

Formulation And Evaluation Of Herbal Ointment Containing Extracts Of *Curcuma Longa* & *Piper Nigrum*.

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ABSTRACT

Even in areas where modernized medicine is available, plant-derived substances and natural medicines have currently attracted super interest towards their flexible application, due to the reachest source of bioactive compounds. Herbal products are not only the most effective, but they are fantastically non-poisonous and have therapeutic doses properly underneath their toxic levels. Ointments are topical formulations that provide higher patient compliance and hence turn out to be more suited. due to the presence of antioxidants and anti-inflammatory components. of *Curcuma longa* may provide glow and luster to the skin and may also revive skin by bringing out its natural glow. comparably, *Piper nigrum* has antibacterial and anti-inflammatory properties that help cure skin infections and acne. Ointment formulation was prepared using an oily base by the trituration method. Further, the formulation was prepared with 0.6gm *Curcuma longa* extract and 0.2gm of *piper nigrum* extract. The physicochemical properties were studied which showed 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 2°C, 25°C, and 37°C for four weeks. No changes were observed in spreading ability, diffusion study as well as irritant effect. Thus, an ointment formulation containing *Curcuma longa* and *piper nigrum* extract could become a medium to use the medicinal properties of these herbs effectively.

keywords: *Curcuma longa*, *Piper nigrum*, herbal Ointment, Stability.

INTRODUCTION:

Even in areas where modernized medicine is available, the interest in herbal drugs and their usage were increasing rapidly in recent years. Plant-derived substances and natural medicines have currently attracted super interest towards their flexible application, as medicinal plants are the richest supply of bioactive compounds utilized in traditional and modern medicinal drug¹. Herbal plant products are used as the foundation of numerous scientific treatments in human beings. herbal products are not only the most effective, but they are fantastically non-poisonous and have therapeutic doses properly underneath their toxic levels². Ointments that are generally used for topical use and formulated by using medicinal natural phytoconstituents, that provide higher patient compliance and hence turn out to be more suited to patients³.

Turmeric consists of dried and fresh rhizomes of a plant referred to as *Curcuma longa*. Family-Zingiberaceae. *Curcuma longa* is a rhizomatous herbaceous perennial plant of the ginger family⁴It contains 7% essential oils and dietary fiber and 1-6% curcuminoids⁵.it is used as an antiseptic, Anti-inflammatory⁶, expectorant, condiment, or spice. it's far wealthy in antioxidants, studies conducted have revealed uses of *Curcuma longa* for the treatment of arthritis, liver sicknesses, Alzheimer and depression control⁷.*Curcuma longa* has been traditionally used in Asian countries as a medical herb due to its antioxidant, anti-inflammatory, antimutagenic, antimicrobial^{8,9}, and anticancer properties^{10,11}.Curcumin is the principal component of *Curcuma longa*, a curry spice used as a suitable eating factor in unique parts of Asia, in particular for its taste and colour profile and less so for its medicinal properties.In Ayurvedic remedy, curcumin is used as a treatment for several health conditions¹²*Curcuma longa* contains antioxidants and anti-inflammatory components. These properties allow it to add glow and radiance to the skin. *Curcuma Longa* can also revitalize the skin by bringing out its natural glow¹³.

Piper nigrum is a flowering vine within the family Piperaceae, cultivated for its fruit, known as a peppercorn, which is commonly dried and used as a spice and seasoning.piper nigrum and its active compound piperine have potent antioxidant and anti-inflammatory properties. Laboratory studies suggest that piper nigrum may improve cholesterol levels, blood sugar control, and brain and gut health¹⁴.Also, it has antibacterial and anti-inflammatory properties that help cure skin infections and acne¹⁵.

The major problem associated with curcumin is its poor bioavailability¹⁶, Piperine is a known bioavailability enhancer, is the major active component of *Piper nigrum*¹⁷ and is associated with an increase of 2000% in the bioavailability of curcumin¹⁸Therefore, the problem of low bioavailability seems to be solved by creating a curcumin complex with the addition of active ingredients such as piperine that increase bioavailability.

The purpose of this research work is to formulate and evaluate the herbal ointment of *Curcuma longa* and *piper nigrum* extract to use their medicinal properties effectively and easily as a simple dosage form.

Materials And Methods

Materials

Collection of materials

Dried Rhizomes of *Curcuma longa* (turmeric)and dried fruits of *piper nigrum* were procured from vendors in the local market of Nashik region and were checked for quality and used as it is

for the extraction purpose All the solvents and chemicals used for extraction were of analytical grade and purchase from S.D.Fine, India, and were used without purification.

Preparation of extract

1) Preparation of *Curcuma longa* extract:

Requirements for the *Curcuma longa* extraction are ethyl acetate, petroleum ether, and Soxhlet apparatus.

The procedure for the extraction is carried out followed by the grinding of the dried rhizomes to get powder. the powder was subjected to extraction with petroleum ether to remove oil and unsaponifiable material. then the marc was again subjected to extraction with the ethyl acetate for around 2 hr to get the crude residue of curcuminoids.the residue was washed with a small quantity of pet.ether for two times. Finally, recrystallize with ethanol to get curcuminoids.Evaporate to dryness and store it in an airtight container¹⁹.

2) Preparation of *Piper nigrum* extract:

With the help of solvents such as petroleum ether and alcohol, the *Piper nigrum* was extracted to get piperine.

The *Piper nigrum* fruit was powdered and the powder was extracted with 400ml of petroleum ether in the Soxhlet apparatus for 2hr. the extract was concentrated to 1/5th of its original volume using distillation assembly whereupon oily residue settles down. Decant the supernatant and concentrate to about 20-30ml and allow it to cool whereupon piperine precipitates. Filter and treat the residue with 20-40ml petroleum ether to remove oil. Recrystallize piperine with alcohol¹⁹.

Formulation of Ointment

Procedure for preparation of ointment

Initially, the ointment base was prepared by weighing accurately white petroleum which was placed in an evaporating dish in the water bath. After melting of white petroleum remaining white wax was added and stirred gently to aid melting and mixing homogeneously followed by cooling of the ointment base. The number of ingredients taken for the preparation of the ointment base was mentioned in table no.1.

Table No.1: Formulation of ointment base.

| Sr.No. | Ingredients | Quantity |
|--------|-----------------|----------|
| 1) | White wax | 0.5gm |
| 2) | White petroleum | 9.5gm |

The herbal ointment was prepared by mixing accurately weighed isolated extract of *Curcuma longa* and isolated extract of *Piper nigrum* to the ointment base by trituration method to prepare a smooth paste with 2 or 3 times its weight of the base, gradually incorporating more base until form homogeneous ointment, lastly, the methylparaben added as a preservative, finally transferred in a suitable container and evaluated final prepared formulation is given in table no.2.

Table no.2: The Final prepared formulation.

| Sr.No. | Ingredients | Quantity | Use |
|--------|------------------------------|----------------|--------------|
| 1 | <i>Curcuma longa</i> extract | 0.6gm | API |
| 2 | <i>Piper nigrum</i> extract | 0.2gm | API |
| 3 | Methylparaben | 0.1gm | Preservative |
| 4 | Ointment base | Q.S. upto 10gm | Base |

Evaluation of Ointment

The final ointment was evaluated by various parameters such as color, odor, consistency, PH, Spreadability, Extrudability, Diffusion study, LOD, Solubility, Washability, Non-irritancy Test, and Stability study (table no. 4)

Organoleptic characteristics

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

Colour evaluation

Colour evaluation has been tested by visible examination by using a black and white background and any change has been observed for change in colour.

Odour evaluation

Odour of the ointment has been tested with the three volunteers for more accurate observation.

Consistency evaluation

The prepared ointment was found to be Smooth and no greediness is observed.

PH evaluation

About 2 gm of the ointment was taken in a beaker followed by 100 ml of distilled water. resulting solutions were heated up to 70°C. The pH of ointments is determined using a digital pH meter. And the readings were recorded in triplicate.

Spreadability evaluation

The spreadability was determined by placing an excess sample in between two slides which were compressed to uniform thickness by placing a definite weight for a definite time. The time required to separate the two slides was measured as spreadability.

Spreadability was calculated by the following formula

$$S = M \times L / T$$

Where, S= Spreadability

M= Weight tide to the upper slide

L= Length of glass slide

T= Time taken to separate the slides

Extrudability evaluation

The ointment formulation was filled into squeezable tube containers. Extrudability was determined in terms of the weight of ointment required to extrude a 0.5 cm tape of ointment in 10 seconds.

Diffusion study

A diffusion test was performed by preparing an agar nutrient medium. There was a plate with a hole in the middle of the medium, in which the ointment was placed. The time required for the ointment to spread was recorded after 1 hour.

LOD evaluation

Loss on Drying (LOD) was determined by placing the formulation in a petri-dish in a water bath and drying it at the temperature of 105°C.

Solubility evaluation

A rapid and simple method was used to determine solubility.

Washability evaluation

The formulation was applied to the skin of two volunteers and then the ease extend of washing with water was checked.

Non-irritancy Test

An herbal ointment prepared was applied to the skin of two volunteers and observed for the effect.

Stability study

A physical stability test of the herbal ointment was carried out for four weeks at various temperature conditions like 2°C, 25°C, and 37°C. The herbal ointment was found to be physically stable at different temperatures i.e., 2°C, 25°C, and 37°C within four weeks. The results of the stability study were mentioned in table no.3.

Results And Discussion

This study was conducted to prepare and evaluate an herbal ointment. To do this, the herbal extract was produced using the Soxhlation process, resulting in good extraction yields, and the chemical constituents and their activity were not affected. Because the ointment was prepared by the grinding method, herbal extracts and ointment bases are evenly mixed and stable during storage. Physico-chemical properties were studied and satisfactory results were shown for spreadability, extrudability, washability, solubility, loss on drying, etc. Additionally, the formulations underwent stability testing within 4 weeks at different temperature conditions such as 2°C, 25°C, and 37°C. No changes were observed in diffusion capacity, diffusion studies, and stimulation effects.

Physicochemical evaluation of ointment:

Table no.3: stability study of an ointment

| Time (Hr.) | Temperature | Physicochemical parameters | | | |
|------------|-------------|----------------------------|----------------|-----|-----------|
| | | Colour | Odour | Ph | Stability |
| | | Yellowish | Characteristic | 5.3 | |
| 1 week | 2°C | No change | No change | 5.2 | Stable |
| | 25°C | No change | No change | 5.2 | Stable |
| | 37°C | No change | No change | 5.2 | Stable |
| 2week | 2°C | No change | No change | 5.5 | Stable |
| | 25°C | No change | No change | 5.5 | Stable |
| | 37°C | No change | No change | 5.5 | Stable |
| 3week | 2°C | No change | No change | 5.5 | Stable |
| | 25°C | No change | No change | 5.2 | Stable |
| | 37°C | No change | No change | 5.2 | Stable |
| 4week | 2°C | No change | No change | 5.2 | Stable |
| | 25°C | No change | No change | 5.5 | Stable |
| | 37°C | No change | No change | 5.2 | Stable |

Table No.4:Physicochemical Evaluation of Ointment.

| Sr.No. | Parameters | Observation |
|--------|-----------------|---|
| 1) | Colour | Yellowish |
| 2) | Odour | Characteristic |
| 3) | Consistency | Smooth |
| 4) | Ph | 5.3 |
| 5) | Spreadability | 11(seconds) |
| 6) | Extrudability | 0.5gm |
| 7) | Diffusion Study | 0.8cm |
| 8) | Loss on Drying | 25% |
| 9) | Solubility | Soluble in boiling water, insoluble in ether and alcohol. |

| | | |
|-----|-----------------|--------------|
| 10) | Washability | Good |
| 11) | Non-irritancy | Non-irritant |
| 12) | Stability study | Stable |

CONCLUSION

Since ancient times, herbs play a major role in treatment because of fewer side effects, low cost, and easy availability. From ancient times Curcuma longa and piper nigrum is used for their various medicinal properties. Thus, this ointment could become a medium to use these medicinal properties effectively and easily as a simple dosage form. The present formulation study showed that it is feasible to prepare, develop and evaluate the ointment containing curcumin and piperine.

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Conflict Of Interest

The Authors Declare that there is no conflict of interest.

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