The Biobrio ISSN : 2393-9508 e-ISSN: 2582-4902
An International Quarterly Journal of Life Sciences
Website: www.thebiobrio.in SJIF 2021:7.237
8 (3&4): 661-664, 2021

Antibacterial activity of plant parts of *Butea monosperma*

***Ashok Kumar Nag[1], Aparna Sinha[1] & Shweta Nag[2]**
[1]P.G. Department of Botany, Dr. Shyma Prasad Mukherjee University, Ranchi, Jharkhand, India
[2]P.G. Department of Botany, Ranchi University, Ranchi, Jharkhand, India

ABSTRACT

Since ancient times, plants have been source of medicines as they are a reservoir of chemical agents with therapeutic properties. All parts of the plant, from root to fruit, consisting of a multitude of secondary metabolites which impart an unprecedented variety of medicinal uses to the plant. Studies have shown the presence of different phytochemical constituents in botanical sample responsible for the antimicrobial activity. The antibacterial activity was examined form the leaf and flower of *Butea monosperma*. Sample was collected and its crude extract was obtained by using methanal, acetone and water as the extraction solvent. These extract were tested against some pathogenic microorganisms like *Staphylococcus aureus* and *Bacillus subtilis*. The extract of *Butea monosperma* showed antibacterial activity against *Staphylococcus aureus* and *Bacillus subtilis*.

Key Words - Antibacterial activity, Plant extract, *Butea monosperma*

***Corresponding author :** nagashok193@rediffmail.com

INTRODUCTION

Medicinal plants contain plentiful active ingredients that may be potentially useful for the development of therapeutic agents. However, to evaluate their quality, standardisation of these plant parts needs to be carried out, which includes a series of tests determine the quality, quantity and the purity of the phyto-compounds (Fageri & Rao, 2015).

Butea monosperma is taken into consideration for this experiment. *Butea monosperma* is commonly known as Flame of forest, belongs to the family Fabaceae. It is locally called as Palas, Polash, Mutthuga, Khakara, Chichra etc. almost all the parts of the plant are being utilized since decodes in medicine and for other purposes. These days' herbal medicines are trendier than modern medicine because of their effectiveness, easy availability, low cost and for being comparatively devoid of side effects.

Nature always stands a golden mark to exemplify the outstanding phenomenon of symbiosis and it has granted the storehouse of remedies to cure all ailments of mankind, only the thing is that there is a need to evaluate them scientifically (Patil *et al.* 2006, Kar & Basu 1935, Kapoor 2005). *Butea monosperma* in traditional system of medicine is a medicinal plants. As reported by the Indian Ayurvedic texts, its leaves, stem, flowers, seeds, gum and roots have been widely used as traditional ayurvedic medicine.

Food-borne illness caused by eating food or drinking beverage contaminated with bacteria,, can parasites or viruses cause symptoms that range from an upset stomach to more serious symptoms such as diarrhoea, fever, vomiting, abdominal cramps and dehydration (Chandarana *et al.* 2005).

Food borne pathogens are of public health concern worldwide. Estimates of the total number of food borne illness and associated hospitalizations and deaths are needed to figure out their effect on health and to set priorities for surveillance, prevention, and control strategies (Vaillant *et al.* 2005).

Furthermore, the demand for medicinal plants is increasing due to recognition of natural products

being non-narcotic, non-toxic with no side effects, easy availability, cost effectiveness and after in numerous cases being the only source of health care for the poor. So by review of history and previous documentation, it is an attempt to detect the compound responsible for specific pharma cological activity (Gupta & Chandra 2016).

Butea monosperma has astringent, antidiarrheal, antidysenteric, febrifuge aphrodisiac puragative antihelmintic properties. It is used for timber, resin, fodder, medicine and dye.

MATERIALS AND METHODS

Leaves and Flowers of *Butea monosperma* were used as plant material for preparation of extract. The antibacterial activity of each plant extract was estimated using two bacterial strains causing food poisoning diseases, were of Gram positive *Staphylococcus aureus* and *Bacillus subtilis* bacteria.

Preparation of Plant extracts :

The plant materials of *Butea monosperma* were collected, disinfected, water washed and dried under a shade. The dried plant material was grand using mortar and pestle to obtain fine power and them was passed through 1.00 mm sieve.

10 gram fine power of plant extract was soaked in 100 ml of different solvents such as methanol, acetone and water separately for 48 hours followed by loading in soxhlet apparatus and subject to continuous extraction (4-5 hours) with respective solvents to obtain crude extracts. There after the solvent (acetone, methanol and water) was removed under reduced pressure using rotatory residues were dissolved in dimethyl sulphoxide (DMSO, 10% w/v) and stared at 4°C (Kruti *et al.* 2015).

Evaluation of Antibacterial Activities of Plant Extracts:

Antibacterial activity of plant extracts was analysed by well diffusion method. About 20 ml nutrient agar was plated in petri dishes and allowed to solidify for 30 minutes.

The test microorganism *Staphylococcus aureus* and *Bacillus subtilis* were seeded (0.1 ml : 107-108 cells/ml) into sterile molten nutrient soft agar medium which was overlaid on the nutrient agar base. The well (5mm diameter) was formed on the surface of the seeded agar plants. Proceeded by the plant extract of *Butea monosperma* were loaded in to well (50 mg/me). 10 ml. of DMSO (*Demethyl sulphoscide*) was used as negative control and antibiotics like Amplicillin and ciprofloxacin (10 μg/ml) were used as positive control. These plants were incubated at 37°C for 24-48 hours to allow maximum growth of the microorganism. After incubation, the plates were observed for clear, distinct zone of inhibition surrounding the well. The diameter (mm) of zone of inhibition produced by the extract was measured and compared with the standard. All assays performed in triplicates to consider mean values as a standard one.

Table 1- Antibacterial activity (ZOI) for ethanol and methanol extracts of flowers of *Butea monosperma.*

Plant Part	Extract	Concentration	Zone of Inhibition	
		(mg/me)	*S. aureus*	*B. subtilis*
Flower	Methanal Extract	50	17±0.5	22±0.5
	Acetone Extract	50	15±0.50	17±0.70
	Aquaus Extract	50	11±0.50	12±0.40
	Ampicillin/Ciprofloxacin	10 μg/ml	26.01±0.1	23±0.2
	Solvent		0.00	0.00

Table 2- Antibacterial activity (ZOI) for ethanol and methanol extracts of leaves of *Butea monosperma.*

Plant Part	Extract	Concentration	Zone of Inhibition	
		(mg/me)	*S. aureus*	*B. subtilis*
Leaves	Methanal Extract	50	11±0.5	22±0.5
	Acetone Extract	50	09±0.50	17±0.70
	Aquaus Extract	50	07±0.50	12±0.40
	Ampicillin/Ciprofloxacin	10 µg/ml	25.09±0.1	23±0.2
	Solvent		0.00	0.00

RESULT AND DISCUSSION

Infectious diseases are the main cause of mortality worldwide. The member of multidrug resistant microbial strains and strains with reduced susceptibility to antibiotics are continuously increasing due to indiscriminate use of antibiotics, the toxicity caused by their excessive usage causing fatal or non-fatal diseases and other synthetic antibacterial agents in treatment. (Sharajiya *et al.* 2015)

Agar well diffusion techniques have been widely utilized to assay the antimicrobial activity of plant extracts. Here antibacterial activity (in terns if the zone of inhibition) of the extracts was evaluated against selected pathogenic bacterial strains by agar well diffusion method. In the present investigation, total these extracts, methanol, acetone and aqueous extracts of *Butea monosperma* leaves and flower with a concentration of 50 mg/ml were tried. (Dash *et al.* 2011)

The extracts of *Butea monosperma* and antibiotics as positive control showed varying degrees of antimicrobial activity against the different test organisms while there was no inhibition of growth with the control (DMSo) as it used as negative control.

Methanolic extract showed higher zone of inhibition against different test organisms in a range of 17.05-22.0 m.m. It was observed that methanolic extract exhibited significant higher antibacterial activity against all test organisms as compared to acetonic and aqucons extract. In addition extract yield in methanol solvent was significantly higher, therefore, it may enhance the solubility of active components of *Butea monosperma* which resulted in higher antimicrobial activity compared to acetone extract. Plants extracts of *Butea monosperma* showed comparative elevated antimicrobial activity against *S. aureus* and *B. subtilis.*

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