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Studies on antimicrobial activity of *Clerodendrum infortunatum*, *Argyreia nervosa* and *Vitex negundo* : A comparison

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Abstract

Ethanolic extracts of leaves of *Clerodendrum infortunatum Linn, Argyreia nervosa* and *Vitex negundo* were subjected to preliminary screening for antimicrobial activity .All ethanolic extracts exhibited significant anti-microbial activity comparable to the standard drug tetracycline. Ethanolic extract of *Clerodendrum infortunatum* shows more inhibitory zone as compared to ethanolic extracts *Argyreia nervosa* of and *Vitex negundo*. The mixture of all three extracts together in equal concentration shows more inhibitory zone as compared to other extracts.

Keywords: *Clerodendrum infortunatum, Argyreia nervosa, Vitex negundo*, antimicrobial.

Introduction

Many plants were found to contain compounds, which are used as natural medicines to treat common bacterial infections. Indian medicinal plants are regularly used in various system of medicine because of minimal side effect and cost effectiveness. The potential for developing antimicrobials from higher plants appears rewarding as it may lead to the development of phytomedicine against microbes.

Clerodendrum infortunatum Linn. (Verbanaceae: Bhat in Hindi, Ghentu in Bengali, Bhania in Oriya) is a terrestrial shrub having square, blackish stem and simple, opposite, decussate, petiole, exstipulate, coriacious, hairy leaves with a disagreeable odour.[1,2] The plant is common throughout the plains of India. Various parts of the plant have been used by tribes in colic, scorpion string, snake bite, tumour and certain skin diseases.[3,4] also used in Indian folk medicine as in the treatment of bronchitis, asthma, fever, diseases of the blood, inflammation, burning sensation and epilepsy.[7-9] Fresh juice of the leaves has been used as vermifuge and in

treatment of malaria. [4,5]*Clerodendrum infortunatum* leaves on preliminary chemical analysis are found to contain saponin, clerodin (a bitter diterpene)[4,6] and some enzymes. Leaves also contain a fixed oil which consists of Glycerides of Lenoleic, oleic, stearic and lignoceric acid.[9] Previous phytochemical investigation of the plant revealed the presence of alkyl sterols and 2,-(3,4-dehydroxyphenyl)ethanol-1-O-α-2-rhamnopyranosyl-(1→3)-β-D-(4-O-caffeoyl) glycolpyr -anoside (acteoside) in this plant.[10, 11]

Argyreia nervosa (Linn.f.) bojer belongs to family Convolvulaceae is a climbing shrub with woody tomentose stem, found mainly in Deccan, Karnataka and East slopes of the West Ghats at an altitude of 900m.[12] It is commonly known as Elephant creeper and in Samudra-sok Hindi.[13]Traditinally, leaves are used by Rajasthani tribes to prevent conception.[14] Seeds of *Argyreia nervosa* found to possess hypotension, spamolytic,[15] and anti-inflammatory activity.[16] Chemical analysis revealed the presence of triterpenoids, flavanoids, steroids and lipids.[17] Roots of *Argyreia nervosa* proved the immunomodulatory activity against the myelosuppressive effects induced by Cyclophosphamide.[18] 24R-ergost-5- en-11-oxo-3 beta-ol alpha –D glucopyranoside xylose was isolated from seeds of *Argyreia nervosa* known as Argyreioside.[19]

Vitex negundo (Verbanaceae) commonly known as Nirgundi. It is a large, aromatic shrub, sometimes a small slender tree found throughout the greater part of the India. It contains various chemical classes such as alkaloids, tannins, flavonoids, carbohydrates. Traditionally leaves reported to posses tranquilizing effect, insecticidal properties and laid over grain to ward off insects.[20, 21, 22]

Material and Methods

Plant Material:

Leaves of *Clerodendrum infortunatum*, leaves of *Argyreia nervosa* and leaves of *Vitex negundo* were collected from Amaravati (M.S.).The collected material was authenticated by Mrs.Prabha Bhogoankar, Director Govt. Vid. Inst. of Sci. and Hum. Amravati.

Extract preparation

The collected materials were washed thoroughly in water, chopped, air dried for a week at 35-40°C and pulverized in electric grinder and exhaustively extracted successively in soxhlet apparatus, using petroleum ether and ethanol respectively. The extracts were concentrated under reduced pressure and were then made to powder. These powders were dissolved in (DMSO).These solutions extracts were used for analyzing the antimicrobial activity against reference strains.

Microorganisms

Four clinical strains *E.coli, Proteus vulgaris, Bacillus subtilis, Staphylococcus aureus* were used for assessing the antimicrobial activity with standard tetracycline (10ug/ml). Three fungal strains *Aspergillus niger, Aspergillus flavus and Candida albicans* were used for antifungal activity.

Antimicrobial Activity: [23, 24, 25]

Antimicrobial activity was determined by the disc diffusion method. Muller hilton and Saboured dextrose broth were used as medium for bacterial and fungal strains respectively. Control experiments were carried out under the similar condition by using tetracycline (100ug/ml). The Petri dishes with bacteria and fungal cultures were incubated at 37±2°C for 24 hrs and 27±2°C for 48 hrs respectively. The assessment of antimicrobial activity was based on the measurement of diameter of inhibition zone formed by dissolving the plant material extract in DMSO and standard drug also. The experiment was repeated thrice and results were taken as mean of these readings.

Results and Discussion

The results of antimicrobial activity of ethanolic extracts of *Clerodendrum infortunatum*, *Argyreia nervosa* and *Vitex negundo* are given in table 1.From the results it was found that all ethanolic extracts exhibited significant antimicrobial activity comparable to the standard drug tetracycline.Ethanolic extract of shows *Clerodendrum infortunatum* more inhibitory zone as compared to ethanolic extracts of *Argyreia nervosa* and Vitex negundo.When the three extracts were mixed together in equal concentration(1:1:1), it shows more inhibitory zone as compared to other individual extracts. From these results we can concluded that some of the component from the mixture of all three extracts exhibit the synergistic action. It needs the isolation of the active component from these extracts that exhibit synergistic action against bacteria.

Table 1: Antimicrobial activity of *Clerodendrum infortunatum*, *Argyreia nervosa* and *Vitex negundo*

Treatment	Conc. (mcg/ml)	Diameter of zone of inhibition(cm.)						
		Bacteria				Fungi		
		P.vulgaris	*B.subtilis*	*E.coli*	*S.aureus*	*A. niger*	*A. flavus*	*C. albicans*
C.infortunatum	500	1.8	1.9	2.0	1.8	2.0	2.0	1.6
A. nervosa	500	1.2	1.5	1.3	1.2	1.3	1.1	1.0
v.negundo	500	1.3	1.3	1.4	1.4	1.2	1.3	1.0
Mixture of *C.infortunatum+ A.nervosa+ v.negundo(1:1:1)*	500	2.1	2.2	2.2	2.0	2.1	2.2	1.8
Standard (Tetracycline)	100	2.2	2.3	2.6	2.6	2.2	2.8	2.1

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