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Formulation and Evaluation of Herbal Face Wash Gel

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ABSTRACT:

Acne is the common skin problem that 85 of the teenagers face today. Natural remedies are more satisfactory in the faith that they're trustable with lower side effects than the synthetic ones. Natural remedies are more acceptable with the belief that they're safe and having lower side effects. Herbal medicines have been used since numerous years not just in asian countries but also worldwide for social well being. Herbal formulations own rising claim in the humankind demand. In this study, herbalanti-acne face wash gels were prepared using polymers carbopol & extracts of neem, aloe vera, lemon & curcuma longa show the antibacterial & antimicrobial activity. From this study, herbal gel was demonstrated to be stable and regarded as an effective herbal formulation for acne treatment. Prepared formulation was estimated for various parameters like colour, appearance, thickness, ph, density.

Keyword: Natural face wash gel, Gentle herbal cleanse aging, Hydrates the skin, Antioxidant.

INTRODUCTION

The ancient healthcare system in the humankind is probable India's herbal medicine business. The Vedas, an ancient religious manual of the Indians, portray an ancient form of herbal recovery because the history of herbs in ancient India is so old. The use of herbs and natural remedies to treat health problems is midmost to the ancient herbal recovery practices of Ayurveda and Unani. Indeed though it might feel like herbal remedies are being new to western healers and doctors, the majority of entrusted drugs still contain plant extracts.

Acne may cause long-lasting and adverse psychosocial and physical effects. It's companied with depression and anxiety, anyhow of disease inflexibility, although the psychological effects generally upgrade with treatment. moreover, acne may create endless scarring that's tough to correct. Acne vulgaris is characterized by inflammatory, open or unrestricted declines and by inflammatory pustules, papules, and bumps. Acne vulgaris generally affects the areas of skin with the packed population of sebaceous follicles(e.g., face, upper chest, back). Original symptoms of acne vulgaris may include pain, tenderheartedness, or erythema Systemic symptoms are most frequently missing in acne vulgaris. Severe acne with associated systemic signs and symptoms, alike as fever, is related to as acne fulminans. Severe acne, characterized by multiple downfalls, without the presence of systemic symptoms, is known as acne conglobate. A gel is a solid jelly like material that can have properties ranking from soft and weak to



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hard and tough. Gels are defined as a mainly dilute cross linked system, which exhibits no outflow when in the steady- state. By weight, gels are generally liquid, yet they behave like solids due to a three dimensional crosslinked network within the liquid. It's the cross linking within the fluid that gives a gel its structure(hardness) and contributes to the adhesive stick track. The remedial use of medicinal workshops has gained considerable encouragement in the world during the late decade. The overuse of synthetic medicines with contaminations results in advanced incidence of adverse drug responses in more advanced communities has motivated humankind to go back to nature for safer remedies. even so, it should be assured that marketable formulations based on medicinal shops are safe, effective and of standard quality. now, over the world, there's a great deal of claim in Ayurvedic system of drug and therefore the demand for various commonly applied medicinal shops in the production Ayurvedic drug is ever expanding^[1]

• SKIN CARE PREPARATIONS:

The development of skin care products has been amazing. People use a variety of skin care products, such as foot powder, lipstick, mouthwash, and complexion creams, in an effort to safeguard their bodies, enhance their personalities, and prevent body odour. Skin care preparations are defined as items that are meant to be rubbed, poured, sprinkled, sprayed, or otherwise applied to the human body or any part of the body for cleansing, beautifying, promoting attractiveness, or changing the look of skin^[2]

The skin care preparations is grown extraordinary over the years. People make use of range of skin care preparations, from lipsticks, from facewash to complexion creams to foot powders and so on, in the hope of developing their personality good and protecting their bodies to avoiding smell. Skin care preparations are described as substances that are planned to be rubbed, poured, sprinkled and sprayed on or, applied to human body or any part of body, for beautifying, cleansing, improving attractiveness or changing the appearance of skin to look good.

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In terms of cosmetic preparations, Ayurveda describes the use of different herbs like amla and haldi. Without realizing the risks, many European women of the eighteenth century used lead carbonate to whiten their skin. died from lead poisoning^[3]

• SKIN CARE PREPERATION FOR FACE:

- Cleansing creams and lotions
- Compact powders
- Rouges
- Face packs and masks
- Face washes^[4]

• FACE WASH:

A face wash 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^{.[5,6]}

Advantages of Face Wash:

- It helps to remove dead skin cells that helps new skin cells replace old one.
- It helps to keep skin fresh and healthy.



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- It makes the skin to look radiant
- The mixture of dead skin cells and excessive oil clog pores, which can lead to acne white heads, blackheads and total weary appearance.
- Exfoliating the pores regularly, avoids all the above skin problems.
- Removing dead skin cells that means your skin will develop wrinkles at a slower pace^[7]

PROPERTIES OF FACE WASH:

- Exfoliation fosters skin regeneration and rejuvenation and quickens blood circulation.
- The overproduction of sebum by sebaceous glands blocks pores on the face and contributes to oily skin.
- Cleansers with herbs and botanicals that will unclog pores and lessen oil accumulation are necessary for oily skin.
- Anti-inflammatory and antioxidant ingredients in these exfoliating cleansers help to heal and nurture damaged skin.
- Herbal face wash, which has many health benefits, is used to cure acne and pimples.
- Herbal facial wash, which contains rich plant-based components like neem, removes excess oil without depleting the skin's nutrients.
- It should be strong and present a nice look.
- When applied to the epidermis, it ought to become softer.
- It ought to disperse without trailing.
- Throughout implementation It shouldn't feel sticky or oily.
- The cream residue after water vaporization shouldn't thicken up.
- Its physical effect ought to be pore opening and skin flushing rather than absorption^[7]

USES OF FACE WASH:

- 1. Cleanses Skin Naturally Removes dirt, oil, and impurities without harsh chemicals.
- 2. Maintains pH Balance Helps keep the skin's natural pH level intact.
- 3. Controls Acne Ingredients like neem or tea tree oil reduce pimples and acne breakouts.
- 4. Reduces Oiliness Regulates sebum production, especially helpful for oily skin.
- 5. Hydrates the Skin Many herbal gels include moisturizing herbs like aloe vera.
- 6. Soothes Irritation Calms redness, itchiness, or inflammation due to natural antiinflammatory herbs.
- 7. Fights Bacterial Growth Herbal ingredients often have antibacterial properties.
- 8. Brightens Complexion Regular use can improve skin tone and texture.
- 9. Prevents Premature Aging Antioxidant-rich herbs help reduce signs of aging.
- 10. Suitable for Sensitive Skin Generally gentle and free from synthetic irritants [8]

AGENTS USE IN FACE WASH:

A Use of medicinal ingredients in facial washes Antimicrobial An antimicrobial is a substance that prevents the development and reproduction of bacteria, according to the broadest meaning. Although both antibiotics and antimicrobials target bacteria, these words have developed over time to denote two distinct concepts. Nowadays, agents used to disinfect surfaces and eradicate possibly harmful bacteria are most frequently referred to as "antimicrobials."^[9]



Anti-inflammatory: It is a characteristic of a substance or therapy that lessens swelling or inflammation. About half of analgesics are anti-inflammatory medications, which treat pain by reducing inflammation as opposed to opioids, which act on the central nervous system to suppress pain signals to the brain. **Anti-acne:**

A skin condition known as acne causes an outbreak of zits or pimple-like blemishes. Acne vulgaris is the name of the disease that affects teenagers the most frequently. The medications known as antiacne medications help a teen with acne get rid of their pimples, blackheads, whiteheads, and more serious forms of lesions^{. [10]}

• ADDITIVES USED IN FACE WASH GEL:

Antioxidants: Antioxidants are chemicals, either man-made or natural, that may stop or postpone certain types of cell damage. Fruits and vegetables, among other foods, contain antioxidants. Moreover, they are offered as dietary supplements. Examples: - , Vitamin A, Vitamin C, and Vitamin $E^{\cdot [11]}$

Gelling Agent: Gelling agents are substances that can transform an oil or water phase into a thicker yet flexible gel. Emulsions that have been thickened using gelling agents will be less rigid and more mobile. Several of these gels exhibit thixotropy, which causes them to thin when force is applied and return to viscosity when the force is removed. These gels enable the production of thick products that can be shaken or agitated vigorously for simpler bottling or spraying. Examples: - Carbopol 940, Carbopol 934^{. [12]}

Preservative: Preservatives are primarily used to make food safer by reducing the impact of biological elements. The biggest risk to customers is food spoilage or becoming hazardous due to the presence of microorganisms (such as bacteria, yeast, or mould). Several of these creatures have the ability to release poisons, which are harmful to human health and even lethal. Examples include propyl and methyl parabens^{. [13]}

Humectants: The antitheses of desiccant, humectants are hygroscopic substances that are employed to maintain moisture in objects. It is frequently a molecule having many hydrophilic groups, most frequently hydroxyl groups, although it can also include amines, carboxyl groups, and sometimes esterified hydrophilic groups (its affinity to form hydrogen bonds with molecules of water is the crucial trait). They are an ingredient in a variety of goods, including as food, cosmetics, pharmaceuticals, and insecticides. The humectants bring water vapour into and/or beneath the surface of the organism or object by absorption, attracting and holding onto the moisture in the air nearby. propylene glycol are among examples^{. [14]}

Foaming Agent: A surfactant or blowing agent is an example of a substance that serves as a foaming agent. Little amounts of a surfactant can lower a liquid's surface tension (lessen the effort required to produce foam) or raise the colloidal stability of a substance by preventing bubbles from coalescing. A blowing agent is a gas that forms the gaseous element of the foam. Examples: - titanium hydride, and sodium lauryl sulphate^{.[15]}

AIM & OBJECTIVE :

- Aim : To make a natural and safe face wash gel using herbs that can clean the face, remove dirt and oil, and keep the skin healthy and fresh without using harmful chemicals.
- Objectives:
- Choose the right herb



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- Make a smooth gel base
- skin soft and moist
- Make sure it is safe
- Check if it works well
- Improve skin health.
- o Be eco-friendly
- Test shelf life
- Keep it affordable
- Follow rules and guidelines

Literature Review:-

[1] P. K. Mane*, Aniket Dangare

The skin care preparations has grown phenomenally over the years. People utilize a range of skin care preparations, from mouth wash, from lipsticks to complexion creams to foot powders and so on, in the hope of developing a charming personality, protecting their bodies and avoiding bad smell. Skin care preparations are described as substances that are intended to be rubbed, poured, sprinkled and sprayed on or, introduced into or otherwise applied to human body or any part of body, for cleansing, beautifying, promoting attractiveness or altering the appearance of skin.

Ayurveda describes the role of various herbs like amla, haldi in cosmetic preparations. Ladies of eighteenth century, europe, whitened their faces with lead carbonate without knowing what harm they were doing to themselves-many of them died from lead Poisoning

[2] Naman Agarwal, Abhishek, Amulya Jindal

Abstract: Herbal skincare products are in high demand worldwide. The human skin is highly vulnerable to infections and requires protection. It also plays a role in respiration and overall health. During puberty, hormonal imbalances can lead to skin problems.

Acne is the most common skin issue, mainly affecting the face and neck. Removing excess oil through proper cleaning helps prevent acne.Many anti-acne treatments use synthetic chemicals. However, these chemicals may cause side effects.

Studies show that herbal ingredients are effective alternatives. Plant-based formulations help cleanse and protect the skin naturally. This study examines various herbal ingredients used in face washes. Key ingredients include Neem, Aloe vera, Haldi, Lemon, and others.

The research compares their effectiveness and benefits. It also explores emerging techniques in herbal skincare. The goal is to develop safer and more effective face wash formulations.

[3] Harsharan Pal Singh, Neeraj Samnhotra, Sumeet Gullaiya, Ishpreet Kaur

Abstract: Acne is a chronic inflammatory condition of the pilosebaceous unit, caused by excess sebum production, abnormal shedding of skin cells, and bacterial proliferation, particularly Propionibacterium acnes. It commonly occurs during puberty due to increased androgen levels. This study aims to formulate and evaluate an herbal face wash gel containing extracts of Azadirachtaindica (Neem), Curcuma longa (Haldi), Aloe barbadensis (Aloe Vera), Citrus limon (Lemon), and Mentha (Pudina) distillate using CarbomerUltrez 20. These plants possess antimicrobial, antioxidant, and anti-inflammatory properties. The formulated gel was assessed for color, appearance, consistency, pH, viscosity, stability, and consumer acceptance. The study highlights the potential of herbal formulations as an effective and safer alternative for acne treatment.



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PLAN OF WORK:

- Literature survey
- Herbal/ Drug selection
- Procurement of drug and other chemical
- Development of procedure
- Preparation Of Face wash
- PLANT PROFILE:
- 1) LEMON



Synonym: Citrus limon, Limon, Nimbu (Hindi)

Biological Source: Lemon consists of the fresh fruit of Citrus limon

Family: Rutaceae

Chemical Constituents:

Citric acid (major organic acid)

Limonene (dominant essential oil component)

Flavonoids (like hesperidin, eriocitrin)

Vitamin C (ascorbic acid)

Pectin

Uses:

- Acts as a natural antioxidant and immunity booster
- Used as a flavoring agent in foods and beverages
- Applied in skincare for its astringent and brightening properties
- Helps in digestion and detoxification
- Used in cleaning products for its antibacterial and freshening effects ^[16,17,18,19]
- **2) NEEM:**



Synonym: Margosa, Indian Lilac, Nimba (Sanskrit), Azadirachta Biological Source: Neem consists of the dried leaves, bark, seeds, and oil derived from the plant



Azadirachta indica A. Juss.

Family: Meliaceae.

Chemical Constituents: Azadirachtin (main active compound, especially in seeds and oil), Nimbin ,Nimbidin ,Nimbidol, Gedunin,Flavonoids, tannins, and limonoids

Uses:

1.Antibacterial and antifungal agent

2.Insect repellent and natural pesticide

3.Antiseptic in skin infections and wounds

3) ALOE VERA:



Synonym: Aloe, Kumari (Ayurveda), Ghritkumari (Hindi) **Biological Source:** Aloe vera gel is the mucilage obtained from the parenchymatous tissue of the leaves of Aloe vera

Family: Asphodelaceae (earlier classified under Liliaceae)

Chemical Constituents:

Aloin (a type of anthraquinone), Glucomannans,

Vitamins – A, C, E, and B12,

Enzymes – amylase, lipase, Saponins, amino acids, and minerals

Uses:

- Promotes wound healing and soothes burns
- Moisturizes and rejuvenates the skin
- Helps treat acne and skin infection
- Used in digestive remedies for constipation and ulcers
- Acts as an anti-inflammatory and antioxidant agent

5) TURMERIC:



Synonym: Turmeric, Haldi (Hindi), Haridra (Ayurveda) Biological Source: It is the dried rhizome of Curcuma longa Linn. Family: Zingiberaceae Chemical Constituents: Curcuminoids – mainly curcumin (responsible for yellow color) Volatile oils – such as turmerone, zingiberene

Resins and polysaccharides



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Uses:

- Used as an anti-inflammatory and antioxidant agent
- Helps in wound healing and skin conditions
- Acts as a digestive aid and liver tonic
- Used in traditional medicine for arthritis and infections
- Commonly used as a spice, coloring, and flavoring agent in food^{.[20-23]}

INGREDIENTS USED IN FACE WASH:

Carbopol 934	Gelling agent, suspension agent.
Methyl Paraben	Antifungal agent and preservative.
Triethanolamine	Neutralizer, ph balancer
Propylene Glycol	Humectants, vaporizer solvent.
Sodium lauryl Sulphate	Foaming agent
Distilled water	Vehicle

TABLE 1: INGRIDIENT USED IN FACE WASH

METHODOLOGY:

COLLECTION & EXTRACTION PROCEDURE:

1. Collection of Plant Materials:

Collect fresh samples of Aloe vera, Neem leaves (Azadirachta indica), Curcuma longa (turmeric), and Lemon.

2. Washing:

Wash all collected plant materials thoroughly using distilled water to remove any dirt or contaminants.

3. Preparation:

Crush Neem leaves and Curcuma longa using a mortar and pestle. Peel Aloe vera leaves and extract the gel. Cut the lemon into small pieces.

4. Extraction Setup:

Place each of the prepared materials into separate beakers.

Add a mixture of distilled water and ethanol in a 3:1 ratio to each beaker.

5. Heating:

Heat all beakers in a water bath at a controlled temperature for 45 minutes.

6. Cooling and Storage:

Allow the beakers to cool, then store them at room temperature for 2 days to facilitate extraction.

7. Filtration:

After 2 days, filter each extract using Whattman filter paper.

8. Collection of Extracts:

Collect the filtered extracts for further use^{.[24-28]}

PREPERATION OF HERBAL FACE WASH GEL:

1. Prepare the herbal extracts: In a beaker mix the lemon, aloe vera, turmeric & neem extract.



- 2. Create the gel base: In separate beaker mix the Carbapol 934, methyl paraben & triethanolamine.
- 3. Combine the Gel base & herbal extracts:
- 4. Slowly add the gel base to the mixture of the herbal extracts while continues stirring.
- 5. Mix propylene glycol with sodium laural sulphate (SLS)
- 6. Adjust pH: To adjust the pH of mixture add triethanolamine
- 7. Add distilled water gradually to get proper consistency.
- 8. Stir the mixture for about 10 minutes to ensure everything is well combined^{.[29,30]}

Sr. no.	Name of Ingredient	F1	F2	F3	F4	F 5
1	Extraction of Neem	2 ml	3 ml	5 ml	4 ml	4 ml
2	Lemon	2 ml	3 ml	5 ml	4 ml	4 ml
3	Aloe vera	2 ml	3 ml	3 ml	4 ml	4 ml
4	Turmeric	2 ml	3 ml	3 ml	4 ml	4 ml
5	Carbopol 934	3 gm	1.5 gm	1 gm	1.5 gm	1.5 gm
6	Methyl paraben	0.3 gm	0.1 gm	0.5 gm	0.6 gm	1 gm
7	Triethanolamine	4 ml	2 ml	1 ml	0.3 ml	1 ml
8	Propylene Glycol	4 ml	2.5 ml	5 ml	1 ml	1 ml
9	Sodium Lauryl Sulphate	4 gm	2.5 gm	10 gm	3.5 gm	2.5 gm
10	Distilled water	q.s	q.s	q.s	q.s	q.s.

 TABLE 2 : FORMULATION BATCHES

RESULT :

The combination of aloe vera, neem, turmeric, and lemon extracts in a face wash gel offers multiple dermatological benefits. Aloe vera provides hydration and promotes skin healing, while neem exhibits antibacterial properties that reduce acne-causing bacteria. Turmeric contributes anti-inflammatory and antioxidant effects, helping to diminish redness and pigmentation. Lemon extract, rich in vitamin C and citric acid, aids in exfoliation and skin brightening. Together, these natural ingredients help control sebum production, reduce acne, and improve skin tone. Regular use of this formulation can lead to clearer, healthier, and more radiant skin within weeks.

DISCUSSION:

CHARACTERIZATION & EVALUATION OF FACE WASH GEL:

The prepared face wash gel was evaluated based on the following parameters:

- 1. Colour: The colour of the gel was assessed through visual inspection.
- 2. **Odour:** The odour of the formulation was evaluated by smelling the sample.
- 3. **Consistency:** The consistency of the gel was examined manually.
- 4. **Viscosity:** The viscosity of the gel was measured using a Brookfield viscometer. The values for both the gel and water were recorded.



- 5. **Spreadability:** The spreadability was evaluated manually by gently rubbing the gel on the skin and observing its ease of application.
- 6. **Washability:** The gel was applied to the hand and rinsed under running water to observe its ease of removal.
- 7. **Foamability:** A small amount of the gel was added to a beaker containing water. The initial volume was recorded, the beaker was shaken ten times, and the final volume was noted. Foam formation was also assessed by applying the gel to the skin in the presence of water.
- 8. **Grittiness:** The formulation was examined for the presence of any gritty particles by applying it to the skin and evaluating the texture.

CONCLUSION:

The herbal face wash gel with aloe vera, neem, turmeric, and lemon effectively cleanses the skin, reduces acne, and controls oil without irritation. It offers antimicrobial, anti-inflammatory, and skinbrightening benefits. The formulation is safe, natural, and suitable for daily use, making it a beneficial alternative to synthetic facial cleansers.

REFERANCE:

- 1. Sanju nanda, arun nanda, roop k. Khar. "Introduction and design of the study, cosmetics technology", Birla publication first edition2006-2007 Page no. 243.
- 2. P.P. sharm "cosmetics-formulation, manufacturing and quality control" by Vandana publication third edition page no. 142.
- 3. Sanju nanda, arun nanda, roop k. khar. "Introduction and design of the study,cosmetics technology", birla publication first edition2006-2007 Page no. 243.
- 4. P.P. sharm "cosmetics-formulation, manufacturing and quality control" by Vandana publication third edition page no. 142.
- 5. Dhanashri Sanjay koli , abhyangshree nandkumar Mane , formulation and evaluation of herbal antiacne facewash, world journal of pharmacy and pharmaceutical science, volume 5, issue 6, 2016
- 6. Mr Tejas L Takale, Mr Ajay s surwase, a review literature on herbal facewash, international journal of creative research thought, volume 11, issue 5
- 7. P.P. sharm "cosmetics-formulation, manufacturing and quality control" by Vandana publication third edition page no. 142.
- Shraddha Tathe, malti salunke , extraction method for ingredient of herbal facewash , international journal of pharmaceutical science review and research, 72 (2), jan-feb 2022, article no 6, pages 36 43
- 9. https://storify.com/aseem_sood/benefitsofherbalfacewash
- 10. [10]https://en.wikipedia.org/wiki
- 11. https://www.nlm.nih.gov/medlineplus/antioxidants.html.
- 12. http://www.ingredientstodiefor.com/category/Thickeners_Polymers_RheologyModifiers/c36
- $13.\ http://www.eufic.org/article/en/foodsafetyquality/foodadditives/artid/preservativesfoodlongerse.$
- 14. What is a humectant (http://www.wisegeek.org/whatisanhumectant.htm), wisegeek.org
- 15. Compendium of Chemical Terminology



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- 16. Jaseer JJ, Meera Ajay, Muhammd Jasmal, Nivin George, Vaishna VV, Remya S B. "Formulation and evaluation of liquid based fashwash", International Journal of pharmaceutical research and application, vol-7(2), 2022, Page no. 1533-1547.
- 17. Khaandagle G. S.,et.al., "Formulation and evaluation of anti acne herbal fachwash by using natural ingredients", International research journal of modernization in Engineering Technology and Science, vol-3(1) 2021, page no. 306-310.
- 18. Nitin yadav, Shashikant maury, Piyush yadav, Manoj kumar yadav, Manish k. Maurya, "A Review on Formulation and Development of facewash" Journal of emerging technologies and innovative research, vol- 8(6), 2021 page no.410-417.
- 19. Komal Hule, Shashank prabhale, Omkar kalaskar , Harshal dhole , "Introduction and extraction method for polyherbal facewash formulation", Journal of drug design and medicinal chemistry , vol-8(1) , 2022, page no. 11-15.
- 20. Caius J., The Medicinal and Poisonous Plants of India. Scientific Publishers, India; 2003, p. 527.
- 21. Aburijai T., F.M.Natsheh., Plants used in cosmetics. Phytother.Res., 2003; 17: 987-1000. [22] Ayurvedic Pharmacopoeia of India; Part I & Part II, 2007; Govt. Of India; Published by IPC, Ghaziabad.
- 22. Kanlayavattanakul M. and Lourith N., Therapeutic agents and herbs in topical application for acne treatment, International Journal of Cosmetic Science., 2011; 33: 289–297.
- 23. Harborne, J.B. (1998). Phytochemical Methods: A Guide to Modern Techniques of Plant Analysis. 3rd ed., Springer.
- 24. Sofowora, A. (1993). Medicinal Plants and Traditional Medicine in Africa. 2nd ed., Spectrum Books Ltd.
- 25. Cowan, M.M. (1999). Plant products as antimicrobial agents. Clinical Microbiology Reviews, 12(4), 564–582. https://doi.org/10.1128/CMR.12.4.564
- 26. Kaur, S., & Arora, S. (2009). Antibacterial and phytochemical screening of Curcuma longa, Azadirachta indica, and Aloe vera. International Journal of Research in Pharmaceutical and Biomedical Sciences, 1(1), 20–24.
- 27. Egharevba, H.O., & Kunle, O.F. (2010). Preliminary phytochemical and proximate analysis of the leaves of Neem (Azadirachta indica). Ethnobotanical Leaflets, 14, 570–578.
- 28. Seema Yuvraj Mendhekar*, Pratik Bharat Thorat, Nikita Nivruti Bodke, Jadhav S. L, "Formulation and evaluation of gel containing neem, turmeric, aloe vera, green tea and lemon extract with activated charcoal and honey" European journal of pharmaceutical and medical research,2017, 4(12), page no. 439 -443.
- 29. Harsharan Pal Singh*1, Neeraj Samnhotra1,2, Sumeet Gullaiya3, Ishpreet Kaur4,"Anti-acne synergistic herbal face wash gel: formulation evaluation and stability studies", World journal of pharmaceutical research, volume 4,(2015), page no. 1261-1273.