

Research Article



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 herbal ointment containing 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 herbal 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, solubility, washability. Also the formulation was evaluated for its stability at various temperature conditions which shows no change in the irritancy, spreadability. 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.

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Important use of various part of neem tree

Table 1: Important uses of various parts of neem tree

Part	Medicinal uses
Leaf	Leprosy, eye problem, skin ulcer, worms.
Bark	Analgesic, alternative and curative of fever.
Flower	Bile suppression and intestinal worms.
Twig	Relieves cough, asthma, piles, phantom tumour and diabetes.
Gum	Effective against skin disease like ringworm, scabies, wound and ulcers.
Seed pulp	Leprosy and intestinal worm.

INTRODUCTION

NEEM (*Azadirachta indica*)

The *Azadirachta indica* is a fast growing ever green popular tree found commonly in India, Africa and America. It has been used in ayurvedic medicine for more than 4000 years due to its medicinal properties. Neem is called 'arista' in Sanskrit a word that means 'perfect, complete and imperishable'. Arishtha is the Sanskrit name of the neem tree meaning 'reliever of sickness and hence considered as a 'Sarbarogaribarini'. The importance of neem tree has been recognised by US National Academy of Sciences, which publish a report in 1992 entitled 'Neem- a tree for solving global problem'.^{1,2}

Benefits of Neem³

- Antioxidant Activity
- Anti Cancerous Activity
- Anti-Inflammatory Effect of Neem
- Anti Viral Activity
- Anti Bacterial Activity
- Anti Fungal Activity

TURMERIC (*Curcuma longa*)

Turmeric (*Curcuma longa* L.), belonging to the Zingiberaceae family, has been traditionally used as a medicinal herb, dietary spice, food source, food preservative, and a coloring agent in many Asian countries. *C. longa* L. is a perennial plant with a short stem and large leaves that bears ovate, pyriform, or oblong rhizomes that are brownish-yellow colored and branched.⁴

Turmeric is a mild digestive, being aromatic, a stimulant and carminative. Turmeric is one of nature's most powerful healers. The active ingredient in turmeric is curcumin. Turmeric has been used for over 2500 years in Indian, where it was most likely first used as a dye. Turmeric water is an Asian cosmetic applied to impart a golden glow to the complexion. Curcumin has been shown to be active against *Staphylococcus aureus* (pus-producing infection). Anemia, cancer, diabetes, digestion, food poisoning, gallstone,



indigestion, IBS, parasites, poor circulation and wounds. Turmeric decreases Kapha and so is used to remove mucous in the throat watery discharges like leucorrhoea, and any pus in the eyes, ears, or in wounds, etc.⁵

Uses of Turmeric

Since ancient times, turmeric has been used as a traditional medicine and for beauty care. In Ayurvedic system of Indian medicine, turmeric is an important herbal medicine prescribed for various diseases. In fact, turmeric is even used in modern times to plug radiator leaks in water-cooled radiators. The various uses of turmeric are as follows:⁵

Food Additive

- Turmeric is used in products that are packaged to protect them from sunlight.
- Turmeric also forms a substitute for mustard in the cattle feed.
- Turmeric is a mild aromatic stimulant used in the manufacturing of curry powders.
- Sometimes in pickles and mustard, turmeric is used to compensate for fading.
- The curcumin solution or curcumin powder dissolved in alcohol is used for water containing products.⁵

Medicinal

- Turmeric is used for treating digestive disorders.
- Raw Turmeric juice is used to treat hyper acidity and indigestion.
- Curcumin also has an anti-inflammatory effect by reducing histamine (hormone) levels.
- The fluoride present in turmeric is essential for teeth.
- Curcumin an active component of turmeric, has anti-oxidant properties and so turmeric is used alternative medicine.

Cosmetic

- Regular turmeric use is said to make the skin fair, soft and smooth.
- Raw turmeric juice is applied to the skin as a paste, kept for around thirty minutes and then washed off. It adds glow to the skin.
- It is believed that regular bathing in water containing turmeric reduces growth of body hair.
- It is an essential ingredient of the traditional bathing ritual of Indian marriages where it is applied along with sandal wood paste before the bath.
- Turmeric is used for spots caused due to pigmentation or blotches and also for disease like eczema.⁵

MATERIALS AND METHODS

Collection of plant material

The *Azadirachta indica* A. Juss leaves were collected from in and around Perambalur. Dried rhizomes of turmeric were collected from in and around Perambalur. These are authenticated by botanist, department of botany, national college, Trichy. Then the leaves cleaned properly and shade dried at room temperature.

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 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.⁶

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.



Figure 1: Maceration Process



Figure 2: Crude extract of Turmeric and Neem

Formulation of Ointment

Table 2: Formation of ointment bases¹

S.No	Name of Ingredients	Quantity to be taken
1.	Wool fat	0.5gm
2.	Cetostearyl alcohol	0.5gm
3.	Hard paraffin	0.5gm
4.	Yellow soft paraffin	8.5gm

Table 3: Formulation of Herbal ointment¹

Name of Ingredients	Quantity to be Taken		
	F1	F2	F3
Prepared Neem Extract	0.08gm	0.10gm	0.12gm
Prepared Turmeric Extract	0.08gm	0.10gm	0.12gm
Ointment Base q.s	10gm	10gm	10gm

Procedure for preparation of herbal 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.
- 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 more base until to form homogeneous ointment, finally transferred in a suitable container.¹

Evaluation

Colour and Odour

Physical parameters like colour and odour were examined by visual examination.

Consistency

Smooth and no greediness is observed.

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.¹

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 formula¹

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

Where, S= Spreadability

M= Weight tide to the upper slide

L= Length of glass slide

T= Time taken to separate the slides

Extrudability

Extrudability test is the measure of the force required to extrude the material from a collapsible tube when certain amount of force has been applied on it in the form of weight. In the present study the quantity in percentage of ointment extruded from the tube on application of certain load was determined. The extrudability of prepared neem and turmeric containing ointment formulations was calculated by using following formula:

Extrudability = Amount of ointment extruded from the tube x100/Total amount of ointment filled in the tube⁷

LOD

LOD was determined by placing the formulation in Petri dish on water bath and dried for the temperature 105°C.

Solubility

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

Washability

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

Non irritancy test

Herbal ointment prepared was applied to the skin of human being and observed for the effect.¹ 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.⁸

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, Loss on drying and others.



Determination of absorption maxima

Maximum absorbance of the Neem extract was found to be 0.188 at 542nm

Maximum absorbance of the Turmeric extract was found to be 418nm

Maximum absorbance of the Neem extract¹⁰

Preparation of stock solution:

A standard stock solution containing 1mg/ml that is 1000µg/ml is prepared by dissolving 100mg of Azadirachtin in 100ml distilled water.

Preparation of working standard solution:

A working standard containing 100µg/ml is prepared by diluting the above stock solution taking 1ml in 100ml distilled water.

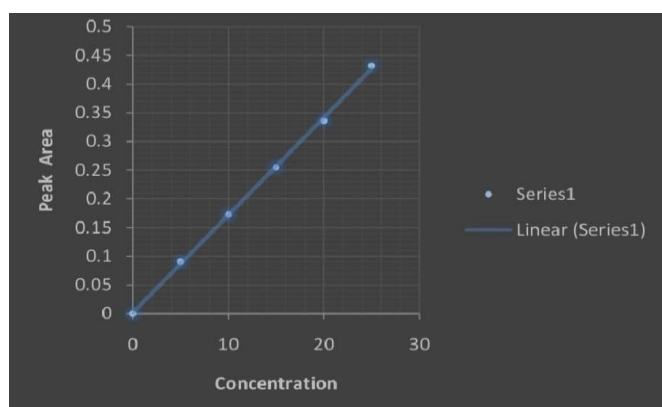


Figure 3: Linearity of isolated sample of Azadirachtin in dichloromethane

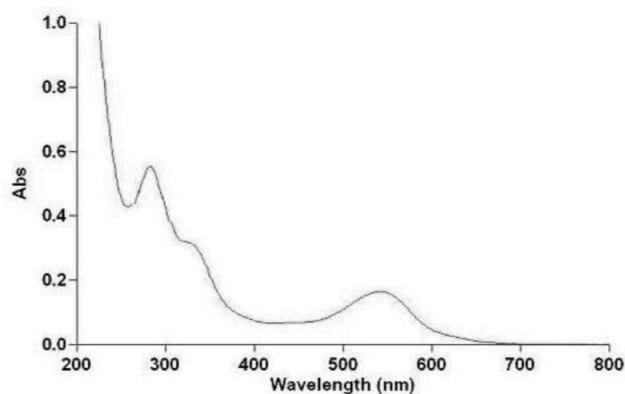


Figure 4: Assay of isolated sample of Azadirachtin

Maximum absorbance of the Turmeric extract⁹

Preparation of Standard Solutions

Standard solutions were prepared in the concentration range of 1-5 µg/mL by further dilution with ethyl acetate. Wavelength of maximum absorption (λ_{max}) was determined by scanning 10 µg/mL solution of curcumin using UV visible double beam spectrophotometer from 400-600 nm using ethyl acetate. The maximum absorbance at 418nm shown in fig 5.

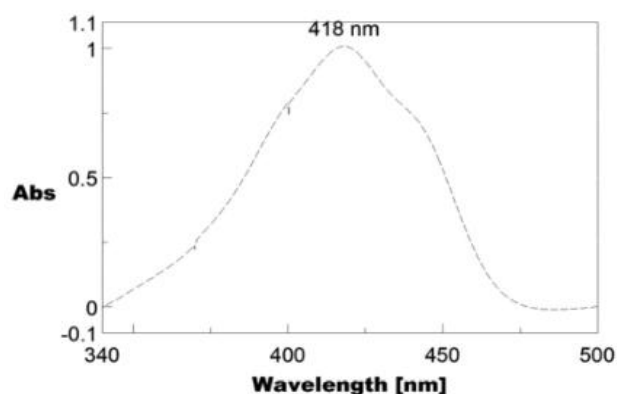


Figure 5: UV spectrum of curcumin in ethyl acetate.

Preparation of standard calibration curve

The absorbance of the standard solutions in ethyl acetate at 1-5µg/mL range was measured at 418nm. Standard calibration curve was prepared by plotting average (n=3) maximum absorbance (λ_{max}) versus concentration linearity was studied using a regression equation. It was shown in fig 6 and table 4.

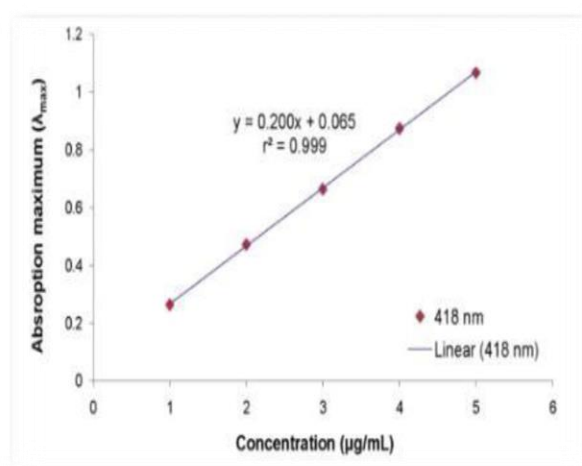


Figure 6: Linearity and range of the proposed UV method

Table 4: Linearity and range proposed by UV method

Concentration of curcumin (µg/mL)	Absorbance (λ_{max}) at 418 nm (Mean±SD) (n=3)	% RSD
1	0.2636±0.001	0.4172
2	0.4724±0.0023	0.4868
3	0.6641±0.0082	1.2347
4	0.8742±0.0035	0.4003
5	1.0671±0.0014	0.1311

Physical properties of herbal ointment

The formulated ointment is evaluated for its physical properties like colour, odour and state. The Formulated ointment are semisolid in nature, characteristic odour is occurred and yellow in colour. The texture of ointment is smooth. By visual appearance and touch its confirm that all formulation produces uniform distribution of extract in ointment.

Table 5: Physical properties of herbal ointment

S.NO	Specification	Limit
1.	State	Semi solid
2.	Colour	Yellow
3.	Odour	Characteristic
4.	Texture	Smooth

Determination of pH

The pH of the ointment was found to be in range of 5-6.5 which is good for skin pH. All the herbal formulation of ointment were shown pH near to the skin required. i.e. F1-5.4, F2-6 and F3-6.2. The observed pH are near to the skin pH.

Table 6: Determination of pH

S.NO	Formulation	pH
1.	F1	5.4
2.	F2	6
3.	F3	6.2

Determination of Spreadability

The Spreadability plays a considerable role in patient compliance and ensures uniform application of ointment to a large area of the skin. The low value of spreadability coefficient of the ointment was sufficient suggesting easy spreading. The lower value of spreadability indicates the lesser work required to spread the ointment over the skin. Which means formulation was easily spreadable by applying small amount of shear. The spreadability test showed that formulation has good spreadable property.

Table 7: Determination of Spreadability

S.NO	Formulation	Spreadability
1.	F1	26.5 sec
2.	F2	29.2 sec
3.	F3	31 sec

Evaluation parameters of herbal ointment**Table 8:** Evaluation parameters of herbal ointment

Formulation	Colour	pH	Spreadability	Texture
F1	Yellow	5.4	26.5 sec	Smooth
F2	Yellow	6	29.2 sec	Smooth
F3	Yellow	6.2	31sec	Smooth

Physicochemical evaluation of formulated ointment**Table 9:** Physicochemical evaluation of formulated ointment

Physicochemical parameters	Observation
Colour	Yellow
Odour	Characteristic
Consistency	Smooth
pH	5.4
Spreadability	26.5sec
Extrudability	0.4 gm
Diffusion study (after 60 min)	0.7 cm
Loss on drying	30%
Solubility	Soluble in boiling water, miscible with alcohol, ether, chloroform
Washability	Good
Non irritancy	Non irritant
Stability study (20°C, 25°C, 37°C)	Stable

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 results of different tests of ointment showing that the formulation could be used topically in order to protect skin against damage the comparison of F1, F2 and F3 the F1 produce better activity than F2 and F3.

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