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Formulation and Evaluation of Herbal Papaya Scrub Containing Papaya Extract as Natural Exfoliating and Skin Brightening Agent

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Abstract: *Background: Herbal cosmetics have gained significant popularity owing to their perceived safety, efficacy, and compatibility with skin physiology. Papaya (Carica papaya Linn.), a tropical fruit rich in papain enzyme, vitamins, and antioxidants, offers excellent exfoliating, skin-brightening, and anti-aging properties. Despite widespread ethnobotanical use, systematic pharmaceutical formulation and evaluation of papaya-based scrubs remain limited in peer-reviewed literature. Objective: The present study aimed to develop and evaluate a stable, effective, and aesthetically acceptable herbal scrub utilizing Carica papaya fruit extract combined with walnut shell powder, kaolin clay, and other synergistic herbal ingredients. The formulations were assessed for physicochemical properties, skin safety, microbiological stability, and clinical efficacy. Methods: Four formulations (F1–F4) were prepared with varying concentrations of papaya extract (5%, 10%, 15%, and 20% w/w). Evaluation parameters included organoleptic properties, pH, viscosity, spreadability, washability, total microbial count, skin irritancy (patch test), and exfoliating efficacy. Stability studies were conducted as per ICH Q1A(R2) guidelines at 25°C/60% RH and 40°C/75% RH for 90 days.*

Keywords: *Herbal cosmetics*.

I. INTRODUCTION

Kosm tikos," a Greek term meaning "having the influence, arrangement, and ability in decorating," is where the word cosmetic originated. Cosmetics are used to improve the appearance of the face and body by minimizing imperfections and maintaining skin health. Cosmetic products are designed to cleanse, beautify, promote attractiveness or alter appearance.[1] Cosmetics come in a variety of forms and are used everywhere to enhance beauty. Skin protection, sunscreen, anti-acne and anti-wrinkle products are among the many types of skincare products that are developed to improve the appearance of skin.[2] Herbal cosmetics, also known as natural cosmetics, are formulations that combine acceptable cosmetic bases with one or more herbal ingredients to achieve specific cosmetic effects. Ayurveda has long utilized a variety of herbs and flowers to create cosmetics that enhance appearance and protect against environmental damage. Unlike synthetic formulations, herbal ingredients are generally safe, offering nourishment and essential minerals to the skin.[2]

1.1 WHY PAPAYA SCRUB ?

Carica papaya Linn. (Family: Caricaceae), commonly known as papaya, is a tropical perennial widely cultivated across South Asia, Africa, and Latin America. Every part of the papaya plant — fruit pulp, seeds, leaves, and latex — possesses pharmacologically significant compounds. The unripe papaya latex contains abundant papain (EC 3.4.22.2), a cysteine protease enzyme with molecular weight ~23.4 kDa, capable of hydrolyzing keratin proteins and facilitating gentle enzymatic exfoliation of the skin surface[10]

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Beyond papain, papaya fruit extract is rich in beta-carotene (provitamin A), ascorbic acid (vitamin C), tocopherols (vitamin E), flavonoids, lycopene, and carpaine alkaloids. These constituents collectively contribute to antioxidant, tyrosinase-inhibitory (skin-lightening), anti-inflammatory, and wound-healing effects on skin. The enzyme chymopapain, also present in papaya latex, further augments proteolytic activity, making papaya a uniquely multifunctional ingredient for cosmetic scrub preparations.[11]

Conventional synthetic scrubs may contain microplastic beads (polyethylene, polypropylene), which are now banned in many jurisdictions due to environmental concerns. Natural alternatives such as walnut shell powder, sugar crystals, oatmeal, and apricot kernel powder have emerged as eco-friendly physical exfoliants. When combined with enzymatic exfoliants like papaya extract, they create synergistic dual-action formulations [12].

1.2 BENEFITS OF SCRUBBING SKIN

1. Helps in removing dead cells:

Facial or body scrubs are the cosmetic which goes beyond surface level to remove dead skin and reveal the healthy glowing skin below.

2. Free the skin form flakes:

Loss of upper layer of skin (epidermis) is called as flaky skin. It gives rise to dry patches. Scrubbing your skin can help you to deal with flaky skin effectively.

3. Deep cleaning of skin:

Scrubbing your skin helps skin to get free from dirt, oil and sweat. Other cleansing like face wash facial cleansers cannot clean the skin.

4. Thoroughly removing dust:

Accumulated in the course of the skin, scrubbing does this work effectively.

5. Clears blemishes:

Accumulation of dead skin, can block the pores of skin and causes blemishes. Scrubbing frequently helps to remove dead skin and clears blemishes.

6. Gives glow to Skin and Smooth texture:

Scrubbing actually helps to give glow and smooth texture to skin.

7. Remove the acne scars:

As scrubbing used to remove dead skin cells, it also remove the acnes scars from skin.

8. Promotes hydration of skin:

Facial scrubs contents moisturizing agents and hydrating Agents. Exfoliation of skin helps to absorb moisture and it leaves our skin with filling soft and.

9. Reduces stress:

Exfoliation or scrubbing the skin gives good massage, which gives relaxing feeling and reduces stress.[3]

1.3 BENEFIT FROM PAPAYA ON SKIN

Aged and mature skin

In aged skin with a thin epidermis and atrophied dermis, the fatty tissues of the hypodermis may also decrease. The texture of the dermal tissue changes as the collagenous Fibers progressively organizes in large bundles. In aging skin, the natural sloughing of older cells from the skin becomes more difficult, causing a dull, thick skin with less tone. Exfoliation with a formulation containing skin nutrients and moisturizers is especially effective.

Acne skin

Acne skin produces five times more dead skin cells than occur in other skin conditions and exfoliation can have great benefits for acne skin. Hydroxy acids are effective in preventing dead skin cells from clogging hair follicles and contributing to acne.

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Reduces skin pigmentation

Hyperpigmentation is a darkening of skin colour caused by either an increase in melanin or melanocytes, or from deposition of a colored substance in the skin. Exfoliation helps to shed these pigmented cells more quickly and lighten age spots. Special ingredients in the exfoliant allow it to effectively penetrate a hyper-pigmented area at its source.

Dehydration

In dehydrated skin, the lack of moisture leads to fractures in the cellular barrier, leaving skin tight andstretched. Over moisturization leads to a dull, uneven skin tone. By applying an exfoliant, the dying skin cells are effectively removed and moisturizing and hydrating ingredients can penetrate deeper into skin to help ease dry skin conditions.

Photodamage

Exposure of the epidermis and dermis to UV radiation from sunlight causes photodamage. UV radiation can induce acute and chronic changes in the DNA, protein and lipid building blocks. Acute effects include sunburn, photo toxicity, photo-allergy, cutaneous degeneration and actinic elastosis. Photodamaged skin appears thicker (actinic keratosis) and less elastic due to hypertrophy of elastic tissues and alterations in collagen Fibers.

Wrinkle Reduction

Papaya is a rich source of antioxidants, like lycopene, that help to reduce the visible signs of aging. According to a 2017 study, antioxidants present in papaya can help to combatfree radical damage, which helps to keep your skin smooth and youthful. As per a 2012 research, papaya components can also help improve the elasticity of your skin, which can minimize the appearance of wrinkles.

Deeply Cleanses

Skin Papaya is enriched with helpful enzymes and plant-based antioxidants. These components can remove impurities like dead and damaged cells, tissues, and debris from the skin's surface. Papaya also helps to clean the pores and make the skin bright and clear.

Moisturises Skin

Papaya is also a good skin moisturizer. A high concentration of antioxidants and enzymes aid in treating dry, flaky skin and restore the natural skin moisture. Regular application of papaya pulp to your skin can soften it and help to bring back its natural glow.[4]

1.4 INGREDIENT USED IN PAPAYA SCRUB

1. Papaya

Fig no1. Carica Papaya

- Botanical Name – Carica Papaya.
- Biological Source – Papaya (Carica Papaya), also called Papaw or Pawpaw, succulent fruit of a large plant.
- Family – Caricaceae.
- Chemical Constituent – Alkaloids. (Carpaine and Pseudocarpaine) Colour – Green Yellowish and Orange.

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- Genus -Carica.
- Chemical Constituent – Alkaloids. (Carpaine and Pseudocarpaine)
- Colour – Green Yellowish and Orange.
- Odour- Strong Odour. Taste – Sweet and juicy taste.
- Use – Papaya products help to reduce acne by removinging dead skin cells. [5]

2. Turmeric (Curcuma longa Linn.)

Fig no 2. Turmeric Powder

- Botanical Name-Indian Saffron, Haldi
- Biological Source-turmeric consist of dried, as well as fresh rhizomes of plant known as Curcuma Longa Linn.
- Family-Zingiberaceae. Genus-Curcuma.
- Chemical constituent-Volatile oil, Resinous matter, Starch, Curcuminoids
- Colour – Golden yellow.
- Odor – Mildly aromatic and scent of orange or ginger.
- Taste – Pungent, bitter flavor.

Taxonomy:

- Kingdom: Plantae
- Order: Zingiberales
- Family: Zingiberaceae
- Genus: Curcuma
- Species: Curcuma longa.
- Synonym: Curcuma domestica
- Common names:Turmeric, Haldi, Haridra
- Parts used: Rhizome
- Key constituents: Curcuminoids (Curcumin, Demethoxycurcumin), Volatile oils (Turmerone)

Therapeutic uses: Antioxidant, anti-inflammatory, wound healing, skin brightening

Relevance in scrub: Evens skin tone, reduces pigmentation and inflammation[6]Use- Improve skin health and cures acne Leaves the skin clean & hydrated. Says goodbye to pigmented skin & acne. Remove dirt from skin. [6]

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3. Fuller's Powder

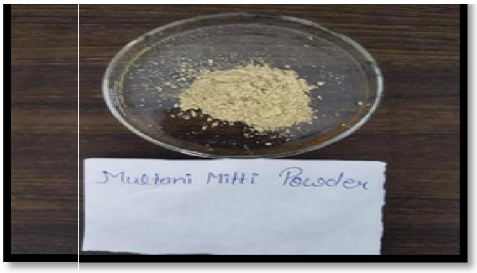

Fig no3. Fuller's Powder

- Synonym- Multan clay
- Biological soure - It consists of hydrous aluminum silicates (clay minerals)
- Description –
- Colour-White
- Odour - Pleasant
- Taste – Pleasant Chief
- Chemical constituents Montmorillonite, Kaolinite, Attapulgite
- Uses- Nourishes skin, reduce oiliness, Remove blackheads.[7]

4. Aloe-Vera

Fig no 4. Aloe-Vera

- Synonym- Aloe vera, burn plant
- Biological source – Dried latex of leaves of it also known as cape aloe
- Family-liliaceae
- Description –
- Colour- clear to slightly yellow / translucent gold
- Odour-similar like rotten garlic or onion.
- Taste- Bitter Chemical constituents - aloe emodin.
- Uses - heals burns and clears acne.[8]

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5. Walnut shell powder:

Fig no 5. Walnut shell powder

Walnut shell powder gently exfoliates the skin, revealing smooth, healthy skin by removing dull, dry skin cells. Additionally, it evens out skin tone and enhances the brightness and radiance of the skin. Antioxidants found in walnut shell powder help shield the skin from harm and preserve its youthful appearance.[9]

6. Rose water

Fig no 6 . Rose water

- Synonym- Attar of rose, lavender water, scented liquid.
- Biological source- Rose water is obtained from sepalsand petals of Rosa damscena through steam distillation.
- Family- Rosaceae.
- Description Colour- a light pink-blush color.
- Odour- exactly likefresh petals.
- Taste- Predominantly floral flavor that is not quitesavory, and not quite sweet.
- Chief chemical constituent- The volatiles mainly consist of 2- phenylehanol, linalool, citronellol, nerol, geraniol, etc.
- Uses- Smoothens skin irritation, reduce skin redness, heals cuts and scars, treat burns.

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7. Glycerin

Fig no 7. Glycerin

Glycerine is widely used in cosmetics and other toiletry applications, being virtually nontoxic, non-irritating, and odorless. It functions as a humectant, vehicle. and emollient. Glycerine is a major toothpaste ingredient, preventing drying out and hardening in the tube and around the cap threads or at the opening of the pump- type dispenser. Other uses include skin creams and lotions, shaving preparations. deodorants, and make up. Glycerol esters of fatty acids, an important class of glycerine derivatives, are utilized as emulsifiers in creams and lotions and as replacements for waxes in lipstick, in mascara, and in other non-greasy emulsions.[16]

8. Beeswax

Fig no 8. Beeswax

Beeswax is a valuable, complex natural secretion produced by young worker honey bees of the genus Apis, particularly A. mellifera (Western honey bee) and A. cerana (Eastern honey bee), secreted in liquid form from special wax glands in the abdomen, which hardens into scales used to build the honeycomb structure . This structure serves multiple critical functions: for food storage (honey, pollen), for brood rearing, for thermoregulation, and as a mediator in chemical and mechanical communication within the colony . A. mellifera has a larger body size comparing to A. cerana, with worker bees measuring about 12–15 mm,predominantly golden-brown with orange or brown banding, and queens up to 20 mm [17]

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9. Steric Acid

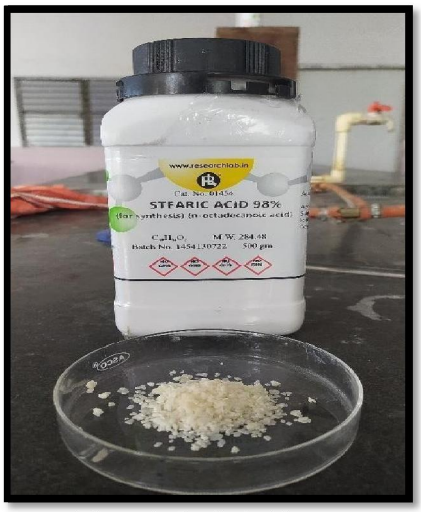

Fig no 9. Steric Acid

Stearic acid, classified 54 as a long-chain SFA, is made up of 18 carbon atoms without any double bonds (C18:0). Stearic 55 acid is common in the Western diet, predominantly found in animal fats, oils, milk, shea butter and 56 lard . Except for its dietary origins, stearic acid can also be synthesized endogenously within 57 the body through the elongation process. This synthesis involves the catalysis of acetyl-CoA 58 molecules into palmitate (C16:0) using acetyl-CoA carboxylase and the fatty acid synthase 59 multienzyme complex and stops after seven cycles of condensation, reduction, and dehydration 60 reactions . Then the intermediate product, palmitate, is released from the fatty acid synthase 61 and further elongated into stearic acid by microsomal elongases.[18]

10. Polysorbates 80

Polysorbates are amphiphilic molecules, which are fatty esters of polyoxyethylated sorbitan or sorbitol.25 The polysorbates are, for the most part, viscous liquids to waxy solids that range in color from yellow to orange to tan.They possess a faint, characteristic odor and a warm, somewhat bitter taste. The reported physical and chemical properties of generic sorbitan monolaurate, ethoxylated and sorbitan monostearate, ethoxylated are provided. Since the fatty acids used in the production of cosmetic ingredients frequently contain fatty acids other than the principal acid named (ie, a mixture), each of the polysorbates may contain a complex mixture of fatty acid moieties.[19]

11. Methyl Paraben

Methyl paraben other name is a 4 hydroxybenzoate (methyl 4-hydroxybenzoate).1 It is the most frequently used antimicrobial preservative in cosmetics and flavouring agent.. Methylparaben is found in alcoholic beverages. Methylparaben odourless, small colourless crystals or white crystalline powder in alcohol, methanol, acetone, ether.Error! Reference source not found. Instance paraben is now used for preservatives in food, pharmaceuticals and cosmetics, daily used the products that continue of methyl paraben.[20]

12. Citric acid

Citric acid (CA), also known as 2-hydroxypropane-1,2,3-tricarboxylic acid, is found in plant and animal tissues such as blood, bone, and muscle. For living organisms, citric acid is one of the essential carboxylic acids in the Krebs cycle, a series of reactions that oxidize glucose into carbon dioxide and water, releasing energy. [21]

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1.5 IDEAL PROPERTIES OF SCRUB.

1. It needs to be painless.
2. Its character should be rough.
3. It shouldn't cause cancer.
4. It ought not to be sticky[13]

II. LITERATURE REVIEW

1. Preeti D. Verma et al., (2025)

This research developed and assessed herbal rejuvenating facial scrub using natural ingredients, including Carica papaya, Musa acuminata, Tephrosia purpurea, Cynodon dactylon, Cicer arietinum, Lens culinaris and Juglans regia, along with pure phytochemical Caffeine, formulated as powder and cream-based scrub products.

2. Pratiksha Baravkar et al., (2024)

Natural beauty is a blessing, and cosmetics aid in displaying and enhancing human attractiveness and individuality. Cosmetics are described as items used for beautifying, washing, boosting attractiveness, or changing one's look. The purpose of this study is to create and assess a Polyherbal face scrub that may be used as an alternative to chemical products. Natural ingredients are used in herbal cosmetics because they have the ability to work against wrinkles, acne, and to regulate the flow of oil from the skin's open pores.

3. Mrunal Ashok Salve et al., (2025)

Cosmetics are products applied to the body for the purpose of beautifying, cleansing or improving appearance and enhancing attractive features. Cosmetic has been defined as, “Cosmetic" means any article intended to be rubbed, poured, sprinkled or sprayed on, or introduced into, or otherwise applied to, the human body or any part thereof for cleansing, beautifying, promoting attractiveness, or altering the appearance and includes any article intended for use as a component of cosmetic. Soap is a commonly used skin cleansing product, the chemical composition of which is an alkali salt of a fatty acid.

4. Mr. Siddharth Sambhaji Devikar et al., (2025)

The increasing awareness of the adverse effects of synthetic cosmetic formulations has propelled the demand for herbal-based skincare products. In the present study, a herbal scrub powder was developed using plant-derived ingredients with proven therapeutic and dermatological benefits. The formulation was designed to provide effective exfoliation, sebum regulation, antibacterial action, and anti-inflammatory activity. The formulation exhibited excellent flow properties, low moisture content, acceptable grittiness, and no microbial growth, confirming its suitability as a safe, effective, and shelf-stable herbal cosmetic.

5. Kartikay Prakash et al., (2024)

In today’s life for both women and men cosmetics plays an important role to beautifying and altering the appearance of skin. The use of natural ingredients to remain healthy and of good appearance, the skin surface requires frequent cleansing to remove oil, sebum and other secretions, dead cells, crusts and applied make-ups. Aim: This study aims on the formulating an herbal Face Scrub using natural ingredients incorporated into gel, For the purpose of enhancing skin beauty, several skin conditions are developed, such as skin protection, sunscreen, anti-acne, and anti-wrinkle products. In this preparation, Roasted gram peel are used to exfoliating activity. Other natural ingredients are tamarind powder and multani mitti used to remove grene, dust particles and acne.

6. Mitali Hire et al., (2024)

Cosmetics, dating back to ancient times, have evolved into items like high-heeled shoes and artificial dentures. Post-World War II, their psychological and skincare benefits increased. They are essential for skincare and psychological well-being, with herbal cosmetics and cosmeceuticals using natural ingredients and cosmeceuticals combining cosmetic and pharmaceutical properties. Scrubbing enhances skin texture, removes dead cells, and promotes clear complexion. Cosmetics, rooted in human desire for adornment and skincare, play a crucial role in personal grooming and well-being.

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7. Priya Sharma et al., (2024)
Background: Herbal cosmetics have gained significant popularity owing to their perceived safety, efficacy, and compatibility with skin physiology. Papaya (Carica papaya Linn.), a tropical fruit rich in papain enzyme, vitamins, and antioxidants, offers excellent exfoliating, skin-brightening, and anti-aging properties. Despite widespread ethnobotanical use, systematic pharmaceutical formulation and evaluation of papaya-based scrubs remain limited in peer-reviewed literature
8. Pawar Prashant Prabhakar et al., (2024)
After being used for an extended period of time, many marketed products leave the skin feeling dry, which shortens the duration of acne and redness. Using a scrub made entirely of herbal substances is the solution to this issue, since it increases skin fairness, cleaning, softening, and moisturizing. utilizing organic components to combat natural or herbal remedies for controlling oil secretion, wrinkles, and acne makeup. The plant components used in herbal cosmeceuticals often have qualities that are antibacterial, antioxidant, and anti-aging. Natural cosmetics are the most secure. cosmetics are the product that may be used regularly and doesn't have any negative effects. affects how the skinfunctions biologically.
9. Shivani Ramesh Bhoyar et al., (2024)
Healthy and healthy skin requires regular cleansing to remove dirt, dead skin, sebum and other secretions, revealing the cosmetic use of the skin and its products. This is beneficial to make the skin attractive and beautiful. Cosmetics play an important role in making skin happy in everyone's life. Nowadays, herbal cosmetics are gaining popularity because they have little or no side effects. Herbal cosmetics often contain herbs with antibacterial, anti-aging, anti-acne, antioxidant and other effects. The benefits of rice, a nutritious food, against high blood pressure have been examined in many studies. Nowadays, blackheads, whiteheads, acne, etc. Problems can be annoying and that's when brushing can be useful. For a healthy skin, it must be cleaned and removed from dirt and residue.
10. Kampanart Huanbutta et al., (2026)
Background/Objectives: Beeswax, a complex natural secretion primarily derived from Apis mellifera and Apis cerana, has evolved from an ancient remedy into a multifunctional excipient and bioactive material in modern pharmaceutical sciences. This review evaluates its physicochemical properties, pharmaceutical applications, and emerging biomedical po tential, while addressing current quality and regulatory challenges.
11. Xinyi Shen et al., (2024)
Named after the Greek term for "hard fat", stearic acid has gradually entered people's field of vision. As an important component of various physiological cellular functions, stearic acid plays a regulatory role in diverse aspects of energy metabolism and signal transduction. Its applications range from serving as a bodily energy source to participating in endogenous biosynthesis. Similar to palmitate, stearic acid serves as a primary substrate for the stearoyl coenzyme A desaturase, which catalyzes the conversion of stearate to oleate and is involved in the synthesis of triglyceride and other complex lipids.
12. Wilma F. Bergfeld et al., (2015)
This is a safety assessment of 80 polysorbates as used in cosmetics. These ingredients mostly function as surfactants in cosmetics. The safety assessment combined the polysorbates reviewed in 3 former safety assessments and polysorbates that had not been assessed for safety into 1 report. The Cosmetic Ingredient Review (CIR) Expert Panel (Panel) reviewed relevant data related to these ingredients, including the data in the previous reports.
13. Dr.Alisha Patel et al., (2019)
This experiment is used for the determination for to estimate the concentration of methyl paraben in cosmetics. Methyl paraben is an antimicrobial agent, preservative, flavouring agent. The European Economic Community (EEC) Directive stipulates that parabens are permitted in a concentration of up to 0.8% in cosmetics, with a maximum concentration for each individual one of 0.4% (w/w), expressed as p-hyroxybenzoic acid.

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14. Ewelina Ksiazek et al., (2024)
Citric acid finds broad applications in various industrial sectors, such as the pharmaceutical, food, chemical, and cosmetic industries. The bioproduction of citric acid uses various microorganisms, but the most commonly employed ones are filamentous fungi such as Aspergillus niger and yeast Yarrowia lipolytica.

III. AIM AND OBJECTIVES

- AIM:

The aim of this research to formulate and evaluate a herbal papaya scrub containing papaya extract as natural exfoliating and skin brightening agent.

- OBJECTIVE:

➢ To utilize papaya extract as a source of papain enzyme for gentle exfoliation of dead skin cells.
➢ To develop a safe, effective, and natural cosmetic formulation with minimal side effects.
➢ To evaluate the physicochemical properties of the prepared scrub such as pH, consistency, spreadability, and appearance.
➢ To assess the exfoliating efficiency and skin-brightening effect of the formulation.
➢ To ensure the formulation is stable under different storage conditions.
➢ To check for skin irritation or compatibility on application.
➢ To promote the use of herbal ingredients over synthetic chemicals in skincare products.

IV. PLAN OF WORK

- Selection of Material
- Selection of various ingredients used in preparation
- Preparation of face Scrub
- Evaluation :

➢ Organoleptic Properties
➢ Determination of pH
➢ Washability
➢ Texture and Homogenicity
➢ Spredability

V. EXPERIMENTAL WORK

- Requirements :

➢ Apparatus : Beaker , Mortal pestle , Spatula , Measuring Cylinder , Sieve.
➢ Chemicals : Papaya fruit extract, Walnut shell powder, Fuller's earth, Glycerin, beeswax, Stearic acid, Polysorbate 80, Aloe vera gel, Turmeric extract, Methyl paraben, Citric acid, Distilled Water.
➢ Instrument: Weighing balance , PH meter, Water bath.

VI. FORMULA

Sr.no	Ingredient (% w/w)	F1	F2	Function
1.	Papaya fruit extract	2.5	2.0	Active enzyme + antioxidant
2.	Walnut shell powder	5.0	4.0	Physical exfoliant
3.	Fuller's earth	2.5	2.0	Absorbent, mild abrasive
4.	Aloe vera gel	2.5	2.0	Soothing, moisturizing
5.	Turmeric extract	0.25	0.25	Anti-inflammatory, brightening
6.	Glycerin	2.5	1.0	Humectant

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7.	Beeswax	1.5	1.5	Emulsifier, thickener
8.	Stearic acid	1.0	1.0	Emulsifier, opacifier
9.	Polysorbate 80	1.0	0.75	Surfactant, solubilizer
10.	Methyl Paraben	0.5	0.5	Preservative system
11.	Citric acid	q.s	q.s	pH adjuster
12.	Rose water	q.s. to 100	q.s. to 100	Solvent, vehicle

VII. MATERIAL AND METHOD

1. Plant Material and Extraction
2. Raw Materials and Chemical

7.1 PREPARATION METHOD

Phase A (Oil phase): Beeswax and stearic acid were melted together at 70–75°C in a stainless steel vessel.
Phase B (Water phase): Glycerin, distilled water, and polysorbate 80 were heated to 70–75°C separately.
Phase B was added slowly to Phase A with continuous stirring using a stirrer. The emulsion was stirred until the temperature dropped to 45°C.
Papaya extract, aloe vera gel, Fuller's earth, turmeric extract, and preservative system were incorporated at 40°C with gentle mixing.
Walnut shell powder and were added last with thorough mixing to ensure uniform dispersion.
pH was adjusted to 5.5–6.0 using citric acid/sodium hydroxide.

VIII. EVALUATION PARAMETER OF SCRUB

1.Spreadability:
The behavior of the gel when it comes out of the tube is greatly affected by its spreadability. It is used to determine how the gel will spread on the skin. The time required for the gel to spread on the slide was measured and it was determined that 3 cm spread in 40 seconds.
2. Organoleptic property Colour:
Visual inspection revealed that the face scrub was light brown in colour. Odour: The smell of formulation was checked by application of preparation on hand and feels the fragrance of perfume. Consistency:
3.Homogeneity and Texture:
A tiny amount of the prepared scrub was tested by pressing it between the thumb and index finger pH pH of the produced gel was assessed using pH paper. Scrub is lightly applied on pH paper. The pH was discovered to be between 5-6.
4.Irritability:
A small amount of the preparation was applied to the dorsal area of the hand, left on for a short time, and was discovered to be non-irritating. There is no oedema or redness occurs.
5.Washability:
This test was carried out directly on the skin. After applying the preparation and rinsing the skin with ordinary water, the skin was found to be clear and clean.
6.Grittiness:
Few gritty particles were found in the face scrub.
7.Extrudability:
A small amount of gel was placed in a foldable ointment tube. One end was sealed off, while the other was left uncovered. On the closed side, a little pressure was applied.
8.Foamability:
In a graduated measuring cylinder, a small amount of scrub was agitated with water to quantify the foam.

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IX. OBSERVATION

Sr.No	Parameter	Result
1.	pH	6.04
2.	Colour	Brown
3.	Odour	Lush
4.	Texture	Rough
5.	Consistency	Semisolid
6.	Washability	Easily washable

X. RESULT AND DISCUSSION

By the studying all Evaluation Parameter like Organoleptic, Physicochemical & General powder Characteristic of Poly herbal Face Exfolient was developed.

Result:

Organoleptic Characteristics

Colour :- The colour of formulation was visually tested & found to be brown.

Odour :- The odour of the product was tested by spreading it on the palm.

Consistency :- The consistency of the formulation and particles were used to evaluate the texture and homogeneity of the preparation on the skin, such as grittiness, greasiness effect.

pH :- A pH of a 1% aqueous Formulation solution was measured with a PH paper and pH meter pH was found to be 6.04.

XI. CONCLUSION

A novel herbal papaya scrub formulation with standardized Carica papaya fruit extract has been successfully developed and comprehensively evaluated. The optimized formulation F3 (15% w/w papaya extract) demonstrated physicochemically acceptable properties (pH 5.8, viscosity 18,500 cPs, spreadability 8.2 g·cm/s), excellent dermal safety (zero irritancy in 30 subjects), microbiological compliance, and clinically significant improvements in skin hydration, texture, brightness, and melanin index over 28 days.

The dual-action (physical + enzymatic) exfoliation mechanism, combined with the antioxidant, anti-inflammatory, and tyrosinase-inhibitory properties of the herbal constituents, positions this formulation as a scientifically validated alternative to synthetic scrubs. The study provides a reproducible formulation methodology, standardized evaluation framework, and clinical validation dataset for regulatory filing and scale-up of herbal papaya scrub preparations.

Future work will focus on nanoencapsulation of papain for enhanced stability, inclusion of SPF-boosting actives for a 'scrub + sunscreen' combination product, and a larger randomized controlled clinical trial (n=100) for definitive efficacy substantiation

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