

Formulation and Evaluation of Anti-bacterial Herbal Ointment from Neem and Turmeric extract

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ABSTRACT:

The present study focus on the formulation and Evaluation of an antibacterial ointment using natural extract from *Azadirachta indica* (Neem) and *Curcuma longa* (Turmeric). Both plants are well-known in traditional medicine for their potent antimicrobial, anti-inflammatory, and wound-healing properties. Neem extract contains active compounds like nimbin and azadirachtin, while turmeric is rich in curcumin, a powerful antibacterial and antioxidant agent. In this study, ethanolic extracts of Neem and Turmeric were incorporated into a simple ointment base. The ointment was prepared using the levigation method, and its physicochemical evaluations including appearance, spreadability, pH, stability, and microbial assay against common skin pathogens like *Staphylococcus aureus* and *Escherichia coli*. The antibacterial activity of extract was predominantly against Gram positive organism. In the present study, herbal ointment containing Neem and Turmeric was formulated and evaluated to study antibacterial and antifungal activity. Plant material (leaves, stem, bulbs and roots) of many special of medicinal plant are used in the treatment of skin conditions. Neem has become valuable plant in the world which shows the solution for hundreds and thousands problems. This herbal ointment of neem and turmeric extract can be used in the treatments of skin infections.

The present work is to formulate and evaluate the ointment of ethanolic extract of Neem (*Azadirachta indica*) and turmeric (*Curcuma longa*). The prepare extract also used to determine the membrane stabilizing effect. The ethanolic extract was prepared by using maceration method. After completion of formulation it was evaluated fir its physicochemical properties like colour, odour, pH, spreadability, washability also formulation was evaluated for its stability at various temperature conditions which shows no change in irritancy, spreadability and diffusion study.

RATIONALE AND OBJECTIVES:

RATIONALE:

Neem (*Azadirachta indica*) and Turmeric (*Curcuma longa*) are well-known medicinal plant with strong antibacterial, anti-inflammatory and wound-healing properties. Due to increasing resistance to synthetic antibiotic and the demand for natural remedies, herbal ointment offer a safe, effective and economical alternative for treating skin infections. Formulating an ointment with these extract allows targeted delivery

of active compounds directly to the site of infection, improving therapeutic outcomes and minimizing side effects.

OBJECTIVES:

1. To extract and prepare Neem and Turmeric extract with antibacterial properties.
2. To formulate a stable ointment base using natural ingredients.
3. To assess the stability and shelf life of the ointment.
4. To develop a natural alternative to synthetic antibacterial ointments.
5. To promote the use of medicinal plants in pharmaceutical plants in ph. Formulation.
6. To evaluate the physical properties of formulated ointment.
7. To compare the herbal ointment with standard antibacterial products.

INTRODUCTION:

Certain European and oriental countries have been exploring the use of herbs and has been in practice since the centuries. Great work has been done which eluded the common man's reach and knowledge. With the techno-savvy lifestyle in 21st century human suffering are coming out with different names. The basic herbs have the answer with no side effects and effective remedies and the golden fact is use of herbal treatment is independent of any age group. When two or more herbs are used in the formulation they are known as polyherbal formulations. Numerous studies have been conducted with the extract of Neem leaves (*Azadirachta indica*; Family-Meliaceae) and extract of turmeric rhizomes (*Curcuma longa*; Family-Zingiberaceae) with the combination of many other herbal drugs. Along with other dosage forms herbal drugs are also available in the form of ointment which is semisolid preparation used topically for several purposes e.g. as protectants, antiseptic, emollients, antipruritics, keratolytics and astringents.

Neem is consists of leaves and other aerial parts of *Azadirachta indica*, Family-Meliaceae. Neem leaves and neem oil has many properties like antiseptics, insecticides also attributed antifertility and antiviral properties and is being screened for efficacy in treatment of AIDS.

Turmeric consist of dried as well as fresh rhizomes of plant known as *Curcuma longa*, Family-Zingiberaceae. It is used as expectorant, condiment or spice. It is rich in antioxidants, research conducted has demonstrate uses of turmeric in the treatment of arthritis, liver diseases, Alzheimer and depression management. The rise in antibiotic resistance and the side effects associated with synthetic antimicrobial agents have led to a renewed interest in plant-based remedies. Medicinal plants like Neem (*Azadirachta indica*) and Turmeric (*Curcuma longa*) have been traditionally used in Ayurvedic and folk medicine for their

potent antimicrobial, anti-inflammatory, and wound-healing properties. Neem is widely recognize for its broad-

spectrum antibacterial activity due to bioactive compounds such as nimbidin, nimbin, and azadirachtin. Similarly, turmeric contains curcumin, a compounds known for its strong antibacterial, antioxidant and anti-inflammatory properties. The combination of these two natural agents offers a promising alternative for topical treatments of bacterial skin infections. The purpose of this study is to formulate an antibacterial ointment using extracts from neem and turmeric, and

To evaluate its physicochemical properties and antimicrobial effectiveness against selected bacterial strains. This natural formulation aims to provide a safer, cost-effective, and eco-friendly alternative to conventional synthetic ointments.

The development of such a formulation could lead to a safe, affordable, and effective alternatives to synthetic antibacterial creams, especially beneficial in rural and resource-limited setting where access to conventional medication may be restricted. This includes testing against common pathogenic bacteria such as *Staphylococcus aureus* and *Escherichia coli* using standardize microbiological assays.

Formulation Techniques:

The formulation of herbal ointment involves selecting suitable excipients, concentration of active ingredients, and designing a stable and effective delivery system. Different techniques such as cold process, hot process, and emulsion-based methods have been employed to formulate ointments containing neem and turmeric extract. The choice of technique depends on the physiochemical Properties of the extracts and desired ointment characteristics.

Phytochemical Composition:

Neem and turmeric extract contains several bioactive compounds responsible for their therapeutic effects. Neem extract contains nimbin, nimbidin, azadirachtin and other triterpenoids. Turmeric extract contains curcuminoids, mainly curcumin,

dimethoxycurumin, and bisdemethoxycurcumin. These phytochemicals contribute to the pharmacological activities of the herbal ointments.

Application in Dermatological Conditions:

Stability and efficacy, These parameters include physical microbiological activity, antioxidant potential, and skin irritation potential. Additionally, in vivo studies and clinical trials necessary to assess the safety and effectiveness of the formulated ointments. Herbal ointments containing neem, turmeric, and extract have shown promise in the managements of various dermatological conditions, including acne, eczema, psoriasis, wound healing and fungal infection. The synergistic, effects of these herbal extracts enhance their therapeutic potential, making them suitable alternatives to conventional treatments.

Advantages:

1. Handling of ointment is easier than bulky liquid dosage forms.
2. They prolong the contact time between the drug and effected area.
3. They are chemically more stable than liquid dosage forms.
4. Non-greasy.
5. They do not hydrolyze, rancidify or support microbial growth.
6. They are easily incorporated with skin and hair.
7. Compatibility with many dermatological medicaments.
8. Easily available.
9. Found in large variety & quantity.
10. Wide range of compatibility.
11. Adhere well to skin.
12. Low incidence of sensitization.
13. Spreadability.
14. Stability of drug.
15. Cooling effect.

Disadvantages:

1. They are difficult to hide taste and odour.
2. Manufacturing procedure are time consuming and complicated.
3. It requires long term therapy.
4. Herbal drugs have slower effects as compare to Allopathic dosage form.
5. Some people shows allergic reaction to neem, including rashes and swelling.
6. May reduce absorption of some drugs.
7. Not suitable for hairy areas.
8. Greasy and Sticky Texture.

Uses:

1. Ointment are used topically for several purpose e.g., as protectants, antiseptics, emollient, antipruritics, kerolytics and astringents.
2. In the case of a protective ointment, it serves to protect the skin against moisture, air, sun rays and other external factors.
3. It is necessary that the ointment neither penetrates the human skin barriers nor facilitates the absorption of substances through this barrier.

PLAN OF WORK:

1. Introduction
2. Literature review
3. Selection Of Standard plant
4. Phytochemical analysis
5. Selection of materials
6. Selection of method
7. Extraction of bioactive compounds.
8. Identification test
9. Preparation of ointment base.
10. Formualtion of herbal ointment.
11. Physiochemical evaluation of ointment.
12. Result complication and conclusion.
13. Reference

LITERATURE REVIEW:

1. **Sule and Agbabiaka *et al*;2008:** Nepal is richly blessed with forests containing arrays of different herbs, shrubs and trees. The leaves, stems, bark and roots of these plants are being used by the local populace and people with thin income for incurring different types of ailments because of the inadequate medical facilities across the country.
2. **Odimegwu *et al*: 2008:** In an earlier study, medicinal plants have been reported to be very beneficial in wound care, promoting the rate of wound healing with minimal pain, discomfort, and scarring to the patient (Odimegwu et al.,2008)
3. **Reiner *et al*:1984:** Antimicrobial activity is the ability of a substance to inhibit or kill bacterial cells, Different types of antibiotics and chemotherapeutic agents are being used in the treatment of one form of disease or the other. Most of these antibiotics were originally derived from micro-organism

while the chemotherapeutic agents are from plants. However, now a days these antibiotics and chemotherapeutic agents are obtained by various synthetic processes.

4. **Momin *et al*; 1987**: Traditional medicine is an important source of potentially useful new compounds for the development of chemotherapeutic agents. The first step towards this goal is the screening of plants used in popular medicine. Thus antimicrobial research is geared towards the discovery and development of novel antibacterial and antifungal agents. Plants drugs are frequently considered to be less toxic and freer from side effects than the synthetic ones.
5. **Ashima Chandel *et al***: The current inventions neem ointment is effective in treating fungal and bacterial skin infections in topical regoins. By utilising all of the components of garlic and neem, this ointment seeks to maximize the advantages, Allin and Allicin are stabilised by ointment.
6. **ShauryaeChawan *et al***: Neem powder, freeze-dried garlic, and a delivery system that has received pharmaceutical approval make up the mixture. It can be applied topically to treat common skin conditions. A base for n ointment was produced, and the extract was then added to the base using the levigation process to create the ointment.
7. **SomayehHandali *et al***: Herbal drugs are also formulated in the form of ointment. An ointment is a viscous semisolid preparation used topically on a variety of body surfaces. These include the skin and the mucus membrane of the eye, vagina, anus, and nose. An ointment may or may not be medicate.
8. **Hyam Hosseini *et al***: This antimicrobial research is geared towards the discovery and development of novel antibacterial and antifungal agents. Plant drugs are frequently considered to be less toxic and freer from side effects than the synthetic ones.

PLANT PROFILE:

Neem:



Fig.1: Neem leaves powder

Biological name: Azardirachta indica.

Synonym: Neem, Indian Lilac, Margosa Tree.

Family: Meliaceae

Chemical Constituents:

Azadirachtin (Most potent bio-insecticidal compound)

Nimbin (Antiseptic and Antibacterial)

Salanin (insect repellent)

Quercertin (Antioxidant)

Uses & Effectiveness:**1. Skin Disorders/ Skin Health:**

Neem has potent antibacterial, antifungal, and antiviral properties, making it beneficial for various skin conditions. It can help to treat acne, eczema, psoriasis and other inflammatory skin conditions.

2. Oral Health:

Used in Toothpaste and Mouthwash for gum diseases.

3. Insect Repellent:

Neem oil is a natural insect repellent and is commonly used to Protect against Mosquitoes, fleas, ticks and other insects. It can be applied topically or used in the form of candles, incense or sprays.

4. Dental Care:

Neem has been traditionally used for oral hygiene due to its antimicrobial properties. Neem twigs can be used as a natural toothpaste to prevent gum diseases, tooth decay and bad breath. Neem oil can also be found in some toothpaste and mouthwash products.

5. Antibacterial & Antifungal:

Used for infections, wounds, and ulcers.

6. Immune System Support:

Neem contains compounds that boost the immune system and help the body fight off infections. Consuming neem leaves or extract can support immune health and enhance the body's natural defence mechanism.

7. Digestive Health:

Neem has been traditionally used to aid digestion and relieve gastrointestinal issues. Neem leaves can be consumed in the form of tea to help with digestion, treat stomach ulcers, and support liver function.

Neem (*Azadirachta indica*) is a versatile tree native to the Indian subcontinent and is known for various medicinal properties. Almost every part of the neem tree, including the leaves, bark, seeds, and oil has been traditionally used in Ayurvedic medicine for centuries. Neem leaf extract or neem tea may be beneficial for individuals with diabetes, but it's important to consult a healthcare professional before using it as a treatment.

Neem is well-known for its durable wood. In addition, the non-wood products neem, in this study, a poly herbal ointment with antibacterial activity was created and evaluated. Neem has been widely in Ayurveda, Unani and Homeopathic treatment and has become a modern medicine hot topic due to its medicinal properties.

Taxonomical Classification of Neem:

Common Name	Neem
Botanical Name	<i>Azadirachta Indica</i>
Kingdom	Kingdom
Division	Magnoliophyta
Class	Magnoliopsida
Order	Sapindales
Genus	<i>Azadirachta</i>
Species	<i>Azadirachta Indica</i>
Family	Meliaceae

Turmeric:



Fig.2: Turmeric powder

Biological name: *Curcuma longa*

Synonym: Turmeric, Haldi (Hindi), Haridra (Sanskrit), Indian Saffron

Family: Zingiberaceae

Chemical Constituents: Curcuminoids, Curcumin, Bisdemethoxycurcumin, demethoxycurcumin.

Energetic: Drying and Warming

Part used: Rhizomes.

Uses & Effectiveness:

1. Antioxidant activity:

Curcumin in turmeric acts as an antioxidant, helping to neutralize harmful free radicals in the body. By doing so, it may help protect cells from oxidative damage and contributes to overall well-being.

2. Dermatological conditions:

There aren't enough studies to provide conclusive evidence about how turmeric can help other skin conditions. However, it's suggested that it can help with eczema, alopecia, lichen planus, and skin issues.

3. Heal Wound:

The curcumin found in turmeric can help wounds heal by decreasing inflammation and oxidation. It also lowers the response of your body to cutaneous wounds. This results in your wounds healing more quickly.

4. Acne Scarring:

A turmeric help to reduce acne and any resulting scars. The anti-inflammatory qualities can target your pores and clam the skin. Turmeric is also known to reduce scarring. This combination of uses face clear up from acne breakouts.

5. Anti-inflammatory properties:

Turmeric contains a compound called curcumin, which has potent anti-inflammatory effects. It may help reduce inflammation in the body, which is beneficial for conditions like arthritis, joint pain, and inflammatory bowel disease.

6. Anti-cancer properties:

Some studies suggest that curcumin may have anti-cancer properties, as it can inhibit the growth of cancer cells and prevent the spread of tumours in animal in animal and laboratory studies.

Turmeric or *Curcuma longa* is a flowering plant in the ginger family Zingiberaceae. It is a perennial, rhizomatous, herbaceous plant native to the India subcontinent and Southeast Asia that requires temperature between 20 & 30 C (68 & 86 F) and high 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 a deep orange-yellow powder commonly used as a colouring and flavouring agents in many Asian cuisines, especially for curries, as well as for the dyeing characteristics imparted by the principal turmeric constituent, curcumin. Turmeric powder has a warm, bitter,

Black pepper-like flavour and earthy, mustard-like aroma. Curcumin, a bright yellow chemical produced by the turmeric plant, is approved as food additive by the World Health Organization, European Parliament, and United States Food and Drug Administration. Although long used in Ayurvedic medicine, there is no high-quality clinical evidence that consuming turmeric or curcumin is effective for treating any diseases.

Turmeric is a mild digestive, being aromatic, a stimulant and a carminative Turmeric is one of nature's most powerful healers. The active ingredients in turmeric is curcumin. Turmeric has been used for over 2500 years in India, where it was most likely first used as a dye. The medicinal properties of this spice have been slowly revealing themselves over the centuries.

Taxonomical Classification of Turmeric:

Kingdom	Plantae
Subkingdom	Tracheobionts
Super Division	Spermatophyte
Division	Mangoliophyta
Order	Zingiberales
Family	Zingiberaceae
Genus	Curcuma
Species	Longa
Scientific Name	Curcuma Longa

MATERIAL AND METHODS

DRUG PROFILE

1. Nimbidin:

Drug name: Nimbidin

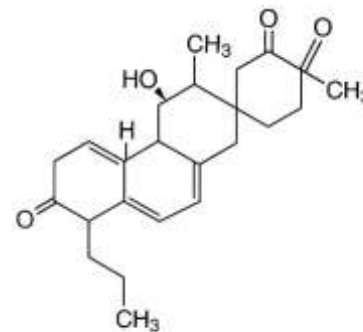
Chemical formula: C₃₀H₄₄O₆

Chemical name: Nimbidin

Molecular weight: 500.66 g/mol

Activity: Anti-bacterial, Anti-inflammatory, Ant

Solubility: Soluble in organic solvents like Chloroform, Ethanol, and Methanol.



Nimbidin

2. Nimbin:

Drug name: Nimbin

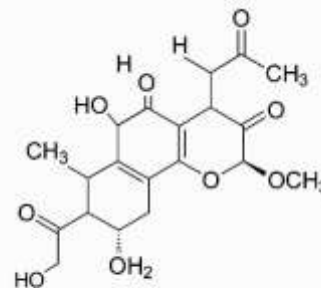
Chemical formula: C₃₀H₃₆O₉

Chemical name: Nimbin

Molecular weight: 540.6 g/mol

Activity: Anti-bacterial, Anti-inflammatory, Antifun

Solubility: Soluble in Organic solvent like ethanol, methanol, chloroform, acetone and Insoluble in water



Nimbin

3. Curcumin:

Drug name: Curcumin

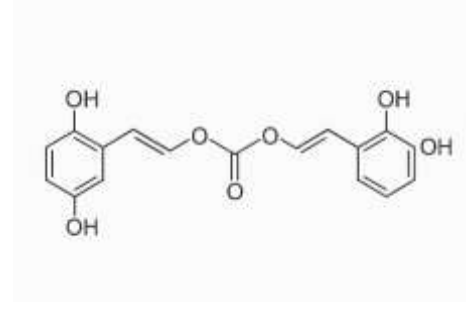
Chemical formula: C₂₁H₂₀O₆

Chemical name: (1E, 6E)-1,7-bis
(4-hydroxy-3-methoxyphenyl)-1,6-
Heptadiene-3,5-dione

Molecular weight: 368.39g/mol

Activity: Anti-bacterial, Antioxidant, Antifungal.

Solubility: Soluble in organic solvents like ethanol, methanol, acetone, chloroform and Insoluble in water.



EXCIPIENT PROFILE:

1. Wool fat:

Common Name: Lanolin

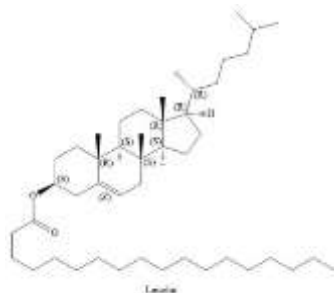
Source: Natural product derived from the Sebaceous secretions of Sheep's Wool

Chemical Nature: Complex mixture of esters

Chemical formula: C₃₄H₆₈O₂

Molecular Weight: 508.9g/m

Chemical Strucutre:



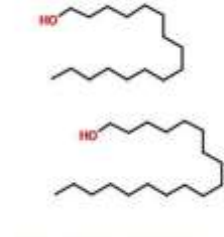
2. Cetostearyl alcohol:

Common Name: Cetearyl alcohol, Cetyl-stearyl alcohol.

Chemical formula: C₃₄H₇₂O₂

Category: Emulsifying agent

Chemical Structure:



3. Hard paraffin:

Common Name: Paraffin wax, Solid paraffin, Heavy paraffin

Source: Derived from petroleum by refining and de-oiling heavy lubricating oil fractions.

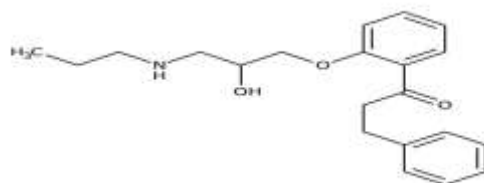
Physical Description:

- White or Colourless, odourless, tasteless, hard waxy solid
- Melting point: ~50-65C
- Insoluble in water, soluble in oils and organic solvents

Chemical Nature: A mixture of high molecular weight saturated hydrocarbons (alkanes)

Chemical Formula: C_nH_{2n+2}

Chemical Structure:



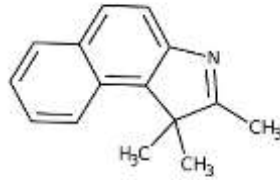
4. Yellow soft Paraffin:

Common Name: Petrolatum, Yellow Petroleum Jelly

Source: Semi-solid mixture of hydrocarbons derived from Petroleum.

Chemical Nature: Mixture of saturated hydrocarbons

Chemical formula: C₁₅H₁₅N (Petrolatum)

Chemical structure:**Methods****Different method used for preparing ointment**

Here are the different methods used for preparing ointment, especially in pharmaceutical and herbal formulation:

1. Fusion Method:

All ingredients are melted together, mixed and then cooled with constant stirring until a uniform ointment is formed.

2. Incorporation method:

Ingredients (especially powders or liquids) are incorporated into the base by geometric dilution and mixing (e.g. using a mortar & pestle or ointment slab).

Type: Solid incorporation and Liquid incorporation

3. Emulsification Method:

Used when ointment contains both aqueous and oily components. Emulsifiers are used to stabilize the mixture.

4. Trituration Method:

Involves grinding insoluble solids with a small amount of base to form a smooth paste, then adding more base gradually.

5. Mechanical Mixing (Ointment Mill or Mixer):

Industrial method using machines for uniform mixing and smooth texture.

6. Maceration Method:

Crude drugs are soaked in a solvent for a period to extract active compounds, then filtered and evaporated to obtain residues of Drug for the addition in ointment.

Formulation method by using Maceration Extraction

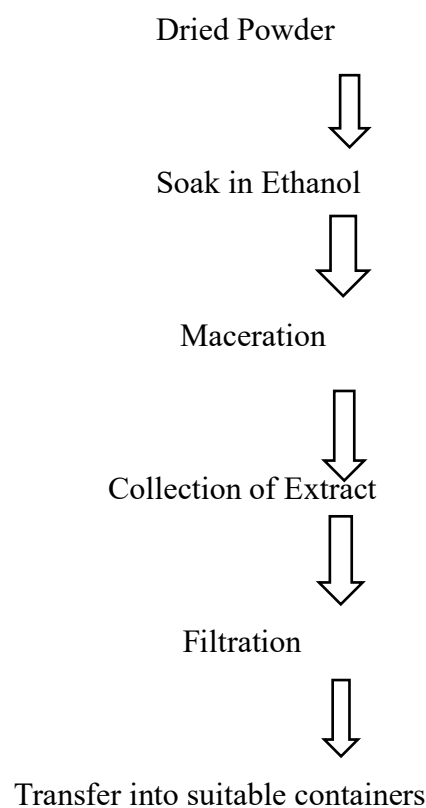
Apparatus:

500ml of Conical flask, digital weighing balance, heating mental, 250 ml beaker, magnetic stirrer, measuring cylinder.

Preparation of Extract:

Extraction: Extraction is the first step to separate the desired natural products from the raw materials. Extraction methods include solvent extraction, distillation method, pressing and sublimation according to the extraction principle. Solvent extraction is the most widely used method.

Steps for extraction:



Preparation of Neem Extract:

Leaves of plant were collected and washed thoroughly with distilled water and shed dried for 10 days. Dried leaves were ground into powder, 100gm powder was imbibed with 350ml of 90% ethanol for 3hrs, and transferred to percolator with addition of 150ml of 90% ethanol for maceration for 7 days with occasional stirring. Finally, ethanolic extract was collected and concentrated to get blackish green residue. The extract was stored in the airtight container at cool and dark place.

Preparation of Turmeric Extract:

Dried rhizomes of turmeric were ground and the powder obtained was followed for extraction same as that for Neem leaves extract. The extract with crimson red colour was obtained and stored at cool and dark place in airtight container.



Fig.3: Preparation of Neem and Turmeric extract



Fig.4: Filtration the extract

Method of preparation of Herbal Ointment Base

- Initially ointment base was prepared by weighing accurately grated hard paraffin which was placed in evaporating dish on water bath.
- After melting of hard paraffin remaining ingredients were added and stirred gently to aid melting
- Mixing homogeneously followed by cooling of ointment base.

Formulation of Herbal Ointment:

- Herbal ointment was prepared by mixing accurately weighed Neem and Turmeric extract to the ointment base
- By levigation method
- To prepared a smooth paste with two or three times its weight of base, gradually incorporating more base until to form homogeneous ointment
- Finally transferred in a suitable container.

Formulation table:

Sr. No	Name of Ingredients	Quantity to be taken
1	Wool fat	0.5gm
2	Cetostearyl alcohol	0.5gm
3	Hard Paraffin	0.5gm
4	Yellow soft Paraffin	8.5gm

Formulation of Ointment base

Name of Ingredients	Quantity to be Taken		
	F1	F2	F3
Prepared Neem Extract	0.08gm	0.10gm	0.12gm
Prepared Turmeric Extract	0.08gm	0.10gm	0.12gm
Ointment Base q. s	10gm	10gm	10gm

Formulation of Herbal Ointment

Fig.5: Preparation of ointment base



Fig.6 Preparation of Ointment



Fig.7: Herbal Ointment

UV Absorption Ranges

a) *Azadirachta indica* leaves extract:

Neem extract exhibit UV absorption in the range 300-400nm range. Specifically, the maximum absorption peak for aqueous neem leaf extract is often observed around 320nm and 370nm. Additionally, neem leaf extract can be synthesize nanoparticles, such as silver nanoparticles, which exhibit surface plasmon resonance peak in the UV-visible range of 400-500nm.

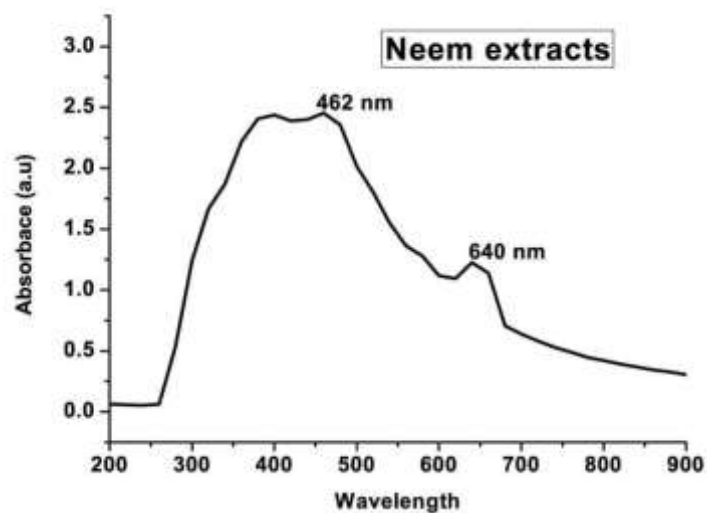


Fig.8: UV Absorption Ranges of Neem extract

b) *Curcuma longa* extract:

Turmeric exhibit UV absorption primarily in the range of 260-290nm and 420-430nm, with the most prominent peak around 420-425nm. This absorption is primarily due to the presence of curcumin, the main active compounds in turmeric.

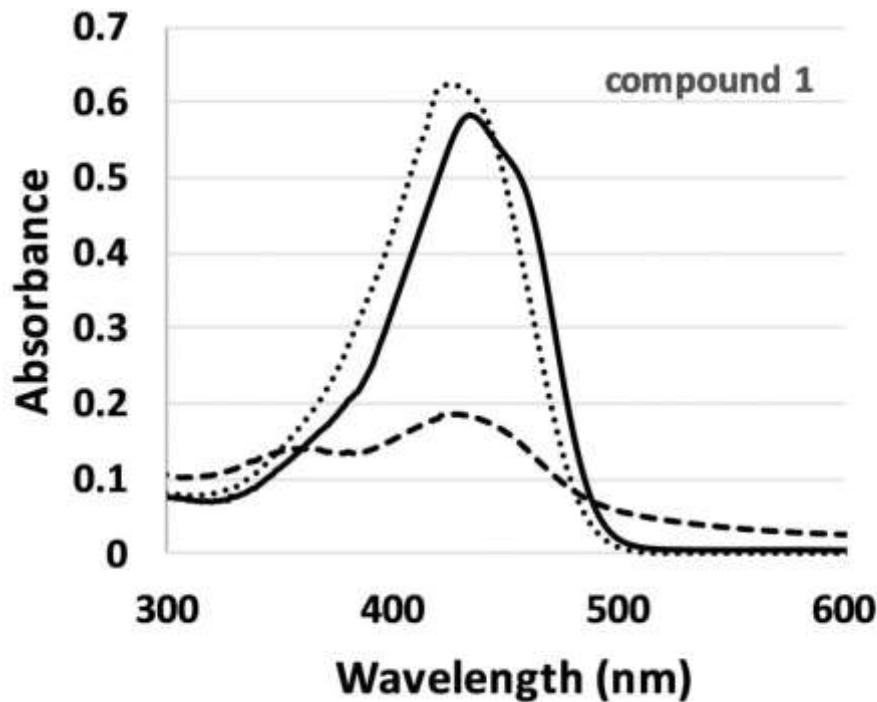


Fig.9: UV Absorption Ranges of Turmeric extract

Evaluation Parameters

A. Phytochemical test:

1. Alkaloids (Mayer's Test):

Take 2ml of extract, Add 1ml of Mayer's reagent
(Potassium mercuric iodide)

Result-Creamy white precipitate indicates alkaloids.

2. Flavonoids (Alkaline Reagent Test):

Take a 2ml of extract, Add few drops of NaOH solution.

Result-yellow colour that disappears on adding dilute HCl confirms flavonoids.

3. Tannins (Ferric Chloride Test):

Take 2ml of extract, Add 1-2 drops of 1% FeCl₃ solution.

Result-Blue-black or greenish colour.

4. Saponins (Foam Test):

Shake 5ml of extract with 5ml of distilled water in a test tube.

Result-Persistent froth.

5. Wagner's Reagent Test:

Take 2ml of extract, Add few drops of wagner's reagent, Mix gently and observe.

Sr.no	Phytochemical test	Method used	Observation	Inference
1	Alkaloids	Mayer's test	Creamy white precipitate	Present
2	Flavonoids	Alkaline reagent test	Yellow colour	Present
3	Tannins	Ferric chloride test	Blue-black/greenish precipitates	Present
4	Saponins	Foam test	Persistent froth	Present
5	-	Wagner's reagent test	Reddish brown/brown precipitates	Present

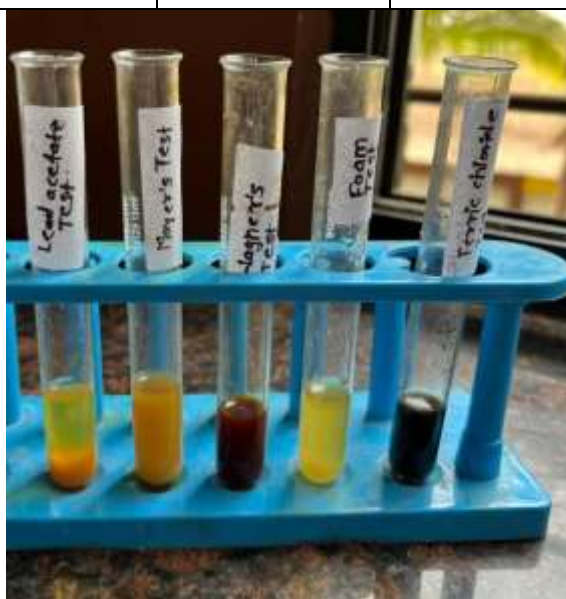


Fig.10: Phytochemical test

B. Post Formulation Studies

1. Physical Evaluation:

i). Organoleptic Parameters:

The prepared ointment formulation was evaluated for various parameters like colour, ambience, texture and any possible phase separation by visual observation. Pressing small quantity of the ointment on the finger and thumb gives an idea about its texture and homogeneous nature.

Sr.no	Physical properties	Specification Limit
1.	State	Semi Solid
2.	Colour	Faint Yellow
3.	Odour	Characteristic
4.	Texture	Smooth

Physical properties of Ointment

ii). pH determination:

The pH of various formulation was determined by using digital pH meter. About 2 gm of the ointment was taken in a beaker followed by 100ml of distilled water, resulting solution were heated up to 70C. The pH of ointment is determine using a digital pH meter, and the reading were recorded in triplic



Fig.11: pH meter

iii). Homogeneity:

All the developed ointment was tested for homogeneity by visual inspection. They were tested for their appearance with no lumps.

iv). **Solubility:**

A rapid and simple method used to determine solubility. With boiled water ointment is soluble, and with Chloroform, Ether, ointment was miscible.



Fig.12: Solubility Test

2. **Loss On Drying:**

The loss in weight, in the sample so tested, principally is due to loss of water and small amount of volatile material from it. Loss on drying was determined by placing 1gm of ointment formulation of different batches in a petri dish on water bath dried until constant weight obtained.

3. **Stability Study:**

Formulation were evaluated for their stability at an amount condition of pressure and temperature for four weeks. Formulation were observed for phase separation and particle agglomeration. A physical stability test of the herbal ointment was carried out four weeks at various temperature conditions like 2C, 25C and 37C. The herbal ointment was found to be physically stable at different temperature i.e. 2C, 25C, and 37C within four weeks.

4. **Spreadability:**

The ointment sample was applied between the two glass slides and was compressed between the two-glass slide to uniform thickness by placing 100gm of weight for 5 minutes then weight was added to the weighing pan. The time in which the upper glass slide moved over the lower slide was taken as a measure of spreadability.

$$\text{Sreadability} = m \cdot l / t$$

Where, m=weight tight to upper slide

l=length moved on the glass slide

t= time take



Fig.13: Spreadability Test

5. Consistency:

Smooth and no greediness is observed.

6. Washability:

Prepared ointment formulation were applied on the skin and then is extend of washing with water and checked. Washability was checked by keeping applied skin area under the tap water for about 10 minutes.

7. Non-irritancy test:

Herbal ointment prepared was applied to the skin of human being and observed for the effect. This test is performed by applying the small amount sample to the hand and observed for 24 hours to checked the effects like redness, erythema, inflammation etc. Hence, no such effect was observed, it is non-irritant to the skin.

Evaluation Result:

Physicochemical Parameters	Observations
Colour	Faint Yellow
Odour	Characteristic
Consistency	Smooth
pH	5.4
Spreadability	26.5 Sec
Extrudability	0.4gm
Diffusion study	0.7cm
Loss on Drying	20%
Solubility	Soluble in Boiling Water, Miscible with Alcohol, Ether, chloroform
Washability	Good
NON-irritancy	Non -Irritant
Stability Study	Stable

Physicochemical Evaluation**RESULT AND DISCUSSION:****Formulation table:**

Sr. No	Name of Ingredients	Quantity to be taken
1	Wool fat	0.5gm
2	Cetostearyl alcohol	0.5gm
3	Hard Paraffin	0.5gm
4	Yellow soft Paraffin	8.5gm

Formulation of Ointment base

Name of Ingredients	Quantity to be Taken		
	F1	F2	F3
Prepared Neem Extract	0.08gm	0.10gm	0.12gm
Prepared Turmeric Extract	0.08gm	0.10gm	0.12gm
Ointment Base q.s	10gm	10gm	10gm

Formulation of Herbal Ointment

Discussion:

Three herbal ointment formulation (F1, F2, and F3) were prepared using Neem and Turmeric extracts. All formulation showed acceptable physiochemical properties with transparent appearance and bitter taste. Among them, F2 exhibited the best stability and palatability, indicating higher potential for bacterial infections.

CONCLUSION:

Since ancient time, herbs plays major role in the treatment because of less side effect, cost and easy availability. The neem leaves extract can be formulated by four different formulation with different bases like methyl paraben, cetostearyl alcohol, and formulation evaluated for physical parameters and standardized as per pharmacopoeial standard. The result of the physical evaluation of ointment preparation with extract of neem and turmeric indicated the stability of method for the production of ointments. Further investigation are necessary to determine therapeutic efficiency of prepared herbal ointment formulation. Since ancient times neem and turmeric have been used for their various medicinal properties, such as antibacterial, antimicrobial, antifungal, anti-inflammatory, wound healing and so on. As a result, this ointment could be used as medium to effectively and easily use these medicinal properties as a simple dosage form, physicochemical parameters of herbal ointment is evaluated by several test. Such as spreadability, stability, washability, viscosity test. So all the result which was obtained by performed test are good.

FUTURE SCOPE:

1. **Development of safer alternatives** to synthetic antibiotics for treating skin infections, minimizing the risk of side effects and antibiotic resistance.
2. **Commercial production** of herbal-based antibacterial ointments using standardized extracts, ensuring consistency, safety, and effectiveness.
3. **Expansion into other dosage forms** such as gels, sprays, or creams to improve patient convenience and application.
4. **Use in treating a wider range of infections**, including fungal or mixed microbial skin infections due to the broad-spectrum nature of Neem and Turmeric.
5. **Potential for clinical trials** to validate the efficacy and safety of herbal ointments in real-world healthcare settings.
6. **Integration with modern medicine** as part of complementary and alternative therapy, promoting holistic treatment approaches.
7. **Application in veterinary care** for wound healing and skin infection treatment in animals.

8. **Scope for innovation** by combining with other medicinal plants to create multi-functional topical formulations (e.g., anti-inflammatory, analgesic, antifungal).

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Registration ID - 303335


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