = M x L/T

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Fig 22. Spreadability

Calculation:
For F1
S = M x L/T
= 10 x 9.6/3.22
=96/3.22
F1 = 29.81 gm.cm/sec

For F2
S = M x L/T
= 10 x 11.3/20.67
= 113\20.67
F2 = 15.46 gm.cm/sec

For F3
S = M x L/T
= 10 x 11/14.86
= 110/14.86
F3 = 7.4 gm.cm/s

• Antimicrobial Test:
Gel cleanser should be treated for the absence of such microorganism's solution of different samples of the preparation are made, each sample is inoculated into separate volume under aseptic condition and incubated at 37 °c for 1-4 hours. No formation of the clot in the Incubation mass indicates the absence of the microorganism
Procedure:
Preparation of a standardized inoculated from a bacterial culture:
A. Choosing well- isolated colonies
B. Creating a bacterial suspension (inoculated)
C. Standardizing the bacterial suspension using McFarland standards Dilution of bacterial suspension (only for MIC method)
Inoculation of bacterial suspension to one of the following:
D. A particular growth medium (e.g Mueller Hinton Agar, MHA for disk diffusion)
E. A MIC panel

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Addition of antimicrobial disks (only for disk diffusion), Incubation of plate (disk diffusion) or panels (MIC), Measuring the zone of Incubation or reading MIC panel, Interpretation of AST results.

Fig 23. Antimicrobial Test

Formula	Bacteria	Zone of inhibition
F1	E. coli	6 mm

Table no.8: Antimicrobial Test

Result:

Evaluation Result:

The Evaluation Test such as colour, odour, appearance, and pH were tested. Colour was determined by comparing with standard colour charts, odour by smelling, and remaining parameters as per standard methods.

Evaluation Test	F1	F2	F3
Physical Appearance:	Semisolid	Semisolid	Semisolid
Colour:	Yellowish orange	Yellowish orange	Yellowish orange
Odour	Pleasant	Pleasant	Pleasant
Transparency	Clear	Clear	Clear
Grittiness	No gritty particles	No gritty particles	No gritty particles
Skin irritability	No irritation	No irritation	No irritation
Washability	Easily washable	Easily washable	Easily washable
Foamability:	Present	Present	Present
Viscosity (cp value)	5495 cp	7239 cp	9314 cp
PH	5.53	5.56	5.18
Spreadability Test:	29.81 gm.cm/sec	15.46 gm.cm/sec	7.4 gm.cm/sec
Antimicrobial growth	Absent	Absent	Absent

Table no. 9:(Evaluation Test result)

II. CONCLUSION

The world market is also moving towards poly herbal medicines for health care, health and for cosmetics purposes including dermal preparations like face washes gels anti acne preparations etc. A survey of global skin care market trends indicates that consumer use of herbal products has significantly increased over the past years. In the world market, herbal formulations are in a great demand. It is a very good attempt to establish the herbal face wash containing extracts of Bael leaves and Neem. In the present study, an attempt was made to formulate anti acne gel cleanser using different natural ingredients like Bael leaves, Neem leaves, honey, and to evaluate the prepared formulations for the

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desired parameters. Prepared formulations were evaluated for physical parameters like colour, odour, grittiness, greasiness, PH, viscosity, consistency, spreadability, washability, skin irritation test and stability studies. Carbopol 940 produces desired gel strength to formulations. Honey produces humectants activity during stability studies. These preparations are having good spreadability results. It indicates easy apply on the skin. There was not any microbial growth shown in the test done for microbial growth for formulated product.

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