Calotropis as a potential antibiotic cream

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Abstract: *Calotropis procera* belonging to the family Asclepiadaceae is a tall shrub with white flowers and is grown all over the world for its benefits. It has been used for fiber, fuel as well for its important secondary metabolites but there is not much information about its antibiotic properties. We focused on this particular aspect using the latex of the plant on Nutrient Agar medium (NA) and a varied number of bacterial microorganisms on the medium to test the effects of *Calotropis* on it. We found that *Calotropis* had significant inhibitory effects on the bacterial cells out of which *E.coli* showed the highest susceptibility. This shows a promising result and can potentially make *Calotropis procera* a useful antibiotic cream.

Keywords: *Calotropis procera*, Antibiotic, *E.coli.*

Introduction:

Calotropis procera is derived from a "Greek" word which means beautiful (Hassan et al.2015). It is a tall shrub with yellowish-white bark containing white flowers. Leaves are oblong and contain milky latex on it. Inflorescence is multi flowered umbellate cyme while fruits are ovoid with about 250-300 seeds (Al Sulaibi et al.2020). It is a multipurpose plant grown all over the world due to its involvement in fibers, fuel and fodder (Batool et al.2020).

Phytochemistry:

Calotropis procera has shown to have many useful secondary metabolites such as flavonoids, tannins, saponins produced by various parts of the plant, mainly leaves and latex (Mossa et al.1991; Moustafa et al.2010; Al-Rowaily et al.2020). The content of phenolic compounds and terpenoids were found to be higher in leaves than the root-bark of the plant (Kinda et al. 2020).

Latex produced by the plant have shown toxic effects against human and animal cell lines and have been investigated in cancer cell lines although no conclusive evidence has been found yet (Ibrahim et al. 2015; Viana et al. 2017; Al-Qahtani et al. 2020).

Antibiotics:

These are powerful medicines used to treat a wide range of infections which work by destroying bacterial cells. Antibiotics act as an assistant to immune cells to eradicate bacterial cells when there is an exodus of bacterial infection in the body. Several antibiotics such as penicillin G, ampicillin have been used regularly to counter bacterial infections [Adam Felman and Fazana Begum 2022].

The aim of the paper is to investigate antibiotic properties of *Calotropis procera* by formulating antibiotic cream using latex of the plant.

Materials and Methods:

Chemicals For Media Preparation

- Agar
- Dextrose
- Distilled water
- Universal indicator
- Peptone
- Yeast extract
- Sodium Chloride

Chemicals For Cream Formulation

- Stearic acid
- Spermaceti
- Acetyl alcohol
- Glycerin
- Triethanolamine
- Benzyl alcohol
- Water
- Plant Latex

Plant Extraction:

- The latex was collected into a sterile wide-necked screw-capped container by deliberately breaking the smooth stem and milky sap oozing out from the stem; this was repeated continuously until the required volume of the latex was tapped.
- Collected into a bottle and dried to make powder.

Phytochemical Analysis

The latex was analyzed for the presence of alkaloids, flavonoids, tannin, saponin, triterpenoids, anthraquinones, and glycosides compounds using the standard colorimetric procedures as described by Sofowora and Kennedy and Thorley.

Disk diffusion method was used to assess antibacterial activity of *Calotropis procera* latex. Antibacterial activity of this plant was compared with doxycycline, streptomycin, chloramphenicol and E coli.

In order to prepare cream, a number of ingredients were incorporated together, then the required amount of the herbal extract was added. The cream formulations were compared according to their physical and chemical stability. Finally, the best formulation was selected by altering the type and quantity of formulation factors (Sofowora ,Kennedy and Thorley).

Phase	Compounds	Amount (g)
Oil phase	Stearic acid	1
	Spermaceti	0.5
	acetyl alcohol	0.5
Water phase	Glycerin	0.5
	Triethanolamine	0.2
	Benzyl alcohol	0.2
	Water	7
	Plant Latex	0.1

Table No. 1. Ingredients for Cream preparation

Formulation Of Antibiotic Cream

Base of the cream contains water and oil phases. The compositions and amounts of the formulation ingredients are shown in the table .

In order to prepare the cream, different amounts of ingredients were incorporated together, then the required amount of the herbal extract (latex) was added. A 10g sample of the formulation was placed in a centrifuge tube (1 cm diameter) and centrifuged at 2000 rpm for 5, 15, 30 and 60 mins. Then the phase separation and solid sedimentation of the samples were inspected.

Fig 1. Latex collection

Fig 2. Dry latex powder

Fig 3. Formulated antibiotic cream

Culture Media of Nutrient Agar (Na)

Nutrient agar is a type of culture media in which contain specific ingredients that allow the growth or cultivation of the bacteria.

S.N.	INGREDIENTS	GRAM/LITER
1	Peptone	5.0
2	Yeast extract	1.5
3	Beef extract	1.5
4	Sodium chloride	5.0
4	Agar	15.0

Table No 2. Nutrient Agar Ingredients

FIG 4. Nutrient agar medium

Test Of Formulated Cream on Microorganisms:

- Prepare two Nutrient agar plates with or without cream.
- Without cream of Nutrient agar plate consider as black plate.
- With cream of Nutrient agar plate cons as a sample plate.
- Both plates were exposed to bacterial contamination.
- Incubate it at 37°C for 48 hours of time to promote bacterial growth on the nutrient agar plate.

Fig 5. Blank And Sample Plate

Observation And Results:

- Less number of bacterial colonies in cream containing nutrients agar petri plate (Sample plate) and blank petri plate of NA (Nutrient agar) shows high colonies of *Staphylococcus aureus*, *Streptomyces maritimus*, *Streptomyces carminius* ,*Klebsiella pneumonia*, *Bacillus subtilis*, and *Escherichia coli.*

Fig 6. Bacterial Growth on Blank and Sample Plate

Conclusion:

Calotropis procera is an important plant used for its secondary metabolites such as tannins, terpenoids etc. We investigated whether the latex of *Calotropis* has antibiotic properties and our results showed that this plant does have antibiotic properties by inhibiting bacterial organisms from the medium. Out of which *E.coli* was most vulnerable to the latex which shows a promising potential to be used as an antibiotic cream.

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