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Research Article

ANTIBACTERIAL SCREENING ON LEAVES OF *ARGYREIA CYMOSA ROXB.* AGAINST PATHOGENIC BACTERIA ISOLATED FROM INFECTED PATEINTS SAMPLES WOUND, SPUTUM AND STOOL

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Abstract

The present study deals with the aqueous leaf extract and synthesized silver nanoparticle of *Argyreia cymosa* (Roxb) were evaluated for antibacterial activity. The aqueous leaf extract and synthesized nanoparticle of *Argyreia cymosa* is active against *E.coli, P.aeruginosa, Bacillus and S.aureus*. The aqueous leaf extract showed maximum activity against *Bacillus* (20mm), *S.aureus* (18mm), *P.aeruginosa* (13mm) *E.coli* (12mm) and the synthesized silver nano particle showed maximum activity against Bacillus (27mm) , *E. coli* (21mm) , *S. aureus* (12mm) and *P. aeruginosa* (11mm).

Key words: *Argyreia cymosa*; Aqueous extract; Pathogens;Antibacterial activity.

Introduction

Argyreia cymosa (Roxb) is stem woody, terete, pubescent, leaves deltoid to cordiform, 6-8×4-6 cm Chartceous, thins pubescent on both sides, entire acute or obtuse, base truncule or cordate, flowers pinkins in axillary, carymbone cymes, fruit globose, 1.7× 1.4 cm, glabrous, seeds 2or 3 ovate to elliptic black. Flowering stage of *Argyreia cymosa* at the month of august-september. The paste of leaves applied on wounds and cracks (Karrupusamy, 2007 and Salav Ashok punjaji, 2003). *Argyreia cymosa* barks have antioxidant activity (Shrishallappa badami, 2008) and it has various pharmacognostic activities (Biradar Rupali, 2013). The leaf extract of *Argyreia cymosa* used to synthesize silver nanoparticle and their antibacterial efficiency were tested.

Taxonomic Classification

Kingdom:	Plantae
Phylum:	Tracheophyta
Class:	Magnoliopsida
Order:	Solanales
Family:	Convolvulaceae
Genus:	*Argyreia*
Species:	*Argyreia cymosa*

Materials and Method

Collection of Plant Materials

The plant *Argyreia cymosa* was collected from region of Tiruchirappalli district and identified by local flora. The leaves were separated from the collected plant and dried under shade. After drying, it was powdered and used for our studies.

Microbial Strains Used

The clinical bacterial isolates collected from different patients who suffered from clinical wounds, respiratory illness and diahhorea.The collected sample were transferred in to Amies transport medium and brought laboratory safely. Agar culture of test microorganisms were prepared and incubated at 34 hrs at 37°c. After incubation the organisms were confirmed by Gram's staining and biochemical tests as standard. The isolated bacteria were maintained in nutrient agar respectively, which were stored at 4°c. From the wound sample there were three different pathogenic bacteria such as *E.coli, S.aureus* and *P.aeruginosa* were isolated. Similarly from the sputum of respiratory illness *E.coli, Bacillus*, and from the stool *Bacillus, E.coli* was confirmed by biochemical tests.

Synthesis of silver nanoparticle

5ml of the prepared extract was added to 10ml of aqueous AgNO3 (0.1M solution) at room temperature. The mixture was stirred continuously for 5-10 minutes. The reduction was completed after 24 hours with the appearance of brownish-black colour which confirms the formation of silver nanoparticles (Fig 1).

Antibacterial Screening

Disc Diffusion Method

Disc diffusion method was carried out for antibacterial susceptibility testing according to the standard method to

assess the presence of antibacterial activities of the plant extract. Muller Hinton agar (MHA) plates were prepared. Overnight nutrient broth culture of test organisms were seeded over the MHA plates using sterile cotton swab so as to make lawn culture. The discs which had been impregnated with aqueous extracts of leaf and compound separated from column were on the MHA plates with the control disc and subjected to antibacterial screening. The plates were then incubated at 37^0 c for 18 to 24 hours depending on the species of bacteria used in this test. After the incubation the plates were examined for inhibition zone.

Results

The present study showed that aqueous extract of leaves and synthesized silver nanoparticle from the leaves showed antibacterial activity against the organism, *Escherichia coli, S.aureus, Bacillus sp.* and *P. aeruginosa*.(Fig 2).

Table 1: Zone of inhibiton formed by aqueous extract and synthesized silver nanoparticle from the leaf of *Argyreia cymosa* against the pathogenic organisms

S. no	Organisms	Name of the samples			Zone of inhibition(mm)	
		Wound	Sputum	Stool	Aqueous	$AgNo_3$
1	*E.coli*	+	+	+	12	21
2	*S.aureus*	+	-	-	18	17
3	*P.aeruginosa*	+	-	-	13	11
4	*Bacillus*	-	+	+	20	27

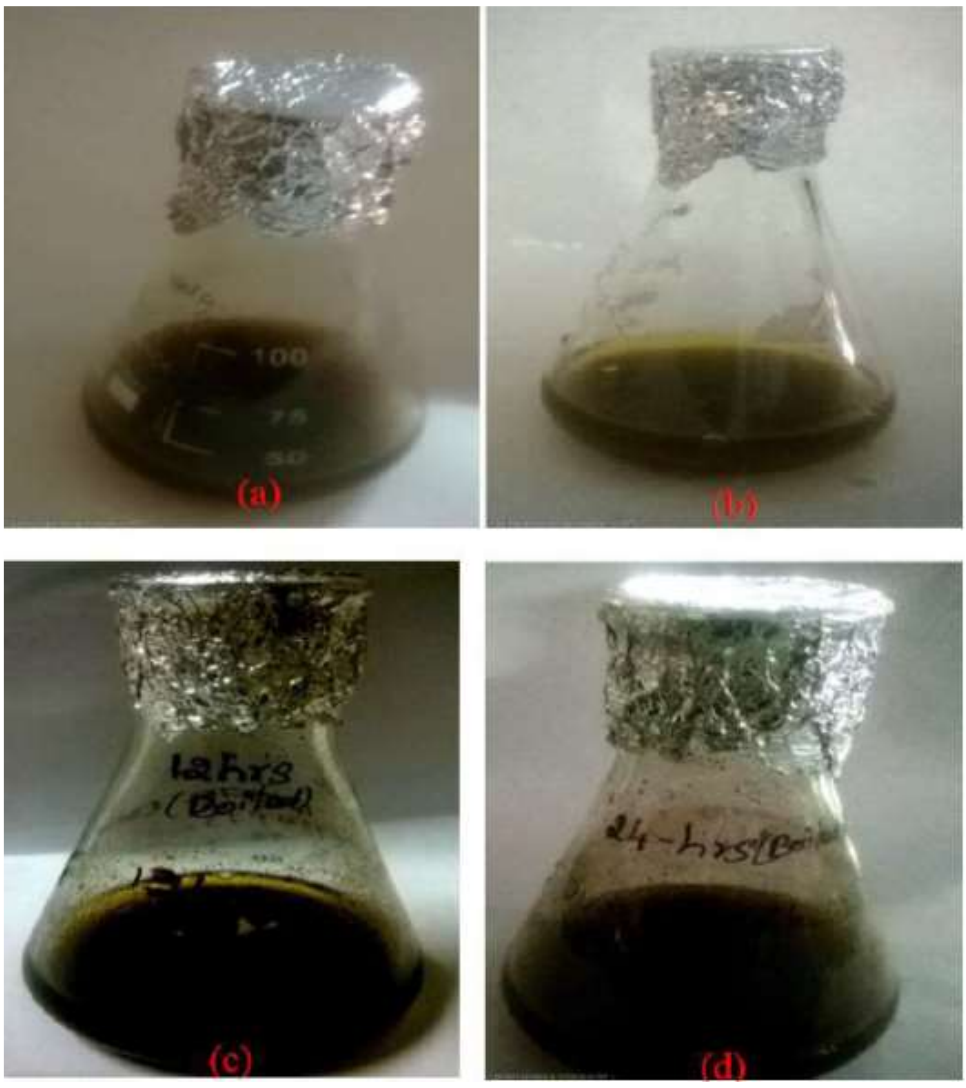

Fig. 1: Synthesis of Silver Nano Particle from *Argyreia cymosa* (Roxb). (a) Fresh leaves extract; (b) 0 h of inoculation after adding silver nitrate; (c) 12 h of inoculation; (d) 24 h of inoculation.

Fig. 2: Antibacterial activity of crude extract and silver nanoparticle of *Argyreia cymosa* leaves. A. *E. coli*; B. *S. aureus*; C. *P. aeruginosa*; D. *Bacillus sp*.

Discussion

In earlier study *Argyreia nervosa* is a common medicinal plant used in various ethno-medical preparations. Traditionally it is used as an antibacterial, antifungal, antipyretic, analgesic, anti-inflammatory etc. In the present study the ethyl acetate extract and methanol extract of the whole aerial part from *Argyreia nervosa* was studied for its anti-inflammatory activity (Kamal jeet, 2012).

In earlier study an ethnobotanical survey was carried out to collect information on the use of medicinal plants by paliyan tribes in sirumalai hills of eastern ghats (karuppusamy, 2007).

In previous study of Alcoholic and aqueous extracts of *Argyreia nervosa* were evaluated for their antibacterial activity against five bacterial strains viz., *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Escherichia coli*, *Citrobactor* and *Klebsiella pneumoniae* using agar disc diffusion method. Solvents used to determine antibacterial activity were methanol and water. Both methanolic and aqueous extract showed zone of inhibition against all tested strains of bacteria. From methanolic and aqueous extract of *Argyreia nervosa*, methanolic extract had the most inhibitory effect on the growth of all bacterial strains tested as compared to aqueous extract. Among all the bacterial strains *Escherichia coli* was the most sensitive to *Argyreia nervosa* extracts of methanol and water. The MIC value for different strains and varieties ranged from 3.0 to 20.6 mm in diameter (Priyanka Yadav, 2014).

In earlier study, *Argyreia cymosa* bark extracts were subjected to in vivo antioxidant activity with different methods. The petroleum ether extract has shown antioxidant activity in ABTS, nitric oxide, hydroxyl radical (by P-NDA) and lipid peroxidation methods. The ethyl acetate extract has shown antioxidant activity (Shrishallappa Badami, 2008).

The aim of earlier work was to evaluate the wound healing property in normal and diabetic animals by oral and topical administration of ethanolic extract of leaves. A single injection of alloxan monohydrate (120 mg/kg, i.p.) prepared in citrate buffer (0.1 M, pH 4.5) was administered to produce diabetes in rats and mice, after overnight fasting. Excision wounds (sized 300 mm2 and of 2 mm depth) were used for the study of rate of contraction of wound and epithelization. The study demonstrates that *A. nervosa* leaves extract applied topically promotes healing of wounds

more significantly as compared to oral application (Singhal, 2011).

In our study, the nanoparticles were synthesized and the mixture was stirred continuously for 5-10 minutes. The reduction was completed after 24 hours with the appearance of brownish-black colour which confirms the formation of silver nanoparticles the aqueous extract and synthesized silver nano particle from *Argyreia cymosa* showed activity against the pathogenic bacteria. The aqueous leaf extract showed maximum of activity against *Bacillus* (20mm), *S.aureus* (18mm), *P.aeruginosa* (13mm), *E.coli* (12mm) and the synthesized silver nano particle showed maximum activity against against Bacillus (27mm) , *E. coli* (21mm) , *S. aureus* (12mm) and *P. aeruginosa* (11mm).

Conclusion

The present study of the plant *Argyreia cymosa* had the ability to synthesize the silver nanoparticles and showed maximum activity against pathogenic organisms, hence leaf extract of *Argyreia cymosa* is highly recommended for various illness such as skin infection, respiratory problems and gastrointestinal problems and also recommended for herbal preparations to the traditional medicinal practioners and for the pharmaceutical industries for the mass scale extraction of therapeutic agents.

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