



Antibacterial And Antifungal activity of Polyherbal Gel

Samruddhi Popat Gholap, Dr Amol Navnath Khedkar, Abhay Vishal Dhumal

Department of Pharmaceutical Sciences, Saikrupa Institute of Pharmacy, Ghargaon, Shrigonda, Ahmednagar, Maharashtra, India 414728

Corresponding Authors Details: Samruddhi Popat Gholap, Final Year B Pharmacy, Department of Pharmaceutical Sciences, Saikrupa Institute of Pharmacy, Ghargaon

ABSTRACT-* Plants are naturally God gifted for the synthesis of medicinal compound and provide a great help in a new discovery in the area of chemical diversity because of the unknown availability either as a standardized extract or as a pure compound. Plants are the oldest source of pharmacologically active compounds and have provided human kind with many medicinally useful compounds from centuries. Today more than two thirds of the world's population relies on plant derived drugs. The origin of many effective drugs is found in the traditional medicinal practices and in view of this it is very important to undertake studies pertaining to screening of the medicinal plants for their proclaimed biological activity. Numerous studies have been conducted with the extracts of various plants, screening antimicrobial activity as well as for the discovery of new, antimicrobial compounds. As like Aloe Vera, Turmeric, Neem and Tomato seeds has antimicrobial and antifungal properties. To formulate and evaluate the antimicrobial and antifungal activities of poly herbal gel this study had been proceed.

KEYWORDS:- Herbal Gel, Indian Herbs.

INTRODUCTION

Numerous studies have been conducted with the extracts of various plants, screening antimicrobial activity as well as for the discovery of new, antimicrobial compounds. Aloe vera (family- Liliaceae) is a stem-less plant and evergreen. Aloe vera juice is of great medicinal importance and is traditionally used as anti-inflammatory agent in cosmetic industry. It can be useful in the treatment of Burns, Heat rashes, Allergy, Eczema, Psoriasis, Dermatitis as well as balnea, and vaginal yeast infection. If Aloe vera juice is consumed directly or with any other type of liquid it gives relief from many kinds of stomach ailments like irritable bowel, reflux, Crohn's disease, indigestion and heartburn. Azadirachta indica (Family-Meliaceae) known as Neem is well known in India for its medicinal properties. Its leaves possess broad spectrum of activity against Gram +ve and Gram - ve bacteria including M.tuberculosis, and Vibrio cholera. Curcuma longa (Family-Zingiberaceae) is a rhizomatous plant known as Turmeric. It is one of the spice. It is used for the treatment of wounds, cuts, burns, galactose-induced cataract formation, ulcer etc. It is also used in protection against vascular dementia due to antioxidant activity. Both curcumin and the oil fraction suppress growth of several microbes like Streptococcus,

Staphylococcus, Lactobacillus. A.flavus, P.digitatum. A.parasiticus, etc.

Uses: This gel can be used in the treatment of sun burns, rashes, burns, wounds and other skin infections. It can also be used in the treatment of superficial mycosis. (Ref. 1.)

What are skin infections?

Your skin is your body's largest organ. It has many different functions, including covering and protecting your body. It helps keep germs out. But sometimes the germs can cause a skin infection. This often happens when there is a break, cut, or wound on your skin. It can also happen when your immune system is weakened, because of another disease or a medical treatment.

Some skin infections cover a small area on the top of your skin. Other infections can go deep into your skin or spread to a larger area. Functions of the skin

- Provides a protective barrier against mechanical, thermal and physical injury and hazardous substances.
- Prevents loss of moisture.
- Reduces harmful effects of UV radiation.
- Acts as a sensory organ (touch, detects temperature).
- Helps regulate temperature.
- An immune organ to detect infections etc.

Because it interfaces with the environment, skin plays a key role in protecting (the body) against pathogens and excessive water loss. Its other functions are insulation, temperature regulation, sensation, storage and synthesis of vitamin D by action of ultraviolet (UV) and the protection of vitamin B folates, absorption of oxygen and drugs and water resistance. Severely damaged skin will try to heal by forming scar tissue. This is often discoloured and depigmented.

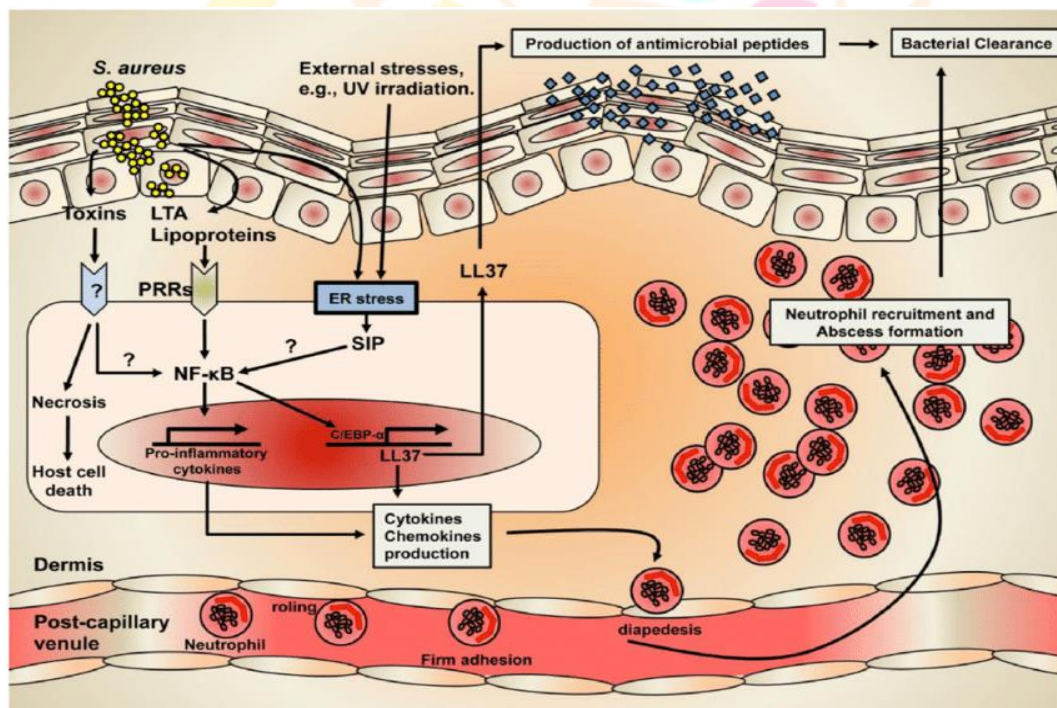


Fig.NO. 1. SKIN IMMUNOLOGY IN STAPHYLOCOCCUS INFECTION

What causes skin infections?

Different kinds of germs cause skin infections. For example:

- Fungi cause athlete's foot and yeast infections.
- Bacteria cause cellulitis, impetigo, and staphylococcal (staph) infections.

Common Bacterial Skin Infections:

Bacterial skin infections are the 28th most common diagnosis in hospitalised patients. Cellulitis, impetigo, and folliculitis are the most common bacterial skin infections seen by the family physician.

Cellulitis: Cellulitis is a painful, erythematous infection of the dermis and subcutaneous tissues that is characterized by warmth, oedema, and advancing borders. Cellulitis commonly occurs near breaks in the skin, such as surgical wounds, trauma, tinea infections, or ulcerations, but occasionally. The most common sites of cellulitis were the legs and digits, followed by the face, feet, hands, torso, neck, and buttocks.

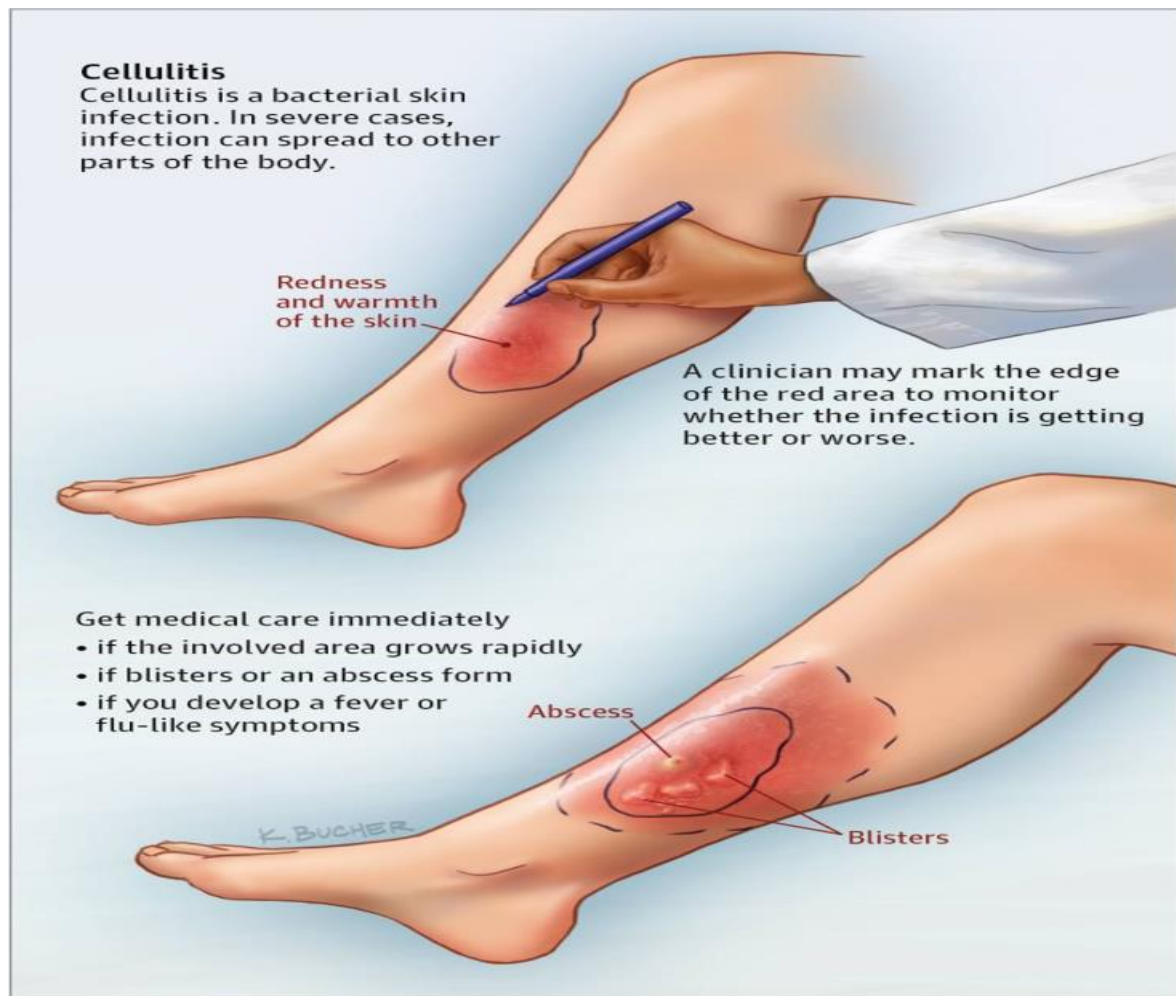


FIG NO.2 Cellulitis infection

Erysipelas: This is also known as St. Anthony's fire, usually presents as an intensely erythematous infection with clearly demarcated raised margins and often with associated lymphatic streaking. Common sites are the legs and face. Most cases do not have an inciting wound or skin lesion and are preceded by influenza-like symptoms. The incidence of erysipelas is rising, especially in young children, the elderly, persons with diabetes, alcoholic persons, and patients with compromised immune systems or lymphedema.

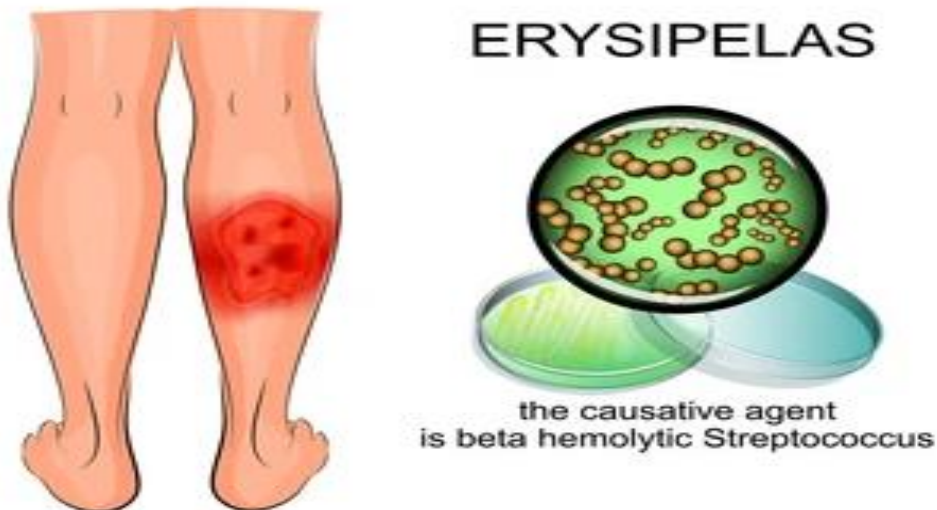


FIG NO.3 Erysipelas

Impetigo: Impetigo is most commonly seen in children between two to five years and is classified: as bullous or non-bullous. The non-bullous type predominates and presents with a corrosion (sore) Cluster of erosions, or small vesicles or pustules that have an adherent or oozing honey-yellow crust.

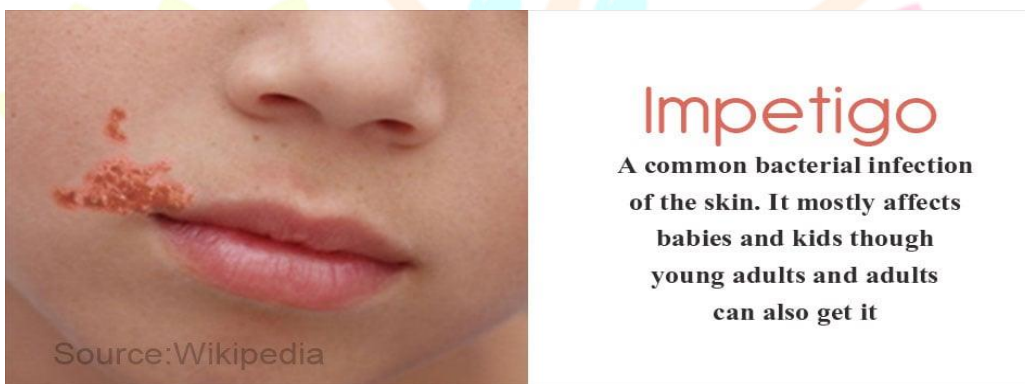


Fig.no. 4: Impetigo infection

FOLLICULITIS: Hair follicles can become inflamed by physical injury, chemical imitation, or infection for leads to folliculitis. The most common form is superficial folliculitis which manifests as a tender or Painless pustule that heals without scarring. the hair shaft will frequently be seen In the centre of the pustule. Multiple or single it can appear on my skin bearing li including the head neck, trunk buttocks and extremities. Associated systemic symptoms of lever rarely exist. S. aureus is the most likely pathogen.

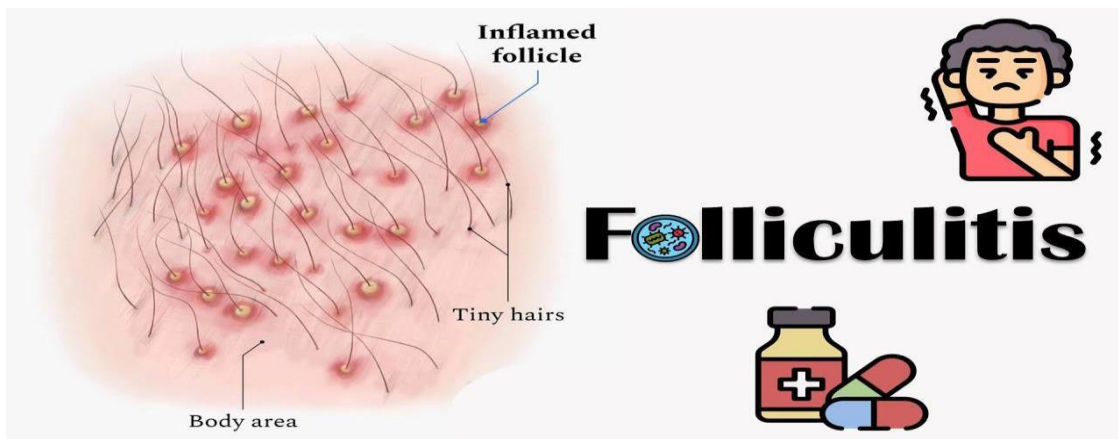


FIG NO.5 Folliculitis Infection

Who is at risk for skin infections?

- You are at a higher risk for a skin infection if you:
 - Have poor circulation Have diabetes
 - Are older
- Have an immune system disease, such as HIV/AIDS
- Have a weakened immune system because of chemotherapy or other medicines that suppress your immune system
- Have to stay in one position for a long time, such as if you are sick and have to stay in bed for a long time or you are paralyzed
- Are malnourished.
- Have excessive skinfolds, which can happen if you have obesity

What are the symptoms of skin infections?

Many skin infections include rashes, swelling, redness, pain, pus, and itching.

How are skin infections diagnosed?

To diagnose a skin infection, healthcare providers will do a physical exam and ask about your symptoms. You may have lab tests, such as a skin culture. This is a test to identify what type of infection you have, using a sample from your skin. Your provider may take the sample by swabbing or scraping your skin, or removing a small piece of skin (biopsy). Sometimes providers use other tests, such as blood tests.

How are skin infections treated?

The treatment depends on the type of infection and how serious it is. Some infections will go away on their own. When you do need treatment, it may include a cream or lotion to put on the skin. Other possible treatments include medicines and a procedure to drain pus.









Type of Infection	Appearance of Lesion	Description of Lesion	Layer of Skin Involved	Common Pathogens	Treatment
Impetigo		Vesicles with honey-colored crust, often on the face of a child	Epidermis	<i>Staphylococcus aureus</i> , <i>Streptococcus pyogenes</i>	Few lesions: topical antibiotics (e.g., mupirocin); numerous lesions: systemic therapy (e.g., cephalixin, clindamycin)
Erysipelas		Erythematous, very painful lesion with sharply demarcated, raised, regular border	Superficial dermis	<i>S. pyogenes</i> , <i>Streptococcus agalactiae</i> > <i>S. aureus</i>	Systemic antibiotics (e.g., cephalixin or cefazolin)
Cellulitis		Erythematous diffuse, flat lesion with irregular border	Deep dermis	<i>Streptococcus pyogenes</i> , <i>Streptococcus agalactiae</i> > <i>Staphylococcus aureus</i>	Systemic antibiotics, eg cephalixin or cefazolin
Folliculitis		Localized, inflamed papules containing a small amount of pus	Hair follicle	<i>S. aureus</i> , <i>Pseudomonas aeruginosa</i> (associated with hot tubs)	Antibiotics often not needed; warm, moist compresses are useful
Skin abscess (furuncle also known as a boil, furuncle, carbuncle)		Raised, tender, inflamed nodule with central region of purulence; the area of pus initially is firm but then progresses to fluctuance (becomes movable)	Deep dermis	<i>S. aureus</i>	Incision and drainage is mainstay of therapy; antibiotics directed against <i>S. aureus</i> in select cases
Necrotizing soft tissue infections (necrotizing fasciitis)		Very painful area of inflammation with rapid progression to necrosis, bullae, purpura, anesthesia, and systemic toxicity	Fascia and muscle; local blood vessels and nerves also involved	1. Monomicrobial form: <i>S. pyogenes</i> , <i>Clostridium perfringens</i> , <i>Vibrio vulnificus</i> ; 2. Polymicrobial form: enteric gram-negative rods plus anaerobes	Surgical débridement is critical in addition to broad-spectrum systemic antibiotics

TABLE NO. 1 Bacterial Diseases.

Which bacteria and fungus can cause skin infections?

BACTERIA: The majority of bacterial infections are caused by the Gram-positive bacteria *Staphylococcus* and *Streptococcus* species.

FUNGUS: *Candida* species.

CONVENTIONAL TREATMENT OF SKIN DISEASES

The common medications for topical use include:

1. Antibacterials: These medicines, like bactroban or cleocin are often used to treat or prevent infection
2. Anthralin drithocrema, micanol and others): Although not often used, these help to reduce inflammation and can help treat psoriasis
3. Antifungal Agents: Lamisil, lotrimin and nizoral are few examples of common topical antifungal drugs used to treat skin conditions such as ringworm and athlete's foot
4. Benzoyl peroxide: Creams and other products containing benzoyl peroxide are used to treat
5. Coal tar: This topical treatment is available with and without a prescription in strengths ranging from 0.5% to 5%, Coal tar is used to treat conditions including seborrheic dermatitis (usually in shampoos) or psoriasis. Currently, coal tar is seldom used because it can be slow acting and can cause severe staining of personal clothing and bedding
6. Corticosteroids: These are used to treat skin conditions including eczema and come in many forms including foams, lotions, ointments and creams

7. Retinoids These medications (such as retin-A and tazorac) are gels or creams derived from vitamin A and are used to treat conditions including acne
8. Salicylic acid: This medication is available in the form of lotions, gels, soaps, shampoos and patches. It should be used sparingly putting too much on one's body at once can cause toxicity. Salicylic acid is the active ingredient in many skin care products for the treatment of acne.

AIM AND OBJECTIVE

AIM: TO formulate and evaluate poly herbal gel containing Aloe Vera, Azadirachta indica, Curcuma longa, and Solanum Lycopersicum seed extract.

OBJECTIVES:

- a) Formulate and evaluate A GEL of lycopersicum seeds.
- b) Select stable and compatible excipients with lycopersicum as well as other herbal drugs by carrying out a pharmacological compatibility study of the excipients.
- c) To characterize pure medicine for intrinsic physio-chemical properties.
- d) Evaluate the gel for spreadability parameters.
- e) Evaluate the poly herbal gel for its appearance and homogeneity.
- f) To check out the Extrudability of gel.
- g) To determine the antimicrobial and antifungal activity of gel.
- h) Determine the PH of the prepared gel.

Determine the Minimum Inhibitory concentration (MIC) And zone of inhibition

DRUG PROFILE

1. ALOE VERA: (ref.1,2,8)

Aloe Vera is an evergreen perennial, plant that originates from the Arabian Peninsula, but grows wild in tropical, semi-tropical, and arid climates around the world. It is cultivated for agricultural and medicinal uses. It is found in many consumer products including beverages, skin lotion, cosmetics, ointments, or in the form of gel for minor burns and sunburns.

- **BOTANICAL NAME:** Aloe barbadense Miller
- **FAMILY:** Liliaceae
- **SYNONYM:** Aloe barbadense, Alocindica, Aloe arborescence, Aloe ferox
- **COMMON NAME:** Nepali Gwar Patha, Sanskrit Ghritkumari, Hindi Musa bar, Marathi Korphad, Kannada kathaligida
- **CHEMICAL CONSTITUENTS:** Active Constitutes of Aloe Vera The Aloe vera leaf gel contains about 98% water. The total solid content of Aloe vera gel is 0.66% and soluble solids are 0.56% with some seasonal fluctuation. On a dry matter basis aloe gel consists of polysaccharides (53%), sugars (17%), minerals (16%), proteins (7%), lipids (5%) and phenolic compounds (2%) Aloe vera contains 200 potentially active constituents: vitamins, enzymes, minerals, sugars, lignin, saponins, salicylic acids, and amino acids, which are responsible for the multifunctional activity of Aloe.
- **USES:** Aloe Vera juice is of great medicinal importance and is traditionally used as an anti-inflammatory agent in the cosmetic industry. It is claimed to be useful in the treatment of Burns, Heat rashes, Allergy, Eczema, Psoriasis, Dermatitis as well as balnea, and vaginal yeast infection. If Aloe vera juice is consumed directly or with any other type of liquid it gives relief from many kinds of stomach ailments like irritable bowel, reflux, Cohn's disease, indigestion and heartburn.



FIG NO.6. ALOE VERA

2. AZADIRACHTA INDICA: (ref.4,5,6)

Azadirachta indica (*A. indica*) belongs to the botanic family Meliaceae, commonly known as Neem. It is used in traditional medicine as a source of many therapeutic agents. *A. indica* (leaf, bark, and seeds) are known to contain antibacterial and antifungal activities against different pathogenic microorganisms; in addition to antiviral activity against vaccinia, chikungunya, measles, and Coxsackie B virus. Different parts of Neem (leaf, bark, and seeds) have been shown to exhibit wide pharmacological activities such as antioxidant, antimalarial, anticarcinogenic, anti-inflammatory, antiulcer, and antidiabetic properties. The biological activities are attributed to the presence of many bioactive compounds in their different parts.

- Botanical name:- *Azadirachta Indica*
- Family: Mahogany
- Synonyms: Margosa, Arishth, *Melia Azadirachta*, Roschip, Witch-Hazel Melaleuca,
- Chemical Constituents: Leaf extracts: Active constituents of neem leaf extract include isomeldenin, nimbin, nimbinene, 6desacetylnimbinene, nimbandiol, immobile, nimocinol. quercetin, and beta-sitosterol Two additional tetracyclic triterpenoids zafaral [24,25,26,27- tetranorapotirucalla(apocupha)-6alpha-methoxy-7alphaacetoxy-1,14-dien- 3,16-dione-21-al] and malcinanhydride 124,25,26,27tetranorapotirucalla-(apoeupha)- 14hydroxyl.11alpha- methoxy-7alpha, 12 alpha-diacetoxy, 1, 14, 20(22)-trien-3-one] have been isolated from the methanolic extract of neem leaves.
- Uses: Neem is considered a boon for mankind by nature. The use of Neem has been recommended by Ayurveda for a wide range of diseases. Such usage is attributed to its purification effect on the blood. [21] Scientific research on Neem demonstrates it to be a Panacea. It is suggested to be an antibacterial, anthelmintic, antiviral, anticancer, and more importantly immune modulatory agent.



FIG NO.7. Azadirachta Indica

3. CURCUMA LONGA: (ref. 2)

Botanical name: Curcuma longa

Family: Zingiberaceae

Source: The tuberous rhizomes or underground stems of Curcuma longa.

Uses: Turmeric is used as a herbal medicine for Rheumatoid arthritis, chronic anterior uveitis, conjunctivitis, skin cancer, wound healing, UTI infections, liver ailments, etc.



FIG NO.8. CURCUMA LONGA

4. SOLANUM LYCOPERSICUM: (ref.1,2,8)

- Solanum Lycopersicon, popularly known as tomato, originated in South America and is now used and cultivated in various parts of the world. This product is cultivated in warm climate regions, but can also be planted inside a greenhouse during winter. Tomatoes are full of vitamins and antioxidants essential to a healthy body
- Botanical Name: - Solanum Lycopersicum
- Family:- Solanaceae
- Synonyms:- Solanum Lycopersicum L., Lycopersicon lycopersicum Geographical Sources The tomato originated from the Andean region of South America, in the area now covered by parts of Bolivia, Chile, Ecuador, Colombia, and Peru. The related species of cultivated tomatoes are native and widely distributed in this region.
- Uses: the pulped fruit is an extremely beneficial skin wash for people with oily skin. Sliced fruits are a quick and easy first-aid treatment for burns, scald, and sunburn. A decoction of the root is ingested in the treatment of toothache. The skin of tomato fruits is a good source of lycopene, a substance that has been shown to protect people from heart attacks. It seems to be more effective when it is cooked and so can be obtained from food products

Such as tomato ketchup and tinned tomatoes. [28] 1.lycopene has also been shown to have a very beneficial effect on the prostate and is being used



FIG NO.9.Solanum Lycopersicum

increasingly to treat enlarged prostate and the difficulties in urination that accompany this disorder. A homoeopathic remedy is made from the plant. It is used in the treatment of rheumatism and severe headaches.

EVALUATION PARAMETERS:

- 1) pH: The pH of the prepared polyherbal gel can be determined by using a pH meter.
- 2) Appearance and Homogeneity: physical appearance and homogeneity of the polyherbal gel by doing visual observation
- 3) Viscosity: The viscosity of individual and polyherbal gels was measured by Brookfield viscometer (Model RVTDV II) at 100 rpm using spindle no. 4.
- 4) Spreadability: The spreadability of the gel formulations was determined by measuring the spreading diameter of polyherbal gel 1 g of sample spread on glass slab plates (20 cm x 20 cm) after one min.
- 5) Extrudability: The gel formulations were filled in standard-capped collapsible aluminium tubes and sealed by crimping to the end. The weights of the tubes were recorded. The tubes were placed between two glass slides and were clamped, 0.5 gm was placed over the slides and then the cap was removed. The amount of the extruded gel was collected and weighed. The percent of the extruded gel was calculated

Spreadability of Polyherbal: An excess of gel sample 2 g was placed between two glass slides and a 1000g weight was placed on slides for 5 minutes to compress the sample to a uniform thickness. Weight (60g) was added to the pan. The time (seconds) required to separate the two slides was taken as a measure of spreadability It was calculated using the formula,

$$S = \frac{m \cdot 1}{t}$$

Where,

S-Spreadability in g.cm/sec m-Weight tied to upper slide 1-Length of glass slide

1- Time in seconds Length of the glass slide was 11.3 cm and the weight tied to the upper slide was (60g) throughout the experiment.

Determination of Antibacterial and Antifungal Activity Test

Microorganism Bacteria: E. coli, Fungi: A. Niger Preparation of Inoculums Bacterial suspensions were prepared from overnight cultures by the direct colony method. Colonies were taken directly from the plate and suspended in broth. This preculture broth was allowed to stand overnight in a rotary shaker at 37°C, after which these cultures were maintained in broth in freeze for further use.

PREPARATION OF GROWTH MEDIA:

Nutrient agar was used for the preparation of a medium for the growth of the above-said organisms. Nutrient agar was taken (2.3 gm with 100 ml of distilled water) for preparation of growth media. Prepared nutrient agar was autoclaved at 121°C 9 and 15 lb. pressure and then nutrient agar was poured in Petri plates under the laminar flow with suitable sterile conditions.

After solidification, plates were kept in an incubator for 24 hours to check of contamination in media, followed by using the plates for further testing the antibiotic susceptibility of the isolated strains (ref.1,2,9)

Determination of Zone of Inhibition

Antifungal and Antibacterial activity was checked by the agar well diffusion method. In this method, a previously liquefied medium was inoculated with 0.2 ml of Fungal and Bacterial suspension having uniform turbidity at a temperature of 40°C. 20 ml of culture medium was poured into the sterile petri dish having an internal diameter of 8.5 cm. Care was taken for

the uniform thickness of the layer of a medium in different plates. After complete solidification of the liquefied inoculated medium, the wells were made aseptically with a cork borer having a 6mm diameter.

In each of these plates, gel solutions were placed carefully. Plates were kept for pre-diffusion for 30 mins. After it normalized to room temperature; the plates were incubated at 37°C for 24 hours in case of bacteria and at 27°C for 48 hours in case of fungi.

APPLICATIONS

- i. This gel is can be used in treatment of sunburns.
- ii. It can be used in rashes and itching
- iii. It has good wound healing property
- iv. Used in treatment of fungal diseases like Mycosis
- v. It Used in Candidis treatment
- vi. It gives effective cooling action on injured site
- vii. It is topically preferable gel formulation
- viii. There are no side effects
- ix. It can be used in inflammation

CONCLUSION

The polyherbal gel will prepare with a combination of aloe vera, neem & tomato extract using the analytical grade polymer of lab scale to provide a soothing effect the physical observation of the gel was observed fulfil all the necessary criteria like PH, viscosity and Antibacterial and Antifungal activity against the bacteria E.Coli and A Niger. General GEI. containing Aloe vera, Neem and Turmeric was formulated. All the gel exhibited broad spectrum anti-bacterial and anti-fungal activity against all the tested microorganisms. It was found that bacteria are more sensitive as compared to fungi to all of the gel.

REFERENCES

1. Tikesh Agrawal, Upadesh Lade, Sandip Agrawal, Santosh Gotefode, Prachi Barsagade "Polyherbal Gel Formulation of Aloe Vera, Neem, and Tomato Extract" Innovations in Pharmacy Research and Development, Volume 1 Issue 2, 7-18 Pp.
2. Abhijeet Pandey, Jui V. Jagtap, Aditi A. Patil, Richa N. Joshi and B. S. Kuchekar Formulation and evaluation of anti-bacterial and antifungal activity of a herbal ointment containing Aloe-vera, Azadirachta indica and Curcuma longa", J. Chem. Pharm. Res., 2010, 2(3):182186.
3. Kim HS, Kacew S, Lee BM. In vitro chemopreventive effects of plant polysaccharides (Aloe barbadensis Miller, Lentinus edodes, Ganoderma lucidum, and Coriolus vesicolor) Carcinogenesis. 1999;20:16 37-40
4. Eid, A., Jaradat, N., & Elmarzugi, N. (2017). A review of chemical constituents and traditional usage of Neem plant (Azadirachta Indica), 2(2), 75-81
5. Chen, J., Fan, X., Zhu, J., Song, L., Li, Z., Lin, F., Zi, J. (2018). Limonoids from seeds of Azadirachta indica A. Juss, and their cytotoxic activity. Acta Pharmaceutica Sinica B, 8(4), 639 644.
6. Basir, S., & Shailey, S. (2012). Strengthening of antioxidant defense by Azadirachta indica in alloxandiabetic rat tissues. Journal of Ayurveda and Integrative Medicine, 3(3), 130
7. Mahapatra S., Young C. Y. F., Kohli M., et al. Antiangiogenic effects and therapeutic targets of azadirachta indica leaf extract in endothelial cells. Evidence-Based Complementary and Alternative Medicine. 2012:2012:14.
8. Dixit G, Misal G, Gulkari V and Upadhye K: Formulation and
9. Evaluation of Polyherbal Gel for Anti-inflammatory Activity. Int J Pharm Sci Res. 2013;4(2), 1186-1191
10. Sharma M, Schoop R, Suter A, Hudson JB. The potential use of Echinacea in acne: Control of Propionibacterium acnes growth and inflammation. Phytother Res 2011;25:517-21
11. Haroun, M.F., and AlKayali, R.S. (2016) Synergistic Effect of ThymraSpi catal. Extracts with Antibiotics against Multidrug-Resistant Staphylococcus aureus and Klebsiella pneumoniae Strains. Iran J. Basic Med. Sci. 19 (11), 1193-1200.

12. Chalo, D. M. (2015). Evaluation of Antimicrobial Activity, Toxicity and Phytochemical Screening of Selected Medicinal Plants of Losho, Narok County, Kenya, Nairobi, Kenya: Univeristy of Nairobi OjewoleJA. Antiinflammatory, analgesic and hypoglycemic effects of *Mangifera indica* Linn (Anacardiaceae) stem-bark aqueous extract. *Methods Find Exp Clin Pharmacol* 2005;27:547-54.
13. Ojewole JA. Antiinflammatory, analgesic and hypoglycemic effects of *Mangifera indica* Linn.(Anacardiaceae) stem-bark aqueous extract. *Methods Find Exp Clin Pharmacol* 2005;27:547-54
14. Patzelt-Wenzler R, Ponce-Pöschl E. Proof of efficacy of Kamillosan(R)cream in atopic eczema. *Eur J Med Res* 2000;5:171-5.
15. Brown AC, Hairfield M. Richards DG, McMillin DI. Mein EA, Nelson CD. Medical nutrition therapy as a potential complementary treatment for psoriasis-Five case reports. *Altern Med Rev* 2004;9:297-307.
16. . Singh A, Singh SP, Bamezai R. *Momordica charantia* (Bitter Gourd) peel, pulp, seed and whole fruit extract inhibits mouse skin papillomagenesis. *Toxicol Lett* 1998;94:37-46.
17. . Sand JM, Bin Hafeez B, Jamal MS, Witkowsky O, Siebers EM, Fischer J, et al. Plumbagin (5-hydroxy-2-methyl-1,4-naphthoquinone), isolated from *Plumbago zeylanica*, inhibits ultraviolet radiation-induced development of squamous cell carcinomas. *Carcinogenesis* 2012;33:184-90.
18. Sharma M, Schoop R, Suter A, Hudson JB. The potential use of *Echinacea* in acne: Control of *Propionibacterium acnes* growth and inflammation. *Phytother Res* 2011;25:517-21.
19. Fuchs SM, Schliemann-Willers S. Fischer TW, Elsner P. Protective effects of different marigold (*Calendula officinalis* L.) and rosemary cream preparations against sodium-lauryl-sulfate-induced irritant contact dermatitis. *Skin Pharmacol Physiol* 2005;18:195-200.

