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Formulation and Evaluation of Herbal Face Wash of Cynodon Dactylon

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Abstract: ***In recent years, Herbal Face Products have become progressively more popular as consumers search for harmless and natural substitutes for more traditional skincare products. The aim of formulation of Herbal Face Wash of Cynodon Dactylon is to prevent face skin from Synthetic Chemicals which causes side effects . Herbal Face Wash is a type of cosmetic product that is frequently utilized for facial cleansing , that works without irritating the skin . This Herbal Face Wash was prepared by using Natural Ingredients like Cynodon Dactylon (Bermuda Grass) , Neem (Azadirachta indica), Turmeric (Curcuma Longa) , Aloe Vera (Aloe barbadensis miller) , Tulsi (Ocimum tenuiflorum) , Lemon (Citrus limon) , Honey (Apis mellifera) , Glycerine , Xanthum Gum , Rose Water which shows Anti-microbial , Anti-inflammatory , Anti-Bacterial , Anti-Tanning , Anti-Oxidant , Anti-Pigmentation , Anti-Wrinkles, Antiseptic, Astringents , etc. activities . The face wash had a multipurpose effect, and each of these herbal constituents shown significant variations in activity. The ingredients used to make the herbal face wash have the ability to cleanse, hydrate, nourish, and regenerate the skin. They also soften the skin's epidermis, get rid of acne, remove tanning and lightens scars and blemishes , speed up the healing process. All these ingredients are very useful and reduce all face problems and it has the least side effects. The formulated herbal face wash was evaluated for Colour, Odour, Consistency , pH, Washability, Foamability, Viscosity, Grittiness , Irritancy and Phase Separation .***

Keywords: Herbal face wash, Cynodon Dactylon, Neem, Turmeric, Aloe Vera, Tulsi, Anti-microbial, Anti-inflammatory.

I. INTRODUCTION

A significant movement toward natural and herbal-based medications has occurred in the current skincare market as a result of growing consumer knowledge of the potential benefits of botanical compounds[1]. One of the oldest medical care systems in the world belongs to the herbal medication industry in India[2]. Cosmetics are categories that are typically used to both adorn and cleanse the skin[3].

Products used to enhance or beautify appearance have been classified as cosmetics since ancient times. The word cosmetics is derived from the Greek word "Kosmeticos," which means to "adorn" (adding something ornamental to a person or object). A wide variety of items, including toothpaste, shampoo, conditioners, mascara, after-shave lotion, styling gel, creams, face washes, and powders, are included in the category of cosmetics. Hairstyles, cosmetics for the eyes and face, finger and toe nail polish, lipsticks, and perfumes.

Hair dyes, deodorants, and antiperspirants[4]. Herbal face cosmetics combine innovation and tradition, drawing on thousands of years of botanical knowledge and utilizing recent scientific advancements[1]. People have been utilizing polyherbal or herbal cosmetics to beautify their skin since ancient times. Using herbal products as cosmetics is very common today, as it was in olden times. Because they exhibit better results after application and have fewer or no side effects than synthetic products, herbal cosmetics tend to be selected[3,46].

1) Face Wash

One cosmetic care product used to cleanse the skin is called a face wash. Another common name for it is "cleanser"[5]. A face wash is a particular kind of facial cleanser that is intended to eliminate impurities from the face's skin, including dead skin cells, oil, dirt, and makeup[2]. This aids in clearing up clogged pores and avoiding skin disorders like acne. Together with a toner and moisturizer, a cleanser can be used as part of a skin care routine[6]. Cleaning, anti-wrinkle, anti-acne, moisturizing, and skin-fairness benefits can all be obtained using face washes[5].

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2) Ideal Properties of Face Wash

- It should be both visually beautiful and stable[2].
- Offers efficient washing without irritating the skin or depleting it of its natural oils[4].
- It should spread without dragging with ease[6].
- When applied to the skin, it must become smoother[7].
- It should not feel greasy or oily when applied[8].
- The face wash residue shouldn't thicken after the water has evaporated[10].
- Rather than absorbing, its physical impact should be to open pores and cleanse the skin[2].
- It ought to be capable of lowering the skin's microbial flora[4].

3) Role and Function of Face Wash

- To get rid of all makeup residue each day.
- For skin cleaning.
- Keeping the skin clean and lustrous through bathing and rejuvenation.
- It promotes the renewal and three-generation of skin cells.
- It also aids in clearing the clogged pores.
- Taking out dead cells
- Restoring skin cells and reducing stress
- Eliminating contaminants, oil, and dirt2,6.

4) Advantages of Face Wash

- It aids in the replacement of old skin cells with new ones by removing dead skin cells.
- It maintains healthy, glowing skin.
- It keeps skin softened, soft, well-hydrated, and youthful-looking.
- It gives the skin a glowing appearance.
- Blackheads, whiteheads, and a generally exhausted appearance are caused by clogged pores caused by excess oil and dead skin cells. All of the aforementioned skin problems can be avoided with regular pore exfoliation.
- Blood circulation is accelerated by exfoliation.
- Encourages skin renewal and rejuvenation.
- It facilitates the elimination of debris, makeup, dead skin cells, and contaminants[5,9,12].

5) Uses of Face Wash

- It facilitates the skin's ability to absorb other products.
- For skin purification.
- For daily use, to eliminate the makeup, microorganisms, and contaminants.
- It additionally stimulates the production and renewal of skin cells[2,9,11].

6) Forms of Face Wash

- Cream based face wash
- Gel based face wash
- Liquid based face wash
- Face wash in powder form[1]

7) Herbal face wash

Herbal face wash contains rich plant-based ingredients and removes excess oil without damaging the skin's nutrients. Herbal preparations, which might include tinctures, fatty oils of herbs, or powdered or ground herbs, serve as the core for completed herbal products. Finished herbal goods are products that are made from one or more herbs[13].

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8) Anatomy of Skin

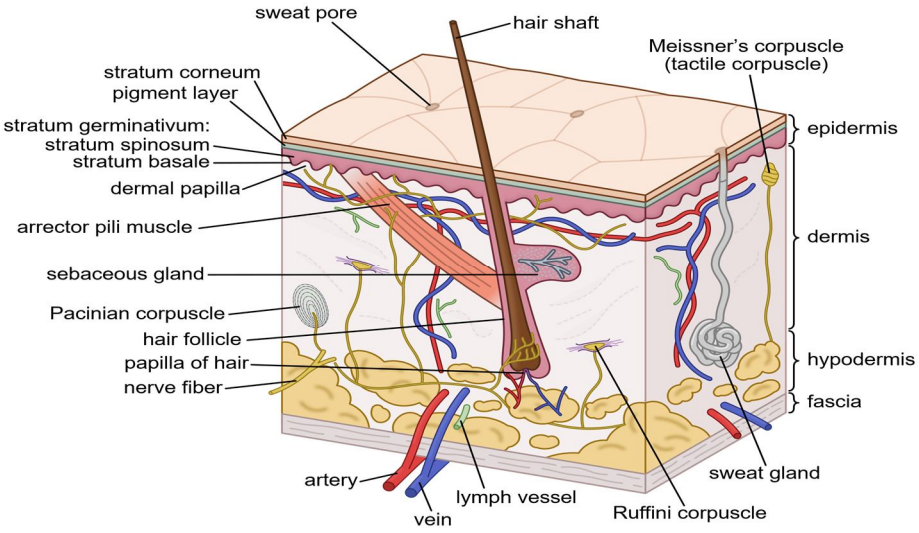


Figure 1 :- Anatomy of Skin

The body is generally protected by the integumentary system, which is composed of the skin and the tissues that support it[12]. The largest organ in the body, the skin covers the whole external surface of the body and has a surface area of 1.5 to 2 square meters in adults. Eight percent of an adult's body weight is made up of skin. It is the living body's outermost layer or tissue[8].The three layers that make up the skin—the epidermis, dermis, and hypodermis—each have unique physical features and purposes[48].

A. Epidermis

The uppermost layer of skin is called the epidermis, and it is around 0.2 mm thick. It consists of layered keratinized squamous epithelium. The deeper layers of the epidermis are surrounded by interstitial fluid from the dermis, which supplies oxygen and nutrients and drains away as lymph, but the epidermis itself lacks blood vessels and nerve endings. Numerous cell layers, or strata, hold the epidermis together from the lowest basal layer to the thinnest stratum corneum, which is a thick horny layer[48]. The position of the body affects the epidermis' thickness. Dendritic and keratinocyte cells make up nearly all of the cells in the epidermis.There are also Langerhans cells, melanocytes, and other cell types. The metabolically active tissue is a common term used to describe the layer of the epidermis[8].

The bottom layer, which is composed of cuboidal, nucleated, highly active, and continuously dividing epithelial cells, is where the cells of the epidermis begin to develop[48].

1) Stratum Corneum: The stratum corneum is the name given to this uppermost layer of the epidermis. Another name for it is "horny cell layer," and its thickness ranges from 8 to 15 micrometers. The hexagon-shaped layer helps shield skin from extreme dryness. Water retention is significantly influenced by "ceramide," its main constituent.

2) Stratum lucidum: The stratum lucidum is the thin, transparent layer of dead skin cells. The soles of the feet and palms of the hands are the only places on them where it is present.

3) Stratum granulosum: Granular cell layer is another term for the three-meter-thick layer. Granular cells are arranged in two to four layers. The cells' form becomes flatter as more keratin strands are incorporated into them.

4) Stratum spinosum: With a thickness ranging from 50 to 150 µm, it is also known as the prickle cell layer. It is made up of several cells that might vary in shape and arrangement.

5) Stratum Basal: Stratum basal is the bottom layer and the deepest sublayer of the epidermis. The stratum basal is where keratinocytes are created, and they rise to the surface. Keratinocytes rise to the surface after forming in the stratum basal. The phrase "turnover" describes keratinocyte movement. One cycle of this process takes days to finish, and keratinocytes change structurally and functionally as well. Eight percent of the water in the epidermis is found in this layer, which is also referred to as the basal cell layer[8].

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B. DERMIS

The dermis is elastic and hard. The matrix is composed of connective tissue and contains collagen and elastic fibers. Collagen fibres bind water and provide the skin its tensile strength, but as this ability weakens with age, wrinkles emerge. Macrophages, fibroblasts, and mast cells are the main cells of the dermis. Adipose (fat) and areolar tissue are found in variable levels in the subcutaneous layer, which lies beneath the dermis. Dermal structures include hairs, arrector pili muscles, sweat glands and their ducts, sensory nerve terminals, sebaceous glands, and tiny blood and lymph arteries[48].

Subcutaneous: The layer of fat that lies between your bones and muscles is the deepest layer of skin. It reaches a depth that your skincare products' active compounds can never. The layer beneath the skin functions similarly to a thermostat. In an emergency, it can be used as a source of energy in addition to protecting the body. Fat also acts as a filter, protecting your bones, muscles, and organs. Lastly, the deepest oil-producing sebaceous gland, hair follicular roots, nerve endings, and extra blood arteries are found in the subcutaneous layer[8].

II. MATERIAL AND METHODS

A. Material

1) Cynodon Dactylon



Figure 2 :- Cynodon Dactylon

Kingdom :- Plantae
Sub Kingdom :- Tracheobionta
Super Division :- Spermatophyta
Division :- Magneliophyta
Class :- Liliosida
Sub Class :- Commelinidae
Order :- Cyperales
Family :- Poaceae
Genus :- Cynodon
Species :- Cynodon Dactylon

Synonyms :- Durva grass, Bermuda grass, dog's tooth grass, Bahama grass, devil's grass, couch grass, Indian doab, Scutch grass, Dhub, Doob, and durba .

Chemical Constituents :- Apigenin, luteolin, orientin, vitexin, beta-carotene, neoxanthin, violaxanthin

Properties :- Diuretic, Antimicrobial, Antiparasitic, Gastrointestinal, Antidiabetic, Antioxidant, Immunological, Antiallergic, Anti-inflammatory, Antipyretic, Analgesic, Anticancer, Dermatological properties[14,15,16,17,18,19,49,50,51].

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2) Neem



Figure 3 :- Neem

Kingdom :- Plantae
Division :- Magnoliophyta
Class :- Magnoliophyta
Order :- Spindale
Family :- Meliaceae
Genus :- Azadirachta
Species :- Azadirachta Indica
Chemical Constituents :- Nimbinn, Nimbidin , Quercetin
Properties :- Larvicidal activity, Antibacterial, Antiseptic, Antidiabetic evaluation, Antioxidant, Skin disorders, Anti-Hiv /AIDS, Antiulcer, Antimalerial activity, Anti-tumour effect, Antifertility effect, Anti-dental caries, Antihypertensive and Antipercholestermic effect[20,21,22,23,49,50,51].

3) Turmeric



Figure 4 :- Turmeric

Kingdom :- Plantae
Division :- Magnoliophyta
Class :- Liliopsida
Order :- Zingiberales
Family :- Zingiberaceae
Genus :- Curcuma
Species :- Curcuma Longa
Synonyms :- Ameshta , Indiansaffron , Haldi , Halad
Chemical constituents :- Curcumin , Curcuminoids
Properties :- Antioxidant , Anti-Inflammatory , Anti-pigmentation , Anti-tanning , Arthritis , Antimicrobial , Anti-neoplastic[24,25,26,27,49,50,51].

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4) Aloe Vera



Figure 5 :- Aloe Vera

Kingdom :- Plantae
Division :- Magnoliophyta
Class :- Liliopsida
Order :- Asparagales
Family :- Asphodelaceae
Genus :- Aloe
Species :- Aloe barbadensis Miller (Aloe vera)
Synonyms :- Ghritakumari, Indian Aloe, Barbados Aloe, Burn Aloe
Chemical constituents :- Aloin , emodin , lupeol , Sapon
Properties :- Anti-Inflammatory, Wound healing, Antimicrobial, Hydration and moisturizing features, Antioxidant activity, fighting against skin aging, Anti-Wrinkles, Foaming[28,29,30,31,49,50,51].

5) Tulsi



Figure 6 :- Tulsi

Kingdom :- Plantae
Division :- Magnoliophyta
Class :- Magnoliopsida
Order :- Lamiales
Family :- Lamiaceae
Genus :- Ocimum
Species :- O. tenuiflorum
Binomial name **:-** Ocimum tenuiflorum L.
Synonyms :- Ocimum sanctum L. , Holy Basil, Surasa, Vishnupraya, Nagamata, Surabhi, Bhutaghni
Chemical constituents :- Oleanolic acid, ursolic acid, rosmarinic acid
Properties :- Anti-stress, Antioxidant, Anti-bacterial, Immunomodulator, Anti-diabetic, Anti-viral, Anti-tussive, Anti-Inflammatory, Cardio-protective , Remove Blackheads[32,33,34,49,50,51].

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6) Lemon Juice



Figure 7 :- Lemon juice

Kingdom :- Plantae
Division :- Magnoliophyta
Class :- Magnoliopsida
Order :- Sapindales
Family :- Rutaceae
Genus :- Citrus
Species :- C. limon
Binomial name :- Citrus limon (L.)
Synonyms :- Lemon, Nimbu
Chemical constituents :- limonene , Citric Acid , Vitamin C
Properties :- Anti-inflammatory, Antimicrobial, Skin-brightening, Preservative, pH Adjuster, Enhanced substance penetration[35,36,37].

7) Honey



Figure 8 :- Honey

Biological Source :- Many bee species, including Apis mellifera, Apis dorsata, Apis florea, Apis indica, and other Apis species that belong to the family Apideae (Order: Hymenotera), store honey, a viscid and sweet secretion, in their honey combs.
Kingdom :- Animal
Phylum :- Arthropoda
Class :- Insecta
Order :- Hymenoptera
Suborder :- Apocrita

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Superfamily :- Apoidaea
Family :- Apidae
Subfamily :- Apinae
Tribe :- Apini
Genus :- Apis
Species :- Mellifera, cerana etc
Binomial name :- Apis mellifera, Apis cerana
Synonmys :- Madhu, Madh, Mel, Purified Honey
Chemical Constituents :- Dextrose, Fructose, Sucrose, Dextrin, Diastase, Invertase, Inulase
Properties :- Antimicrobial, Antibacterial, Anti-inflammatory, Wound Healing, Moisturizing, Humectant, Emollient[38,39].

8) Glycerin

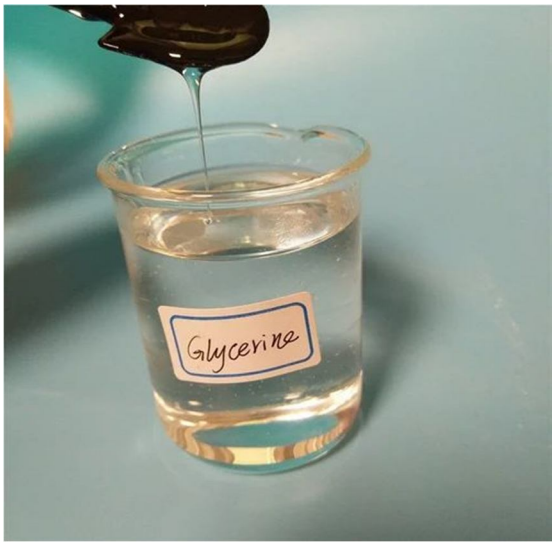


Figure 9 :- Glycerin

A form of carbohydrate called glycerin is also referred to as a sugar alcohol or polyol. It is an odorless liquid with a syrupy consistency and a sweet taste. Glycerin is produced spontaneously by plants when sugars ferment.
Properties :- Moisturizing Agent , Humectant[40] .

9) XANTHUM GUM


Figure 10 :- Xanthum Gum

The strains of Xanthomonas species produce xanthan gum, a hetero-polysaccharide. It is a naturally occurring high molecular weight polysaccharide molecule that is mostly produced by different fermentation processes.
Properties :- Thickener , Stabilizer , pH , Temperature Stability , etc[41] .

10) Rose Water



Figure 11 :- Rose Water

Rose petals are steam-distilled to create rose water. To extract the essential oils and fragrance of the rose, the petals are heated with water, the steam is collected, cooled, and then condensed.
Properties :- Moisturizing, Soothing, Cooling, Antioxidant and Antibacterial effects, Toning[42] .

INGREDIENTS	ROLE IN FORMULATION
Cynodon Dactylon (*Bermuda Grass*)	Antimicrobial , Anti-inflammatory
Neem (*Azadirachta indica*)	Antibacterial , Antiseptic
Turmeric (*Curcuma Longa*)	Anti-pigmentation , Anti-tanning
Aloe Vera (*Aloe barbadensis miller)*	Anti-Wrinkles , Foaming Agent
Tulsi (*Ocimum tenuiflorum*)	Antioxidant , Remove blackheads
Lemon (*Citrus limon*)	Preservative, pH Adjuster
Honey (*Apis mellifera*)	Emollient , Wound Healing
Glycerin	Moisturizing Agent , Humectant
Xanthum Gum	Thickener , Stabilizer
Rose Water	Solvent , Perfuming Agent , Cooling Agent

Table No. 1 :- Role of Ingredients in Formulation

B. Method

1) Preparation Of Extracts

a) Cynodon Dactylon :- After being thoroughly cleansed with distilled water, the entire portion of C. dactylon was shade-dried for 24 hours at 40–500C in a drying chamber before being ground into powder using a mechanical blender. The extract was obtained by soaking 100 g of plant powder in 200 ml of ethanol and shaking it on a platform shaker at 150 rpm and 250 °C. Three days of soaking were required for a full extraction. Using a straightforward filtration technique, the material was removed after three days, and the filtrates were obtained in a separate container[11].



Figure 12 :- Extraction of Cynodon dactylon

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b) Neem: Take neem leaves and let them dry at room temperature. After being thoroughly dried, the leaves were blended into a powder. 50 g of powdered neem leaves were obtained and put in a thimble with 500 ml of ethanol as a solvent for three hours using a soxhlet equipment. Once the neem leaves are extracted, they should be filtered and allowed to evaporate for an hour in a water bath[12,49,50,51].



Figure 13 :- Extraction of Neem

c) Turmeric:- For extraction, a sox-let apparatus was set up. 50 grams of coarse turmeric powder were taken and put in a thimble, which was then put in a distillation flask with 500 ml of ethanol as a solvent. After the assembly was put in place, the temperature was maintained at 60 C for three hours. Following the extraction of turmeric, the extraction filter was taken out and allowed to evaporate for one hour in a water bath[12,49,50,51].



Figure 14 :- Extraction of Turmeric

d) Aloe Vera:- Use distilled water to wash some aloe vera leaves. Then trim the outer part of the leaf edges using a sterile knife.After that, remove the jelly portion, which is the gathered aloe vera gel. Finally, extract the pulp and use a blender for blending[12,29,49,50,51].

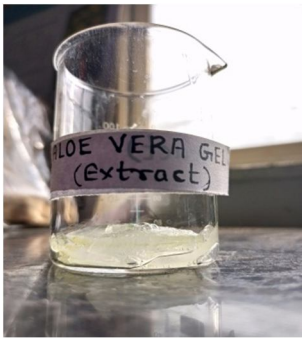


Figure 15 :- Extraction of Aloe Vera

e) Tulsi:- Ocimum sanctum fresh leaves were ground into a coarse powder using a mechanical grinder after being dried in the shade. 1 kg of powdered material was then subjected to cold maceration with 50% alcohol (1.5 L ethanol and 1.5 L water) for 3 days with shaken periodically, then filtered, evaporated and vacuum dried. It formed a brownish residue that weighed 15.5% (w/w)[34,49,50,51].



Figure 16 :- Extraction of Tulsi

INGREDIENTS	Quantity
Cynodon Dactylon Extract	5 ml
Neem Extract	4 ml
Turmeric Extract	3 ml
Aloe Vera Extract	5 ml
Tulsi Extract	4 ml
Lemon Juice	1 ml
Honey	3 ml
Glycerine	4 ml
Xanthum Gum	2 gm
Rose Water	50 ml

Table No. 2 :- Formulation Table

2) Preparation Of Formulation

a) In a beaker, first add the required quantity of xanthan gum and leave it overnight in rose water.

b) Mix together aloe vera gel, glycerin, honey, and a few drops of lemon juice in a second beaker.

c) Pour the second beaker mixture (aloe vera gel, glycerin, honey, and a few drops of lemon juice) into the rose water mixture (rose water + xanthan gum).

d) Mix the two until the mixtures are homogeneous.

e) After that, thoroughly combine the previous mixture with the Cynodon Dactylon Extract, Neem Extract, Turmeric Extract, and Tulsi Extract to create a concentrated herbal face wash.

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Figure 17 :- Beaker 1

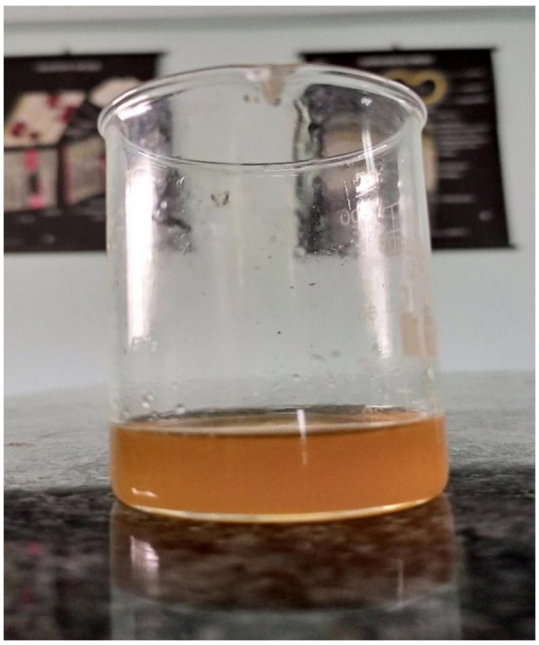
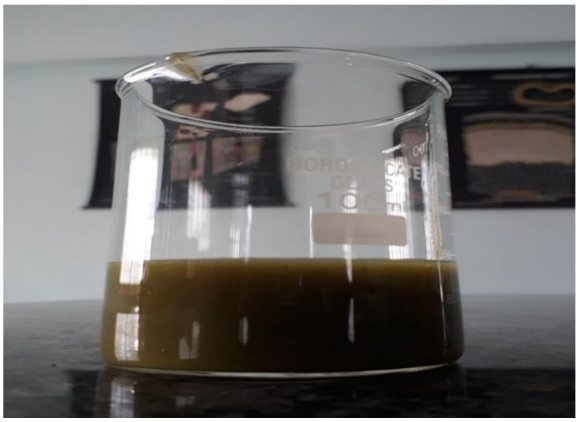

Figure 18 :- Beaker 2


Figure 19 :- Add all extracts in beaker 1


Figure 20 :- Herbal Face Wash

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3) Evaluation Test

The prepared face wash formulation was evaluated for following parameter :-

a) Colour :- The colour of the face wash formulation was checked visually.

b) Odour :- The formulation was evaluated for its odour by smelling it.

c) Consistency :- It was determined manually.

d) pH :- pH of 1% aqueous solution of the formulation was measured by using a caliberated digital pH meter at constant temperature.

e) Washability:- The application of the formulation to the skin was followed by a manual assessment of the degree and ease of water washing.

f) Foamability :- A small amount of gel was placed in a water-filled beaker. After marking the initial volume and shaking the beaker ten times, the final volume was recorded.

g) Viscosity :- A formed sample of approximately 10 ml was placed in a beaker, measured with a digital viscometer, and the results were noted.

h) Grittiness:- Through skin application, the product's presence of any gritty particles was examined.

i) Test for irritancy :- The hand's dorsal surface was marked. The time was then recorded after the face wash was applied to that location. After that, it is observed for up to 24 hours to check for irritability, erythema, and any oedema, and it is observed.

j) Phase separation :- At room temperature, the prepared face wash was stored in a closed container. Phase separation was then monitored from 24 hours to 20 days. Phase separation was monitored or examined for any changes[11,12,43,44,45,47] .

III. RESULT AND DISCUSSION

The herbal face wash of Cynodon Dactylon containing Neem , Turmeric , Aloe Vera , Tulsi was formulated and evaluated for Colour, Odour, Consistency , pH , washability , foamability , Viscosity , Grittiness , Irritancy , Phase Separation parameters and the results of these evaluation parameters are given below in table ,

Sr.No.	Evaluation Parameters	Observation
1	Colour	Dark Green
2	Odour	Characteristic
3	Consistency	Semisolid
4	pH	6.8
5	Washability	Easily Washable
6	Foamability	2.5 ml
7	Viscosity	1574 cps
8	Grittiness	No Grittiness
9	Irritancy	No irritation on skin
10	Phase Separation	No Phase Separation

IV. CONCLUSION

Based on Result and Discussion , the herbal face wash was stable at room temperature and can be safely used on a face . The ingredients used in herbal face wash having variety of pharmacological activities like Antimicrobial , Anti-inflammatory , Antibacterial , Antiseptic , Anti-pigmentation , Anti-tanning , Anti-wrinkle , Antioxidant , remove blackhead , wound healing and also shows significant activities on face skin like emollienting , moisturizing , cooling . The herbal face wash may be suitable for for all skin types to prevent from skin problems like acne , pimple , pigmentation , wrinkles , blackhead with less side effects than synthetic face wash .

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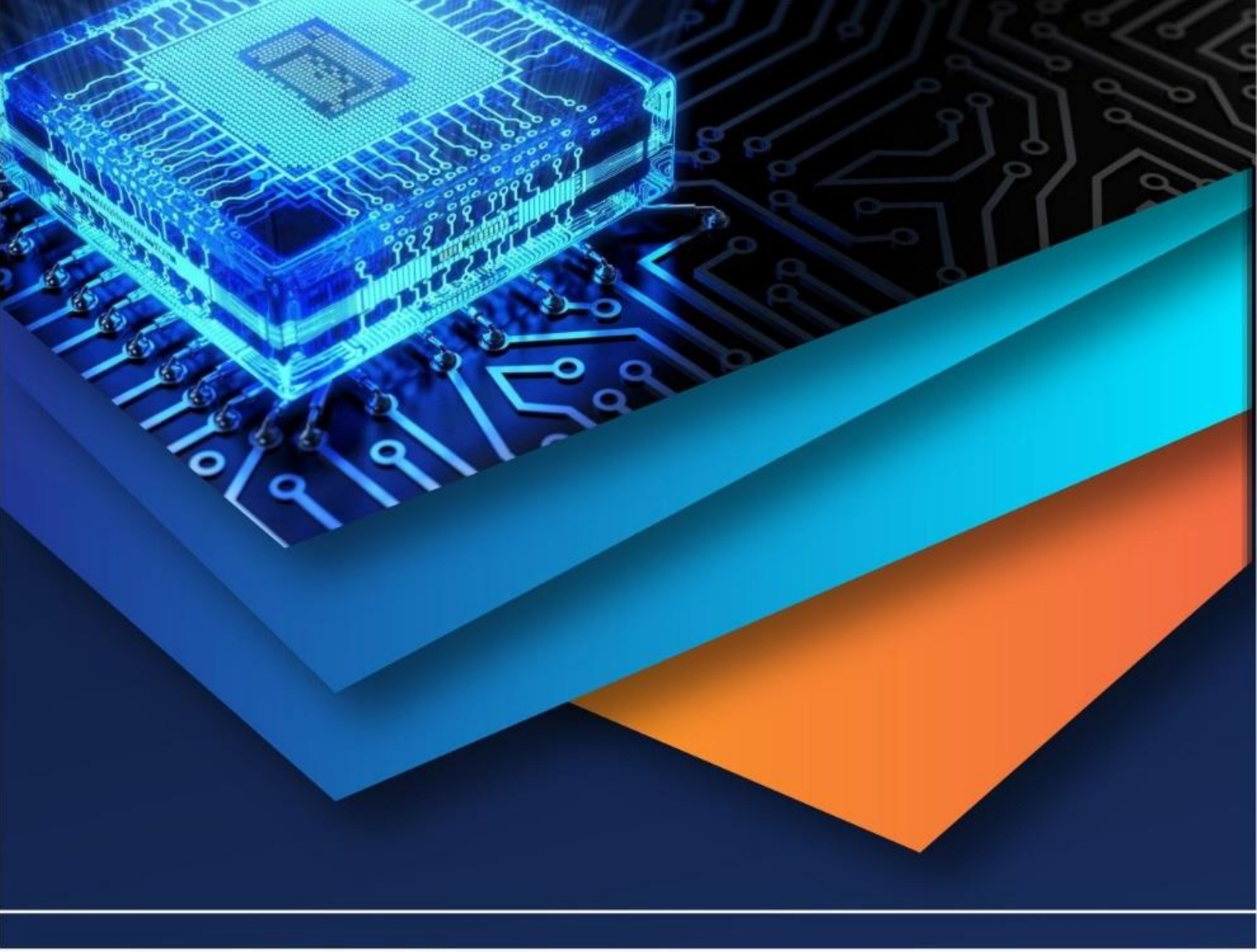
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