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Review Article

Optimization Of Herbal Extract-Based Ointments: Characterization and Wound Healing Potential

Dipraj Sonawane*, Shrikant Madhekar, Sachidanand Angadi

Yash Institute of Pharmacy, Cidco Waluj Mahanagar 2, Chhatrapati Sambhajanagar, Maharashtra 431136.

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ABSTRACT

Ointments are a category of semi-solid formulations intended for external application to the skin or mucous membranes. Ointments contain medicament or medicaments, suspended, emulsify or dissolved in a base ointment formulation provides better application property and stability in comparison to cream and gel. Topical ointment are to certain mucosal surfaces for local action or percutaneous penetration of medicament or for their emollient or defensive action. Ointment is evaluated by subsequent parameters such as pH, viscosity, spread ability, extrude ability, skin irritation studies, in Stability. Thus, it could become a media to use the medicinal properties of Neem and Turmeric effectively and easily as a simple dosage form. The formulation consideration of ointment was reviewed.

INTRODUCTION

A type of semi-solid dose form called an ointment is applied externally to the skin or mucous membrane. Ointments contain medications that are dissolved, emulsified, or suspended in a base. They perform emollient and protective action. An ointment can also be considered as a soothing, healing [2]. Slightly oily or fatty substance into which this sense of a healing plant has been dissolved basically, this is accomplished by heating the fat or oil with the plant until it loses its normal colour and the oil or fat has absorbed the

healing chemical principles. The plant is then strained out, and beeswax is added to harden the ointment. Preservatives, such as tincture of benzoin or glycerine can also be added. When the ointment reaches body temperature, it should be smooth, steady, free of grit, and easy to apply. It is necessary to evenly distribute and finely split the medication used throughout the bases. The basis for the ointment should not irritate the skin and should not have any medicinal properties. They may be applied to the skin, placed on the surface of the eye or used nasally, vaginally or rectally. Topical medicines are applied to achieve both

***Corresponding Author:** Dipraj Sonawane

Address: Yash Institute of Pharmacy Cidco Waluj Mahanagar 2, Chhatrapati Sambhajanagar, Maharashtra 431136.

Email ✉: diprajsonawane400@gmail.com

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systemic and local effects [3,4]. When it comes to dermatological uses, the following differentiation is crucial. The goal of a topical dermatological product is to treat dermal issues by administering a drug to the target organ, the skin. Dermatological products functional to the membrane are diverse in formulation and range in consistency from liquids to solid powders, but most popular products are semisolid preparations [5]. Some of these may be non-medicated, in the sense that these may be devoid of any therapeutically active ingredients and are used for cosmetic purposes.

Background studies:

Neem (azadiracta indica):

The well-known example of microbial and anti-inflammatory properties represents Neem as the plant that is widely known as a pharmacy of nature belonging to Meliaceae family. Its active constituents are primarily azadirachtin, nimbin, nimbidin and gedunin which give it its antibacterial and healing properties (24). Neem extracts were also reported to carry a high in vitro inhibitory activity against *S. aureus* and *E. coli* (25).

Turmeric (Curcuma longa):

Turmeric, a herb of the Zingiberaceae family which is perennial, is made up of curcuminoids with the most significant one being curcumin and desmethoxycurcumin. These are substances that are reported to have a strong antioxidant, an anti-inflammatory and anti-bacterial effect (26). Turmeric preparations applied to skin improve wound healing by the synthesis of collagen and detoxication of the oxidative stress (27).

Moringa (Moringa oleifera):

The foliage of *Moringa oleifera* offers potent antioxidant and tissue-regenerative effects that

cannot be neglected because of the presence of flavonoids, vitamins, and essential amino acids in these leaves. The extracts of the plant indicate healing through its factors by affecting the microbial barrier with regard to the Gram-positive and Gram-negative bacterium (28,29).

Types of ointments:

The various types of ointments are:

- 1.Unmediated ointments
- 2.Medicated ointments

Unmediated ointments:

These ointments do not contain any drugs. They are useful as emollients, protectants.

Example: Petroleum jelly [6].

Medicated ointments: These ointments contain medications that can have systemic or local effects. These come in a variety of subtypes:

- 1.Dermatologic ointments
- 2.Ophthalmic ointments
- 3.Rectal ointments
- 4.Vaginal ointments
- 5.Nasal ointments [7,8]

Characteristics of ointments:

1.Ointments are used topically for several purposes, e.g., as protectants, antiseptics, emollients, antipruritic, keratolytic, and astringents [9].

2. A protective ointment shields the skin from the elements, including moisture, air, and sunlight [10].



3. Neither penetrates the human skin's protective layers nor makes it easier for substances to pass through them.

4. To kill or stop bacteria from growing [11], an antiseptic ointment is applied. Since many bacterial infections are deeply rooted, it is preferable to have a foundation that can dissolve or penetrate and efficiently release the medication.

5. Creams with emollient properties should be simple to use, oil-free, and able to enter the skin [12,13].

Advantages of Herbal Ointments

1. Natural origin:

Made from plant-based bioactive compounds such as *Azadirachta indica* (neem), *Curcuma longa* (turmeric), and *Moringa oleifera* (moringa).

Minimal chances of irritant or toxic effects.

2. Therapeutic properties:

Neem: strong antibacterial and antifungal activity.

Turmeric: potent anti-inflammatory and antioxidant properties.

Moringa: therapeutic and skin-nourishing effects.

3. Synergistic healing effect:

Combination of herbal ingredients enhances wound healing and promotes better skin health.

4. High patient tolerability:

Generally biocompatible and well-tolerated with fewer side effects.

5. Cost-effective:

Plant sources are easily accessible and affordable.

6. Environmentally friendly:

Supports sustainable and eco-friendly approaches.

7. Traditional support:

Use is backed by centuries of cultural and empirical traditional medicine.

Disadvantages of Herbal Ointments

1. Lack of standardization:

Active compound content can vary depending on harvest time, extraction method, and storage.

2. Limited scientific evidence:

Few controlled clinical trials and small-scale studies limit global regulatory acceptance.

3. Stability issues:

Prone to microbial contamination and oxidation.

Requires special storage conditions.

4. Allergic reactions:

Some individuals may experience sensitivity or skin allergies.

5. Delayed onset of action:

Effects may appear slower compared to synthetic drugs.

6. Potential drug interactions:

Herbal components can interact with other medications.

7. Quality control challenges:

Need for standardization, clinical trials, and quality assurance to ensure safety and efficacy.



Limitations:

First, the application of herbal ointments made of neem, turmeric, and moringa as a treatment is encouraging and, still, there are several challenges to overcome:

1. Unpredictability of herbal extracts - Due to the source of plant, season of harvest and extraction methods, the concentration of the bioactive compound may vary, which may influence the consistency and efficacy.
2. Stability problems - Natural compounds are likely to be destroyed over time, particularly when light, heat, or oxygen are involved; hence, their shelf-life may be decreased.
3. Scarcity of clinical evidence - Most of the studies are in vitro or in animals; there are still not sufficiently well-designed and large-scale clinical trials that can show conclusively the safety and efficacy in humans.
4. Allergic reactions - The ingredients of the herbs may prove to be irritating or even allergic to some individuals and therefore special testing needs to be done before it is used.
5. Formulation issues - It can be a complicated task to make sure that the active compounds are stable and to attain the right absorption, texture, and Spreadability.

Plant Profile



1) Moringa Oleifera:

Drug Name: Moringa

Synonyms: Drumstick tree

Scientific name: Moringa oleifera

Biological source: Moringa oleifera it consists of dried leaves.

Family: Moringaceae

Chemical constituents: Phenolic, Flavonoids, Tannins, Saponins,

Sterols, Tocopherols, Carotenoids, Chlorophylls [14].

Geographical source:

Moringa oleifera is one of the edible plants of the Brassica order and belongs to the family Moringaceae. Malnutrition has been averted by utilizing moringa trees, particularly in nursing women and newborns. Moringa oleifera is a small native tree of the sub-Himalayan regions of North West India, which is now indigenous to many regions in West India, Africa, Arabia, South East Asia, Islands and South America

Uses:

- ☐ It uses as an Antibacterial.
- ☐ It uses as an Antifungal.

☐ It uses as an Antioxidant [15]



☐ It is use to Treats Wounds.



2)Neem:

Drug Name: Neem

Synonyms: Margosa, Neem tree

Scientific name: Dorse Azadi, Conta. Tedico

Biological source: The fresh or dried leaves and seed oil of *Azadirachta indica* make up neem

Family: Meliaceae

Chemical constituents: Nimbin, Nimbidin, Nimbidol, Sodium, Nimbinate, Gedunin, Salannin.

Geographical source:

Neem (*Azadirachta indica*) is a member of the Meliaceae family and its role as health-promoting effect is attributed because it is rich source of antioxidant. Fatty acids, antioxidants, and antibacterial substances found in neem oil have several potential health benefits for the skin. These compounds might assist in the remedy of dermal infections. Encourage wound closure and fight against skin aging symptoms [16,17]

Uses:

- ☐ It is use as a Nourishes Skin.
- ☐ It is use to Treats Fungal Infections.

3)Turmeric:

Drug Name: Turmeric

Synonyms: Haldi, Saffron India

Scientific name: *curcuma longa*

Biological source: *Curcuma longa* is a perennial herbaceous rhizomatous plant that produces turmeric.

Family: Zingiberaceae

Chemical constituents: Curcumin and two related compounds. Demethoxy curcumin and bisdemethoxycurcumin.

Geographical source:

A common ingredient to flavour or colour curry powders, mustards, butters, and cheeses, turmeric has a warm, bitter taste [20]. Turmeric's curcumin and other compounds may reduce swelling, which is why it's frequently used to relieve pain and inflammation. On account of osteoarthritis, people frequently utilize turmeric [18,19].

Uses:

- ☐ Turmeric is used as aromatic
- ☐ Anti-inflammatory



□ Stimulant

Method of preparation of herbal ointment:

A) Ointment bases:

Bases can be conveniently categorized into the following types.

1. Hydrocarbon bases: soft paraffin, hard paraffin, and liquid paraffin are examples of hydrocarbon bases.

2. Absorption bases: Wood alcohol, beeswax, hydrous wool fat, and wool fat (anhydrous lanolin) are examples of absorption bases.

3. Neutral oil bases: Almond oil; coconut oil; olive oil, vitamin E, wheat germ [21,22].

Method of preparation of ointment bases:

1. Melt petroleum jelly (500 gm.) or wax in a glass bowl set in a pan of boiling water.

2. Stir continuously for 15 minutes after adding the finely chopped herb (60 g of dried herb or 150 g of meat herb).

3. Fill a jelly bag tied to the rim of a jug with the herb combination, and let it sit.

4. A liquid to pass through.

5. Using rubber gloves, squeeze out as much of the heated herb mixture as possible.

B) Extraction Process:

1) Preparation of Moringa Oleifera:

Topical balm formulations were developed with the help of different ingredients as depicted in the constituents of the base which were placed together in a melting pan and permitted to melt jointly at 70°C.. The ingredients were gently

mixed after melting to keep the temperature at 70°C for roughly five minutes, and then they were continuously stirred while cooling. Manufacture of the ointment was done by the introduction of 10% w/w of the semisolid extract of *Moringa oleifera* to the different bases through trituration in a ceramic mortar using pestle to attain 100g of herbal ointments with 10 percent w/w of *Moringa oleifera* [14]. The ready herbal ointments had been put in ointment jars, labelled and stored at room temperature pending the evaluation.

2) Preparation of Neem extract:

After a close wash using distilled water, the leaves of the plant were collected and dried in the shades within ten days. We pulverized the dried leaves into a powder. After being incubated for three hours with 350 millilitres of 90% ethanol, 100 grams of powder was moved to a percolator and macerated for seven days with periodic stirring. The ethanolic extract was then gathered and condensed to produce a residue that was blackish green. The extract was kept in a dark, cool place in an airtight container [16].

3) Preparation of Turmeric extract:

Just as it is done to release the neem leaves, dried rhizomes of turmeric were crushed into a fine powder and then extracted [18]. The crimson-red extract was removed and placed in an airtight container in a cool and dark place.

Future Prospects

1. Herbal ointments offer immense opportunities to development and innovation:
2. Nanoformulation methods - nano technologies can be applied with important effect to enhance the bio-availability, skin penetration, and stability of active chemical compounds.



3. Synergistic blends - the combination of multiple herbal extracts or the combination of the latter with modern pharmaceutical agents can lead to a greater therapeutic effect.
 4. Specific medical uses - future research can focus on specific diseases, e.g. non-healing wounds, diabetic ulcers or inflammatory skin disease.
 5. Quality standardization and quality control - the advances in the sphere of the measuring methods (such as HPLC, LC-MS/MS) will ensure the availability of the bioactive compounds at the identical concentration level in various batches.
 6. Eco-friendly production - large-scale and environmentally friendly ways of planting medicinal herbs will be able to supply an endless amount and do less damage to the environment.
 7. Clinical research- It requires human studies that are very rigorous and comprehensive to ascertain the effect, safety and the appropriate dose of drug on each ailment.
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