



FORMULATION AND BIOLOGICAL EVALUATION OF HERBAL FACEWASH

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ABSTRACT

Herbal formulations have growing demand in the world market. Natural remedies are more acceptable to believe that safer and fewer side effects and it can naturally, easily available. Acne is the most common skin problem that 85% of the teenagers faced today, most of oily skin suffer from acne. Acne is a chronic inflammatory disorder of pilosebaceous unit, which involves increased sebum production by sebaceous glands and abnormal desquamation of hair follicles occur in response to increasing androgen levels with the onset of puberty. Obstruction of follicles causes follicular distention which is often accompanied by the proliferation of the bacteria *Propionibacterium acnes* and the activation of an inflammatory response. Although various topical herbal formulations for acne are available in the market, we propose to make pure herbal formulation without using any synthetic ingredient. The current work deals with the development and evaluation of the herbal anti-acne facewash containing Neem leaves (*Azadirachta indica*), Turmeric (*Curcuma longa*), Nutmeg (*Myristica fragrans*), Honey, Orange peel extract, Xanthan gum, Rose water, Walnut. The plants have been reported in the literature having good anti-microbial, anti-oxidant and anti-inflammatory activity. Prepared formulation was evaluated for various parameters like colour, appearance, consistency, pH, viscosity, stability studies and consumer acceptance test.

KEYWORDS: Herbal formulation, Anti-acne, Anti-microbial, Facewash, Neem, Anti-inflammatory.

INTRODUCTION

COSMETICS- According to Drug and Cosmetics Act, 1940 Cosmetic is defined as, any article intended to be rubbed, poured, sprinkled or sprayed on, or introduced into, or otherwise applied to, the human body or any part thereof, for beautifying, cleansing, promoting attractiveness, or alter the appearance and includes any article intended for use as a component of cosmetic. Cosmetics are constituted of mixtures of chemical compounds obtained from either natural sources or synthetically created ones.^[1]

HERBAL COSMETIC- The cosmetics which are prepared using plant products have cosmetic actions. Recently the increased use of botanicals in cosmetics is mainly due to their mild action and non-toxic nature. In cosmetics, both Phyto-ingredients and natural supplements are used. Natural products include oils, extracts, secretions, etc. phyto-ingredients include pure constituents obtained by various processes.^[2]

ADVANTAGES- 1. They do not produce allergic reactions and do not have any side effects. 2. They can easily be used for skin and hair. 3. These relatively show maximum activity with a lesser dose and fewer side

effects. 4. They have more stability, purity, and efficacy, with their herbal constituents. 5. Easy to manufacture.^[3]

Acne, or acne vulgaris, is a skin problem that starts when oil and dead skin cells clog skin pores. It is also blackheads, blemishes, whiteheads, pimples, or zits. Severe acne can mean pimple that cover the face, neck, chest, and back. Or it can be bigger, solid, red lumps that are painful (cysts). Acne occurs most commonly during adolescence, affecting an estimated 80–90% of teenagers. Lower rates are reported in some rural societies. It usually gets better after the teen years. Some women who never had acne growing up will have it as an adult, often right before their menstrual periods. About 4% continue to have difficulties into their forties. Acne is commonly classified by severity as mild, moderate, or severe. This type of categorization can be an important factor in determining the appropriate treatment regimen. Mild acne is classically defined as open (blackheads) and closed comedones (whiteheads) limited to the face with occasional inflammatory lesions. Acne may be considered to be of moderate severity when a higher number of inflammatory papules and pustules occur on the face compared to mild cases of acne and acne lesions also occur on the trunk of the body. Lastly, severe acne is

said to occur when nodules and cysts are the characteristic facial lesions and involvement of the trunk is extensive.^[4]

Typical features of acne include increased oil secretion, microcomedones, comedones, papules, pustules, nodules (large papules), and possibly scarring. The appearance of acne varies with skin color. Acne develops as a result of blockages in the skin's follicles. These blockages are thought to occur as a result of the following four abnormal processes: a higher than normal amount of sebum production (influenced by androgens); excessive keratin deposition leading to comedone formation; colonization of the follicle by *Propionibacterium acnes* bacteria; and the local release of pro-inflammatory chemicals in the skin.^[5] The earliest pathologic changes are the excessive deposition of the protein keratin and oily sebum in the hair follicle resulting in the formation of a plug. During adrenarche, a higher level of the androgen (DHEA-S) results in the enlargement of the sebaceous glands and increases sebum production. A microcomedo may enlarge to form an open comedo (blackhead) or closed comedo. The dark color of a blackhead occurs due to oxidation of the skin pigment melanin. Comedones result from the clogging of sebaceous glands with sebum, naturally occurring oil, and dead skin cells. In these conditions, the naturally occurring largely commensal bacterium *Propionibacterium acnes* can cause inflammation within and around the follicle, leading to inflammatory lesion (papules, infected pustules, or nodules) in the dermis around the microcomedo or comedone, which results in redness and may result in scarring or hyperpigmentation. Severe acne is inflammatory, but acne can also be non-inflammatory.^[6] Commonly used medical treatments include topical therapies such as retinoids, antibiotics, and benzoyl peroxide and systemic therapies including oral retinoids, antibiotics, and hormonal agents. Procedures such as light therapy and laser therapy are not considered to be first-line treatments and typically have an adjunctive role due to their high cost and limited evidence of efficacy.^[7] Herbal Medicines have been extensively used in recent years for chronic and lifestyle related disorders. Gentle Neem Face Wash is an herbal formulation designed to minimize the acne and reduce the oiliness of face on regular usage.^[8]

Drug Profile (MAIN INGREDIENT)

A) Neem

Kingdom: Plantae,
Division: Magnoliophyta,
Order: Sapindales
Family: Meliaceae
Genus: *Azadirachta*
Species: *A. indica*



Azadirachta indica.

Chemical constituents

1. extracted different constituents from the flowers of *Azadirachta indica* and analyzed their insecticidal activity, they found around 38 compounds in the flowers with insecticidal activity (such as: nHentriacontane, n-Nonacosane, nPentacosane, 2-Methoxy-5,40-dimethylbenzenebutanal, Methyl octadecan antiprotozoal).^[9]
2. Several published studies revealed a lot of biological compounds (Azadirachtin M and Azadirachtin N) and effects of these compounds on insects, and other inhibitory activities such as antitypanosomal and antiprotozoal, etc.^[10]
3. The group of tetranortriterpenoids, especially azadirachtin analogues is responsible for most of the active principles as it has many anti-infective and antimicrobial properties.
4. The extracted chemical constituents of different parts of the neem tree contained many biologically active compounds, including triterpenoids, alkaloids, phenolic compounds, flavonoids, carotenoids, ketones and steroids. The most biologically active compound is azadirachtin. This compound belongs to the C-seco limonoids.
5. The Neem oil comprised of the bitter principles which were isolated from biologically active compounds that were isolated from different parts of the plant including meliacin, azadirachtin, gedunin, nimbidin, nimbolides, nimbin, salannin, meliacin and valassin.
6. Besides, the seeds also contain tignin responsible for the distinctive odour of the oil. Around 30-50% of the oil was extracted from neem kernels. This oil is mainly used as pesticide, soap and by pharmaceutical industries and contains many active ingredients which are together called triterpene or limonoids.
7. The four best limonoid compounds were included Azadirachtin, Salannin, Meliantriol, and Nimbin. Limonoids contain insecticidal and pesticidal activity which lead to its role as an antifeedant, repellent, growth inhibitor, attractant, chemosterilant or as insecticide.
8. The phytochemistry screening of Neem samples from leaves extracts also revealed some different chemical constituents compared to other plant parts. The obtained results showed the presence of tannins, saponins, flavonoids, alkaloids, glycosides, reducing sugars, polyphenols, HCN and terpenes in the ethanolic leaf extract.^[11]

Uses

1. This tree was usually used as natural pesticide, planting and afforestation as shade trees and to protect against erosion, and definitely as medicinal plants.
2. In India, the Neem tree twigs are commonly used to scrub teeth. Moreover, the neem tree branches are used as one of the most effective forms of dental care in traditional medicines.
3. All parts of neem trees including leaves, seeds, roots, bark and the flowers of the plant are used to cure different ailments, such as stomach ulcers, jaundice and to overcome a variety of infectious and parasitic diseases, ranging from leprosy, chicken pox, and malaria. Infusions and teas made from leaves are used to alleviate malaria attacks, intestinal complaints, treat dental, headache, stimulating the appetite, heartburn and as insects repellent, in addition to that it was also used as a diuretic and for diabetes, also other febrile illnesses.
4. Treat numerous skin diseases. The use of aqueous extracts from seeds to treat head lice is widely known. Neem oil showed good antiseptic properties. It is applied in the treatment of such skin complaints as furuncles and eczema, as well as to relieve intestinal worm infections.^[12]

B) Turmeric

Curcuma longa of the ginger family, Zingiberaceae, the roots of which are used in cooking. The plant is a perennial, rhizomatous, herbaceous plant native to the Indian subcontinent and Southeast Asia, that requires temperatures between 20 and 30 °C (68 And 86 °F) and a considerable amount of annual rainfall to thrive. Plants are gathered each year for their rhizomes, some for propagation in the following season and some for consumption. The rhizomes are used fresh or boiled in water and dried, after which they are ground into deep orange-yellow powder commonly used as a colouring and flavoring agent in many Asian cuisines, especially for curries, as well as for dyeing. Turmeric powder has a warm, bitter, black pepper-like flavor and earthy, mustard-like aroma. Although long used in Ayurvedic medicine, where it is also known as haridra, no high-quality clinical evidence exists for use of turmeric or its constituent, curcumin, as a therapy.

**Curcuma longa**

Uses- its anti-inflammatory and antibacterial benefits, turmeric can work wonders on condition-riddled skin. It can also help reduce redness from blemishes and calm skin conditions like eczema and rosacea. Turmeric is

excellent for acne because it is a natural antiseptic and helps to keep bacteria from spreading.^[13]

C) Nutmeg

Nutmeg (*Myristica fragrans* Houtt.) belongs to the Myristicaceae family. The plant is native to the Maluku Islands of Indonesia; however, it is extensively distributed to Grenada, India, Sri Lanka, Mauritius, South Africa, and the USA (Francis, James, Varughese, & Nair).

**Myristica fragrans Houtt.****Chemical constituents**

Nutmeg contains fats (30-40%) and essential oils (10%). The distinctive odour of nutmeg is due to presence of essential oil which contains terpenes (α -pinene, p-cymene, sabinene, camphene, myrcene and γ -terpinene) terpene derivatives (terpinol, geraniol, and linalool) and phenylpropanes (myricitin, safrole, and elmicin) the presence of hallucinogenic phenylpropanes. These phenylpropanes are hepatotoxic and are considered being harmful for frequent users.^[14]

Uses

1. Nutmeg has many uses ranging from culinary to medicinal. Nutmeg has been used in cooking for millennia.
2. It is used in soups as well as in meats and vegetables. It is easily blended with other spices like white pepper, clove and ginger; further, all spice and cinnamon are optional ingredients.
3. Nutmeg essential oil is also used in the manufacturing of camphor, plasticizers, bases, solvents, perfume and synthetic pine oil.
4. Nutmeg contains many chemical compounds that are identified as anti-oxidant, health promoting properties and disease preventing. The spicy nuts have fixed oil in the form of trimyristin and also essential (volatile) oils which gives sweet fragrant flavor to nutmeg.
5. These active compounds in nutmeg have numerous curative uses in traditional medicines as anti-depressant, anti-fungal, digestive, aphrodisiac, and carminative. Since ancient times, in Chinese and Indian traditional medicines.
6. Nutmeg and its oil were being used for illnesses associated to the digestive and nervous systems. The compounds such as elemicin and myristicin in this spice have stimulant as well as brain soothing properties. In dentistry, for toothache eugenol has been used to relieve the pain.

7. To reduce rheumatic pain and muscular pain of joints, oil is used for local massage. With honey freshly prepared decoction has been used to relief of gastritis, nausea, and indigestion disorders. Whole kernels usually preferred over powdered form because they have additional essential oils, which gives rich taste and freshness to recipes. Recently, research showed that mace lignin could be used as a skin whitening agent because it inhibits melanin biosynthesis effectively.^[15]

D) Orange pill extract

Kingdom: Plantae

Class: Magnoliopsid.

Subclass: Rosidae

Order: Sapindales

Family: Rutaceae

Genus: Citrus

Species: sinensis

Botanical name: Citrus sinensis



Citrus Sinensis.

Chemical constituents- Essential oils are vegetable products whose constituents are basically complex mixture of terpenic hydrocarbons and oxygenated derivatives such as aldehydes, alcohols and esters. Among many sources, citrus fruit peels are the most familiar and rich source of essential oils.

Uses

1) Orange peels are rich in vitamin C and A. This makes orange peels a natural antioxidant that helps boost your immune system and fight off germs and viruses.

2) Orange peels help cure multiple skin problems such as blackheads, dead cells, acne, pores, dark circles, and dry skin. it also helps brighten your skin.^[16]

- Fragrances are used in a wide variety of products to impart a pleasant odour, mask the inherent smell of some ingredients, and enhance the experience of using the product.

E) Rose Water



Rose water

A rose is a woody perennial flowering plant of the genus *Rosa*, in the family Rosaceae, or the flower it bears. There are over three hundred species and thousands of cultivars. They form a group of plants that can be erect shrubs, climbing, or trailing, with stems that are often armed with sharp prickles. Flowers vary in size and shape and are usually large and showy, in colours ranging from white through yellows and reds. Most species are native to Asia, with smaller numbers native to Europe, North America, and northwestern Africa. Species, cultivars and hybrids are all widely grown for their beauty and often are fragrant. Roses have acquired cultural significance in many societies. Rose plants range in size from compact, miniature roses, to climbers that can reach seven meters in height. Different species hybridize easily, and this has been used in the development of the wide range of garden roses.

Uses - Rose perfumes are made from rose oil (also called attar of roses), which is a mixture of volatile essential oils obtained by steam distilling the crushed petals of roses. An associated product is rose water which is used for cooking, cosmetics, medicine and religious practices. Fragrances are used in a wide variety of products to impart a pleasant odour, mask the inherent smell of some ingredients, and enhance the experience of using the product.^[17]

F) Tragacanth

Superorder- Rosanae

Order- Fabales

Family- Fabaceae – peas, legumes

Genus- Astragalus L. – milkvetch, astragales, locoweed

Species- Astragalus gummifer

Labill. – gum tragacanth milkvetch.



Astragalus gummifer Labill.

Uses

It is used as a demulcent, emollient, thickening, suspending, emulsifying agent. Mucilage of tragacanth is used as a binding agent in tablets and excipient in the pills. • Powder of tragacanth is used as an adhesive, in lotions for external use.

Chemical constituents

It contains two fractions: Tragacanthin 8 - 10% and is water soluble, Bassorin 60-70% and is insoluble in water. Tragacanth contains 15% of methoxy group, it swells in

water and is responsible for high viscosity. 1% solution of tragacanth has 250 oises viscosity. The products of hydrolysis of tragacanth are galactouronic acid, D galactopyranose, L - arabino - rhamnose, and D - xylopyranose.^[18]

G) Honey



Honey

Uses of honey

Honey Deeply Moisturizes and Hydrates the Skin.
Honey Diminishes the Signs of Premature Aging.
Honey is an Effective Pore Cleanser and Gentle Exfoliator.
Honey Lightens Scars and Hyperpigmentation.
Honey Fights Acne and Breakouts. Honey Relieves Sunburn.

Chemical constituents

80–85% carbohydrates, 15–17% water, 0.3% proteins, 0.2% ashes and minor quantities of amino-acids, phenols, pigments and vitamins.^[19]

H) Walnut



Juglans regia.

Walnuts (*Juglans regia*) are a botanical species native to China and Kyrgyztan. It is likely to have been carried along ancient trade routes to Persia, India and Europe, where it is valued for its flavor and high nutritional value.

Chemical constituents

Walnuts are nutrient-rich food due to high contents of fats, proteins, vitamins and minerals. They are also good source of flavonoids, sterols, pectic substances, phenolic acids and related polyphenols.

Uses

1. Walnut is a rich source of antioxidants that helps flush out toxins and neutralises free radicals in the body. According to a report in Harvard Health, this further breaks a chain reaction that can affect other molecules in

the cell, purifying the blood. It also prevents skin issues like acne and pimple.

2. Moisturises Skin: Walnut is loaded with moisturising properties like vitamins B5 and E. These nutrients help keep our skin hydrated and nourish it from within. This further prevents skin from drying out and clogging of the pores.^[20]

EVALUATION TESTS

The prepared formulations(Facewash) evaluated for following tests-

1. PHYSICAL APPEARANCE- Visually checked the physical appearance of the formulation.

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

Odour: The odour of the face washes was checked manually.

2. CONSISTENCY-The consistency was evaluated by applying on the skin.

3. GREASINESS-The greasiness was assessed by directly applying onto the skin.

4. PH-An amount of 20 ml of the formulation was taken in a beaker and was subjected to the PH measurement using a digital PH meter within 24 hours of manufacture.

5. WASHABILITY-The prepared formulations were applied to the skin and then ease and extent of washing with water werechecked manually.

6. HOMOGENEITY- Here allow the formulation to set on a container and homogeneity was tested by visual inspection. They are hence evaluated for their appearance and presence of aggregates.

7. VISCOSITY-Viscosities of formulations were determined using Brookfield viscometer spindle # 64 at 100 rpm and 25 degrees Celsius. The corresponding viscometer reading was noted accordingly.

8. SKIN IRRITABILITY TEST-This test was performed on a few healthy human volunteers of either sex after obtaining consent for the same. About a few drops of the formulation were applied to an area of skin and kept as such for certain minutes and note down any irritancy occurrence.

9. STABILITY STUDIES-The physical stability of the formulations was studied by placing them in a plastic or a glass container and they were placed in a humidity chamber at 45°C and 75% relative humidity. Their appearance and physical stability were inspected for a period of three months at an interval of 1 month.

10. spreadability test - Spreadability denotes the extent of the area to which the formulation readily spreads on the application to the skin. The bioavailability efficiency of the formulation also depends on the spreadability value. Spreadability is defined in terms of time in seconds required taken by the upper slide to slip off the product placed between the two slides under a certain load. The lesser time is taken for the separation of two slides, the better the spreadability. A few ml of the formulation was sandwiched between the two slides. A weight of 100g was placed upon the upper slide so that the formulation between the two slides gets pressured uniformly to form a thin layer. Then the weight was

removed, and the excess of the formulation adhering to the slides was scrapped.^[21]

CONCLUSION

The concluded that to make an herbal anti-acne gel face wash with using given ingredients. Hence, that included as the main ingredient, gel base to increase reactivity and efficiency of the product. Thus, considering various parameters were evaluated giving a result, and improve skin health without any side effect.

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