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Research Article

IN -VITRO ANTIBACTERIAL ACTIVITY OF FLOWER EXTRACTS OF *WOODFORDIA FRUTICOSA* KURZ.

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Abstract

Medicinal plants are potential resources for the discovery of new antimicrobials agents against most resistant strains of bacteria. Three flower extracts (aqueous, methanol and chloroform) of *Woodfordia fruticosa* Kurz were examined for antibacterial activity using the agar disk-diffusion method against six important disease causing clinically isolated bacterial strains. The flower extracts were found to be active against most of the bacterial strains. The methanolic flower extracts of *Woodfordia fruticosa* exhibited a better antibacterial activity. All of the extracts of *Woodfordia fruticosa* were highly active against *Vibrio chlorea* and *Shigella dysenteriea*.

Keywords: *Woodfordia fruticosa* Kurz; Lythraceae; Three flower extracts; Antimicrobial activity.

Introduction

Since time memorial, medicinal herbs are used as traditional medicine to heal most of the dreaded diseases. Most of the medicinal herbs have been used in day to life to treat various infectious disease throughout the world. In fact, herbs produce a wide range of bioactive principles, making them a good source of various types of medicines (Farombi, 2003). About 50 percent of all new pharmaceutical drugs are obtained from natural origin (Stuffness and Douros, 1982) and natural products play an significant role in drug designing in pharmaceutical industry (Baker et al., 1995). Plants are the fundamental resources of novel medicine. The fundamentals of molecular and active elucidations for synthetic medicines are provided by a wealthy natural sources.

Medicinal herbs are potential antimicrobial activity and need to be investigated against a suitable microbial culture to confirm the activity and to determine the given parameter related with it. Antimicrobial activity using medicinal herbs have been proved by many researchers (Reddy et al., 2001; Erdogrul, 2002; Ates and Erdogrul, 2003). In India, the study extensively investigated by many researchers and incorporated with ethnomedicine (Maheshwari, 1986; Rai, 1989; Negi et al., 1993). Based on the herbal studies, a huge number of traditional natural products has been validated (Taylor et al., 1996) and proved as potential sources of antibacterial, antiviral, antitumor and antifungal agents (Chung et al., 1995; Vlietinck et al., 1995). The crude plant extracts of screening programs have been potentially initiated in early stage followed by the screening of pure compounds isolated from natural products (Kusumoto et al., 1995).

Infectious diseases, mainly those involving the Gastrointestinal tract, are a hazardous problem in developing and developed countries, especially among

third world children (Watson, 1992). Most of the currently using synthetic drugs have more adverse side effects (Covington, 1988). Hence the search for new antimicrobial agents exhibiting minimal side effects is necessary and urgently needed (Watson, 1992; Covington, 1988; Kandil et al., 1994). One of the most potential areas in the search are the medicinal herbs (Alonso et al., 1995).

Woodfordia fruticosa (Family: Lythraceae) is a traditional medicinal herbs widely present in India and south east Asian counties, growing in higher altitude of about 1500 m (Kirtikar and Basu, 1935). The leaves are used as a agents for sedative, antibacterial, antihelminthic, astringent (Kirtikar and Basu, 1935), emetic, febrifuge (Nadkarni, 2005), and stimulant (Tambekar and Khante, 2010). The flower is used for hemorrhage, burns, diabetes, leprosy and skin diseases (Nadkarni, 2005). The flower contains ellagitannin dimmers (Anjaria et al., 2002), used as astringent and haemostatic properties that release histamine. It is used in menorrhagia, leucorrhoea (Yoshida et al., 1989) and antitumor activity (Kuramochi-Motegi et al., 1992). The dried flowers are helpful for wounds and reduce discharge and enhance granulation (Cho et al., 1990; Krishnan and Seeni, 1994). The present work was investigated the antibacterial activity of different extracts of flower of *Woodfordia fruticosa* Kurz.

Materials and Methods

Plant material

Woodfordia fruticosa was collected from Solakkad, Kollihills and was properly identified by the classical and botanical literature available and then further confirmation of the flower from Rapinat Herbarium, Tiruchirapalli. The shadow dried flowers were homogenized to fine powder and further subjected to extraction**.**

Preparation of extracts

Aqueous extract

100g of dried flower powder *Woodfordia fruticosa* herb was infused in distilled water until complete exhaustion and evaporated under reduced pressure at 50^0 C using a rotavapor apparatus.

Methanolic extract

100g of dried flower powder *Woodfordia fruticosa* herb was macerated in 80% methanol and concentrated as described above.

Chloroformic extract

100g of dried flower powder *Woodfordia fruticosa* herb was extracted with chloroform in a Soxhlet apparatus and the extract obtained was concentrated as described above.

Microbial strains

The bacterial strains used to assess the antibacterial properties of three solvent (aqueous, methanol and chloroform) extracts of *Woodfordia fruticosa* included Gram-positive and Gram-negative bacteria. The microorganisms used in this study were *Shigella dysenteriae, Salmonella typhi, Escherichia coli, Vibrio cholera, Staphylococcus aureus* and *Bacillus cereus*. The investigated microbial strains were obtained from National Chemical Laboratory (NCL), Pune, India. The organisms were maintained on Mueller-Hinton agar (Hi Media, India) slope at 4^0C and sub-cultured before use. The bacteria studied are clinically important ones causing several infections and it is essential to overcome them through some active therapeutic agents

Microbiological assay

The antimicrobial activity of the extracts was evaluated by the paper disk-agar diffusion method (Covington, 1988). Test plates were prepared with Mueller-Hinton agar and inoculated on the surface with a cell suspension in sterile dissolution of 0.9% saline. In all cases, the concentration was adjusted to $1.5X10^8$ CFU/mL. About 5 mg of each extract was dissolved in solvent (0.5-1mL). Paper disks (6.4mm) were impregnated with the resulting solutions and then deposited on the surface of inoculated plates. After 24h of incubation at 37^0 C, positive results were established by the presence of clear zones of inhibition around active extracts. Disks of Chloramphenicol (25µg), Gentamicin (10µg), Co-trimoxazole (25µg) and Erythromycin (15µg) were used as positive antibacterial controls. All the assays were carried out in triplicate.

Results and Discussion

The data presented in Table 1 indicate that the extracts from *Woodfordia fruticosa* herb inhibit the growth of some of the tested microorganisms to various degrees. The methanolic extract was found to be the most effective antimicrobial agent. *Shigella dysenteriea* and *Vibrio cholera* appeared to be the most sensitive organism and all of the extracts were active against it.

At the molecular level *Woodfordia fruticosa* contains chemical constituents of Tannins and Flavonoids

Table 1. *In vitro* antibacterial activity of flower extracts of *Woodfordia fruticosa*

Extract	Microorganism					
	Shigella dysenteriea	***Salmonella typhi***	***Escherichia coli***	***Vibrio cholera***	***Staphylococcus aureus***	***Bacillus cereus***
Aqueous	+	-	-	+	+	+
Methanolic	+	+	+	+	+	+
Chloroformic	+	+	+	+	+	-

(Chougale et al., 2007) responsible to overcome microbial infection. The activity of these chemical constituents are probably due to their ability to complex with extracellular and soluble proteins and to complex with bacterial cell walls. *Woodfordin fruticosin* C is a tannins which shows inhibitory activity towards DNA topoisomerase enzyme II (Scalbert, 1991) may also involved in the antibacterial potential. Over all, the Gram-positive bacterial strains were more sensitive than the Gram-negative ones. These results may provide a basis for the isolation of compounds of biological interest from *Woodfordia fruticosa*.

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