

FORMULATION, EVALUATION AND ANTI-INFLAMMATORY ACTIVITY OF NYCTANTHES ARBOR TRISTS HERBAL GEL

A. Aruna*, M. Hemapriyadharshini, P. Jaishree, M. Jeevarani, M. Jeyaprakash, Dr. A. Babu
Thandapani, Dr. S. Ramkumar

Department of Pharmaceutics, Ultra college of Pharmacy, Tamil Nadu, Madurai.

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***Corresponding Author: A. Aruna**

Department of Pharmaceutics, Ultra college of Pharmacy, Tamil Nadu, Madurai.

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ABSTRACT

Extraction of crude extracts from the selected herbs followed by formulation and evaluation of herbal gel and lastly assessment of anti-inflammatory activity. Cold Maceration extraction method was employed for the extraction of *Nyctanthes arbor-trist* and menthol for the ratio of (1:5). Formulation of herbal gel by using *Nyctanthes arbor-trist* extract, HPMC, methyl paraben, propyl paraben and glycerin. The formulation was then evaluated by several tests like organoleptic character, pH determination, Homogeneity, Stability studies, Viscosity, Spreadability, Grittiness, Washability test and Skin irritation test. Further formulated gel was investigated for anti-inflammatory activity by using Egg albumin denaturation assay. Herbal gel was prepared and evaluated for various parameters and it showed anti-inflammatory activity also. This gel can be used for care and protection of skin.

KEYWORDS: *Nyctanthes arbor-trist* extract, Herbal gel, Anti Inflammation activity.

INTRODUCTION

Inflammation is an essential response provided by the immune systems that ensures the survival during infection and tissue injury. When an inflammation occurs in your body, many different immune system cells may be involved. They release various substances, known as inflammatory mediators. These include the hormones bradykinin and histamine. They cause the small blood vessels in the tissue to become wider (dilate), allowing more blood to reach the injured tissue. For this reason, Inflamed areas turn red and feel hot. A drug or substance that reduces inflammation (redness, swelling, and pain) in the body. Anti-inflammatory agents block certain substances in the body that cause inflammation. They are used to treat many different conditions. An effective anti-inflammatory drug should be able to inhibit the development of inflammation without interfering in normal homeostasis.^[1,2] Herbal medicine is the

backbone of alternative and complementary treatment systems, gradually gaining worldwide recognition and moving toward integration into mainstream healthcare.^[3,4]

The World Health Organization (WHO) defines herbal medicines as labelled medicinal products containing active ingredients from aerial or underground plant parts, or combinations thereof.

A gel is a solid or semisolid system of at least two constituents, consisting of a condensed mass enclosing and interpenetrated by a liquid. A gel, in its solution form, requires a specific concentration of polymer to increase the viscosity of the gel. During the gel formation, swelling occurs as a result of solvent penetration causing the polymer network to stretch and hold its shape and entwine the drug particles in them.^[5,6,7] Topical application of gel overcomes the problems to be associated with other dosage forms. Hence a study on formulation and evaluation of herbal gel by using *Nyctanthes arbor-trist extract*.

MATERIALS AND METHODS

Collection of the plants

The plant part of *Nyctanthes arbor-trist* Linn., leaves were collected and dried.

Method of Extraction:^[8,9]

Cold maceration was used to extract the constituents from the dried leaf sample using methanol as solvent.

Formulation of herbal Gel:^[10]

Weigh the required quantity of *Nyctanthes arbor-tristis* extract. Disperse HPMC gel base in hot distilled water and allow it to swell. Dissolve methyl paraben & propyl paraben in a small amount of hot distilled water. Dissolve the methanol extract of *Nyctanthes* in propylene glycol. Combine all mixtures with the pre-swollen gel base. Stir until a homogeneous hydrogel mass is formed. Add distilled water to adjust final weight to 15 g; store in a clean, wide-mouth container in a cool, dry place.

Table 1: Evaluation of anti-inflammatory gel:^[11,12,13]

S.NO	NAME OF INGREDIENTS	QUANTITY TO BE TAKEN (15GM)
1	<i>Nyctanthus arbor-tristis</i> L.extract	1gm
2	Hydroxypropylmethylcellulose (HPMC)	3gm
3	Methylparaben	1.5gm
4	Propylparaben	1.5gm
5	Propylene glycol	5gm
6	Glycerin	1gm
7	Distilled water	q.s
8	Fragrance	q.s

Organoleptic character

The gel was formulated and evaluated for its odour, colour, appearance. The appearance of the gel was analysed by its color and roughness visually and by touch.

PH determination

The PH of the formulation was determined by using pH paper.

Homogeneity

The formulated herbal gels were checked for colour homogeneity by visual observation. Look for any signs of uneven texture, color variations, or visible particulates that could indicate uneven distribution of herbal extracts or additives.

Viscosity

Viscosity of gel was measured by using Brook field viscometer at 20 rpm using spindle no.6. Each reading was taken after equilibrium of the sample at the end of the two minutes. The samples were repeated four times.

Skin irritation test

This involves applying a small amount of the herbal gel to a small area of skin, usually on the forearm or back, and observing for any immediate reactions like redness, itching, or swelling.

Washability

Formulation was applied on the skin and then ease extended periods of washing with water was checked. A little amount of the produced formulation wash applied to the skin, and it was then rinsed with water to determine the washability test. After applying a tiny hit of the prepared formulations (gels) to the skin.

Spreadability

The spreadability of the gel formulations was determined by measuring the spreading diameter of 1gm of gel between two horizontal plates (20cm ×20cm) after one minute.

Grittiness

The gel was evaluated microscopically for the presence of particles.

Stability studies

The stability was performed on the formulation by maintaining room temperature (25+/-2°C), for 20 days.

IN VITRO ANTI-INFLAMMATORY ACTIVITY ^[14,15]**Egg albumin assay**

The anti-inflammatory activity of the *Nyctanthes arbor tristis* gel was evaluated and various concentrations ranging from 20-100ug/ml were added to 0.2ml of egg albumin (fresh). The 2.8ml phosphate buffer was added. The PH of the solution was adjusted to 6.4 by using a small amount of Hydrochloric acid. These samples were then incubated at room temperature for 10 minutes, followed by heating 70 °C for 20 minutes in a water bath. After the heating process, the sample were allowed to cool. After cooling the mixture, the absorbance was measured using UV spectrophotometer at 660nm. ASPIRIN was the standard drug for comparisons. Dimethyl sulfoxide (DMSO) was used as a control in this experiment. The percentage of protein denaturation inhibition, which indicates the anti-inflammatory activity of the compound was calculated by the following equation:

$$\% \text{ Inhibition} = \frac{A_c - A_t}{A_c} \times 100$$

Where,

A_c = absorbance of the control

A_t = absorbance of the test sample

RESULTS AND DISCUSSION

Formulation of herbal anti-inflammatory gel:

The Anti-inflammatory gel was prepared by Maceration method. About 15g of gel was prepared and stored in an air-tight container

Evaluation of Anti-inflammatory Gel

Table 2.

S.No	Physical parameters	Observation
1	Colour	Green
2	Texture	Smooth
3	Appearance	Semi solid
4	Odour	Floral
5	pH determination	6.1
6	Homogeneity	Uniformly
7	Viscosity	Excellent
8	Skin irritation	No
9	Spreadability	Good
10	Grittiness	No
11	Washability	No
12	Stability test	Stable

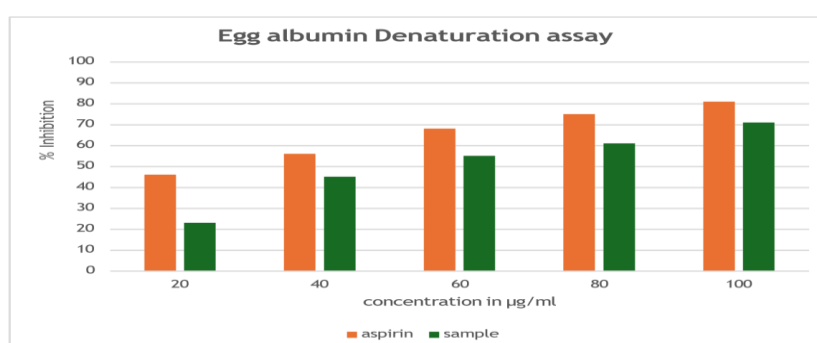
In-vitro anti-inflammatory activity of herbal gel:

The anti-inflammatory activity of *Nyctanthes arbor tristis* gel was assessed using the egg albumin denaturation assay. The gel was tested at various concentration and compared to standard value. The various concentration of absorbance was measured and calculated to the % inhibition. The results of a percentage inhibition of 50% at a concentration of 20 μ g/ml, 60% at a concentration of 40 μ g/ml, 80% at a concentration of 60 μ g/ml, 90% at concentration of 80 μ g/ml, 100% at a concentration of 100 μ g/ml. The values indicate that the *Nyctanthes arbor tristis* gel exhibits significant Anti-inflammatory activity. Moreover, the Anti-inflammatory properties of gel were compared to the standard Aspirin values. The results exhibit the greater Anti-inflammatory activity.

Percentage Inhibition

Table 3.

S.no	Concentration in μ g/ml	%Inhibition aspirin	%Inhibition sample
1.	20 μ g/ml	46	23
2.	40 μ g/ml	56	45
3.	60 μ g/ml	68	55
4.	80 μ g/ml	75	61
5.	100 μ g/ml	81	71



Graph 1.

CONCLUSION

This project focused on the extraction and formulation of an anti-inflammatory herbal gel using *Nyctanthes arbor-tristis*, a plant readily available in local areas and markets. The formulated herbal gel showed good anti-inflammatory activity. The future work will extend to other formulations (cream, oil) and additional activities such as anti-oxidant and anti-bacterial properties.

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