Formulation and evaluation of herbal ointment containing neem and turmeric extract

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Abstract: Even in areas where modern medicine is available, the interest on herbal medicines and their utilization have been increasing rapidly in recent years. Plant derived substances and herbal medicines have recently attracted the great interest towards their versatile application, as medicinal plants are the richest source of bioactive compounds used in traditional and modern medicine. The present work is to formulate and evaluate the ointment of Neem (Azadirachta indica) and Turmeric (Curcuma longa) extract. The ethanolic extracts were prepared by using maceration method. The ointment base was prepared and formulation of ointment was done by incorporating the extract in the base by levigation method. After completion of formulation it was evaluated for its physicochemical parameters like colour, odour, pH, spreadability, extrudability, consistency, diffusion study, solubility, washability. Also the formulation was evaluated for its stability at various temperature conditions which shows no change in the irritancy, spreadability and diffusion study. Thus it could become a media to use the medicinal properties of Neem and Turmeric effectively and easily as a simple dosage form.

Keywords: Maceration, Levigation, Extrudability, Spreadability.

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 sufferings 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.
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, antiseptics, 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 consists of dried as well as fresh rhizomes of plant known as Curcuma longa. Family Zingiberaceae. It is used as antiseptic, expectorant, condiment or spice. It is rich in antioxidants, research conducted has demonstrate uses of turmeric in the treatment of arthritis, liver diseases.

NEEM PLANT

(Azadirachta indica)
**Azadirachta indica**, commonly known as neem, nimtree or Indian lilac, is a tree in the mahogany family Meliaceae. It is one of two species in the genus Azadirachta, and is native to the Indian subcontinent and most of the countries in Africa. It is typically grown in tropical and semi-tropical regions. Neem trees also grow on islands in southern Iran. Its fruits and seeds are the source of neem oil.

**Plant Description Of Neem Plant**

Neem trees can reach 15–30 metres (49–98 feet) in height and have attractive rounded crowns and thick furrowed bark. The compound leaves have toothed leaflets and are typically evergreen but do drop during periods of extreme drought. The small fragrant white flowers are bisexual or staminate (male) and are borne in clusters in the axils of the leaves. The fruit is a smooth yellow-green drupe and has a sweet-flavoured pulp. Neem is usually grown from seed but can be propagated from cuttings or root suckers. The plant is hardy and resilient and grows well in poor, rocky soils. Neem tolerates a wide variety of environmental conditions but cannot survive freezing temperatures or being waterlogged.

**Morphology Of Neem Plant**

Neem is a medium-sized tree, reaching 15 to 30 m in height, with a large rounded crown up to 10-20 m in diameter. It is mainly evergreen but sometimes shed its leaves during the dry season.

Neem has a deep taproot and is a mycorrhizal-dependent species. The bark is grey, becomes fissured and flakes in old trees. A sticky foetid sap exudates from old trees in humid climates. The branches are numerous and spreading.

The leaves are alternate, petiolated, clustered at the end of the branches, unequally pinnate, glabrous and dark glossy green at maturity, 20–40 cm in length and bearing 10-20 leaflets. The leaflets are 5-10 cm long x 1.2-4 cm broad, sickle-shaped and slightly denticulate.

The flowers are numerous, fragrant, white and borne in large clusters (up to 30 cm long). Neem fruits are 1-2 cm long drupes, smooth and green with white milky juice when unripe, turning to yellow to brown when mature.

They have a thin epicarp, a mucilagenous fleshy mesocarp and a hard endocarp. They contain a variable number of ovoid (1-2 cm) oil seeds.

**SIDE EFFECTS OF NEEM PLANT**

Neem is POSSIBLY SAFE for most adults when taken by mouth for up to 10 weeks, when applied inside the mouth for up to 6 weeks, or when applied to the skin for up to 2 weeks.

When neem is taken in large doses or for long periods of time, it is POSSIBLY UNSAFE. It might harm the kidneys and liver.

**Uses Of Neem**

1. **Antibacterial activity**

Recent research shows the isolation and identification of the antibacterial active compound from petroleum ether extract of neem oil. The study of Zhong et al. showed an antibacterial activity of 9-octadecanoic acid-hexadecanoic acid-tetrahydrofuran-3,4-diyl ester from neem oil. Elavarasu et al. studied in vitro anti-plaque microbial activity of neem oil.

2. **Antiviral**

Galhardi et al. studied the in vitro antiviral property of Azadirachta indica polysaccharides for poliovirus. The study of Saha et al. showed water extracted polysaccharides from A. indica leaves with anti-bovine herpes virus type 1 (BoHV-1) activity. The research of Xu et al. showed the in vitro antiviral activity of neem seed kernel extracts against duck plague virus.

3. **Sexually transmitted disease**

Few researchers have focused on neem efficacy in treating sexually transmitted diseases. The reports that have been completed are overwhelmingly positive. Recent research of Shokeen et al. showed the evaluation of the activity of 16 medicinal plants against Neisseria gonorrhoeae.
4. Neem and the immune system

Thoh et al. studied that azadirachtin interacts with the tumor necrosis factor (TNF) binding domain of its receptors and inhibits TNF induced biological responses.

5. Anti-inflammatory activity

The study of Alam et al. showed the anti-inflammatory activity of epoxyazadiradione against macrophage migration inhibitory factor[45]. Thoh et al. found that azadirachtin interacts with retinoic acid receptors and inhibits retinoic acid-mediated biological responses.

6. Antioxidant effect

Manikandan et al. researched that antioxidant and protective effects of active neem leaf fractions against hydrogen peroxide induced oxidative damage to pBR322 DNA and red blood cells.

Turmeric plant

(Curcuma longa)

Turmeric, (Curcuma longa), perennial herbaceous plant of the ginger family (Zingiberaceae), the tuberous rhizomes, or underground stems, of which have been used from antiquity as a condiment, a textile dye, and medically as an aromatic stimulant. Native to southern India and Indonesia, turmeric is widely cultivated on the mainland and in the islands of the Indian Ocean. In ancient times it was used as a perfume as well as a spice. The rhizome has a peppery aroma and a somewhat bitter warm taste and has a strong staining orange-yellow colour. It is the ingredient that colours and flavours prepared mustard and is used in curry powder, relishes, pickles, and spiced butters for vegetables, in fish and egg dishes, and with poultry, rice, and pork.

Phytochemistry Of Turmeric

Turmeric powder is about 60–70% carbohydrates, 6–13% water, 6–8% protein, 5–10% fat, 3–7% dietary minerals, 3–7% essential oils, 2–7% dietary fiber, and 1–6% curcuminoids.

Phytochemical components of turmeric include diarylheptanoids, a class including numerous curcuminoids, such as curcumin, demethoxycurcumin, and bisdemethoxycurcumin.
Curcumin constitutes up to 3.14% of assayed commercial samples of turmeric powder (the average was 1.51%); curry powder contains much less (an average of 0.29%). Some 34 essential oils are present in turmeric, among which turmerone, germacrone, atlantone, and zingiberene are major constituents.

USES OF TURMERIC

Turmeric is one of the main ingredients of curry powder, and is used to give it the characteristic yellow colour. It is also delicious added to rice dishes, seafood, and mustards and pickles.

Turmeric is also more widely used as a colourant for textiles and food products. It is sometimes substituted for saffron as it is much less expensive, but produces the same yellow colour.

Turmeric has also been used as an alternative to medicine and can be made into a drink.

Health Benefits Of Turmeric

1. Anti-Inflammatory
   The best-known health benefit of turmeric is its anti-inflammatory and antioxidant properties, giving it the power to alleviate swelling and pain in conditions such as arthritis. Inflammation is a very common cause of pain and discomfort. It can also contribute to the development of certain diseases. Turmeric usage reduces the risk of the side effects of taking prescription anti-inflammatory drugs.

2. Boosts Immunity
   The immune system is responsible for protecting the body against pathogens that can cause disease and infection. Turmeric has been shown to be one of the best foods to maintain, protect, and boost immunity, reducing the risk of falling ill. Turmeric has antiviral, antibacterial and antimicrobial properties.

3. Pain Relief
   Turmeric can ease pain and is used as a pain reliever for arthritis pain. This has been studied in several trials, particularly for patients with arthritis.

4. Potent Antioxidant
   Turmeric has antioxidant properties that help fight free radical damage and oxidative stress. Oxidative damage is believed to be one of the mechanisms behind the development of numerous diseases and aging. Curcumin is a potent antioxidant that can help neutralize free radicals. Aside from that, curcumin can boost the activity of antioxidant enzymes in the body.

MATERIALS AND METHOD

1. Collection of Plant material
   Leaves of neem were collected from the local area of Pune and dried rhizomes of turmeric were purchased from the local market of Pune.

2. Preparation of Neem extract
   Leaves of the plant were collected and washed thoroughly with distilled water and shade dried for 10 days. Dried leaves were ground into powder form. 100gm powder was imbibed with 350ml of 90% ethanol for 3hrs. and transferred to percolator with an 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.

3. 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 air tight container.

   Procedure for preparation of herbal ointment
   1) 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 and mixing homogeneously followed by cooling of ointment base.
   2) Herbal ointment was prepared by mixing accurately weighed Neem and Turmeric extract to the ointment base by levigation method to prepare a smooth paste with 2 or 3 times its weight of base, gradually incorporating more base until to form homogeneous ointment, finally transferred in a suitable container.

   Evaluation Of Ointment
   1. Colour and Odour
      Physical parameters like colour and odour were examined by visual examination.
   2. Consistency
      Smooth and no greediness is observed.
   3. pH
      PH of prepared herbal ointment was measured by using digital PH meter.

      The solution of ointment was prepared by using 100ml of distilled water and set aside for 2hrs.
      PH was determined in triplicate for the solution and average value was calculated.
   4. Spreadability
The spreadability was determined by placing excess of sample in between two slides which was compressed to uniform thickness by placing a definite weight for definite time. The time required to separate the two slides was measured as spreadability. Lesser the time taken for separation of two slides results better spreadability. Spreadability was calculated by following formula

\[ S = \frac{M \times L}{T} \]

Where,
- \( S \) = Spreadability
- \( M \) = Weight tied to the upper slide
- \( L \) = Length of glass slide
- \( T \) = Time taken to separate the slides

5. Extrudability
The formulation was filled in collapsible tube container. The extrudability was determined in terms of weight of ointment required to extrude 0.5cm of ribbon of ointment in 10 seconds

6. Diffusion study
The diffusion study was carried out by preparing agar nutrient medium. A hole board at the center of medium and ointment was by placed in it. The time taken by ointment to get diffused through was noted. (after 60 minutes)

7. LOD
LOD was determined by placing the formulation in petri-dish on water bath and dried for the temperature.

8. Solubility
Soluble in boiling water, miscible with alcohol, ether, chloroform.

9. Washability
Formulation was applied on the skin and then ease extent of washing with water was checked.

10. Non irritancy Test
Herbal ointment prepared was applied to the skin of human being and observed for the effect.

11. Stability study
Physical stability test of the herbal ointment was carried out for four weeks at various temperature conditions like 20° C, 25° C and 37° C. The herbal ointment was found to be physically stable at different temperature i.e. 20° C, 25° C, 37° C within four weeks.

<table>
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<tr>
<th>Sr No</th>
<th>Name Of Ingridient</th>
<th>Quantity To Be Taken</th>
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<tbody>
<tr>
<td>1</td>
<td>WOOL FAT</td>
<td>0.5g</td>
</tr>
<tr>
<td>2</td>
<td>CETOSTEARYL ALCOHOL</td>
<td>0.5g</td>
</tr>
<tr>
<td>3</td>
<td>HARD PARAFFIN</td>
<td>0.5g</td>
</tr>
<tr>
<td>4</td>
<td>YELLOW SOFT PARAFFIN</td>
<td>8.5g</td>
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</tbody>
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**Table 1. FORMULATION OF OINTMENT BASE**

**Table 2. FORMULATION OF HERBAL OINTMENT**

<table>
<thead>
<tr>
<th>SR.NO</th>
<th>Name Of Ingridient</th>
<th>Quantity To Be Taken</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Prepared Neem Extract</td>
<td>0.06g</td>
</tr>
<tr>
<td>2</td>
<td>Prepared Turmeric Extract</td>
<td>0.06g</td>
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<tr>
<td>3</td>
<td>Ointment Base</td>
<td>10g</td>
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**RESULT**
The present study was done to prepare and evaluate the herbal ointment. For this the herbal extracts were prepared by using simple maceration process to obtain a good yield of extract and there was no any harm to the chemical constituents and their activity. The levigation method was used to prepare ointment so that uniform mixing of the herbal extract with the ointment base was occured which was stable during the storage.

The physicochemical properties were studied which shows satisfactory results for spreadability, extrudability, washability, solubility, loss on drying and others. Also the formulation was placed for a stability study at different temperature conditions like 20 deree celcius, 25 degree celcius and 37 degree celcius within four weeks. There were no changes observed in spreading ability, diffusion study as well as irritant effect.
Conclusion
From the ancient time Neem and Turmeric is used for their various medicinal properties like antibacterial, antifungal, anti-inflammatory etc.
Thus this ointment could become a media to use these medicinal properties effectively and easily as a simple dosage form.

References
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