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PREPERATION AND EVALUATION OF ANTI-INFLAMMATORY CREAM OF CALOTROPIS PROCERA LEAVES EXTRACT

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ABSTRACT:

Calotropis procera (family: Apocynaceae) is a medicinal plant widely recognized for its significant pharmacological properties, particularly its anti-inflammatory potential. The present study aimed to evaluate the phytochemical constituents, investigate the anti-inflammatory activity of C. procera leaf extract, and develop a stable topical cream formulation for therapeutic use. Leaves of C. procera were collected, authenticated, shade-dried, and powdered. The extraction was carried out using methanol by cold maceration (1:10) for 48 hours with intermittent shaking, followed by filtration and concentration. Preliminary phytochemical screening of the extract revealed the presence of important secondary metabolites such as flavonoids, alkaloids, tannins, and phenolic compounds, which are known to contribute to anti-inflammatory activity.The mechanism of action was associated with the inhibition of pro-inflammatory mediators, including TNF-α, IL-1β, IL-6, and INF-γ, indicating suppression of inflammatory pathways linked to cyclooxygenase and lipoxygenase enzymes. A topical cream formulation was prepared using beeswax, liquid paraffin, methyl paraben, and triethanolamine through emulsification at controlled temperature. The formulation was evaluated for physicochemical parameters such as pH, spreadability, homogeneity, washability, and irritability. The cream exhibited a pH of 6.9, smooth texture, good spreadability (0.66 cm/sec), and non-irritant nature, indicating its suitability for dermal application. The anti-inflammatory activity of the formulation was further confirmed by the albumin denaturation assay, demonstrating significant inhibition of protein denaturation. These findings highlight the therapeutic potential of Calotropis procera extract in topical formulations for the management of inflammatory conditions.

KEYWORDS: Calotropis Procera, Crude Extract, Anti-inflammatory Cream Formulation, Evaluation.

INTRODUCTION:

Calotropis procera (Aiton) W. T. Aiton is a plant species in the Apocynaceae family. The plant has been known globally under different names, including swallowwort, Sodom apple, dead sea apple, and milkweed. In the Indian region, the plant has been commonly known as orka in the Oriya language, madar in the Hindi language, alarka in the Sanskrit language, and akanda in the Bengali language. In Ayurvedic medicine, specifically in Arkelavana, the plant has been commonly known as Aak. In view of the unique medicinal value of the plant, Calotropis procera (C. procera) has been commonly known in traditional medicine (Murti et al., 2010). The name "Calotropis" has been derived from the Greek language, which means "beautiful," due to the attractive appearance of the flowers.(1)The latex of Calotropis procera (Ait) R Br is well known for its toxic as well as its medicinal properties. It has been reported to cause congestion of eyes, iridocyclitis, and dermatitis after accidental exposure. Local application of latex has shown an inflammatory response, which is mediated by histamine and prostaglandins]. In Indian traditional medicine, it has been used for the treatment of skin diseases, rheumatism, and aches. It has shown potent anti-inflammatory, analgesic, and weak antipyretic effects after oral administration. It is as potent as the anti-inflammatory drug phenylbutazone (PBZ) in inhibiting the inflammatory response mediated by various inflammagens in acute and chronic models of inflammation . But the efficacy of latex of C procera against various inflammatory mediators has not been evaluated.(2)Calotropis procera shows potent Anti-inflammatory activity against various mediators of inflammation such as cyclooxygenase and lipoxygenase enzymes. Various compound such as flavonoids, alkaloids, saponins, and tannins etc.

Scientific Classification:

Kingdom	Plantae
Order	Gentianales
Family	Apocynaceae
Genus	Calotropis
Species	C. Procera
Binomial Name	Calotropis Procera

Table No 01: Scientific Classification of C. procera(3)

CHEMICAL CONSTITUENTS:

Chemical constituents- It shows presence of metabolites such as flavonoids, tannins, terpenoids, saponins, alkaloids, steroids and cardiac glycosides. The plant also contains of several heavy metals such as manganese, lead, chromium, iron, copper, nickel, cobalt, strontium, and cadmium. (4)

MECHANISM OF ACTION:

The anti-inflammatory potential of these extracts by investigating their influence on the gene expression of main pro-inflammatory cytokines such as TNF-α, IL-1β, IL-6, and INF-γ in lipopolysaccharide (LPS)-stimulated human white blood cells. The results revealed that the studied extracts, especially those from flowers and fruits, effectively down-regulated IL-1β gene expression, even lower than that observed with piroxicam.

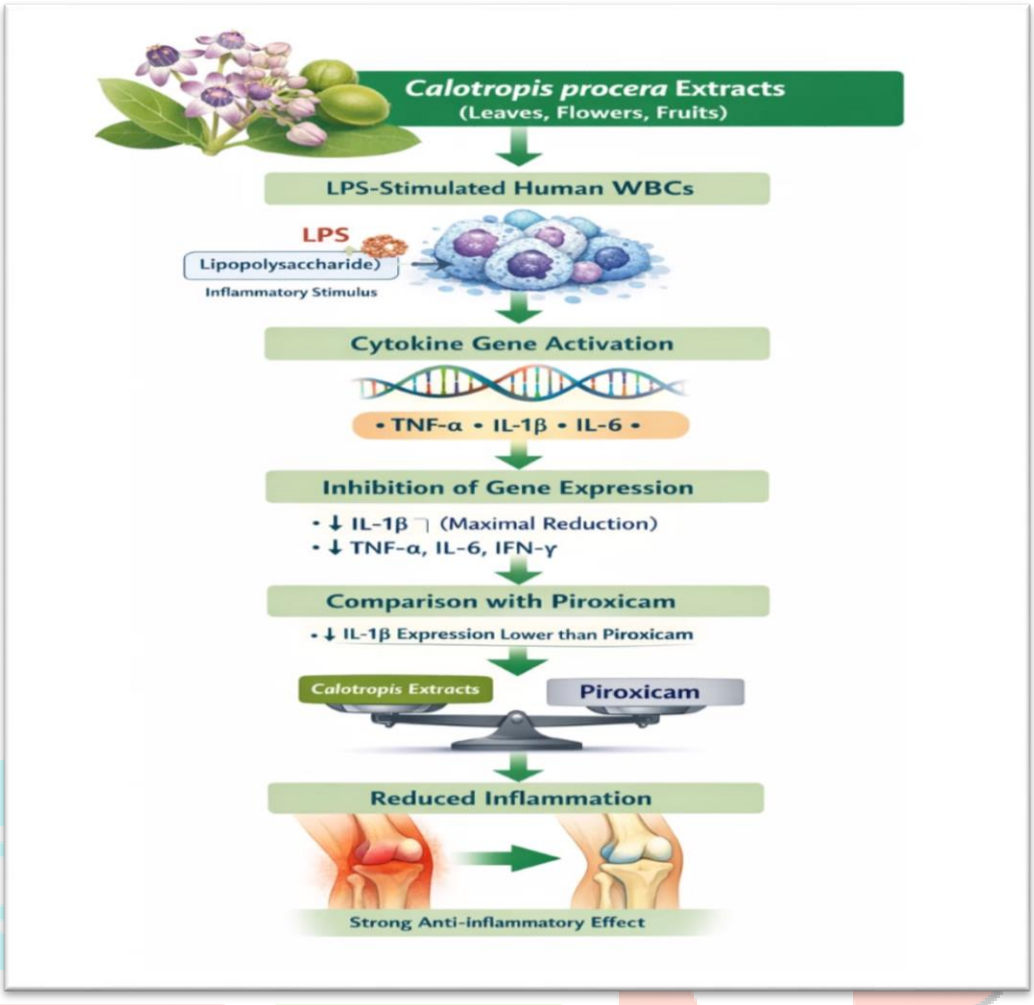

Figure No 01: Mechanism of Action of C.procera(5)

MATERIAL AND METHODS:

Collection of plant material:

The leaves of Calotropis procera were collected from local area of sinnar, the sample . The collected sample was wash by water until all the latex of plant was removed. The clean leaves of C.procera are allowed for complete shade drying and then made to fine powder with mechanical grinder and stored in a container.(6,7).

Preperation of plant extracts:

Extraction of C.procera done by cold maceration process.

Take the 5 gram powder of C.procera in 50 ml of Methanol in the ratio of 1:10 in conical flask with labelled. stand for 48 hrswith shake it periodically. After the 48 hrs the mixture of solution filtered by using whatman filter paper. Evaporate the filter solution by using evaporator to make concentrated liquid drug solution.

PHYTOCHEMICAL ANALYSIS:

Phytochemical analysis of C.procera leaves extract of done by some different chemical testing of alkaloids, tannins, phenolic, flavonoids.

Test	Method	Inference	Result
1. Test of Tannins	2ml of extract +1% lead acetate solution	Yellow precipitate	Tannins are present
2.Test for phenolic compound	2ml extract + few drops of ferric chloride solution	Black color observed	Phenol are present
3. Test for alkaloids	2ml extract +1ml HCL +heat and then cool	Yellow color precipitate	Alkaloids are present
4. Test for flavonoids	1ml extract + sodium hydroxide	Dark yellow solution	Flavonoids are present

Table No 02: Phytochemical analysis of C.procera(8,9).

PROCEDURE FOR FORMULATION CREAM:

The cream was prepared by using liquid paraffin, methyl paraben, bees wax, triethanolamine, distilled water. The oil phase is made by melting bees wax on water bath, after melting the liquid paraffin was added and temperature was maintained at 70°C. The aqueous phase was prepared by adding, methyl paraben and triethanolamine in water and it was dissolved in water at 70°C. Then the aqueous phase was added in oil phase while constantly stirring and prepared extract was simultaneously. After cooling of cream the perfume was added in cream and was packed in air tight container.

FORMULATION TABLE:

Formulation table prepared for 50 gram of cream formulation.

Ingredients	Quantity	Role
Calotropis procera	2 ml	Anti-inflammatory Activity
Bees Wax	8.25 gram	Base
Methyl paraben	0.4 gram	Preservatives
Liquid Paraffin	25ml	Emollient
Triethanolamine	0.4ml	Emulsifying Agent
Water	q.s	Vehicle
Perfume	q.s	fragrance

Table No 03: Formulation table of C.procera cream

EVALUATION PARAMETER FOR CREAM FORMULATION:

1.Organoleptic properties: Color- Light Green

Odor – Perfume

Texture – Smooth

2. pH: pH of cream checked by digital pH meter. pH of cream is 6.9.

3. Viscosity: Viscosity of cream can be measure by Brook field viscometer at 50rpm, and viscosity was found to be 120cp.

4. Spreadability : 5gm cream is sandwiched between two slides and 1 gm weight is placed on upper slide. The weight was removed and extra formulation was scrapped off. The lower slide was fixed on board of apparatus and upper slide was fixed with non-flexible string on which 20gm load was applied. Time taken by upper slide to slip off was noted down.

Formula for speadability:

S= M x L\T

Where: M= weight of cream =1gm

L= Length of slide where cream was spread= 5.3

T= Time required for spreading of cream= 8sce

Sreadability of C.procera cream is 0.66 cm\sec.

5. Washability: Easily washable.

6. Irritability: Non-irritant

7. Homogenity: Homogenous

8. Albumin Denaturation Test:

A- Extraction from the cream-

Weight 1 gm of cream and added into 10 ml of suitable solvent (ethanol or phosphate buffer saline depends on solubility of cream). Sonicate mixture for 15 minutes. Centrifuge at 4000 rpm for 10 minutes. Two layer form (liquid and cream). Use supernatant liquid to create range of concentration (1,2,4,8,10 µg\ml).

B- Albumin denaturation assay:

Combine 2ml of cream extract, 0.2ml of fresh egg albumin and 2.8 ml of phosphate buffer saline solution (6.4). Incubate at 37°C for 15 minutes to allow the phytochemicals to interact with the protein. Heat the mixture in water bath at 70°C for 5 minutes to induce protein structure loss. Cool to room temperature and measure absorbance at 660nm.

If the solution remains clear, it indicates high inhibition of denaturation (higher the anti-inflammatory activity).(10,11,12,13),

OBSERVATION TABLE:

Characterization	Observation
1. Appearance: {a}Color {b} Odor {c} Texture	Light Green Perfume Smooth
2. pH	6.9
3. Viscosity	120cp
4. Spreadibilty	0.66cm\sec
5. Washability	Easily washable
6. Irritability	Non-irritant
7. Homogenity	Homogenous
8. Albumin denaturation test	Test passed

Table No 04: Observation table of C.procera cream

RESULT:

The results demonstrate that the methanolic extract of *Calotropis procera* contains significant phytoconstituents with therapeutic potential. The formulated cream exhibited desirable physicochemical properties such as appropriate pH, good spreadability, homogeneity, and non-irritant nature. Further more, the positive result in the albumin denaturation test confirms the **anti-inflammatory efficacy** of the formulation. Therefore, the developed *Calotropis procera* cream can be considered a promising topical preparation for the management of inflammatory conditions.

DISCUSSTION:

The present study was conducted to evaluate the phytochemical composition and anti-inflammatory potential of *Calotropis procera* leaf extract formulated as a topical cream. The phytochemical screening confirmed the presence of important bioactive constituents such as flavonoids, tannins, phenolic compounds, and alkaloids. These compounds are well documented for their anti-inflammatory, antioxidant, and therapeutic properties, which support the traditional medicinal use of the plant. The cream formulation exhibited desirable physicochemical characteristics, including smooth texture, homogeneity, and good spreadability. The pH of the formulation (6.9) was found to be close to that of normal skin, indicating its suitability for topical application without causing irritation. Additionally, the formulation was non-irritant and easily washable, enhancing its acceptability and safety for use. The albumin denaturation assay demonstrated significant inhibition of protein denaturation, which is a key mechanism in inflammation. This suggests that the formulated cream possesses effective anti-inflammatory activity, likely due to the presence of flavonoids and phenolic compounds that interfere with inflammatory mediators. Overall, the findings of this study validate the traditional use of *Calotropis procera* in the treatment of inflammatory conditions and highlight its potential as a natural and effective topical anti-inflammatory agent.

CONCLUSION:

The study shows that *Calotropis procera* contains important phytochemicals such as flavonoids, alkaloids, tannins, and saponins, which are responsible for its medicinal properties. The plant extract demonstrated good anti-inflammatory activity by reducing the expression of inflammatory cytokines.The cream formulated using *Calotropis procera* extract showed suitable physical and chemical properties like good pH, smooth texture, easy spreadability, and non-irritant nature, making it safe for topical application. The albumin denaturation test confirmed its anti-inflammatory effectiveness.Overall, the formulated cream can be considered a promising herbal formulation for treating inflammation with minimal side effects.

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