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Review Paper

Pharmacological Activity, Medicinal Use and Herbal Face Scrub Powder Formuation of Aegle Marmelos Plant

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ABSTRACT

Aegle marmelos plant is dedicated to Lord Shiva and is also believed that Lord Shiva resides under the Bael tree. the plants were used as medicine in various diseases. In India various medicinal system uses parts of plants (leaves, barks, seed, fruit, flower, stem, root) to cure and treat number of various human ailments. Aegle marmelos is one of the medicinal plant, also known as bale have spiritual as well as medicinal importance. bale belongs to family Rutaceae. In peninsular India, the tree is very commonly found in dry forest hills and central & southern Indian plains. Marmelos has been extensively studied for their medicinal activity, and different phytochemical were isolated from various parts of the plant using various advanced pharmacological technologies.

INTRODUCTION

A. marmelos (Bael tree) belongs to the citrus family Rutaceae. It is the most significant underutilized medicinal, Indigenous fruit crop of India. This plant is of high economic value and is known in India since 800 B.C. as per historical reports. In 1629 A.D., the Chinese Buddhist pilgrim, Hiuen Tsiang also noticed the presence of the Bael tree during his visit to India. As per Hindu culture, The trifoliate leaves of the plant are used in the prayers of Lord Shiva and Parvati, hence the plant is also known by the name of Shivaduma. the plant carries great medicinal value and its medicinal description is also mentioned in the Vedas (Yajurveda), Puranas and has also been portrayed in the paintings of Ajanta Caves. The Bael fruits were known since the Ramayana period and the tree was reported to be found in the Panchvati and Chitrakuta hills. The medicinal properties of the fruit of the Bael tree are also described in the ancient treatise Brihat Samhita and Charka Samhita. As per ancient beliefs, the Bael tree acts as an indicator plant to trace the underground water. All the parts of the plant i.e. root leaf, trunk, seed and fruits carry various medicinal properties and are used to treat variety

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of diseases. The fruit of this plant is edible and is mostly used for medicinal purposes as it is a rich source of vitamins, minerals and antioxidants. It also acts as a Climate Purifier that absorbs the poisonous gases from the atmosphere and making them inactive or neutral. The plant is associated with various bioactive compounds. The main active phytochemical constituents isolated from the fruit part of the plant include marmelosin (helps in curing stomach diseases), psoralen, luvangetin, tannins and marmin. In Ayurveda, all the parts are used in the form of 'panchang' to cure diseases like diarrhoea, dysentery and ulcer. The plant is also used to cure diseases like asthma, fractures, anaemia and swollen joints, wound healing, diabetes, high BP, jaundice, diarrhoea, brain typhoid troubles during pregnancy, stomach ache, cancer, malaria and gastroduodenal disorders. Besides this, the plant extracts are associated with pharmacological properties like anti-diabetic, antiulcer, antioxidant, anti-hyperlipidaemic, anticancer, antipyretic, radio-protective, analgesic, anti-inflammatory and anti-spermatogenic.

- **Vernacular names of Bael Patra**

Hindi	Bel, Beli, Belgiri, Bael Putri, sir phal, kooralam
Sanskrit	Bilva, Shivadruma, Shiva Phala, Vilva
English	Golden apple, Bael fruit, Indian Bael, Holy fruit, Indian quince, elephant apple, stone apple
Urdu	Bel, Bel Kham
Himachal Pradesh	Bil
Bengal	Beal
Karnataka	Bil Patra, kumbala, malura
Andhra Pradesh	Maredu
Marathi	Bel
Gujrati	Bilivaohal, Bili
Kerala	Kuvalum
Malayalam	Marredy
Oriya	Belo
Tamil	Vilva Marum
Telugu	Bilva Pandu
Latin	Aegle marmelos
Nepali	Bel, Gudu
Khmer	Bnau
Indonesian	Mojo tree
Javanese	Modjo
French	Oranger du Malabar
Burmese	Ohshit, opesheet
Malay	Pokok Maja Batu
Thai	Matum, Tum, Mapin

•TAXONOMICAL CLASSIFICATION:-

Kingdom	Plantae
Subkingdom	Tracheobionta
Super division	Spermatophyta
Division	Magnoliophyte
Class	Magnoliopsida
Subclass	Rosidae
Order	Sapindales

Family	Rutaceae
Genus	Aegle
Species	Aegle marmelos

- **Geographical History:-**

Bael has Indian origin generally found in various other countries like Egypt, Bangladesh, Myanmar, Malaysia, Sri Lanka, Pakistan, and Thailand. The bale plant wildly grows on dry forests hills and plains of southern as well as central India, Bangladesh, Pakistan, and Burma, also in mixed deciduous and dry forests. Bael (Aegle Marmelos (Linn), family Rutaceae, is also known as Bale fruit tree, wood apple is a moderate-sized, slender, fragrant tree, 6.0 -7.5 m in height, and 90 to 120 cm in circumference, with a somewhat fluted trunk of the tree of 3.0-4.5 meter growing wild throughout the deciduous forests of India, have an ascending altitude of 1200 meters in the western Himalayans and also occurring in Andaman Island. Bael tree is generally referred to as a sacred tree by Hindus, the leaves are offered in the worship of Lord Shiva. According to Hindu mythology, the tree is another form of Lord Kailashnath. Leaves, fruit, stem, and roots of this tree at all stages of maturity are used as ethnomedicine against various human diseases.



Bael leaf "Fig. 1"



Bael fruit plant "Fig .2"

- **Chemical constituents:-**

1. **Coumarin-**

Coumarins extracted from the fruit part of the plant include 6-(2 hydroxy-3-hydroxymethyl-3-butenyl)-7-hydroxycoumarin, 6 formylumbilliferone, 6-(4-acetoxy-3-methyl-2-butenyl)-7 hydroxyl coumarin, 8-hydroxysmyrindiol, 8-[(3-methyl-2-oxo-3 buten-1-yl)oxy]-7H-furo[3,2-g]benzopyran-2-one, isofraxidin, isogosferol, alloimperatorin, decursinol, demethylsuberosin, marmelosin, isophellodenol C, psoralen, marmelonine, umbelliferone, scoparone, scopoletin, xanthotoxin, xanthoarnol and xanthotoxin

2. **Phenolic acids and Flavonoids-**

Phenolic acids and flavonoids extracted from the fruit part include ellagic acid, quercetin, chlorogenic acid, gallic acid, ferulic acid, and kaempferol and protocatechuic acid.

3. Alkaloids-

Alkaloids isolated from the fruit part include aegelenine, aegelin, marmeline, marmesiline, O-(3,3-dimethylallyl) halofordinol and O-methylhalfordinol.

4. Volatile compounds-

It includes 1,8-cineole, 3,5-octadiene-2-one, acetoin, (E)-2 octenal, €-6,10-dimethyl-5,9-undecadien-2-one, (E, E)-2-4 hepadoenal, carvone, citral, carvyl acetate, citronellal, caryophyllene oxide, dehydro-p-cymene, eugenol, hexanal, hexadecane, beta-ionone, humulene oxide, linalool oxide, limonene, p-cymene, verbenone, trans-p-mentha-2,8-dienol, alpha-humulene, beta-cubebene, beta-phellandrene and isoamyl acetate.

5. Carbohydrates-

Arabinose, fructose, galactose, sucrose and glucose

6. Organic acids-

Malic acid, tartaric acid and oxalic acid

7. Vitamins-

Riboflavin and ascorbic acid

8. Leaves-

The chemical constituents extracted from the leaf part include coumarins (mermenol and praeltin), O-(3,3-dimthylally) halofordinol, N-4-methoxystyryl cinnamide, N-2-methoxy-2- [4 (3',3'-dimethyl allyloxy) phenyl] ethyl cinnamide.

9. Bark –

Coumarins include Angelinol, mermesin, marmesin and umbelliferone and alkaloids include skimmianine, gamma fagarine.

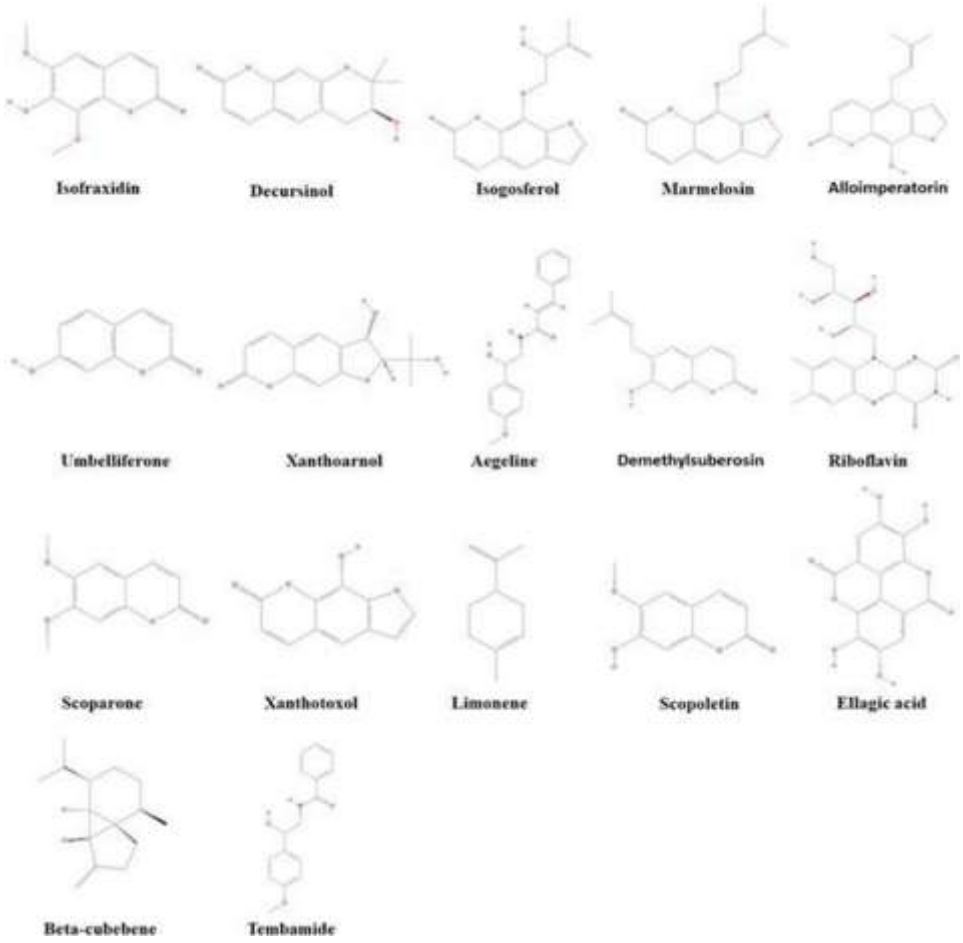
10. Root-

The chemical constituent isolated from root parts include alkaloids which include disctamine, haplopine, tembamide, gamma-fagarine and tembamide and coumarins include aegelinol, marmesin, marmin, scopoletin, umbelliferone, xanthotoxin.

11. Fruit-

The fruit part contains bioactive compounds, carbohydrates, minerals, vitamins, coumarins, phenolic acids alkaloids, flavonoids, organic acids, volatile compounds and fatty acids. Aegle marmelos plant is a rich source of various nutrients including carbohydrates (31.80 g/100 g) fibres (2.90 g/100 g), minerals (1.70 g/100 g), fats (0.39 g/100 g) and vitamins such as Vitamin A (0.05 mg/100 g), vitamin B2 (1.20 mg/100 g), Vitamin C (8.0 mg/100 g), riboflavin (0.03 mg/100 g), thiamine (0.13 mg/100 g) and beta-carotene (55.0 mg/100 g).

- **STRUCTURE:-**



- **THERAPEUTIC APPLICATION:-**

1. Antidiabetic and anti-hyperlipidaemic activity:-

According to Indian Ayurvedic, Siddha, Unani traditional system of medicine, bale plant has been used for control and management of diabetes mellites. Some literature surveys investigates that antidiabetic effect of the plant may be due to the presence of coumarin as a chemical constituent in fruit. Aqueous extract of bale seed help to reduce blood glucose level in severe diabetic cases. In vivo, scientific study has been performed using an animal model to show antidiabetic effect of various organic extracts and juice of bale fruit extract of bale plant effectively reduce the blood cholesterol and urea level in diabetic induced rat. Leaf extract of Aegle mermelos has been enough competent to lower the oxidative stress by lipid peroxidation scavenging and improving the certain level of antioxidant which results in dropping of elevated blood glucose level. An alkaloidal-amide, aegeline (table 4) has been isolated from the leaves of Aegle mermelos, aegeline has antihyperglycemic activity, as demonstrated by lowering blood glucose levels at 12.9% and 16.9% for 5 and 24 hours, respectively. Aegeline also has anti-hyperlipidaemic activity because it significantly reduced plasma triglyceride (Tg) levels by 55% ($P < 0.001$), total cholesterol (TC) by 24% ($P < 0.05$), and free fatty acids (FFA) by 24%. Accompanied by an increase in HDL-C by 28% and HDL-C/TC ratio by 66% in dyslipidaemia hamster models at a dose of 50 mg/kg body weight. The bale plant's lipid lowering property has been investigated by administering aqueous leaf extract in albino Wistar rats. This activity was measured by using serum lipid profiles that is high-density lipoprotein (HDL),

very low-density lipoprotein (VLDL), total cholesterol (TC), and triglyceride (TG)

2. Diarrhoea and dysentery:-

Half ripe or unripe fruit acts as a remedy to cure chronic diarrhoea and dysentery without fever. The half ripe fruit is considered as good for this purpose but fully ripe fruits or uniform powder of fruit has shown better results. The unripe fruit can also be taken by baking and then mixing with brown sugar or jaggery. The amount of blood passed in the fecal matter gets reduced, and the fecal matter gets a more solid form after consumption of fruit. This study was evaluated to verify the gastroprotective and antidiarrheal effects of Aegle marmelos raw fruit extracts. This gastro protective action of bale extract was evaluated in rats besides damage to the gastric mucosa triggered by hypothermic buffer stress, absolute ethanol, and indomethacin. In similarity, the antidiarrheal property was examined by studying the effect on gastrointestinal transit as measured by charcoal indicators on the accumulation of castor oil-induced from intestinal fluid in rats. In the isolated Guinea-pig ileum acetylcholine, histamine, serotonin, and barium chloride cause the contractile response. Raw fruit extracts significantly inhibit both intestinal transit and intestinal fluid accumulation caused by castor oil in mice, at the same dose. Additionally, extracts show contractile responses produced by different agonists on intestinal absorption of Guinea-Pig in vitro. The drug inhibition potential is in the order of acetylcholine > histamine > serotonin > barium chloride. These results designate the possible antidiarrheal effect of A. marmelos raw fruit extracts from inhibition of intestinal motility to secretion can prevent clinical diarrhoea.

3. Antimicrobial and antifungal activity:-

marmelos have been used for the treatment of numerous infectious diseases and have been extensible stated to kill the broad range of pathogenic microorganisms. Many literature surveys evaluated the antimicrobial potential of A. marmelos extracts against pathogenic microorganisms including bacteria and fungi. The agar well diffusion method has been used to identify the antimicrobial activity of A. marmelos leaves. The aqueous, petroleum ether and ethanol extract of the leaves of Aegle marmelos demonstrated effective antimicrobial activity against Proteus Vulgaris, Escherichia coli, Streptococcus pneumoniae, Salmonella typhi, and Klebsiella pneumoniae. Disc diffusion method has been done to identify the antimicrobial activity. The petroleum ether extract of leaves was tested against multi resistant strains of Staphylococcus aureus, Bacillus subtilis, Escherichia coli, Salmonella typhi, Proteus vulgaris, Pseudomonas aeruginosa, and Klebsiella pneumonia. Gram-negative strains show higher antimicrobial activity than of gram-positive strains. Bael leaves have been described as an antifungal against clinical isolates of dermatophytes. A. marmelos leaf extracts and fractions were found to have fungicidal activity against Trichophyton mentagrophytes, T. rubrum, Microsporum Canis, M. gypseum, Epidermophyton floccosum. The antifungal and antibacterial activity of the fruit of A. marmelos was reported. The antimicrobial activity was performed by using the tube dilution MIC method.

The fruit decoction of bale indicated activity against Aspergillus Niger, Aspergillus fumigatus, Candida albicans and Staphylococcus aureus and the MIC results for the above individual organisms were 19.5 µg/ml, 39 µg/ml, 625 µg/ml, and 1.25 mg/ml. The antimicrobial activity was checked against Bacillus subtilis, Staphylococcus aureus, Klebsiella pneumoniae, Proteus mirabilis, Escherichia coli, Salmonella paratyphoid A, and

Salmonella paratyphoid B. The methanol extract showed considerably high activity against the above-mentioned bacteria as compared to other extracts. The hexane, cold methanol, hot methanol, and ciprofloxacin extracts presented high antibacterial activity against Escherichia coli, Klebsiella pneumoniae, Proteus vulgaris, Micrococcus luteus, Enterococcus faecalis, and Streptococcus faecalis.

4. Hepatoprotective activity:-

The present work has been done to study the hepatoprotective activity of aqueous extract of bale at different doses, which shows a toxic effect in mice. The hepatoprotective effect of the A. marmelos leaves and was described in alcohol-induced liver injury in albino rats. For that 30% of ethyl alcohol were administered to rat for 40 days and the induced rats were fed with leaves of A. marmelos for 21 days. It has been also investigated that aqueous extract of bale fruit pulp and seeds have a better effect in the treatment and prevention of CCI4 induced hepatic toxicity.

5. Anticancer activity:-

Literature survey demonstrates the anticancer activity of folk medicine used in Bangladeshi and used extracts of Aegle marmelos for cytotoxic action using brine shrimp lethality assay; sea urchin eggs assay, and MTT assay using tumour cell lines. The extract of Aegle marmelos was found to be effectively toxic to all used assays. Similarly, the anticancer activity of hydroalcoholic extract of bale leaves in the animal model of Ehrlich ascites carcinoma and suggested that the presence of skimmianine in the extract exerts induction of apoptosis.

6. Antiviral activity:-

Viruses are is deliberated as an alive substance inside the host body and as non-living outside the host body. It may lead to the regular outbreak and does not react appropriately to most of the synthetic drugs. therefore the natural bio-resources is in increasing demand to disabling this problem. Bael fruit hydro-alcoholic extract have better antiviral activity against Ranikhet disease virus, which have been also determining Interferon like activity against the same virus. Therefore, bale fruit can be reported to have a better viricidal activity and in the near future it may exploited as a potent antiviral agent. It is also establishing that; bale has antiviral activities during the early stages of viral replication with minimum host cytotoxicity in contrast to recent vermicide chemotherapeutic agents (i.e. ribavirin), which usually effective in the advanced stages of viral infection.

7. Anti-ulcer activity:-

World Journal of Pharmaceutical Research By preparing polyherbal formulation antiviral activity of bale plant was examined by using ethanol induced gastric ulcer model in Wistar rats. This formulation consists of Glycyrrhiza glabra rhizome part (200mg), A. marmelos (L.) Corr leaf part (150 mg), Hemidesmus indicus root part (75mg) and Cuminum cyminum fruit part (75mg). This formulation at the dose of 500 mg/kg was effective to produce moderate inhibition of gastric lesions in ethanol induced ulcer model in Wistar rats and compared with Omeprazole 20 mg/kg as standard. The result shows that the effectiveness of this polyherbal formulation in severe gastric ulcer. Even it is non-toxic at relatively high doses. Pyranocoumarin isolated from the seeds of Aegle marmelos, has protective effect against pylorus-ligated and aspirin-induced gastric ulcers on oral administration. A significant inhibition of absolute ethanol induced gastric mucosal damage can be produced by unripe bale fruit extract. Peptic ulceration in the most significant adverse effect produced by NSAIDs. Even though H2 blockers and proton pump inhibitors effectively prevent NSAID induced peptic ulcers, but both of them

have measurable side effects. Therefore, it is necessary to prevent the NSAIDs induced peptic ulcers producing side effects. In traditional Indian medicine there are two products which are commonly used to treat peptic ulcers namely Aloe vera leaf extract and Aegle marmelos leaf extract. Therefore, this study was directed to evaluate the anti ulcerogenic potential of combining the two drugs compared with standard drug ranitidine in preventing NSAID-induced peptic ulcers.

8. Antiarthritis activity:-

Marmelos leaves were stated to have antarthritics activity against collagen induced arthritis in Wistar rats. Methanol extract of A. marmelos showed the significant reduction of the paw swelling and arthritic index in rats. Also, reduction in Radiological and histopathological changes were also significantly showed in methanol extract treated rats.

9. Radioprotective Activity:-

Exposure of different doses of gamma-radiation in mice and found after oral administration of extract of Aegle marmelos results in an increase in radiation tolerance by 1.6 Gy. Effects of plant extract on the peripheral blood and small intestine of Swiss albino mice has also been studied. They proved that on exposure of animals to gamma radiation and collected the data against radiation-induced alterations in the peripheral blood, spleen colony forming units, and intestinal mucosa, informed that Aegle marmelos extract considerably lowers the harmful effect of radiation in the intestine and bone marrow of a mouse.

10. Antispermatogenic Activity:-

World Journal of Pharmaceutical Research Ethanolic extract of Aegle marmelos leaves reported to have ant spermatogenic activity in rats. Again anti motility of rat sperms through In Vitro study has been also presented. The in vitro effect of ethanol extracts of leaves of A. marmelos on sperm motility has been stated and was recommended a significant effect of extract on the motility of sperm. It was also suggested that if there is increase in concentration of the extracts leads to decrease in motility of sperms.

Miscellaneous uses

- The bale plant has diuretic and laxative effect, due to the presence of marmelosin derived from pulp. It depresses cardiac action, causes sleepiness and reduce the rate of respiration, in increasing dose.
- A mild laxative, tonic and digestive effects produced by the “sherbet” and fresh ripe pulp of higher value cultivars made from bale.
- In cases of haemorrhoids, the unripe fruit decoction, with fennel and ginger, is prescribed.
- It has been concise that the psoralen in the pulp rises tolerance of sunlight and helps to maintain of normal colour of skin. It is active to cure leukoderma.
- In India in the summer month, the unripe bale fruit is most prized as means of halting diarrhoea and dysentery because of astringency, especially of the wild fruits.

- **HERBAL FACE SCRUB POWDER :-**

A herbal anti-acne face scrub powder using Bael Patra (Aegle marmelos) as the main active ingredient, turmeric powder, Multani Matti , rice flour, gram flour, fenugreek seed powder, and rose petals powder is being developed and evaluated in this study.

Since Bael Patra has strong antibacterial and anti-inflammatory qualities, it can be used to treat acne and other skin conditions. Turmeric have antiseptic and antibacterial properties, while rose petals calms and hydrates the skin.

A natural astringent is provided by rose petals powder provides a refreshing and toning effect. Physical appearance, pH, viscosity, spreadability, foam ability, skin irritation test, and stability tests

were among the evaluation parameters that were applied to the manufactured face scrub powder.

The formulation's excellent consistency, foamability, stability over time, and pH (within the skin-friendly range of 5.5–7) were all indicated by the results.

There was no skin irritation during the test. The face wash is safe and effective for everyday use because of the formulation's natural components, which showed synergistic anti-acne effects. A viable substitute for face washes with chemicals, this herbal composition helps treat acne-prone skin.

- **Introduction :-**

Skin

The skin is made up of tissues that work together as a single structure to perform critical and specific functions, even though you would not think of it as an organ. The body is generally protected by the integumentary system, which consists of the skin and the tissues that support it. The several layers of cells and tissues that comprise the skin are held to the underlying structures by connective tissue.

The following are the three layers of skin:

1. Epidermis
2. Dermis
3. Hypodermis

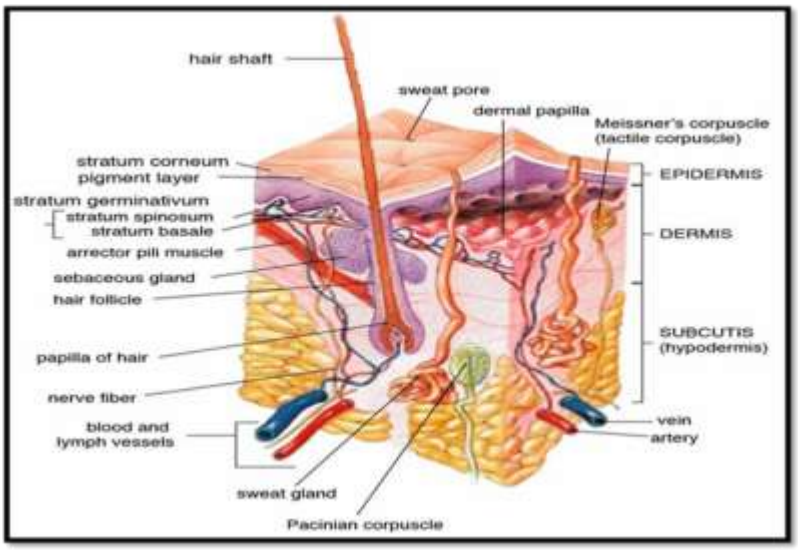


FIG : STRUCTURE OF SKIN

Function of skin: Skin plays numerous vital roles in the physiology of the body

1. Sensation.
2. Protection
3. Thermoregulation
4. Immunity

Types of skin:

1. Dry skin
2. Oily skin

Skin related problem:

Acne:

Types of acne:

1. Blackheads
2. Whiteheads
3. Nodules
4. Papules

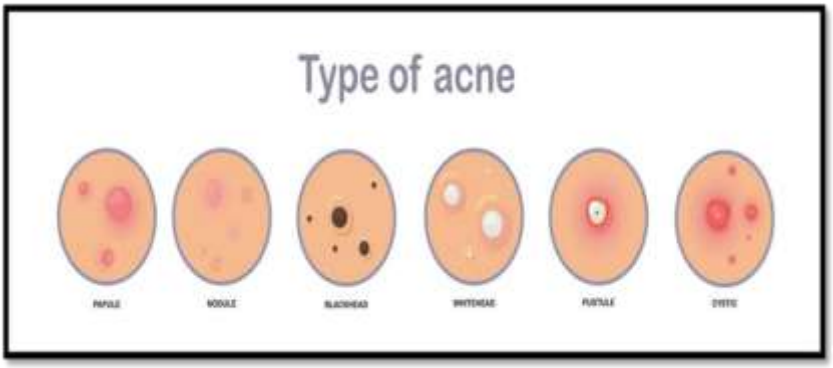


FIG : TYPES OF SKIN

- **Skin Care Preparation for Face Wash**

1) Cleansing creams and lotions
2) Compact powders
3) Rouges
4) Face packs and masks
5) Face wash

- **Face Scrub Powder**

A cleanser or other facial care product is used to remove makeup, dead skin cells, oil, grime, and other pollutants from the face's epidermis. This protects against skin problems like pimples and makes pore cleaning easier. As part of a face care regimen, a cleanser can be used in addition to a toner and moisturizer.

- **Benefit of Face scrub powder :**

Exfoliating chemicals found in certain face washes aid in the removal of dead skin cells, resulting in a smoother complexion.

By keeping the skin clean and renewed, regular use can improve its texture and tone.

Other skincare products, such serums and moisturizers, are better absorbed by a clean face.

Frequent washing aids in avoiding a number of skin problems, including inflammation, irritation, and dullness.

Washing your face might make you feel refreshed right away.

- **Features of Face scrub powder :-**

The exfoliation encourages skin renewal and regeneration and speeds up blood circulation.

The excessive production of sebum by sebaceous glands clogs the pores of the face and causes oily skin.

Cleansers containing herbs and botanicals are necessary for oily skin since they will unclog pores and lessen oil accumulation.

Anti-inflammatory and antioxidant ingredients found in these exfoliating cleansers help to repair and nourish damaged skin.

Instead of absorbing, its physical activity should be to open pores and flush the skin. After use, a thin layer of emollient should still be present on the skin.

- **Advantages :-**

It helps to in removal and replacement of dead skin cells to the new skin cells. It helps to keep skin fresh and healthy.

It makes the skin to lok radiant.

It help in skin pores exfoliation which further helps in prevention of skin problems like acne white heads, blackheads and total weary appearance that is caused due to the combination of dead skin cells and excessive oil which clog pores.

It helps in dead skin removal which later on develops as wrinkles on the face .

- **Herbal face scrub powder Formulation**

:-

Sr.no	Ingredients	Quantity	Uses
1	Agele marmelos leaf	30	Anti-bacterial ,anti-inflammatory
2	Rose petals powder	Q.S	Aroma
3	Fullers earth	30	Cleanser
4	Gram flour	10	
5	Curcuma longa	5	Antioxidant
6	Rice flour	10	Exfoliant
7	Fenugreek powder	5	moisturizer

- Agele marmelos leaf :-



Synonyms: Aegle Marmelos
Biological sources: Native tree from India Family: Rutaceae
Chemical Constituents:
Alkaloids: Alkaloids such as Angeline, marmeline, skimmianine, and N-methylflindersine.
Flavonoids: Rutin, quercetin, and kaempferol, which contribute to its antioxidant and anti-inflammatory effects.
Description: Aegle marmelos is a small to medium-sized deciduous tree or shrub with a maximum height of 13 meters (43 ft.). Its branches droop a little, and its crown is rather open and uneven. The bark is gray or pale brown, peeling, and smooth or finely fissured. Its long, straight spines, which range in length from 1.2 to 2.5 centimeters (1⁄2 to 1 inch), either on their own or in pairs. Slimy sap frequently leaks from the bark's cut areas. The gum can also be described as a clear, sticky sap that drops from damaged branches and has a similar consistency to gum Arabic.
Uses:
1. Bael Patra is rich in laxatives properties.
2. It has anti-inflammatory effects.
3. It detoxifies body naturally.
4. Loaded with vitamins and essential minerals.
5. It is a natural source of anti-oxidant
6. Anti-inflammatory Cures skin infections Wound healing.

- **ROSE PETALS POWDER** :-



Synonyms: Rosa centifolia, Red Rose petals.
Biological Source: It consists of the dried petals of the plant Rosa centifolia (Cabbage rose) or Rosa damascene.
Family: Rosaceae. Chemical Constituents:
Phenolic compounds: Quercetin and Kaempferol (provide antioxidant properties). Essential Oils:

Geraniol, Citronellol, and Nerol (responsible for the fragrance).
Vitamins: Rich in Vitamin C and Vitamin E.
Tannins: Provide astringent properties to tighten skin.

- **Multani Matti :-**



Synonyms: Fuller's Earth, Bentonite Clay.
Biological Source: It is a naturally occurring sedimentary clay-like mineral, primarily composed of hydrous aluminium silicates.
Family: Not applicable (Mineral origin). Chemical Constituents:
Montmorillonite: The primary mineral responsible for deep cleansing. Magnesium Aluminium Silicate: Absorbs excess sebum (oil) from the skin.
Silica, Iron, and Calcium: Minerals that aid in skin detoxification and improving skin tone.

- **Rice flour :-**



synonyms: Oryza sativa flour, Rice powder.
Biological Source: It is the powder obtained by grinding the seeds (grains) of Oryza sativa.
Family: Poaceae (Gramineae).
Chemical Constituents:
Starch: Approximately 75–80% (acts as a soothing agent). Para-aminobenzoic acid (PABA): Acts as a natural sunscreen.
Ferulic Acid: An antioxidant that protects skin from UV damage. Allantoin: Known for its skin-soothing and anti-inflammatory properties

- **Gram flour :-**



Synonyms: Besan, Chickpea flour.
Biological Source: It is the flour made from grounded dried seeds of Cicer arietinum. Family: Fabaceae (Leguminosae).
Chemical Constituents:
Proteins: High concentration of globulins (helps in skin repair). Carbohydrates: Provides a mild cleansing action.
Zinc: Helps in fighting acne-causing bacteria.
Saponins: Natural cleansing agents that remove dirt without stripping moisture.

- Fenugreek seed :-



Synonyms: Methi powder, Trigonella foenum-graecum.

Biological Source: It is obtained from the dried ripened seeds of Trigonella foenum-graecum.

Family: Fabaceae.

Chemical Constituents:

Mucilage: Provides a slippery texture that hydrates the skin. Diosgenin: A saponin with anti-inflammatory and anti-aging effects. Alkaloids: Primarily Trigonelline.

Flavonoids: Apigenin and Luteolin (act as antioxidants).

- **MECHANISAM OF ACTON:-**

1. **Antimicrobial Activity:**

Bael leaves contain compounds such as tannins, flavonoids, and alkaloids that inhibit the growth of harmful microorganisms like bacteria and fungi on the skin, helping to keep the skin clean and prevent infections or acne.

2. **Anti-inflammatory Activity:**

The phytochemicals present in bael leaves help reduce inflammation, redness, and irritation of the skin by inhibiting inflammatory mediators, thereby soothing the skin.

3. Antioxidant Activity:

Bael leaves are rich in natural antioxidants that neutralize free radicals, protect skin cells from oxidative damage, and help maintain healthy and youthful skin

- **METHOD OF PREPRATION :-**

1. collection of raw material
2. cleaning
3. drying
4. crushing
5. mixing
6. sieving
7. packaging
8. labeling

- Collection of raw materials :-

Collect the accurate raw materials , collect the fresh , green , and healthy Aegle marmelos leaves.

Cleaning :-

Wash the leaves thoroughly with deionized or distilled water to remove dirt, debris, and impurities.

Drying:-

To maintain the integrity of the phytochemicals (flavonoids, tannins) and avoid contamination, controlled drying is required: Shade Drying (Recommended): Spread the leaves in a cool, dark place (shade drying) for several days until they are completely brittle and moisture-free.

Alternative – Oven Drying: Alternatively, the leaves can be dried in a hot air oven at a low temperature (40–45°C) for 48 hours to achieve a moisture content of roughly 6%.

Pulverization (Grinding) :-

Grind the dried leaves using a grinder or mortar and pestle to obtain a fine, uniform powder. Sieve the powder (typically using mesh #30 or similar) to ensure consistent particle size, removing any large, unground pieces.

Formulation and blending:-

Mix the Aegle marmelos leaf powder with other natural, dry ingredients to enhance the scrub's efficacy. Common additions include:

Exfoliants: Gram flour (besan), Multani Matti (Fuller's earth), or poppy seeds. Skin Brighteners: Turmeric powder.

Soothing Agents: Sandalwood powder or rose petal powder.

Storage:-

Store the prepared, well-blended herbal scrub powder in an airtight, clean, and dry container. Keep it in a cool, dark place to maintain the efficacy of the herbal ingredients.

- IDENTIFICATION TEST :

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 precipitate	Alkaloids are present.	
4405. By adding 2 ml of Hager's reagent to two ml of extract.	Formation of yellow colour ppt	Alkaloids are present	
3.By adding 2 ml of Wagner's reagent to 2 ml of extract by dissolving 2mg of iodine with 4 mg of potassium iodide	Orange red Ppt	Alkaloids are present	
Flavonoids ; Alkaline reagent test ; Two to three drops of sodium hydroxide were added to 2 mLof extract.	Colourless colour appeared	Flavonoids is present	
Phenolic ; a)Ferric chloride test. Two millilitres 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 colour appeared	Phenolics and tannins is present	

- **PH test:-**

Mix 1 g scrub powder with 10 mL distilled water and measure pH using a pH meter. Ideal range: 5-7.

- **Wash ability test:-**

Apply scrub on skin and check how easily it washes off with water.

- **Spredability test :-**

Spreadability of bael scrub powder is determined by placing the prepared scrub paste between two glass slides, applying a known weight, and measuring the time taken for the upper slide to move a specific distance.

- **Moisture content test :-**

Determine using loss on drying method in a hot air oven at about 105°C.

- **Formula:-**

Moisture Content (%) =(Initial weight – Final weight\Initial weight)100

- Initial weight = 100 g
- Final weight after drying = 95 g Moisture Content = 5%

- **Bulk density test :-**

Measure volume occupied by known weight of powder before tapping.

- Formula:-

Bulk Density = Weight of powder / Bulk volume (g/ml) 100 g powder occupies 200 ml volume,
Bulk Density = 100 / 200 = 0.5 g/m.

- **Tapped density test :-**

Tap density of bael leaf face scrub powder is determined by placing 100 g powder in a graduated measuring cylinder, tapping it repeatedly until the volume becomes constant, and calculating density by dividing the weight of powder by the final tapped volume.

- **Formula :-**

Tapped Density = Weight of Powder/Tapped Volume

- Weight of powder = 100 g
- Final tapped volume = 160 ml

Tapped Density = 100 / 160 = 0.625 g/ml

- TABLE : EVALUATION TEST :

SR.NO	PARAMETER	OBSERVATION
1	COLOUR	GREEN
2	ODOUR	CHARACTERISTICS
3	CONSISTENCY	SOLID
4	PH	7
5	SPREDABILITY	3.35 gm
6	WASHABILITY	WASHABALE
7	FOAMABILITY	FOAM APPEAR
8	VISCOSITY	4405.2 cp
9	MOISTURE CONTENT	5%
10	BULK DENSITY TEST	0.5 g/m
11	TAPPED DENSITY TEST	0.625 g/ml

- **How to use :-**
- Step by step guide
- Cleanse first: Wash your face with a gentle cleanser to remove makeup and dirt, then rinse

with lukewarm water. Use aloe Vera gel, rose water, milk, tap water for mixture

- Dampen skin: Keep your face damp (don't towel dry) to help the scrub glide easily and prevent harshness.
- Apply scrub: Squeeze a small amount (dime or quarter-sized) into your palm and apply to your face, avoiding the delicate eye area.
- Massage gently: Using your fingertips, massage in small, circular motions for about 30-60 seconds, focusing on your nose, chin, and forehead (T-zone).
- Use light pressure; the granules do the work.
- Rinse thoroughly: Wash off the scrub with lukewarm water.
- Pat dry: Gently pat your skin dry with a clean, soft towel.
- Moisturize: Immediately apply your regular moisturizer to hydrate your skin.
- Key tips: Frequency: 1-3 times a week is usually enough.
- Pressure: Never scrub harshly; this can damage skin. Avoid delicate areas: Stay away from the eyes, lips, and inside your ears.
- Follow up: Always moisturize after exfoliating.

- **DIRECTION :-**

Sensitive skin with pimples :- apply once in week as a mask,do not rub on skin. Oily skin :- apply 3 times in a week as a scurb

Dry skin :- apply 2 times in a week as a scrub

RESULT & DISCUSSION

Recent research has explored the formulation and evaluation of herbal anti-acne face wash gels incorporating Bael Patra (Aegle marmelos) due to its known antimicrobial, antioxidant, and anti-inflammatory properties. These studies aimed to develop effective, stable, and skin-friendly herbal formulations for acne treatment.

CONCLUSION

The formulated anti-acne face scrub powder containing Aegle marmelos (Bael) presents a compelling natural strategy for acne treatment. Bael exhibits notable antimicrobial, anti-inflammatory, and antioxidant characteristics, which contribute to the reduction of acne-causing microorganisms, soothing of skin inflammation, and mitigation of oxidative damage.

This preparation efficiently purifies the skin, eliminates surplus sebum and contaminants, and facilitates dermal regeneration without inducing desiccation or sensitization. Consequently, this Bael-enriched facial cleanser emerges as a mild yet efficacious option for consumers desiring a plant-based alternative for managing acne-susceptible skin.

The formulated anti-acne Facewash, enriched with Bael (Aegle marmelos), Turmeric powder, rice flour, gram flour, Multani Matti offers a synergistic blend of natural ingredients that effectively target acne-related concerns. Bael provides antimicrobial and anti-inflammatory action, helping to combat acne-causing bacteria and reduce skin irritation.

Turmeric powder enhances this effect with its strong antioxidant and antiseptic properties, aiding in the reduction of blemishes and prevention of further breakouts. Rose petals powder soothes and hydrates the skin, promoting healing and reducing redness. Together, these ingredients work harmoniously to cleanse the skin, reduce acne lesions, and support overall skin health, making the formulation a gentle yet potent solution for acne-prone skin.

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