

FORMULATION AND EVALUATION OF HERBAL OINTMENT CONTAINING AZADIRACHTA INDICA AND CURCUMA LONGA

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Abstract:

In recent years, there has been a significant increase in the interest and utilization of herbal medicines, even in areas where modern medicine is readily available. Plant derived substances and herbal medicines have gained significant attention due to their wide range of applications. Medicinal plants are known for being a valuable source of bioactive compounds, which have been used in both traditional and modern medicine. This study aims to develop and assess an ointment containing extracts of Neem (*Azadirachta indica*) and Turmeric (*Curcuma longa*). The extracts were prepared using the maceration method. The ointment base was prepared and the formulation of the ointment was accomplished by incorporating the extract in the base using the levigation method. The formulation was evaluated for its physicochemical parameters including color, odor, pH, spreadability, consistency, solubility, and washability. The formulation was assessed for stability under different temperature conditions, and it was found that there were no changes in irritancy, spreadability, and diffusion study. This could potentially serve as a convenient and effective method to harness the medicinal properties of Neem and Turmeric.

Keywords: Maceration, Levigation, Spreadability, acetone, bioactive

Introduction:

Medicinal or pharmaceutical chemistry is a branch of chemistry and pharmacology concerned with the design, synthesis, and development of pharmaceutical medications. The identification, production, and development of novel chemical entities appropriate for therapeutic use is the focus of medicinal chemistry [1-2]. It also involves the investigation of already available pharmaceuticals, their biological features, and their Structure-activity correlations in quantitative terms (QSAR). Pharmaceutical chemistry focuses on the effectiveness of medications and the suitability of medical equipment for the uses for which it is intended [3]. Medicinal plants' importance in drug discovery synthetic chemistry, combinatorial chemistry, molecular modeling, and separation from plants and other natural sources of novel chemical entities have all been used to obtain molecules for drug development [4]. About a quarter of top-selling medications globally in 2001 and 2002 were either natural ingredients themselves or were derived from them [5]. For lead development, lead optimization, and clinical studies, the quantities of isolated natural compounds are frequently insufficient. To assess if synthesis or semi-synthesis would be feasible, cooperation with medicinal and synthetic chemists is required [6-8].

Medical Plants have Positive Effects on Human Health [9]:

- Many contemporary medications, like aspirin, are made inadvertently from therapeutic plants.
- Many cultures around the world, including Chinese medicine and Indian medicine, directly use plants as remedies.
- Many food crops, like garlic, have therapeutic properties. New medications can be derived from medicinal plants. More than 250 000 different species of flowering plants are thought to exist.
- Studying therapeutic plants enables one to comprehend plant toxicity and safeguard both people and animals against natural toxins.
- The cultivation and preservation of therapeutic plants, for instance, protects plant metabolic engineering.

Fundamentals of Phytochemistry:

In the strictest sense, phytochemistry is the study of phytochemicals. These substances are made from plants. The phrases are frequently used in a more restricted sense to refer to the numerous secondary metabolic products that are present in plants. Numerous of them are well known for offering defense against insect assaults and plant illnesses [10]. For human consumers, they also provide a number of protective activities. The separation, identification, and determination of the structure of physiologically active chemicals have become simpler thanks to the ongoing creation of spectroscopic and chromatographic analytical techniques [11]. The publication *Phytochemistry letters* promotes research in all fields involving natural products, including structural elucidation, biotechnology, pharmacology, ethnobotany and traditional use, genetics, analytical evaluation of herbal remedies. Research medicinal herbs and plants, provide training in phytochemical examination, and advise on sample recognition, processing, and production of excellent herbal products [12-13]. The Phytochemistry Unit, which has expertise in the following areas [14], plays a crucial role in the gathering of plants that HMRC finds interesting [14].

- Gathering and preparing plant samples.
- Plant sample preparation for screening and bioassay research on plant compounds.
- Utilizing methods like Flash Chromatography, Preparative TLC, Preparative HPLC, GC- MS, HPLC1UV, HPLC-Diode Array, and LC-MS analysis, bioactive chemicals can be fractionated and isolated.
- Preparing and using HPLC to analyze standardized extracts.

Herbal medicine has been used for millennia and is being studied in some European and Asian nations. A great deal of effort has been made that is beyond the comprehension and ability of the average person [15]. The best thing about using herbal medication is that it can be used by people of any age group and has no side effects or ineffective cures. Polyherbal formulations are defined as those that contain two or more herbs. Numerous studies using turmeric rhizomes (*Curcuma longa* Family-Zingiberaceae) and neem leaves (*Azadirachta indica* Family-Meliaceae) extracts as well as several other herbal medicines have been carried out [16-17]. Ointments, a semisolid preparation used topically for a variety of reasons, including protectants, antiseptics, emollients, antipruritics, keratolytics, and astringents, are also

available as dosage forms for herbal medications. Neem leaves and neem oil are being tested for their effectiveness in treating AIDS and have several qualities, including antiseptics, insecticides, antifertility, and antiviral effects [18-19]. Turmeric is made from the dried and fresh rhizomes of the Zingiberaceae plant species, *Curcuma longa* [20]. It is employed as an antibacterial, expectorant, seasoning, or condiment. Due to its high antioxidant content, studies have shown that turmeric can be used to treat conditions like arthritis, liver disease, Alzheimer and depression [21].

Herbal Ointment

An oil-based topical formulation with a semi-solid texture and a greasy appearance that can be applied to the skin is called an ointment. As per the ointment meaning, the therapeutic substances are dispersed in the medium. The medium generally has 80% oil and 20% water. As you can easily understand that the water medium is mixed evenly with the oil medium to prepare a thick suspension.

This formulation is prepared in such a way that it can deliver a thick and viscous application. The viscosity of an ointment preparation ensures that the medicines in it will be properly absorbed through the skin. In fact, ointments are also used to cure infections. The availability of the therapeutic substances in the application of ointment is much higher and suitable for skin diseases.

As per the technical ointment definition, every preparation has a specific number that signifies the amount or percentage of water content in the formulation. This is called the water number. The degree of emollition is also determined by the level of viscosity of the formulation. The more water it contains the better it will spread and get absorbed.

Where Ointments are Applied?

An ointment is prepared for applying on the skin and mucosal region of our body such as anywhere on the skin, chest, nose, anus, mucous membrane of the eyes, etc. You will be astonished to know that an ointment can be categorized as prescribed or over-the-counter drugs. Due to the viscosity rate, the application remains on the skin and does not get easily removed. This method of preparation confirms the availability of the medications in the affected area for a longer period.

The medications disperse in the oil or water base. When applied topically, the ointment base carries the pharmaceutical substances on the skin cells. When absorbed, the ointment base loses its integrity and releases the medications properly.

How Ointments are Prepared?

The preparation is not that simple as a complex base is prepared by mixing oil and water together. The different kinds of vehicles used to define ointment formulation and its stability.

Absorption Base: A base or vehicle with a specific oleaginous composition that contains one or more emulsifiers is called an absorption base when it can easily absorb water. The water absorbed disperses evenly to form a water-in-oil emulsion ideal for the preparation of different kinds of ointments. Wool fat and beeswax are used for such purposes.

Emulsifying Bases: Emulsions are prepared by introducing water in oil or oil in water. In this aspect, an emulsifying base is prepared by introducing water into the oil system to disperse therapeutic substances. This base acts as a carrier for ointment preparation. The most common bases in this category are emulsifying wax and cetrimide.

Hydrocarbon Bases: In the same way, when hydrocarbons are used as oil bases where water will be introduced, they are called hydrocarbon bases. The most common examples where hydrocarbons are used are ceresin, hard paraffin, soft paraffin, and microcrystalline wax.

Vegetable Oil Bases: In this case, natural vegetable oils are used as the oil base. The water medium is introduced in these oil bases and an ointment base is prepared. These bases are used generally in cosmetics. The most common vegetable oils used for this purpose are almond oil, olive oil, coconut oil, peanut oil, etc.

Material and Methods:

1. Material:

Leaves of neem were collected from the local area of Beswan and dried rhizomes of turmeric were purchased from the local market of Beswan. Acetone, soft and hard paraffin, wool fat, olive oil was taken from the Pharmaceutics lab from Mangalayatan university.

2. Method:

2.1 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. 25 gm powder was imbibed with 50 ml acetone for maceration for 7 days with occasional stirring. Finally, acetone extract was collected and concentrated to get blackish green residue. The extract was stored in the airtight container at cool and dark place.

2.2 Preparation of Turmeric extract:

Dried rhizomes of turmeric were ground and the powder obtained 25 gm powder was imbibed with 50 ml acetone for maceration for 7 days with occasional stirring. The extract with crimson red colour was obtained and stored at cool and dark place in air tight container.

Figure 1: Maceration Process





Figure 2: Extracted product

2.3 Formulation of Ointment:

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 as mentioned in table 1.

Table 1: Formulation of ointment base

S.No.	Name of Ingredient	Quantity to be taken
1.	Wool fat	0.5 gm
2.	Olive oil	0.5 gm
3.	Heavy paraffin	0.5 gm
4.	Soft paraffin	8.5 gm

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 two or three times its weight of base, gradually incorporating base until to form homogeneous ointment, finally transferred in a suitable container as mentioned in table 2.

Table 2: Formulation of Herbal ointment

S.No.	Name of Ingredient	Quantity to be taken
1.	Prepared Neem extract	0.06 gm
2.	Prepared Turmeric extract	0.06 gm
3.	Ointment base q.s.	10 gm

2.4 Evaluation:

2.4.1 Colour and Odour: Physical parameters like colour and odour were examined by visual examination.

2.4.2 Consistency: Smooth and no greediness were examined.

2.4.3 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.

2.4.4 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:

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

Where, S= Spreadability

M= Weight tide to the upper slide

L= Length of glass slide

T= Time taken to separate the slides

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

2.4.6 Washability: Formulation was applied on the skin and then ease extend of washing with water was checked.

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

3. RESULTS AND DISCUSSION

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 occurred which was stable during the storage. The physicochemical properties were studied which shows satisfactory results for spreadability, Extrudability, Washability, Solubility, and others. There were no changes observed in spreading ability, as well as irritant effect.

Table 3: Physicochemical evaluation of formulated ointment

Physicochemical Parameter	Observation
Colour and Odour	Blackish-Green colour and Characteristic
Consistency	Smooth
Ph	5.8
Spreadability (seconds)	6
Solubility	Soluble in boiling water, miscible with alcohol, ether
Washability	Good
Non-irritancy	Non-irritant

4. 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. The ointment formulation is useful for the penetration and slowly absorb the drug in the skin. The result of physicochemical parameters is Blackish-green color formulation and the odour is characteristic in nature. The pH of the ointment is 5.8 and spreadability is also good. The consistency is smooth and no grinded particles are present in the formulation. The ointment gives non-irritant in skin and it is used by every type of skin like dry, oily, sensitive, and normal.

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