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Formulation and evaluation of herbal facewash

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A B S T R A C T

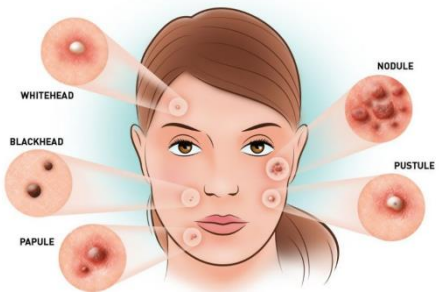
Now a days Acne is the ordinary disorder cause due to the fluctuations of estrogen , progesterone , testosterone , corticosteroid and other factor such as diet , stress , and certain regular daily base medication can also contribute to acne development . So , we prepared herbal facewash formulation to remove acne , oil , dirt , from our face . Herbal facewash is more safer and compatible then synthetic facewash with less side effect . It is more increasing demand in global market.Ethanolic extract of turmeric (Curcuma longa), Ethanolic extract of neem (Azadirichta india) , Ethanolic extract of Bel leaf (Aegle Marmelos) and others are Xanthium Gum , Methyl Paraben , Lemon Juice, Sodium Lauryl Sulphate and Sandalwood oil etc . After the prepared formulation , we evaluated some parameter are pH , colour, odour, consistency , formability , washability , spreadability and viscosity etc .

Keywords: acne , turmeric, neem , beal leaves

Introduction;

Acne vulgaris in one of the most normal dermatological disorder that causes pain and trouble to people in their adolescent . Acne vulgaries or simply known as acne is a human skin diseases characterized by skin with scaly red sin (Seborrhoea) , blackhead and whitehead (Comedones), pinhead (papule) [1]Survey was conducted by taking 1066 healthy women and 1089 healthy men in the range of aged 18-70 years, it was performed to determine the occurrence of facial acne [2].The survey result show that , At 40-49 years 3% of men and 5% of women still had definite, mild , clinical acne, and at 50-59 years 6% of men and 8% of women had physiological acne. The surprisingly high occurrence o acne show in adult due to antibiotic treatment or medication . in women acne is show due to the use of oral contraceptives or skin care product . [3]**TYPES OF ACNE** : [4], [5]

- Blackhead
- Whitehead
- Nodules
- Papules
- Pustules1.Blackheads(OpenComedones):
  Appearance: Small, dark or black bumps on the skin. Cause: Occur when a hair follicle becomes clogged with oil (sebum) and dead skin cells. The clogged pore remains open, and the surface turns black due to oxidation when exposed to air.



2. Whiteheads (Closed Comedones):
   Appearance: Small, white or flesh-colored bumps.

Cause: Similar to blackheads, these occur when a hair follicle is clogged with oil and dead skin cells. However, in this case, the pore remains closed, preventing oxidation and keeping the material inside white.

3. Papules

Appearance: Small, raised, red, tender bumps without a visible center of pus.

Cause: Result from inflammation or infection of hair follicles, typically more severe than comedones but not yet filled with pus.

4. Pustules:

Appearance: Similar to papules but with a white or yellow center filled with pus.

Cause: Form when hair follicles become inflamed and infected, filling with pus. They are red at the base with a white or yellow tip.

5. Nodules:

Appearance: Large, solid, painful lumps beneath the surface of the skin.

Cause: Develop when a hair follicle becomes clogged and inflamed deep within the skin. Nodules can be more severe and may lead to scarring if not treated properly.

6. Cysts:

Appearance: Large, pus-filled lumps beneath the skin's surface, often painful.

Cause: Result from severe inflammation and infection of hair follicles deep within the skin. Cysts can be very painful and are likely to cause scarring.

Each type of acne requires different treatment approaches, ranging from topical medications and good skincare routines for milder forms like blackheads and whiteheads to more aggressive treatments like oral medications or professional dermatological procedures for severe forms like nodules and cyst.

Acne causes:

- Due to hormonal changes caused by puberty or pregnancy.
- Certain medications (birth control pills or corticosteroids).
- A diet that include high sugar , oil , or carbohydrates (chips , breads).
- acne cause during the time of menstruation in women , due to changes in hormone level .
- In some cases , acne cause due to genetic or heredity . [6]

They can have different mechanism, for example :

- Maintain and reduce of sebum production.
- An Antibiotics or beta lactam antibiotic (cefazolin, nafcillin and oxacillin) that reduce or inhibit Propionibacterium and Staphylococcus epidermidis . the main bacteria , Which is responsible for acne problem.
- A Keratolytic treatment that removes the keratin layer and prevents the cutoff the sebum from getting stuck under the skin.
- Anti-inflammatory effect, which can prevent the process of progressively worse condition caused by inflammation (redness, swelling itching , heating etc). [7]

Anatomy of Skin ;[8] [9]

Skin is the largest organ in the body , it contain total 8% of the adult body weight . Skin acts as a protector against the outside environment. When we exposed to sun , skin made a beneficial chemical substance known as vitamin D. The skin serves as a sensory organ & aids in controlling body temperature.* Skin have variety of biological components, including :

- keratinocytes,
- melanocytes, and
- erythrocytes (Because of more components like cells and fibers, it exhibits multi-layered structures.)

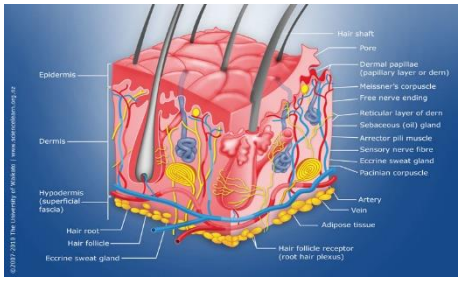


Fig 1

Epidermis ; epidermis is the outermost layer of the skin . epidermis has a thickness around 0.2 mm , in this layer no vein and capillaries are present .it contains four principle type of cell ;

- keratinised (produce strength)
- melanocytes (contribute to skin color)
- langerhans (part of the immunue system)
- merkel cell (detect light touch and pressure)

The outermost layer is classified into five sub layers and these are;

1. Stratum corneum
2. Stratum lucidium
3. Stratum granulosum
4. Stratum spinosum
5. Stratum basale

1) Stratum corneum: It is the superficial layer of keratinised cell . it consist of 25-30 layer of flattened keratinocytes that contains mostly keratin . this multilayer protect deeper layer from injury . it is also known by the name of horny cell layer and it is between 8 to 10 mm thick . it is the barrier that prevent the outside material from entering and its primary ingredient is ceramide which has a function to prevent the loss of water or

water retention .

2)Stratum lucidum: Stratum lucidum is a sub division of stratum corneum . it is thin more and less transparent , glistering layer .it is present only in the thick skin such as fingertip , palms and soles . it is composed of dead skin cell .

3)Stratum granulosum: It is the middle and superficial layer of the non keratinised portion of the epidermis , it is also known as granular cell layer , which has a thickness around 3mm . these are three to five layer of granular cell .

4)Stratum spinosum: It is also known as prickle cell , which has a thickness around 50 um to 150 um . this is the broad layer , where 8 to 10 layer of many sided keratinocyte fit closely together . prickle cell are interconnected by fine prickle which is provide strength and flexibility of the skin

5)Stratum basal: It is also known as stratum germinative , it is the deepest and lowest layer of the skin . it is made up of single cell layer . basal cell layer consist melanocytes , which is responsible for the production and distribution of melanin.

B. The Dermis

Dermis is the majority of comprise of collagen and elastin as well as fibroblasts . This layer serves a number of function ;

- Blood and lymphatic vessels located in the dermis supply the skin with nutrients and remove waste and pollutants.
- The dermis contains sweat glands. They cause your body to perspire, which cools your body and eliminates pollutants.
- The dermis also contains the hair follicles, which are where your hair attaches, and the sebaceous glands, which secrete the oils that smooth and soften skin, sometimes acting too zealously and causing rashes and oily skin.

C. The Subcutaneous layer

- The layer of fat that runs from your bones to your muscles and other tissues is the deepest layer of skin. It penetrates deeper than your skincare products' active ingredients could ever hope to.
- An analogy for the subcutaneous layer is a thermostat. In an emergency, it can serve as a source of energy while simultaneously protecting the body.
- Additionally, fat serves as a filter to prevent harm to your muscles, bones, and organs.
- Lastly, more blood vessels, nerve endings, hair follicular roots, and the deepest sebaceous glands that secrete oil are found in the subcutaneous layer.

FACEWASH :- [10]

A facewash is a facial care product that is used to remove dead skin cells, oil, dirt, and other types of pollutants from the face. This helps to unclog pores and to prevent the skin conditions from the acne.

Fig 2

Function of facewash : [11]

- Removing dead skin cell .
- Removing oil , dirt and other pollutant .
- Its help to unclog pores , prevent acne breakout.
- It gives brightening and soothing effect.
- It protect the skin from premature aging.
- It maintain the face hygiene .

Properties of facewash :- [12] [13]

- When applied on the skin it should soft and glow the face
- Its should have to give good appearance
- It should be stable stable
- It should be spread , without dragging

- Exfoliation accelerates the blood circulation and promote the skin regeneration .
- A thin emollient film should remain on the skin after the use.

Agents use in face wash [14]

1.Therapeutic agents use in face wash :-

- Antimicrobial :- An antimicrobial agent are the those substance which are used to kill or inhibit the microbial growth . For eg; antibiotics are widely used against the bacteria, and antifungal used in the case of fungi .
- Anti-inflammatory :-These are the those agent or substance which are used to reduce the pain and prevent the swelling (inflammation).
- Anti-acne:- These are the those Ingredients or substance that reduce the number of acne blemishes, acne pimples, blackheads, and whiteheads.

2. Additives used in face wash : [15] [16] [17]

- Antioxidant;Antioxidant are the those substance or Ingredients that prevent or slow deterioration due to chemical reaction with Oxygen. They are also available as dietary supplements. Examples ; Lycopene,Vitamin A, Vitamin C, Vitamin E.
- Gelling agent :-Gelling agent are also known as thickening agent , which can used to increase the viscosity of liquid without changing its properties.Examples; carbopol 940, carbopol 934.
- Preservative :-Preservatives are the those substance or Ingredients that prevent or retard bacterial growth, and thus protect cosmetic products from spoilageExaple ; methyl paraben , propyl paraben .
- Humectants:- Humectant are the those substance or Ingredients that increase the water content of the top layers of the skin by drawing moisture from the surrounding airExample ; propylene glycol , butylene glycol
- Foaming agent:- A foaming agent is a material or ingredients such as a surfactant or a blowing agent that facilitates the formation of foam. Examples; Sodium lauryl sulfate

Advantages of Herbal Cosmetics over Synthetic cosmetics Herbal are : *[18] [19]*

- Compatible with all skin types :-Herbal cosmetic is a suitable for all skin type . herbal cosmetic are foundation, eye shadow, and lipstick, whether you have fair or dark complexion. They are also safe for us women with sensitive or oily skin, so women they never have to worry about aggravating their skin. The coal tar color is made synthetically from coal tar. coal tar is also knwon as a human carcinogen . However, natural colors made from herbs are more safer and secure.
- Wide selection to choose from :- Though they may still be relatively new to the beauty business, natural cosmetics already provide a wide range of beauty products for all makeup enthusiasts. There are numerous naturally made options available for foundation, eye shadow, lipstick, blush, mascara, concealer, and much more. In addition, one can get natural cosmetics produced nearby or ones created by internationally renowned designers. Many different herbal extracts are available; some examples are Andrographis Paniculata (Kalmegh), Asparagus Racemosus (Shatawari), Boswellia Serrata (Salai Guggal), Asphalt (Shilajit), and so on.
- Fits your budget :-The cost of natural cosmetics is not too high. Certain of these products are really less expensive than semisynthetic and synthetic ones. During sales, they are sold for a low price and are offered at a discount. All you have to do is survey enough to find good discounts. According to a WHO estimate, 80% of people on the planet trust on natural product for their medical needs due to the negative effects and growing expense of conventional treatment and it is also more safer than synthetic product with less side effect Currently, the World Health Organization supports and encourages traditional herbal remedies in natural health care programs since they are generally safe and readily available at cheap cost.
- Not tested on animals ;To make sure they are safe and effective for human use, several cosmetics undergo early testing on animals. However, animal testing is not required for natural cosmetics. Experts evaluate these natural formulas in labs using the latest technology, without using any animals.
- No Side Effects :-Synthetic cosmetics have the potential to irritate your skin and result in breakouts. They could clog your pores and leave your skin feeling greasy or dry. You don't have to worry about these with natural cosmetics. One can use the natural components at any time and anywhere, since they guarantee no negative effects. Herbal cosmetics, for instance, are devoid of parabens, the most common preservative in cosmetics, which can pierce the skin and may disrupt hormone function.to get rid of acne that is mild to moderately severe. Oral isotretinoin, also known as Accutane, is only recommended for extremely severe, deformity-causing acne.

2. Literature review;

Sr No	Year	Author Name	Journal Name /Title	Insight
1.	2016	Dhanashri Sanjay koli	World journal of pharmacy and pharmaceutical science. (Formulation of herbal anti acne facewash)	The work in this paper is deal with devlopment and evaluation of herbal antiacne facewash. The ingredients in this paper include extract of neem , turmeric, Shahi jeera , nutmeg etc. It is mentioned that the natural remedies facewash is more acceptable than synthetic facewash,they are more safer with less side effect.
2.	2011	M.kanlayavattan-akul	International journal of cosmetic science . (Herbs and theaureptic agent used in topical application for acne treatment)	The paper is discussing on acne vulgaris,which suppreses self confidence by causing distress regarding to the physical appearance of the person.The active ingredients in this paper is cis-retionic acid ,retinol ester they have suppresive effect on sebaceous gland .It is mentioned that the combination treatment should be conducted as it found more effective than single product application.
3.	2022	Shraddha tate	International journal of pharmaceutical science review and research. (Method for extraction of herbal ingredients)	The paper is focusing on the formulation of the herbal Facewash .the ingredients in this paper include turmeric,pumpkin , lavender oil , orange peel etc .it suggest that the herbal Facewash is more effective than synthetic facewash.
4.	2023	Mr . Tejas L Takale	International journal of creative research thought. (Herbal facewash)	The work in this paper is discussing on the formulation of herbal facewash for preventing dermatological problem. The ingredients containing in this paper is aloe vera , turmeric , rosewater , chandan etc .In this study ,it is also mentioned that the natural ingredient facewash have an optimum theaureptic and pharmacological effect on the skin.
5.	2023	Koushik das	International journal for research in applied science and engineering technology. (Herbal facewash for preventing dermatological problem)	The work in this paper is discussing on the formulation of herbal facewash for preventing dermatological problem. The ingredients containing in this paper is aloe vera , turmeric , rosewater , chandan etc .In this study ,it is also mentioned that the natural ingredient facewash have an optimum theaureptic and pharmacological effect on the skin.
6.	2020	Vani mamillapalli	Research journal of pharmaceutical dosage form and technology. (Formulation of polyherbal vanishing cream and facewash)	The paper discussing on the formulation of polyherbal vanishing cream and facewash . The result shows that the both the formulation give better antibacterial and antifungal activities as compared to marketed formulation.
7	2018	Anamika paul	International scientific journal. (Formulation of facewash by using extract of green tea and activated charcoal)	The paper is focusing on the formulation of facewash by using extract of green tea and activated charcoal. The main aim is to formulate the facewash to achieve moisturized, clean , glowing face .
8	2015	X.fatima grace	World journal of pharmacy and pharmaceutical science . (Preparation and evaluation of a polyherbal facewash gel)	The work in this paper is discussing on the formulation and evaluation of a polyherbal facewash gel. The facewash have antioxidant, antibacterial and antiseptic properties. Which are necessary to keep the skin moist , smoot and Good looking .
9	2019	Kamble Manish	Journal of drug delivery and theaureptic. (Formulation of anti acne facewash gel using extract of	The paper is discussing on the preparation and evaluation of anti acne gel facewash using extract of guava. After formulation, the facewash was evaluated by some physical parameter test like spreadability, washability, ph and grittiness.

			guava)	
10	**2021**	**Martha srinivas**	**International Journal of Current Pharmaceutical Review and Research** **(Current Review on Herbal Face Care)**	**The paper is focusing on the formulation of herbal face care. Includes facewashes , face creams, and face moisturizers lotions etc. are made of natural ingredients. Ingredients mostly are herbs, flowers, roots, leaves, and essential oils.**
11	**2015**	**Rajesh Yadav**	**International Journal of chemical and pharmaceutical analysis.** **(Development and evaluation of herbal anti- acne facewash).**	**The paper is discussing the development and evaluation of herbal anti- acne face wash . This helps to unclog pores and prevent skin conditions such as acne. In the present work to formulate and evaluate the facewash from using neem oil, turmeric, sodium lauryl sulphate, glycerin, perfume, propylene glycol, salicylic acid, propylparaben.**
12	**2015**	**Shaikh Arfat**	**International Journal of Research Publication and Reviews** **(Formulation of Herbal Facewash)**	**The paper is focusing on the formulation and evaluation with their stability studies of anti-acne synergistic herbal face wash gel. The ingredients include in this paper are neem, haldi(turmeric), dhaniya(coriander), aloe vera, lemon, mentha(pudina).**
13	**2015**	**Harsharan Pal Singh**	**World Journal of Pharmaceutical Research** **(Anti-acne Synergistic Herbal Face Wash Gel: Formulation, Evaluation and Stability studies)**	**Tha work in this paper is deals with formulation & evaluation of herbal facewash whether it is gel and cream form. Th goals of current work are prepare tablets for herbal facewash and designed to reduce costs, packaging size and also use of harmful preservatives. They are also conveniently portable.**
14	**2023**	**Ankita Sehgal**	**International Journal of Advance Research and Innovative Ideas in Education** **(Formulation and evaluation of anti- acne herbal)**	**The work in this paper is focusing on the herbal formulations of anti-acne facewash. The current research work focus on aqueous extraction of neem leaves, turmeric, aloevera, lemon juice, peppermint oil , xanthum gum, and rose water, for development and evaluation of herbal or natural anti-acne face wash.**
15	**2018**	**Mayur N. Ghotkar,**	**Asian journal of pharmaceutical analysis** **(Formulation and evaluation of herbal facewash for acne)**	**In this paper discussion on the facewash for acne from natural remedies. The current research is development and evaluation of herbal anti-acne flammable extracts with facial spray contains leaf extract of tulsi, hydroalcoholic extract of turmeric, pblack paper, orange peel, and nutmeg also some local herbal formulas available in the markets.**
16	**2021**	**Khandagale Ganesh Sarjerao**	**International Research Journal of Modernization in Engineering Technology and Science**	**The work in this paper is focusing on formulation and evaluation of herbal facewash from natural ingredients by simple matched. The ingredients are leaf of neem , Aloe Vera, tulshi, vit-c, tocopheryl acetate, turmeric powder, vit. E, rose water, lavender essential oil. ayurvedic** **cosmetics is helpful and does not give it side effects.**
17	**2022**	**Khade Swati S**	**International Journal of Advanced Research in Science, Communication and Technology(Formulation and Evaluation for Herbal Face Wash)**	**The paper is discussed about formulation and evaluation of herbal face wash from Hydroalcoholic extract of turmeric (curcuma longa), black pepper, orange peel and nutmeg (myristic aroma) also some local herbal formulas available in the market. The plants have anti-microbial, anti-oxidant and anti inflammatory activity and also it is natural cosmetic products.**
18	**2020**	**Avinash Kumar Reddy**	**International journal of research** **(Formulation and evaluation of fruit facewash)**	**The paper discusses the need for herbal facewash as compared to synthetic facewash, beacuse synthetic facewash have High side effects. The ingredients include in this paper is graphe , seed , cucumber juice , orange juice and lemon juice . The fruit facewash show good consistency.**

19	**2021**	**Hosahalli Rajaiah Yogesh**	**Journal of cosmetic (Clinical study to assess efficacy and safety of Purifying Neem Face Wash in prevention and reduction of acne in healthy adults)**	**The paper is discuss on Acne vulgaris is a chronic, inflammatory skin condition of pilosebaceous units. The treatment involves topical and oral antibiotics, retinoids, benzoyl peroxide, and other synthetic compounds, mostly associated with adverse effects.**
20	**2015**	**Mishra baidynath**	**International journal of bioassays** **(Gentle neem facewash)**	**The study conducted on a clinical trial with ten healthy volunters.who used the gentle neem facewash twice daily for 15 days . The main study aimed to evaluate skin safety. The study found that the gentle neem facewash was safe and effective in reducing oilness of facial skin.**

3. Method and material ;

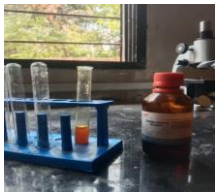
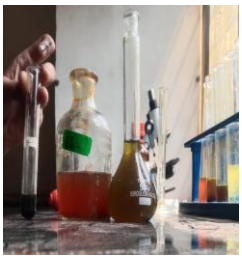
A. Pre formulation evaluation of ingredients;

- **Turmeric**

TEST	Observation	Inference	Image
Carbohydrates **Molisch test ;** **few drops of alcoholic a-naphthol solution were added to 2 mL of extract. Later, few drops of concentrated H2SO4 were added along the walls of test tube**	**At the junction of two liquids, a violet color ring appeared,**	**Carbohydrates were present**	
Alkaloids ; **(a) Dragendorff 's test. By adding 1 mL of Dragendorff"s reagent to 2 mL of extract,**	**an orange red precipitate was formed,**	**indicating the presence of alkaloids.**	
Phenolics ; Ferric chloride test. Two milliliters of 5% neutral ferric chloride solution were added to 1 mL of extract,	**the dark blue coloring**	**the presence of phenolic compounds and tannins**	

Flavonoids; **Two to three drops of sodium hydroxide were added to 2 mL of extract.**	**Colourless appeared**	**Flavonoids present**	

- **Beal leaves ;**

TEST	Observation	Inference	Image
Alkaloids ; **By adding 1 mL of Dragendorff"s reagent to 2 mL of extract, an orange red precipitate was formed, indicating the presence of alkaloids.**	**Orange-red precipate**	**Alkaloids is present**	
Flavanoids ; **Alkaline reagent test ; Two to three drops of sodium hydroxide were added to 2 mL of extract.**	**Colorless color appeared**	**Flavonoids is present**	
Phenolics ; **a)Ferric chloride test. Two milliliters of 5% neutral ferric chloride solution were added to 1 mL of extract, the dark blue colouring indicating the presence of phenolic compounds and tannins.**	**Dark blue colored appeared**	**Phenolics and tannins is present**	

- **Neem ;**

TEST	OBSERVATION	INFERENCE
Alkaloids ; **Mayers test- Few drops of Mayer's reagent were added to 1 mL of extract.**	**yellowish or white precipitate was formed**	**Alkaloids is present**
Terpenoids ; **Two milliliters of trichloroacetic acid was added to 1 mL of extract.**	**Red precipitate formed**	**Terpenoids is present**
Glycoside ; **Keller Killiani test- A solution of 0.5 mL, containing glacial acetic acid and 2-3 drops of ferric chloride, was mixed with 2 mL of extract. Later, 1 mL of concentrated H2SO4, was added along the walls of the test tube.**	**No appearance of blue color**	**Glycoside is absent**

B. Ingredients ; 1. Turmeric –

Biological Source:

- Scientific Name: Curcuma longa
- Family: Zingiberaceae (Ginger family)
- Biological Description: Turmeric is a perennial herbaceous plant characterized by its long, narrow leaves and striking yellow-orange rhizomes (underground stems). It produces spikes of yellow flowers and grows up to about 1 meter in height.
- Geographical Source:
- Origin: Turmeric is native to South Asia, particularly India and Indonesia.
- Cultivation: It is cultivated in tropical and subtropical regions worldwide, including India, China, Indonesia, and other Southeast Asian countries. It also grows in parts of Africa, the Caribbean, and Central America.

Chemical Constituents:

- Curcuminoids: The most well-studied group of compounds in turmeric, curcuminoids include curcumin, demethoxycurcumin, and bisdemethoxycurcumin. Curcumin is the most abundant and biologically active compound among them.
- Curcumin: This polyphenolic compound is responsible for the yellow color of turmeric and has numerous health benefits, including anti-inflammatory, antioxidant, and antimicrobial properties.
- Turmerones: Found in the essential oil fraction of turmeric, turmerones include ar-turmerone, α-turmerone, β-turmerone, and curlone. These compounds contribute to the aroma and flavor of turmeric and have been studied for their potential therapeutic effects.

Uses:

1.Medicinal Uses:

- Anti-inflammatory: Turmeric is known for its potent anti-inflammatory properties, making it beneficial for managing conditions like arthritis and inflammatory skin disorders.
- Antioxidant: Curcumin, the main active compound in turmeric, acts as a powerful antioxidant, protecting cells from oxidative damage caused by free radicals.
- Anti-cancer: Some studies suggest that curcumin may have potential anti-cancer properties, inhibiting the growth of cancer cells and reducing the risk of certain cancers.

2.Beal leaves –

Biological Source:

Bel patra comes from the Bel or Bael tree, scientifically known as Aegle marmelos. It's a deciduous tree native to India and cultivated in various parts of Southeast Asia.

Family : Rutaceae

Geographical Source: The Bel tree is primarily found in India, particularly in the northern and central regions. It's also cultivated in other parts of Asia, including Bangladesh, Sri Lanka, Nepal, and Thailand.

Chemical Constituents:

- Alkaloids: Organic compounds containing nitrogen, alkaloids are known for their pharmacological effects. Bel patra contains alkaloids such as aegeline, marmeline, skimmianine, and N-methylflindersine.
- Flavonoids: These are a class of plant secondary metabolites known for their antioxidant properties. Bel patra contains flavonoids like rutin, quercetin, and kaempferol, which contribute to its antioxidant and anti-inflammatory effects.

- Phenolic Compounds: Bel patra is rich in phenolic compounds, including phenolic acids and flavonoids. These compounds have antioxidant, anti-inflammatory, and antimicrobial properties.
- Tannins: Bel patra contains tannins, which are polyphenolic compounds with astringent properties. Tannins contribute to the herb's ability to treat diarrhea and other gastrointestinal disorders by tightening mucous membranes.

Uses:
Bel patra has several traditional and medicinal uses:

1. Religious Significance: In Hinduism, Bel patra is considered sacred and is used in rituals and worship of Lord Shiva. It's often offered as a part of prayers.
2. Medicinal Uses: Bel patra has been used in Ayurvedic medicine for centuries due to its various medicinal properties. It is believed to have digestive, carminative, anti-inflammatory, anti-diabetic, and antimicrobial properties. It is used to treat various ailments such as diarrhea, dysentery, peptic ulcers, respiratory problems, and skin disorders.

3.Neem –

Biological source ;Neem consists of the fresh or dried leaves and seed oil of Azadirachta indica J. Juss (Melia Indica or M. azadirachta Linn.).
Family ; meliaceae
Geographical Source: Neem trees are primarily found in tropical and subtropical regions. Besides India, they are cultivated in other parts of Asia, Africa, Australia, and the Americas. Neem thrives in arid and semi-arid climates and is tolerant of various soil types.

Chemical Constituents:

- Azadirachtin: This is the most well-known compound in neem, responsible for its insecticidal properties. It disrupts the growth and development of insect pests.
- Nimbin and Nimbidin: These compounds have anti-inflammatory, antipyretic, and analgesic properties, making neem useful in traditional medicine.
- Neem oil: Extracted from neem seeds, neem oil contains fatty acids such as oleic acid, linoleic acid, and palmitic acid. It has insecticidal, antifungal, antibacterial, and moisturizing properties, making it valuable in agriculture, cosmetics, and traditional medicine.
- Quercetin, kaempferol, and other flavonoids: These compounds have antioxidant and anti-inflammatory properties, contributing to neem's medicinal benefits.

Uses:

- Medicinal Purposes: Neem has a long history of use in traditional medicine for treating various ailments, including skin disorders (e.g., eczema, acne), diabetes, gastrointestinal issues, fever, and infections.
- Pesticidal and Insecticidal Properties: Neem extracts and neem oil are effective natural pesticides and insect repellents. They are used in agriculture to control pests, such as aphids, whiteflies, mites, and caterpillars, without harming beneficial insects.
- Dental Care: Neem twigs have been traditionally used as toothbrushes (called miswak) due to their antibacterial properties, helping to prevent dental caries and gum disease.
- Cosmetic Applications: Neem oil is used in skincare products such as soaps, creams, and lotions for its antibacterial, antifungal, and moisturizing properties

4.Glycerin

Properties:

- Structure formula – C3H8O3.
- Molar mass - 92.094 g·mol−1
- Appearance -Colorless hygroscopic liquid
- Odor - Odorless
- Density - 1.261 g/cm3
- Melting point - 17.8 °C (64.0 °F; 290.9 K)
- Boiling point - 290 °C (554 °F; 563 K)
- Solubility in water - miscible

Uses ;

- Skincare Products: Glycerin is a popular ingredient in moisturizers, lotions, and creams due to its humectant properties. It helps attract and retain moisture in the skin, keeping it hydrated and supple.
- Pharmaceuticals: Glycerin is used in pharmaceutical formulations as a solvent, lubricant, and sweetening agent. It is also used in cough syrups and suppositories for its soothing and moisturizing effects.
- Food and Beverages: Glycerin is approved as a food additive and is used as a sweetener, humectant, and solvent in various food products such as baked goods, dairy products, and confectionery.

Personal Care Products: Glycerin is found in toothpaste, mouthwash, and hair care products due to its moisturizing and conditioning properties. It helps maintain moisture balance and improves the texture of these products.

5.Xantham gum –

Family – Xanthomonus Campestres

Uses -

- Food Industry: It is commonly used as a thickening, stabilizing, and emulsifying agent in food products such as sauces, dressings, soups, gravies, dairy products, bakery items (including gluten-free products), beverages, and ice cream. It helps improve texture, shelf-life, and mouthfeel.
- Pharmaceuticals: Xanthan gum is used as a suspending agent in liquid medications, as a binder in tablet formulations, and as a controlled-release agent in drug delivery systems.
- Personal Care Products: It is found in toothpaste, lotions, creams, shampoos, and other personal care items as a thickener, stabilizer, and suspending agent.

6.Lemon juice –

Biological source - The biological source of Lemon is Citrus limon.
Family: Rutaceae
Chemical constituents ;
Water (H2O): Lemon juice is predominantly water, making up the bulk of its composition.
Citric Acid (C6H8O7): The main organic acid in lemon juice, contributing to its sour taste and acidic properties. It consists of three carboxylic acid groups (-COOH) attached to a central carbon atom.
Sugars: Lemon juice contains various sugars, including glucose and fructose, which contribute to its sweetness.
Vitamins: Lemon juice is rich in vitamin C (ascorbic acid), an essential nutrient with antioxidant properties.
Flavonoids: These are phytonutrients found in citrus fruits like lemons, which contribute to their health benefits.

Uses:

- Food Preservation: The acidic nature of lemon juice helps inhibit bacterial growth and oxidation, making it useful for preserving fruits, vegetables, and certain foods like guacamole from browning.
- Cleaning Agent: Lemon juice's acidity and antimicrobial properties make it effective as a natural cleaning agent. It can be used to clean surfaces, remove stains, and freshen up household items.
- Health and Wellness: Lemon juice is often consumed for its potential health benefits. It is rich in vitamin C and antioxidants, which may boost the immune system and reduce oxidative stress.
- Beauty and Skincare: Lemon juice is used in DIY beauty treatments for its astringent and brightening properties. It is believed to help lighten skin, reduce acne, and brighten dull complexion when applied topically (although caution is advised due to its acidity).

7.Sandalwood Oil –

Biological source :
Sandalwood essential oil comes from the wood and roots of Santalum album, or the East Indian sandalwood tree.
Geographical source ;
Indian sandalwood is native to southern India, particularly the states of Karnataka, Tamil Nadu, and Kerala. It's also found in parts of Southeast Asia, including Indonesia, Sri Lanka, and Australia
Chemical constituents;
Sandalwood oil contains several chemical compounds, with the main components being α-santalol and β-santalol. These compounds contribute to the characteristic fragrance and therapeutic properties of sandalwood oil. Other constituents include santalenes, sesquiterpenes, and various minor compounds.

- Alpha-santalol: This is the major constituent, typically comprising 25-60% of the oil. Alpha-santalol is largely responsible for the characteristic fragrance and some of the biological activities of sandalwood oil.
- Beta-santalol: This compound, present in amounts ranging from 10-30%, also contributes significantly to the scent and therapeutic properties of the oil.

Uses –

- Perfumery: Sandalwood oil is prized in perfumery for its warm, woody aroma. It's often used as a base note in perfumes.
- Cosmetics: Due to its fragrance and skincare properties, sandalwood oil is used in various cosmetic products like soaps, lotions, and

creams.

- Aromatherapy: Sandalwood oil is popular in aromatherapy for its calming and grounding effects. It's used to alleviate stress, anxiety, and promote relaxation.
- Traditional Medicine: Sandalwood has a long history of use in traditional medicine systems like Ayurveda and traditional Chinese medicine. It's believed to have anti-inflammatory, antiseptic, and astringent properties. Sandalwood paste is applied topically for skin conditions,

8.Methyl paraben –

Methylparaben, also known as methyl paraben, is a commonly used preservative in cosmetics, pharmaceuticals, and food products. Here are its physical properties and structure:

Physical Properties:

- Appearance: Methylparaben typically appears as white, odorless crystals or a white crystalline powder.
- Solubility: It is soluble in alcohol, ether, and propylene glycol, but only slightly soluble in water.
- Chemical Structure:
- Chemical Formula: C8H8O3
- Structure: Methylparaben is the methyl ester of p-hydroxybenzoic acid. Its chemical structure consists of a benzene ring with a hydroxyl group (-OH) and a carboxyl group (-COOH) at positions 1 and 4, respectively. The carboxyl group is esterified with a methyl group (-CH3), resulting in the formation of methylparaben

Uses :

- Preservative: Methyl paraben is an effective preservative that helps extend the shelf life of products by inhibiting the growth of bacteria, fungi, and other microorganisms. It is particularly useful in water-based formulations such as lotions, creams, shampoos, and liquid soaps to prevent microbial contamination and spoilage.
- Cosmetics: Methyl paraben is widely used in cosmetics and personal care products such as moisturizers, makeup, hair care products, and sunscreen lotions to maintain their stability and safety over time. It helps prevent the growth of harmful microbes, thereby ensuring product integrity and safety for consumers.
- Pharmaceuticals: In pharmaceutical formulations, methyl paraben is used as a preservative to prevent microbial growth and maintain the efficacy and safety of drugs, creams, ointments, and topical solutions. It helps prolong the shelf life of these products and ensures their microbial purity

9.Sodium lauryl sulfate -

Physical Properties:

- Appearance: Sodium lauryl sulfate is commonly found as a white or cream-colored crystalline solid.
- Odor: It is typically odorless.
- Solubility: SLS is highly soluble in water, resulting in a clear or slightly cloudy solution. It is less soluble in organic solvents such as ethanol and ether.

Chemical Properties:

- Chemical Formula: C12H25SO4Na
- Sodium lauryl sulfate is an organic compound consisting of a 12-carbon hydrocarbon chain (lauryl group) attached to a sulfate group (-OSO3Na) via an ether linkage.

Uses ;

- Personal Care Products: Sodium lauryl sulfate is widely used in personal care products, includingShampoos: It helps to cleanse the scalp and hair by removing dirt, oil, and product buildup.
- Body Washes: SLS creates a lather that effectively cleanses the skin, leaving it feeling refreshed.
- Toothpaste: SLS contributes to the foaming action and dispersal of ingredients, aiding in the cleaning of teeth and gums.
- Facial Cleansers: SLS helps to remove impurities and makeup from the skin's surface.
- Household Cleaners: SLS is found in various household cleaning products, including:
- Dishwashing detergents: It helps to break down grease and food residues on dishes and utensils.
- Laundry detergents: SLS assists in removing dirt and stains from clothing fibers

c.] METHODS:-1.Collection :- Leaves of neem , rhizomes of turmeric and leaves of beal were collected

2.Preparation of Herbal Extracts:

- Turmeric Extract: Obtain through ethanol extraction
- Neem Extract: Obtain through water or ethanol extraction.
- Belpatra Extract: Obtain through water extraction.

3. Filtration; Filtration of herbal extract was done by using simple filter paper and funnel

4..Evaporation :- Evaporation was done by electronic water bath . Filtrates were allowed to evaporate in evaporating pan at 60 c temperature until the desired concentration of the extract was obtained.

5..Formulation of Facewash:

Phase A (Water Phase):

- Distilled Water: 60-70%
- Turmeric Extract: 2-5%
- Neem Extract: 2-5%
- Belpatra Extract: 2-5%

Phase B (Gelling Agent):

- Xanthan Gum: 0.5-2%
- Glycerin: 2-5% (optional for moisturizing effect)

Phase C (Surfactant Phase):

- Sodium Lauryl Sulfate (SLS): 5-10%

Phase D (Preservative and Additives):

- Methyl Paraben: 0.1-0.2%
- Fragrance or Essential Oils: 0.5-1% (optional)

6.Procedure:

- Dissolve xanthan gum in distilled water with continuous stirring to avoid clumping.
- Add the herbal extracts (turmeric, neem, and belpatra) to the water phase and mix thoroughly.
- In a separate container, dissolve SLS in a small amount of water.
- Combine the water phase and SLS solution slowly, mixing gently to avoid excessive foam.
- Add methyl paraben and mix until fully dissolved.
- Adjust the pH to 5.5-6.5 if necessary using a pH adjuster like citric acid.
- Add fragrance or essential oils if desired.
- Ensure the mixture is homogeneous, then transfer it to a suitable container for storage.

Evaluation;

Physical evaluation :- Physical parameters such a colour, odour, appearance and consistency will be checked visually.

Consistency ; The consistency was evaluated by applying on the skin

Spreadability:- Spreadability represent the amount of area to which the gel readily spread on application to skin or the affected part of the body

Washability:-firstly Formulation will be applied on the skin and then washing with water will be checked manually.

Foamability:- firstly Small amount of gel will be taken in water containing beaker. First Initial volume will be noted ,then beaker will be shaken for 10 times and the final volume will be noted.

Grittiness ; The grittiness is known by directly applying on the skin

pH:- pH of 1% aqueous solution of the formulation will be measured by calibrated digital pH meter

Skin irritability test ; few drop of preparation are apply on the skin and hold on for some periodic time .

Stability ; The produced formulation was tested for stability by storing at various temperature for 30 days. It was stored at both room temperature and refrigerator temperature

Result and discussion;

Test	Observation
Color	**Yellowish**
Odour	**Pleasant**
Consistency	**Semisolid**
Spreadability	**Easily spreadable**
Washabilty	**Good**
Foamability	**Good**
Grittiness	**No**
Ph	**5.8**
Skin irritability test	**No irritation**
Stabily	**Normal**

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