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Full Length Research Paper

Antibacterial and antifungal activity of latex of *euphorbia antiquorum*

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Euphorbia antiquorum **is a large shrub or small tree belonging to the largest and the most diverse family in the plant kingdom, Euphorbiaceae. In the present study, an attempt was made to evaluate the antimicrobial properties of latex of** ***E. antiquorum*** **on certain microbes. The methanolic extract of the latex was prepared. The extracts were tested for their antibacterial activity against some Gram positive bacteria,** ***Bacillus subtilis, Staphylococcus aureus, Shigella flexneri*** **and Gram negative bacteria** ***Escherichia coli*** **and** ***Klebsiella pneumonia*** **and antifungal activity against pathogenic fungi** ***Candida albicans, Aspergillus flavus, Aspergillus fumigatus, Rhizopus stolonifer*** **and** ***Mucor indicus.*** **The results revealed that the latex showed minimum inhibition only to** ***E. coli*** **and** ***S. flexneri*****. Latex did posses a strong antifungal activity against deadly pathogens namely** ***C. albicans, A. flavus, A. fumigatus*** **and not to** ***Rhizopus Mucor*****. The results suggest that the** ***E. antiquorum*** **latex extract account both for the antibacterial and antifungal properties and has a potential for use as an antimicrobial agent.**

Key words: *Euphorbia antiquorum*, pathogenic micro organisms antibacterial, antifungal.

INTRODUCTION

In recent years, considerable interest has been evidenced by the medical professional regarding the use of indigenous drugs in the treatment of diseases (Ananth and Reddy, 2010). The toxic effects produced by the administration of drugs are much more a serious problem than that of the disease itself. These factors compel us to search for safe formulation from alternative medicinal system, which is devoid of side effects in the body (Siddique et al., 2010). Herbal drugs could be scientifically modified for better pharmacological activity to establish safe and effective drugs (Rahman et al., 2009). Infectious diseases have been a life threatening problem for humans before antibiotics (Seyyednejad and Motamedi, 2010). Infectious diseases are the important causes of morbidity and mortality among humans and the infectious diseases account for about half of the death in tropical countries (Khosravi and Behzadi, 2006).

Infection rates have increased and antibiotic resistance has become an increasing therapeutic problem (Mitscher, 2008; Jarvis, 2008). Antimicrobial chemotherapy has not achieved the much-required success in the eradication of microbial infection because of the antimicrobial resistance developed by most pathogenic microorganisms (Unlu et al., 2008). Bacterial and Fungal infections are some of the most serious global health issues of present century (Ananth and Reddy, 2010). They are evolving numerous mechanisms to evade antimicrobial agents (Parekh and Chanda, 2007). To identify new and novel antimicrobial agents that would help in alleviating the problems of emerging resistant bacterial and fungal pathogens (Talib and Mahesneh, 2010).

The different antimicrobial and phytochemical constituents of medicinal plants and using them for the treatment of microbial infectious as possible alternative to chemically synthetic drugs to which many infection microorganism have become resistant (Akinpelu and Onakoya, 2006) is widely accepted. A better understanding of the ecological role for antibiotics and antibiotic resistance in non clinical environments may

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Table 1. Antibacterial activity of methanolic extract of latex of *E. antiquorum* by Agar plug method and disc diffusion method.

S.NO	Microorganism	Zone of inhibition (mm)	
		Agar plug method	DISC diffusion method
1	*E. coli*	4-5	5
2	*S. flexneri*	3-4	4
3	*K. pneumonia*	NI	NI
4	*S. aureus*	NI	NI
5	*B. subtilis*	NI	NI

NI- No inhibition.

eventually help to predict and counteract the emergence and future evolution of resistance (Martinez, 2008).

METHODOLOGY

Collection of latex

The plant specimen was identified and authenticated (Specimen No 365) by Dr G.V.S Murthy, Scientist E, Director, Botanical survey of India, Tamilnadu. The latex was collected from plant by breaking up the stem of *Euphorbia antiquorum*. The latex was collected in the morning h between 8 to 9 a.m in a glass container and maintained in an ice-cold condition till the use of latex for extraction.

Preparation of sample

The latex collected was extracted with methanol. The methanolic extract was prepared by dissolving 1.0 ml of latex in 5.0 ml of methanol and allowed to evaporate at 60°C in a water bath. The remaining residue was dissolved in minimum amount of DMSO, stored and used for the assays.

Antimicrobial assay

The methanolic extract of latex of *E. antiquorum* was analyzed for antimicrobial activity using the following methods.

ANTIBACTERIAL ASSAY

Strains of bacteria used

Klebsiella pneumoniae, Shigella flexneri, Staphylococcus aureus, Bacillus subtilis and *Escherichia coli.* The antibacterial activity was evaluated by measuring the diameter of zone of inhibition around the well by Agar well diffusion method (NCCLS, 1993) and disc diffusion method (NCCLS, 1997).

ANTIFUNGAL ASSAY

Strains of fungi used

Candida albicans, Aspergillus flavus, Aspergillus fumigatus, Rhizopus and *Mucor.*

The antifungal activity was evaluated by observing crescent shaped zone of inhibition in Agar plug method (Schlumbaum et al., 1986) and inhibition of spore germination by spore germination assay (Alves et al., 1998).

RESULTS

Antibacterial activities of latex of *E. antiquorum* using agar plug method and disc diffusion method

The results obtained in the present study revealed that the methanolic extract of latex of *E. antiquorum* possesses moderate inhibitory effects against *E. coli* and *S. flexneri* where as *K. pneumonia, S. aureus* and *B. subtilis* were not inhibited by the latex extract. The anti-bacterial assay was also assessed using disc diffusion method. It is a qualitative to semi-quantitative test. The results obtained for disc diffusion was similar to the Agar well diffusion method. *E. coli* and *S. flexneri* was moderately inhibited by the latex extract whereas other organism tested did not show considerable inhibition. The diameter of zone of inhibition obtained for the test organisms in Agar plug method and disc diffusion method is presented in Table 1.

Antifungal activities of methanolic extract of latex of euphorbia antiquorum by Agar plug method

The methanolic extracts of latex of *E. bantiquorum* was screened for antifungal activity by Agar well plug method using human pathogenic fungal isolates namely *Aspergillus flavus*, *Aspergillus fumigatus*, *Candida albicans*, *Rhizopus stolonifer* and *Mucor indicus*. The potential sensitivity of the extract was obtained against the three microorganisms tested. The antifungal activity was evaluvated by measuring zone of inhibition of fungal growth surrounding the well in mm. The zone obtained for each fungal organism was recorded and presented in Table 2.

The data revealed that significant reduction in growth of fungal strain was brought about by methanolic extract of latex of *E. antiquorum*. Among the organisms tested the maximum inhibitory effect of the extract was seen against *A. fumigatus* followed by *C. albicans* and *A. flavus* showed considerable inhibitory activity where as *R. stolonifer* and *M. indicus* did not show significant zone of inhibition. Therefore this study suggests that methanolic extracts of latex of the plant would be helpful in treating diseases caused by *A. fumigatus, A. flavus* and a

Table 2. Antifungal activity of methanolic extract of latex of *E.Antiquorum* by agar plug method.

S.NO	Microorganisms	Zone of inhibition (mm)
1.	*A. flavus*	5-6
2.	*A. fumigatus*	12
3.	*C. albicans*	10
4.	*R. stolonifer*	NI
5.	*M. indicus*	NI

*NI- No inhibition.

Table 3. Antifungal activity of methanolic extract of latex of *E.antiquorum* by spore germination assay.

S.NO	Microorganisms	Zone of inhibition (mm)
1.	*A. flavus*	+
2.	*A. fumigatus*	+
3.	*C. albicans*	+
4.	*R. stolonifer*	-
5.	*M. indicus*	-

(+) Presence (-) Absence.

dreadful pathogen *C. albicans.*

Spore germination assay

The antifungal activity of methanolic extract of latex of *E. antiquorum* was confirmed by the spore germination assay. In this assay too, it was explored that latex extract strongly inhibited the spore germination of *C. albicans*, *A. flavus*, *A. fumigatus* and minimum inhibition was observed in *Rhizopus* and *Mucor*. The results obtained for the spore germination assay is presented in Table 3.

The observation of the present study revealed that the methanolic extract of latex of *E. antiquorum* was effective on main pathogenic bacteria and fungi tested. Antibacterial potential of the latex was less effective when compared to antifungal effects. However the latex can be exploited for its antimicrobial affects in medicinal preparations.

DISCUSSION

Plant based products have been effectively proven for their utilization as source for antimicrobial compounds. Plants are important source of potentially useful structures for the development of new chemotherapeutic agents. The first step towards this goal is the *in vitro* antibacterial activity (Mahesh and Satish, 2008) Many reports are available on the antiviral, antibacterial, anti-fungal, anthelmintic, antimolluscal and anti-inflammatory properties of plants (Behera and Misra, 2005 and Govindarajan et al., 2006) In the present study, the methanol extract latex of *E. antiquorum showed* the antibacterial activity against *B. subtilis* and *E. coli* which supports the potential as they can serve the purpose without any side effects that are often associated with synthetic antimicrobials. The methanol extracts of latex of *E. antiquorum* were subjected to a preliminary screening for antimicrobial activity against pathogenic bacteria and fungi. It was clear from the present results, latex extracts exhibited pronounced activity against the two tested bacteria namely *E. coli* and *S. flexneri* does not show any inhibition of *Klebsiella pneumoniae B. subtilis and S. aureus* tested which implies that the latex possesses minimum antibacterial activity.

The methanolic extract of *E. antiquorum* showed anti-fungal properties against *Aspergillus niger, A. flavus* and *C. albicans*. Similar effects were observed in the methanol extract of *W. somnifera* was effective against *C. albicans* (Kambizi and Afolayan, 2008). This tends to show that the active ingredients of the plant parts are better extracted with methanol. It was confirmed that the latex possess potential antimicrobial property which can be used as a active principle in antibiotic preparations. However the present study of *in vitro* antibacterial evaluation of some plants forms a primary platform for further phytochemical and pharmacological studies to discover new antibiotic drugs.

Conclusion

Our study on methanolic extract of *E. antiquorum* latex revealed that the latex is potentially rich in antimicrobial compounds and suggests that they represent an

economic and safe alternative for treatment of infectious diseases.

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