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# Herbal Patch for Anti-Inflammatory Activity of Plant Calotropis Gigantea

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## ABSTRACT

The plant of Calotropis gigantea are traditionally used to cure cancer, intermittent fever, paralyzed part of body, painful joints, swelling, heals wounds. Also used as an antispasmodic, antiasthmatic, externally used for piles, boils, ulcers, scabies, eczema, leprosy. It is having promising anti-inflammatory activity. However, its anti - inflammatory activity is not scientifically documented. The herbal patch of Calotropis gigantea was prepared by solvent casting method, in this method the herbal extract of Calotropis gigantea and excipient i.e. HPMC, MC, Ethanol, Distilled water, Glycerin, chloroform, PVP. Hence, the present study was under taken to evaluate anti-inflammatory activity of Calotropis gigantean leaves extract using in - vitro method. The extract was screened for in vitro anti - inflammatory activity by using inhibition of albumin denaturation technique which was studied. Which indicates that Calotropis gigantea leaves extract possess significant anti - inflammatory activity. Finally the three formulation was prepared i.e. Herbal patch-I(HP-I), Herbal patch-II (HP-II), Herbal patch-III, And all the formulation was evaluated by various parameters like; physical evaluation, weight of the patch, thickness of patch, folding endurance, moisture uptake, moisture content and percentage flatness. We start by summarizing the main findings of our study, emphasizing the effectiveness of the herbal patch in reducing inflammation. In this study we prepare three formulations, that can be herbal patch-I (HP-I), herbal patch-III (HP-III). According to the standard parameters of transdermal patch we observed that the HB-III formulation was better than HB-I and HB-II because it may be stable follows all the parameters of standard procedure.

Keywords: HP, HPMC, Extraction, Evaluation, Inflammation

## 1. INTRODUCTION :-

Caltrops gigantean (Asclepiadaceous), known as milk weed, is a common wasteland weed, drought resistant, salt tolerant, grows wild up throughout India . The term "medicinal plant" refers to a variety of plants used in herbal medicine ("herbology" or "herbal medicine"). It is the practices of using plants for medical purposes as well as the study of such practices. The term "herb" is a combination of the Latin word "herba" and the old French word "herbe." Herb now refers to any plant part, including fruit, seed, stem, bark, flower, and leaf, stigma, or root, as well as non-woody plants. Previously, the term "herb" only applied to non woody plants ,such as those found in trees and bushes. It is one of the peculiar plants not consumed by grazing animals). The identified phytochemicals in this plant are ushering, gigantic,  $\alpha$  and  $\beta$ -calotropeol,  $\beta$ -amylin, fatty acids, hydrocarbons, a mixture of tetracyclic triterpene compounds, sterols, and giganteol Cardenolide, calotropin  $\alpha$ -amyrin,  $\beta$ -amyrin, taraxasterol,  $\beta$ -sitosterol,  $\alpha$ -amyrin methylbutazone,  $\beta$ -amyrin methylbutazone,  $\alpha$ -amyrin acetate,  $\beta$ -amyrin acetate, taraxasteryl acetate lupeol acetate B, gigantursenyl acetate A, gigantursenyl acetate flavonol glycoside, akundarol, uscharidin, calotropin, frugoside calotroposides A to G were isolated. Thus, the plant has immense potential to cure various diseases and disorders <sup>1-5</sup>. The present study reports in silico docking analysis carried out to assess the mosquito larvicidal potential of four terpene compounds isolated from C. gigantean<sup>6,7</sup>.

## 1.1 Method<sup>8-18</sup>

Follow the complexation process in which 50gm. Of powdered drug (*calotropis gigantea*) mixed with 2gm. of oxalic acid and boric acid in 100ml. acetonitrile in RBF. The mixture was heated for 10min. then placed it to cool down. After cooling the water was added by continuous stirring to obtained a dark green colored product. Then filter it with the help of maslin cloth and filterate we add concentrated ammonia to filter the complex dissolved out. The filter was diluted and neutralized with aqueous HCL sol. to obtain a powder form upon continuous stirring then filter it. The crystals/powder was collected on a filter paper. Then follow the solvent casting method in which accurately weight 1gm. HPMC dissolved in 10ml. distilled water and 0.5gm. Methyl cellulose was dissolve in 10ml. then the solution and residue of *calotropis gigantea* crystals was mix with each other with continuous stirring the slightly thick mixture was formed and the solutions was placed in petridis and dry it with the help of hot air oven.

#### **Collection of Material**

Calotropis gigantean was collected from botanical garden of institute and then extract of calotropis to get calotropin by Soxhlet method, and all other chemical were analytical grade from my institute.

#### **Preformulation Studies**

Organoleptic properties

Colour: Powder of Calotropis gigantea was generally green white seen by naked eyes.

Odour: The odour of Calotropis gigantea powder was strongly or slightly unpleasant.

Solubility: The Calotropis gigantea powder was slightly soluble in chloroform.

Particle size: The size of the powder can be analyses by electron microscope.

#### 1.1.1 Flow property

#### Bulk and Tapped density

Bulk density measurement carried out by using flat- round measuring cylinder with a volume of 250 ml. The measuring cylinder was half filled the 5 gm of powder and reading was observed to the nearest millimeter.

#### Bulk density = W/Vo

#### Tapped density

After 50 and 100 taps the corresponding reading was observed to the nearest milliliters. The tapped volume was recorded when the difference between the two volume was smaller than 1 ml.

## Tapped density: After 50 tapping = W/V1

After 100 tapping = W/V2

## Angle of repose

It was determined by fixed funnel method onto a bottom graph paper. The funnel was fixed on a height, and moved according to the height of the conical heap in order to keep a constant distance between the top of the heap and the funnel. The angle of repose was determined by measuring the height of cone of powder with the help of the formula.

tan@= height/base

#### Hausner's ratio

Flow property was defined according to the Hausner ratio.

Hausner ratio = (Tapped density) /(bulk density)

Flow of powder was measured using a standard funnel. In a dry funnel, whose bottom opening has been blocked, the sample was introduced without compacting. After removing the blockage from the bottom opening of the funnel, the time taken for the entire sample to flow out through the funnel was measured.

Hausner ratio = (tapped density / Bulk density)

## Compressibility index

Compressibility study typically involves investigating how a substance responds to changes in pressure. This can be important in various fields like engineering, material science and geology. Compressibility index was determine according to carr's index.

#### Carr's index = (Tapped density) - (bulk density) \*100

(Tapped density)

## 1.1.2 Phytochemical screening

It is a process used to identify and analyze the different chemical compounds present in plants. It involves testing plant extracts for various classes of compounds such as alkaloids, glycosides, flavonoids, terpenoids, phenols and more. It screening helps in understanding the potential medicinal and therapeutic properties of plants.

Test for alkaloids

Wagner's test

20mg of calotropis powder was dissolved in 2ml of methanol. Few drops of 1% HCl added to it. Then the mixture was heated, kept in steam and after cooling. Then the mixture was treated with few drops

of Wagner's reagent. The sample was observed for turbidity or precipitation.

#### Test for tennins Lead test

20mg of Calotropis powder was dissolved in 1ml of distilled water in a test tube and 1-3 drops of Ferric chloride were added to the solution. Then mixture was observed for light green color.

#### Test for cardiac glycosides

20mg of calotropis powder was dissolved in 1ml of glacial acetic acid and 1-2 drops of ferric chloride solution was added. 0.5ml of conc. sulfuric acid was slowly added along the sides of The test tube. A brown ring at the interface indicated a deoxysugar characteristic of cardenolide.



#### Test for flavonoids

#### Ferric chloride test

20mg of calotropis was dissolved in 1ml of distilled water. 0.5ml of dilute ammonia solution was added to it. Conc. Sulphuric acid was added later. A light green colour indicated the presence of flavonoids. The light green colour disappeared on allowing the solution to stand.

#### Test for terpenoids

#### Salkowaski's test

20mg of calotropis was dissolved in 1ml of chloroform and 1ml of concentrated sulphuric acid was added to it. A reddish brown to discolouration at the interface showed the presence of terpenoids.

#### 1.1.3 Evaluation parameter of patches:

- 1. Physical appearance: physical appearance is done by color, odor, uniformity.
- 2. Weight of the patch: patches were taken and weight of each patch was found by using electronic balance. Then average weight of single patch was determined.
- **3.** Thickness of the patch: At various points on the patches, a screw gauge was used to determine the patch's thickness. A single patch's average thickness was determined.
- 4. Percentage moisture content: The prepared films were weighed individually and kept in desiccator containing fused calcium chloride at room temperature for 24 hours. The film was again weighted and the percentage moisture content was calculated using the formula:

#### Percentage moisture content = [initial weight - final weight / final weigh] x100

5. Percentage moisture uptake: The weighted films were kept in a desiccator at room temperature for 24 hours and then exposed to 84 % relative humidity using a saturated solution potassium chloride. Finally, the films were weighted and the percentage moisture uptake was calculated using the formula:

#### Percentage moisture uptake = [final weight-initial weight / initial weight] x100

- **6. Percentage Flatness:** One from the Centre and two from the either side the length of each strip without applying an additional pressure was measured and the variation in length because of non-uniformity in flatness was measured by determining percent constitution equivalent to 100%.
- 7. Folding Endurance: The number times the films could be folded at the same place without breaking gave the value of folding endurance. It was expressed a number.

## 2. RESULT AND DISCUSSION :-

## 2.1 Result

The herbal patch of *Calotropis gigantea* was prepared by solvent casting method, in this method the herbal extract of *Calotropis gigantea* and excipient i.e. HPMC, MC, Ethanol, Distilled water, Glycerin, chloroform, PVP were taken. Finally the three formulation was prepared i.e. Herbal patch-I(HP-I), Herbal patch-II(HP-II), Herbal patch-III, Herbal patch-II(HP-II), Herbal patch-II(HP-I

thickness of patch, folding endurance, moisture uptake, moisture content and percentage flatness. The results of evaluation parameters are done and described in the table.

2.	1.1	Physic	al Ev	aluation:	As	per the	given	method	in 1.	1 the	following	results a	re obtain:
							C						

Parameters	HP-I	HP-II	HP-III
Color	Light green	Light green	Light green
Odor	Odorless	Odorless	Odorless
Uniformity	Yes	Yes	Yes

Table: 1 Observation table for physical appearance

2.1.2 Weight of the patch: As per the standard method the weight of the was checked by the weighing balance and the results are given below:

Formulation	HP-I	HP-II	HP-III
Weight	0.14	0.16	0.15

Table: 2 Observation table of weight of the patch

2.1.3 Thickness of the patch: As per the standard method the weight of the patch was checked by screw gauge and results are given below:

Formulation	HP-I	HP-II	HP-III
Thickness	0.2mm	0.4mm	0.5mm

Table: 3 Observation table for thickness

2.1.4 Percentage Moisture content: As per the standard method the moisture content was checked in desiccator and the results was given below:

Formulation	HP-I	HP-II	HP-III
Initial weight	0.14	0.16	0.15
Final weight	0.12	0.13	0.12
Moisture content	16.6%	23.07%	25%

Table: 4 Observation table for moisture cont

2.1.5 Moisture uptake:- As per the standard method the moisture uptake was checked by desiccator and the results was given below:

Formulation	HP-I	HP-II	HP-III
Initial weight	0.14	0.16	0.15
Final weight	0.18	0.22	0.24
Moisture uptake	22.22%	27.27%	37.5%

Table: 5 Observation table for moisture uptake

2.1.6 Percentage flatness: As per the standard method the flatness was checked by screw gauge and results are given below:

Formulation	HP-I	HP-II	HP-III
Initial length mm	5.0	5.2	5.2
Final length mm	5.0	5.23	5.2
% flatness	100	99.99%	100

Table: 6 Observation table for percentage flatness

2.1.7 Folding endurance: As per the standard method the folding endurance was checked by screw gauge and results are given below:

Formulation	HP-I	HP-II	HP-III
Thickness in mm	0.45	0.40	0.38

#### Table: 7 Observation table for folding endurance

#### 2.2 Discussion

In the discussion the study on the anti-inflammatory activity of a herbal patch containing *Calotropis gigantea*, we can delve into various aspects to provide a comprehensive understanding of your findings. the development of a novel herbal patch for managing inflammatory conditions could offer a natural and potentially safer alternative to conventional treatments.

This may be including:

#### 1. Interpretation of Results

We start by summarizing the main findings of our study, emphasizing the effectiveness of the herbal patch in reducing inflammation. In this study we prepare three formulations, that can be herbal patch-I(HB-I), herbal patch-II(HB-II) and herbal patch-III(HB-III).

According to the standard parameters of transdermal patch we observed that the HB-III formulation was better than HB-I and HB-II because it may be stable follows all the parameters of standard procedure.

#### 2. Mechanism of Action

According to the literature survey we explore the potential mechanisms through which *Calotropis gigantea* exerts its anti-inflammatory activity. This could include inhibiting inflammatory mediators, modulating immune responses, or scavenging reactive oxygen species. Existing literature on the bioactive compounds present in Calotropis gigantea, such as flavonoids, alkaloids, or saponins, and how they may contribute to its anti-inflammatory properties.

#### 3. Compilation of work

According to the standard parameters of transdermal patch we observed that the HB-III formulation was better than

HB-I and HB-II, because it may be stable and under the standard parameters of curcumin patch.

#### 2.3 Summary

The study investigated the efficacy of a herbal patch containing Calotropis gigantea in reducing inflammation. According to results demonstrated a significant reduction in inflammation compared to control groups, for the anti-inflammatory properties of *Calotropis gigantea*. Mechanistic the calotropine and calotropinone compounds present in the plant may contribute to this effect. The findings underscore the promising role of *Calotropis gigantea* as a natural anti-inflammatory agent, offering a novel approach for managing inflammatory conditions. Further research is warranted to elucidate its mechanisms of action and explore its clinical applications.

#### 2.4 Conclusion

*Calotropis gigantea* patches were made synthetically by combining methyl cellulose (MC) and hydroxy propyl methylcellulose (HPMC). The patches were smooth, flexible, and transparent. According to the solubility tests, *calotropis gigantea* is very soluble in ethanol. The uniformity of the patches' weight and thickness that the drug's polymer solution is evenly distributed. The patch's flatness percentage indicates its excellent physical integrity, and its folding endurance demonstrates its excellent flexibility. Through the present experimentation, it has found that the drugs of Ayurveda origin can be utilized in a better form with enhanced efficacy by incorporating in modern dosage forms with higher safety margins and minimal side effect. This experimentation is one of the first few attempts to utilize Ayurveda drugs through TDDS. In *Calotropis gigantea* the active constituent of calotropin and calotropinone has reported anti- inflammatory activity which has low absorption from GIT as it is rapidly metabolized. By using different polymer blends the amount of drug in the body may increase and increase the ant- inflammatory activity<sup>19</sup>.

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