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Short Communication

Preliminary phytochemical screening and antimicrobial activity of *Samanea saman*

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***Samanea saman* is a tropically distributed medicinal plant. Antimicrobial activity of aqueous extract of this plant was investigated by Well-diffusion method against three organisms: *Escherichia coli, Staphylococcus aureus* and *Candida albicans*. The plant extract showed inhibitory activity against all the tested organisms. Five mg/ml inhibited the growth of *E. coli* but slightly higher concentration of 10 mg/mL was necessary to show inhibition against *S. aureus* and *C. albicans*. Phytochemical screening of the plant revealed the presence of tannins, flavonoides, saponins, steroids, cardiac glycosides and terpenoids. The study scientifically validates the use of plant in traditional medicine.**

Key words: *Samanea saman, Escherichia coli, Staphylococcus aureus,* saponins, tannins, alkaloids, glycosides and flavonoides.

INTRODUCTION

The emergence of multi-drug resistant bacterial strains throughout the globe limits the effectiveness of current drugs and significantly limits treatment, leading to pro-longed infections (Hancock, 2005). The increasing resis-tance of bacteria to antibiotics is kindled due to the misuse and over prescription of the drugs. As resistance to antibiotics spreads, the development of new antimi-crobial agents has to be expedited if the problem is to be contained. Thus there is a need to develop new anti-biotics to delay or prevent the arrival of a post-antibiotic era (Leggadrio, 1995) . Thus the search for newer sources of antibiotics is a global challenge preoccupying research institutions, pharmaceutical companies and academia (Latha et al., 2006). However, the past record of rapid, widespread and emergence of resistance to newly introduced antibiotics indicates that even new fami-lies of antibiotics are expected to have a short life (Coates et al., 2002). This situation, coupled with the undesirable side effects of certain antibiotics and the emergence of previously uncommon infections is now one of the serious medical problem (Marchese et al., 2001). The problem posed by the high cost, adulteration and increasing toxic side effects of these synthetic drugs coupled with their inadequacy in diseases treatment found more especially in the developing countries should also be emphasized (Shariff, 2001).

Many plants possess antimicrobial activities and are used for the treatment of different diseases (Arora et al., 1999). The use of plants as source of remedies for the treatment of many diseases dated back to prehistory and people of all continents have this old tradition. The search for agents to cure infectious diseases began long before people were aware of the existence of microbes. These early attempts used natural substances, usually native plants or their extracts and many of these herbal reme-dies proved successful (Sofowora, 1982). Green plants posses the broadest spectrum of synthetic activity and have been the source of many useful compounds (Sofowora, 1986). Coincidentally, the last decade has also witnessed increasing intensive studies on extracts and biologically active compounds isolated from plant species used for natural therapies or herbal medicine (Rıos et al., 2005).

Samanea saman is globally distributed especially in the tropical region. The parts of the tree were used for miti-gating different diseases. The root decoction is used in hot baths for stomach cancer in Venezuela. Rain Tree is a traditional remedy for colds, diarrhea, headache, intes-tinal ailments and stomach ache. The leaf infusion is used as a laxative. In the West Indies; seeds are chewed

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Table 1. Phytochemical screening of *Samanea saman*.

Phytochemicals	Presence / Absence
Tannins	++
Flavonoids	++
Steroids	++
Saponins	++
Cardiac Glycosides	++
Terpenoids	++
Phlobatannins	----

Table 2. Antimicrobial activity of the aqueous extract against the pathogens.

Extract concentration	*E. coli*	*S. aureus*	*C. albicans*
5 mg/mL	9	0	0
10 mg/mL	13	10	10
25 mg/mL	17	14	14
50 mg/mL	19	18	19
Controls			
Negative (H_2O)	0	0	0
Penicillin	0	0	12
Streptomycin	14	33	25
Chloramphenicol	28	18	32

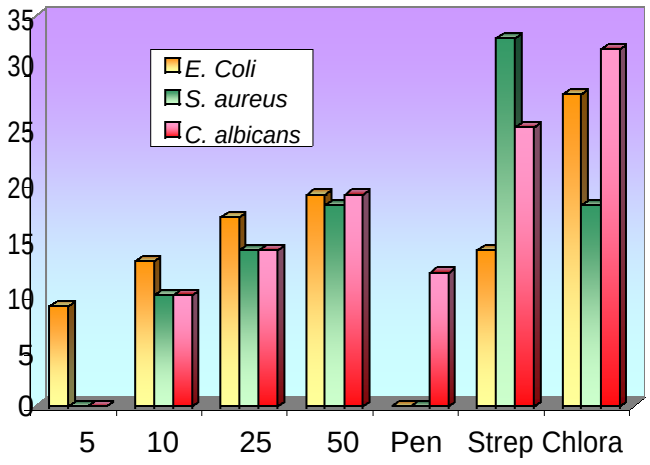

Figure 1. Susceptibility pattern of the tested organisms against different concentration of extracts and to the antibiotics.

for sore throat. The alcoholic extract of the leaves inhibits *Mycobacterium tuberculosis*. In Colombia, the fruit decoction is used as a sedative. (http://www.ntbg.org/). The synonym names of the plant include, *Albizia saman* (Jacq.) Mer, *Mimosa saman* Jacq, *Pithecellobium saman* (Jacq.), *Enterolobium saman*. The common names for this tree includes Seneviratne, Cow Tamarind, East Indian Walnut, Monkey Pod, Rain Tree, Saman, Vaivai Ni Vavalagi etc (ILDIS, 2005).

MATERIALS AND METHODS

Plant material collection and preparation of extract

The leaves used for investigation were collected from the trees growing in and around the college. The leaves were shade dried at room temperature for 10 days. The dried leaves were ground to powder with a help of an electrical blender. The powder was sieved through a 1 mm mesh and was stored in an air-tight container for future use.

For extract preparation 10 g of the sample was shaken with sterile double distilled water overnight at 40°C. The extract was filtered and dried over a hot water-bath to get dry powder. The extract was then re-suspended in water to make a concentration of 10, 25, 50, 100 mg/mL.

Phytochemical screening

Screening of phytochemical constituents of the plant was done using standard procedures described by "(Harborne, 1973; Evans, 1989; Sofowora, 1993)".

Test Organisms

Escherichia coli, Staphylococcus aureus and *Candida albicans* was used in the study. A 24 h fresh culture was prepared in Nutrient Broth and was used for the antimicrobial testing.

Antibacterial testing

The antibacterial activity was tested by Agar- Cup Diffusion Method. Briefly 20 ml of Nutrient Agar (Hi Media Pvt LTD) was poured into the Petri-dish and 8 mm well bored in the agar. 100 L of different concentrations of extracts was poured into the wells. The plates were incubated for 24 h at 37°C and the zone of inhibition was measured in mm. Commercially available penicillin, streptomycin and chloramphenicol disc were used as positive control and the 100 L of water was used as a negative control. All the tests were done in duplicates.

RESULTS AND DISCUSSION

The extract was found to inhibit the growth of *E. coli* at concentrations of 5 mg/mL (Table 2). Penicillin was not found to be active against this organism. Among the three antibiotics Chloramphenicol showed the highest inhibition. Extract 25 mg/mL was found to have more activity than Streptomycin (refer Figure 1). The study on *S. aureus* shows that 5 mg/mL extract was not active against the organism. A slightly higher concentration 10 mg/mL also shows only mild activity (Table 2). Streptomycin showed the highest activity against this organism. Extract 50 mg/mL was found to have same activity as that of the Chloramphenicol (Figure 1). Here, also peni-cillin did not show any activity. From the results, it can be inferred that 10 mg/mL is needed for the minimum inhibition of *C. albicans* (Table 2). Penicillin showed activity only in this case. Extract 50 mg/mL was more potent than penicillin (Figure 1). The Streptomycin Flavonoids are ubiquitous in photosynthesizing cells and are common part of human diet (Sathiamoorthy et al., 2007). Fla-

vonoides are also shown to inhibit microbes which are resistant to antibiotics by Iinuma et al. (1994). New flavornoides are continuously discovered and reported. Flavonoids which recently reported to have antimicrobial activity include quercetin 3' -O-glucoside, rutin (Abou-Donia et al., 2008), coumestrol, genistein and daidzein (Redko et al., 2007), morin (Rattanachaikunsopon et al., 2007) etc. Saponins are a special class of glycosides which have soapy characteristics (Fluck, 1973). It has also been shown that saponins are active antifungal agents (Sodipo et al., 1991). Tannins are also known antimicrobial agents. Tannins (commonly referred to as tannic acid) are water-soluble polyphenols that are present in many plant foods. Tannins are water soluble plant polyphenols that precipitate proteins. Tannins have been reported to prevent the development of microorganisms by precipitating microbial protein and making nutritional proteins unavailable for them (Sodipo et al., 1991). The growth of many fungi, yeasts, bacteria, and viruses was inhibited by tannins (Chung et al., 1998). Tannins are reported to have various physiological effects like anti-irritant, antisecretolytic, antiphlogistic, antimicrobial and antiparasitic effects. Phytotherapeutically tannin-containing plants are used to treat nonspecific diarrhoea, inflammations of mouth and throat and slightly injured skins (Westendarp, 2006). The secondary metabolites identified in the *S. saman* could be responsible for antimicrobial activity exhibited by this plant.

Conclusion

The preliminary qualitative phytochemical screening is reported in this paper. *S. saman* is found to contain phytochemicals namely, tannins, flavonoids, steriods, saponins, cardiac glycosides and terpenoids. The antimicrobial study by agar-cup diffusion method shows that the plant has an antimicrobial activity comparable to that of the commercial antibiotics. The antimicrobial property is claimed to be conferred by the phytochemicals present in the plant. The isolation and purification of the phytochemical followed by a detailed study might result in identification lead compound and thus a potential cure for the diseases caused by the three organisms.

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