Journal of Pharmaceutical, Chemical and Biological Sciences
ISSN: 2348-7658
Impact Factor (SJIF): 2.092
March-May 2015; 3(1):01-05
Available online at http://www.jpcbs.info

Original Research Article

Evaluation of antibacterial activity of ethanolic extract of *Butea monosperma* (Lam.) Kuntz pod

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Received: 06 March 2015 Revised: 14 March 2015 Accepted: 16 March 2015

ABSTRACT

The present study designed to screen antibacterial activity of ethanolic extract of *Butea monosperma* pod. The ethanolic extract was tested for antibacterial activity against *Enterobacter aerogens, Escherichia coli, Pseudomonas aeruginosa, Klebsiella pneumonia, Salmonella typhimurium, Staphylococcus aureus, Bacillus subtilis* and *Proteus vulgaris* bacteriae using agar well diffusion method. The ethanolic extract of *B. monosperma* pod exhibited prominent inhibitory effect against *Bacillus subtilis, Escherichia coli, Peudomonas aeruginosas* and *Salmonella typhimurium*. The extract was active in higher concentration against *Enterobacter aerogens, Klebsiella pneumonia, Proteus vulgaris* and *Staphylococcus aureus.*

Keyword: *Butea monosperma*; *Butea frondosa*; *Erythrina monosperma*; Palash; Raktapuspaka; antibacterial activity

INTRODUCTION

India is an ancient traditional multifariousness country. Ayurveda and siddha are Indian medical sciences, originating over 5000 years ago. Ayurveda and Siddha are well integrated

into the Indian health care system since ancient times. According to world health organization, 80% of the populations in the world depend on traditional medical practitioners for their medicinal needs [1]. Particularly in rural India, uses of raw plant products as well as some concoction of plant products in Ayurvedic medicines are sought after to a great proportion, because of cheap availability and less adverse effects, and in urban areas too those are increasingly popular for cultural nuances that exist. During the last two decades, the development of drug resistance as well as the appearance of undesirable side effects of certain antibiotics has leads to the search of new antimicrobial agents mainly among plant extracts.

In ethno-botanical literature of India, several hundreds of plants are known to have the potential to treat many diseases and one of those popular ones is *Butea monosperma* (Lam.) Kuntz. syn. *Butea frondosa* Roxb. ex Willd., *Erythrina monosperma* Lam. [2]. The tree is called as Raktapuspaka in Sanskrit; Purasu, Paras in Tamil and popular as Palash in Bengali and Punjabi. This tree is also called 'Flame of the Forest' and Bastard Peak in English [3]. It is a medium sized tree with 20-40 feet height belonging to the family Fabeacae [4]. It is found in mountain region of India, Burma and few Asian countries. This plant is extensively used in India to treat various diseases. The flowers are used in the treatment of hepatic disorders, viral hepatitis, diarrhea [5], anti-inflammatory [6], anticonvulsive agent [7] and tonic. The roots are useful in treatment of night blindness [8], piles, ulcers [9], tumor and antispermatic activity [10]. The gum is powerful astringent. The stem bark possesses antifungal [9] activity and dermal wound healing activity [11]. Phytochemical investigation showed the presence of jalaric esterI, jalaric ester II, laccijalaric ester I, laccijalaric ester II [12], palasonin, monospermoside, somono-spermoside, allophonic acid [13] from seed. Hydroethanolic extract of seeds are used as antihyperglycemic and antioxidant [14]. The anticancer activity [15] and antibacterial activity [16] of ethanolic extract of leaves of *Butea monosperma* has recently reported. In present paper we are reporting antibacterial activity of ethanolic extract of *Butea monosperma* pod.

MATERIALS AND METHODS

Plant Material

The fruits of *B. monosperma* were handpicked from Mettur Dam, Salem, Tamil Nadu, INDIA. The fruit was identified by Dr. Padma Sorna Subramanian, Research Officer (Botany), Siddha Medicinal Plants Garden (CCRS), Mettur Dam, Salem. Pod of the plant were cleaned with distilled water, dried and crushed in mixer grinder and the grinding was performed in a hygienic condition.

Extract Preparation

The coarsely powdered pod was soaked in methanol in a conical flask and left for 24 hours. The extract was taken out and filtered using sterile filter paper and concentrated using water bath.

Working solution

Working concentration of 250, 125, 62.5, 31.25, 15.625 mg/ml were prepared by dissolving respective amount of extract in one ml of DMSO in separate test tubes.

Test Organisms

Organisms such as *B. subtilis* (MTCC 441), *E. aerogens* (NCIM 5139), *E. coli* (ATCC 25922), *K. pneumonia* (NCIM 2957), *P. vulgaris* (NCIM 2857), *P. aeruginosa* (NCIM 2945), *S. typhimurium* (NCIM 2501) and *S. aureus* (NCIM 5021) were used for the study. The ATCC culture was procured from Christian Medical College; MTCC culture from Institute of Microbial Technology, Chandigarh and NCIM cultures from National Chemical Laboratory, Pune and were maintained by serial sub-

culturing every month on nutrient agar slants and incubating at 37°C for 18–24 hours. The cultures were stored under refrigerated condition [17].

Antimicrobial activity

The ability of the extracts to inhibit growth of bacteria was determined using the agar disc diffusion method [18, 19, 20]. The extract was tested for antimicrobial activity in five different dilutions against the selected test organisms. Extract was compared with standard drug ampicillin (10 µg disc). Muller Hinton agar was used. 50 µl of extracts of 250, 125, 62.5, 31.25, 15.625 mg/ml concentrations and 10 µg standard disc were transferred into 6 mm well and all were labeled. The test solutions were allowed to diffuse in wells for 2 h at room temperature. The petri plates were incubated for 24 h at 37°C temperature. The stringent aseptic conditions were maintained during microbial culture.

RESULTS AND DISCUSSIONS

Ethanol extract of pod tested for antimicrobial effect against the test organisms *E. aerogens, E. coli, P.aeruginosa, K. pneumonia, S. typhimurium, S. aureus, B. subtilis, P. vulgaris.* According to the results, the extract was found to be active against all pathogenic bacteria. Table 1 summarizes the microbial growth inhibition of ethanol extract of pod comparing with standard drug ampicillin.

Table 1: Antibacterial activity of ethanolic extract of *B. monosperma* pod

S.No	Organism	Zone diameter in mm					Standard Ampicillin 10 µg
		250 mg/ml	125 mg/ml	62.5 mg/ml	31.25 mg/ml	15.625 mg/ml	
1	*B. subtilis*	28	26	20	19	13	+
2	*E. coli*	15	13	12	11	11	-
3	*E. aerogens*	12	-	-	-	-	-
4	*K. pneumonia*	24	18	-	-	-	-
5	*P. vulgaris*	23	19		-	-	+
6	*P. aeruginosa*	18	16	13	9	-	+
7	*S. typhimurium*	22	19	17	15	12	+
8	*S. aureus*	19	12	-	-	-	+

The strongest antibacterial activity was seen against *B. subtilis* followed by *S. typhimurium*, *P. aeruginosa* and *E. coli*. MIC for *P. aeruginosa* was observed with 31.25 mg/ml concentration and no activity was found in the lower concentrations. MIC for *P. vulgaris, K. pneumonia* and *S. aureus* was observed with 125 mg/ml concentration and no activity was found in the lower concentrations. The inhibition of growth of *E. aerogens* was observed with 250 mg/ml concentration only and no activity was found in the lower concentrations. Standard drug ampicillin was found not sensitive for *E. aerogens*, *E. coli, K. pneumonia* but extract was observed antibacterial effect in these organisms. *E. coli* is a gram negative bacteria causing diarrheal and urinary tract infections. *S. typhimurium* is a gram-negative bacteria predominantly found in the intestinal lumen, causes gastroenteritis in humans. *B. subtilis* is a gram-positive bacterium, found in soil, the gastrointestinal tract of human beings, causing gastrointestinal and urinary tract diseases.

CONCLUSION

The results showed that the ethanolic extract of pod of plant possess antibacterial action against especially *B. subtilis, S. typhimurium*, *E. coli* and P. aeruginosa showing the use of *B. monosperma* pod extract in the therapy of gastroenteritis, urinary tract infections and diarrhoea.

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Cite this article as:
Jayasree D, Shakila R, Meeradevi Sri P. Evaluation of antibacterial activity of ethanolic extract of *Butea monosperma* (Lam.) Kuntz pod. J Pharm Chem Biol Sci 2015; 3(1): 01-05