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Review on: Herbal Ointment

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Abstract: ***Various areas where modern medicine is available, but the majority of the peoples in developing countries utilizes plants or plant preparations in their regular health care, many plant species have been proved to to possess antioxidant, antibacterial, and anti-inflammatory effects.A semisolid dose form, ointments often behave as visco-elastic materials under shear stress. Typically, they are given externally to the body to produce a therapeutic effect and include medicinal components. Natural medicines are also made in the form of ointments, along with various dosage forms. Numerous medicinal substances that are applied topically to mucous membranes or intact or injured skin are in semi-solid consistency and are referred to as ointments, creams, pastes, and so forth. It is mostly used to the skin as an emollient or protector. The purpose of this review is to present a summary of the creation and assessment of herbal ointments that contain herbal extract. Formulation, Quality Control and Standardization, Guidelines and Protocols for Quality and Marketed Herbal Ointments were studied.***
Keyword: ***Herbal ointment, Natural medicines, Skin, Physicochemical properties, Quality Control.***

I. INTRODUCTION

Herbal medicine is the oldest form of medicine that has been documented. This form of medicine was the foundation of many ancient civilisations and is currently the most widely used in the globe. The plant showed a wide range of pharmacological characteristics, such as antibacterial, antioxidant, anticancer, hypolipidemic, cardiovascular, neurological, respiratory, immune system, anti-inflammatory, analgesic, and antipyretic effects. Topical herbal medications are popular because of their anti-inflammatory, antibacterial, wound-healing, and analgesic properties. In medicated ointments, the medication is either suspended, emulsified, or mixed with the ointment base. As a result, the ointment has several purposes when applied externally, including keratolytics, protectants, antiseptics, emollients, astringents, and antipruritics. The majority of ointment bases are water-free and often comprise one or more chemicals in a dispersed, suspended, or solution form. Thus, There are several kinds of ointment bases, including water-soluble absorption bases and dehydrating hydrocarbon bases.(1)

The review aims for studies of formulation and to evaluate the stability, effectiveness, and safety of the herbal ointment, ensuring that it meets the standards required for therapeutic use.These active substances are mixed with suitable bases (such petroleum jelly, waxes, or oils) in herbal ointments to provide a medium that increases skin contact and enhances absorption. It is made to be applied to the skin to treat various conditions such as rashes, burns, wound, inflammation, muscle or joint pain, infections and rashes.(2)

A. Types of Ointment

- Medicated – people who have medications to address cutaneous conditions (skin disorders). E.g Zinc Oxide Ointment also Sulphur Ointment.
- Non-medicated – This ointment base is utilised as a carrier in medicinal ointments or for its lubricating properties E.g White Ointment.(3)

B. Ideal Characteristics of Ointment

- Chemically and physically stable
- Ointment base or wax not poses any medicinal properties.
- Smooth and without any rough spots.
- The active ingredient that has been finely divided must be dispersed equally throughout the ointment base.(4)

C. Advantages of Herbal Ointments

- They allow for targeted medicine administration to the afflicted region, minimising non-target exposure and reducing adverse effects.
- They avoid drug metabolism at the first pass.

- Ideal for unconscious patients who struggle with oral administration.
- Chemically stable and easier to handle than liquid dose forms.
- They are appropriate dose formulations for bitter flavour medications.(4)

D. Base used in Ointment

- Oleaginous bases: Water-insoluble hydrocarbons, waxes, and vegetable oil make up this basis. E.g : Petroleum (soft paraffin), liquid paraffin.
- Absorption Bases: These are hydrous materials with the ability to absorb large amounts of water while maintaining their ointment-like consistency. There are two types: a) Non emulsified e.g. wool fat, bee wax. b) water in oil emulsion e.g. hydrous wool fat.
- Emulsion Bases: These are semisolids or have a cream like consistency.O/w and w/o are both utilised as basis for ointments. Example: Emusifying Ointment BP, hydrophilic ointment.
- Water Soluble Bases: These are frequently referred to as basis for greaseless ointments. They consists of carbowaxes. Example: Macrogol Ointment B.P.C(a combination of polyethylene glycols), polyethylene glycol ointment.(5)

II. FORMULATION TECHINQUE

Herbal ointments are made by mixing herbal powders or extracts from medicinal plants with an appropriate ointment base.Stability, consistency, and therapeutic effectiveness are guaranteed by the procedure. The general steps are as follows:

A. Selection of Herbs

Select herbs according to the intended medicinal outcome. (e.g., antimicrobial, anti-inflammatory, wound healing).
Common herbs use in ointment and their medicinal outcomes:

Sr No	Herbs	Medicinal Outcomes
1	Neem	Antibacterial,
2	Turmeric	Anti-inflammatory
3	Aloe vera	Hydrating, Skin healer
4	Chamomile	Moisturizing & Gentle
5	Ginger	Anti-inflammatory, Pain Relief
6	Calendula(Marigold)	Wound healer, Antimicrobial

B. Preparation of Herbal Extract

Plant material should first be shade-dried to retain its active ingredients.The type of component needed determines the extraction method, which can also crush the material into a fine or coarse powder.
This various extraction method are following –

1) Maceration (for chemicals that are volatile or delicate):
Steps:

- The herb powder should be soaked in an appropriate solvent (oil, ethanol, water, or hydroalcohol).
- The herb to solvent ratio is around 1:5. While stirring occasionally, let it sit for three to seven days.
- To obtain the extract, strain the mixture. (6)

2) Soxhlet extraction (for dried herbs):
Steps-

- Weigh a known amount (10–30 g, for example) of the dry, ground material in the extraction thimble.
- Assemble the extractor with condenser over a round-bottom flask that holds the solvent.
- The solvent should be brought to a boil, then liquefied under vacuum and transferred into a thimble.
- After four to eight hours, repeat the process by draining the soluble chemicals back into the flask.
- Once completed, use rotary evaporation or evaporation at reduced pressure to remove the solvent.
- Determine the yield by weighing the residue if quantification is necessary.(7)

3) Water Extraction (Decoction or Infusion):
Steps-

- Take dried plant parts (about 5-10 grams) and place it in water (around 500 ml).
- Boil the mixture for 15–20 minutes until the water is reduced by half.
- After straining, let the mixture cool before drinking.(7)

C. Method for preparation of herbal ointment :

1) Direct Infusion Method
Ingredients: Dried or fresh herbs, carrier oil (e.g., olive, coconut), beeswax.
Steps:

- Infuse herbs in oil using low heat (double boiler or sun-infusion over days).
- Use cheesecloth to strain the infused oil. Melt beeswax in a double boiler.
- After the beeswax has melted, add the strained oil to it (1portion of melted beeswaxand 4th portion of oil.)
- While still heated, pour into sterilised jars after stirring until homogeneous. Allow it to cool and set..
  E.g. Calendula Healing Ointment(8)

2) Direct Addition (for ready-made extracts or essential oils):
Ingredients:Shea butter also beeswax, petroleum jelly, herbal extract or essential oil combined with a carrier oil (almond, coconut, or olive oil).
Steps:

- Take as much of the ointment base as you need (such petroleum jelly or shea butter).
- Use a double boiler to slowly melt any hard bases, such as beeswax, and then combine them with carrier oil. When using beeswax, combine it with a carrier oil in the proportions listed below: Make the necessary adjustments to get the proper consistency: One part oil to four parts beeswax.
- Add it slowly to the slightly cool base. Example: For 100g of ointment, use 1–5 g of extract or essential oil. Mix the mixture with a glass rod or spatula until it is smooth.
- While the ointment is still semi-liquid, pour it into sterile, labelled containers. At room temperature, let it cool and solidify.Label showing name, ingredients, preparation date, and expiration date. Store in a cool, dry location away from direct sunlight.(20-22)
  E.g.: Turmeric Essential Oil Ointment : antiseptic herbal ointment.(9)

3) Trituration Method
Ingredients: Fine herbal powder (e.g., turmeric, neem, sandalwood), Base: Petroleum jelly, lanolin, or any soft ointment base.
Steps:

- Precisely weigh the required amount of finely crushed herbal powder (turmeric, neem, calendula, etc.). Weigh the basis for the petroleum jelly or equivalent ointment.
- You can use a little quantity of a levigating agent (such glycerin or castor oil) to wet the powder before mixing it with the base if it tends to clump.Consequently, smoothness is enhanced. Pour the smooth paste or fine powder into the mortar. A little amount of the ointment base should be pounded in circular movements with the pestle until a homogenous paste is formed.
- Add base progressively while triturating until all of the base has been added and the mixture is uniform. Inspect for irregular dispersion, lumps, or streaks.
- The finished result ought to be smooth, consistent, and uniformly coloured. It is advised that the final ointment be transferred into a sterile, sealed container. The name, content, date, and storage directions of the product should all be listed on its label. Store in a cool, dry location away from direct sunlight.(23-24)
  E.g. : Neem Ointment – 10%
  Formulation: Neem leaf powder- 10 g + White soft paraffin- 85 g + Beeswax- 5 g.(10)

D. Factors That Influence Herbal Formulation

1) Drug tampering
2) Poor collection
3) Inadequate planning
4) Improper storage
5) Use of plant material in a significant amount Replacement with unused drugs. (4)

III. QUALITY CONTROL AND STANDARDIZATION OF HERBAL OINTMENTS

A. Importance

Standardising guarantees batch-to-batch homogeneity, efficacy, safety, and shelf life for herbal ointments. Unlike synthetic drugs, herbal remedies depend on several factors including the plant source, formulation techniques, and processing methods to define their quality.

B. Challenges in Quality Assurance:

- Raw Material Variability:
  Problems of quality control Harvest dates, storage conditions, and geographic source all affect the phytochemical concentration of raw materials. Absence of taxonomic identification and authenticity leads to adulteration.
- Complex phytochemical composition:
  Usually absent or in trace levels are the active components. Recognising and quantifying every bioactive molecule is difficult.(28)
- Lack of Standardized Extraction Methods:
  Extraction solvents time and temperature significantly affect final product quality mercilessly. No universally accepted extraction protocols exist whatsoever globally
- Stability Issues:
  Herbal ointments degrade rapidly due to oxidation microbial contamination or photodegradation under certain conditions unfortunately. Somehow, natural preservatives are frequently less effective than their synthetic equivalents
- Contamination by microbes:
  The susceptibility of plant-based ingredients to microbial development is significantly higher. The risk of contamination is greatly increased by improper sterilisation or preservation.(11)

C. Guidelines and Protocols for Quality Control

- Raw Material Control:
  Identification of plants occurs via techniques like DNA barcoding and microscopy
  Screening for phytochemicals happens using TLC and HPTLC alongside GC-MS fairly routinely.
  Tests for contaminants involve insecticides and microbiological load as well as heavy metals very thoroughly.
- In-Process Quality Control:
  pH measurement is done during in-process quality control rather carefully.
  Viscosity and consistency testing
  check homogeneity.
- Finished Product Testing
  Finished product testing encompasses physical testing that includes spreadability texture colour odour and appearance very comprehensively.
  Chemical tests that include Assay of marker compounds, residual solvent analysis.
  Microbiological testing includes pathogen, fungal, and total viable counts.
- Stability Studies
  Accelerated and real-time studies under ICH guidelines.
  Evaluation of of product considering performance, packaging compatibility, and shelf life across time.

- Standardization protocols
  Using marker-based standardisation to keep key active components' concentrations consistent. Practices for Good Manufacturing (GMP) according to WHO or regional pharmacopoeia.
  Documentation include quality reports, supplier audits, and batch records.
- Regulatory Guidance Sources
  Guidelines for herbal medicines under the WHO's Good Agricultural and Collection Practices (GACP) and GMP guidelines.
  Pharmacopoeial monographs (e.g., Ayurvedic Pharmacopoeia of India, USP, British Herbal Pharmacopoeia).ICH Guidelines for stability and product quality.(12-14)

IV. RECENT ADVANCES AND COMMERCIAL PRODUCTS

A. *Marketed Herbal Ointments*

Product Name	Herbal ingredients	Application
Jatyadi Ointment	Jatyadi oil, haridra (turmeric), neem, manjistha	Chronic wounds, ulcers, eczema, fungal infections.
Boiron Calendula Ointment	Calendula officinalis	Small wounds, scratches, burns, nappy rash and skin that is dry and parched
Betnovate-N Ointment	Betamethasone + Neomycin	Inflammatory skin conditions, eczema
Herbal Skin Doctor Ointment	Neem, tea tree oil, turmeric	Skin infections, eczema, psoriasis, boils

B. *Research and Innovations*

Continuous research has remarkably improved composition of herbal oi ntments thereby significantly increasing their therapeutic efficacy shelf life and bioavailability substantially.

- Nanotechnology-Based Herbal Ointments :
  Liposomes nanogels and nanoemulsions stabilize herbal active ingredients and enhance skin penetration rather effectively.
  An ideal example is a nanoemulsion formulation that contains curcumin, which has natural anti-inflammatory and antioxidant qualities.

- Advanced Extraction Techniques
  The potency of phytoconstituents is significantly preserved by supercritical fluid extraction, ultrasound-assisted extraction, and microwave-assisted extraction procedures.
  These extraction methods facilitate development of solvent-free high-yield environmentally safe extract formulations.

- Bioadhesive and Smart Polymers
  Utilizing mucoadhesive polymers like chitosan can improve the therapeutic effects of the ointments and slow the release of the ointment from the application area.
  Releasable dosage forms under developed hypnosis responsive ointments are novel class of research that focuses on releasing drugs for chosing which are responsive to setting pH or temperature.

- Synergistic and polyherbal compositions:
  These formulations with the synergistic properties of plants are used for enhancing the effects of wound healing or antibacterial activity.
  The healing property is shown by the components textured with neem, aloe vera, and turmeric to help in epithelialisation and prevention of infection.(15-18)

V. FUTURE PERSPECTIVE OF STUDY

Although several traditional herbal ointments are still used and practiced in local culture as therapeutic products, additional clinical evidence is warranted to support these uses preferably in conjunction with a controlled trial. New directions for research include establishing standardized formulations, better extractions, and dispensing methods, which may include new information about active compounds molecular pathways for traditional applications as well as new possibilities for using molecular nanotechnology and biocompatible carrier formulations. Integrative disciplines of ethnobotany, pharmacology, and formulation science, are necessary to explore the therapeutic opportunities for clinical use of herbal ointments.Harmonising international regulations for herbal goods will facilitate the production of superior ointments and make it easier for them to enter other markets.(18-19)

VI. CONCLUSION

Herbal ointments capture both formal knowledge and current therapeutic capacity. The formulation is achieved through identifying suitable medicinal herbs, preparing the extract according to certain established and scientifically accepted extraction processes, delivering safety, stability and efficacy. The topical applications make use of bioactive phytochemicals, which are believed to harness healing power in their applications, with reported positive clinical outcomes associated with treating a range of skin ailments, and with minimal side effects. Herbal ointments have weaknesses to overcome, including potential variability in raw materials, lack-of standardized protocols of preparation, and risk of microbial contamination. There must be strict quality control measures as well as regulatory guidelines in order to manage these outcomes. Other findings, including advances in extraction technologies, nanotechnology based-delivery systems, and smart polymers will enable more innovative, potent and sustainable herbal ointment products. Future investigations are anticipated to support their mainstream into health care systems around the world clinical validation and initiatives which create a harmonization of standards internationally.

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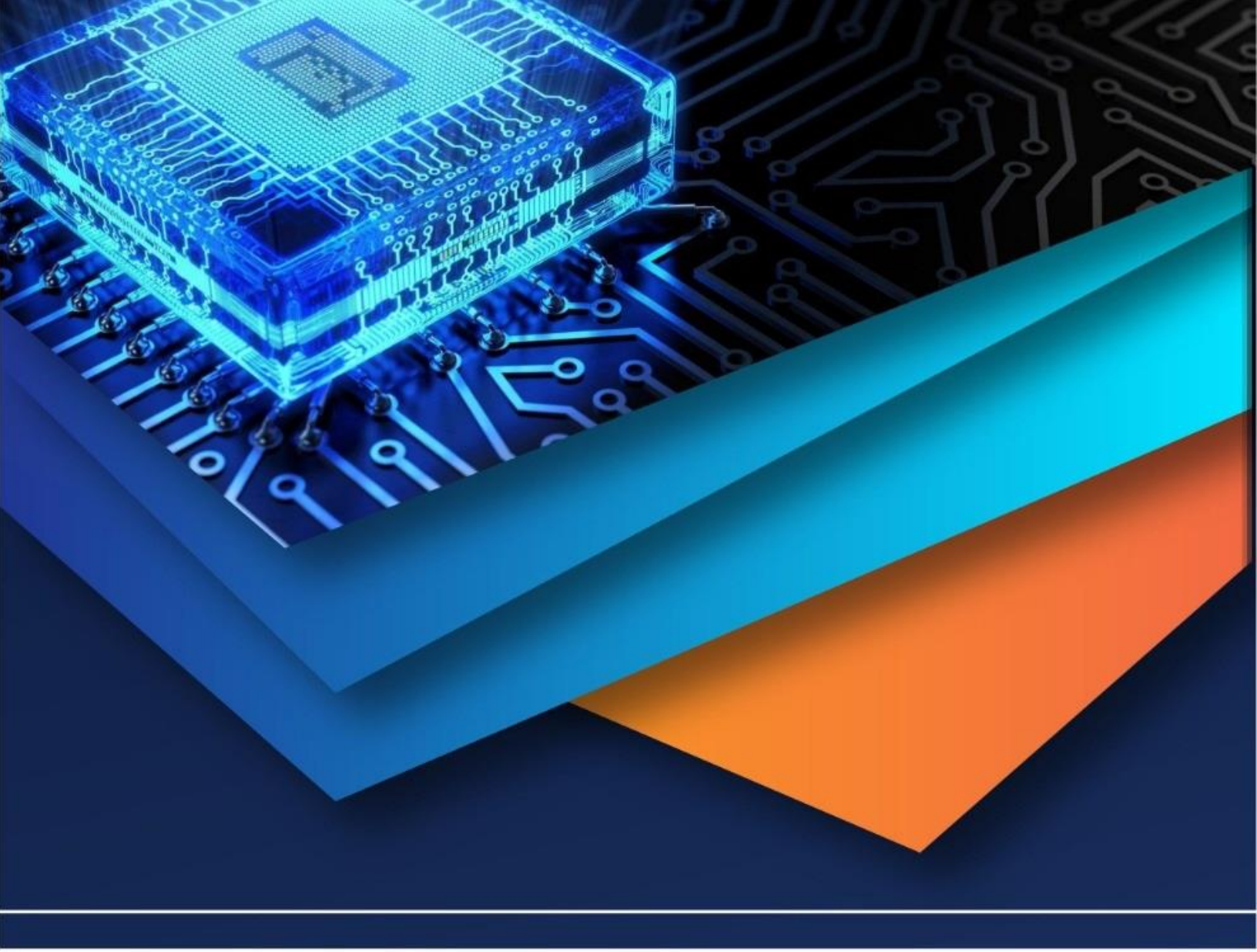

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