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Antimicrobial Activity Of *Butea monosperma* Extracts Against Human Pathogenic Bacteria

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ABSTRACT

Objective:Pseudomonas spp., Vibrio cholerae, Klebsiella spp., Escherichia coli, Salmonella spp., Staphylococcus aureus (S. aureus), and Micrococcus luteus were used to test the antibacterial activity of aqueous and organic solvent extracts of Butea monosperma flowers against different multidrug resistance bacteria. **Methods**: The agar well diffusion method was used to determine the antibacterial activity of plant extracts. **Results:** - With the exception of E.coli, the Aquous extract of Butea monosperma extract had the highest antibacterial activity against all selected human pathogens. However, Methanol extract was found to be effective against E.coli, with a 17mm inhibitory zone. The positive control was streptomycin, and the negative control was DMSO.

Key words:- *Butea monosperma*, Antibacterial activity, Human pathogens.

Introduction:-

Antimicrobial substances are still most commonly found in plants. They are used as traditional health cures by 80 percent of the world's population in Asia, Latin America, and Africa, and are said to have little negative effects. Pharmaceutical corporations have invested a lot of time and money in recent years creating natural medications taken from plants in order to create more cost-effective cures that are accessible to the general public. The increasing prevalence of multidrug resistance among pathogenic bacteria has necessitated the quest for novel antibiotic sources. (Desta B. 1993; Kapoor L.D. 2005; Kirtikar K. R., Basu B. D., and Basu L.M. 1975; Kirtikar K. R., Basu B. D., and Basu L.M. 1975). Since ancient times, herbal preparations of P.lant have been utilized as herbal medicine for their therapeutic powers. The therapeutic benefit of these plants is due to bioactive substances found within them. Alkaloids, tannin, flavonoid, and phenolic chemicals are the most prominent bioactive substances. (Shihabudeen MH and colleagues, 2010). Their quantities in different plant extracts may vary depending on the solvent employed for extraction. It results in a certain plant extract's therapeutic characteristics being unique.

Diarrhoea, gastrointestinal ailments, toothaches, colds, and swelling were all treated with the flowers of the Butea monosperma plant. Herbal medicines are thought to protect against cancers of the lungs, esophagus, pancreas, liver, breast, colon, and skin caused by chemical carcinogens. (H. Mukhtar and N. Ahmed, 2000). Neem leaves can help you avoid hepatitis and manage your diabetes. (W.C. Sarmiento, 2011). Due to their antibacterial and antioxidant effects, low toxicity, and potential to be a cheaper alternative to pricey synthetic medications, global interest in the study of diverse medicinal plants has exploded in recent decades. (AL Chew et al., 2012).

Because of the present global issue of rising antibiotic resistance in microorganisms, determining the antibacterial activity of various medicinal plants is of particular interest these days. Drug resistance in pathogenic bacteria is thought to be increasing as a result of the indiscriminate use of commercial antimicrobial medicines. Antimicrobial resistance poses a growing challenge to the prevention and treatment of infections caused by bacteria, parasites, viruses, and fungi. As a result, identifying chemicals that can be exploited to generate novel treatments with improved antibacterial characteristics is critical. The goal of this research was to find out what antibacterial characteristics several common therapeutic herbs have. The study's main goal was to contribute to ongoing studies on plant antibacterial properties. Azadirachta indica's antibacterial efficacy against dental infections was also investigated by Lekshmi et al., (2012).

Plate No:-1. ***Butea monosperma***

Table No1.Scientific Classification of Butea monosperma (Lam)

Kingdom	**Plantae**
Subkingdom	Tracheobionta
Super kingdom	Spermatophyta
Division	Magnoliophyta
Class	Magnoliopsida
Subclass	Rosidae
Order	Fabales
Family	Fabaceae
Genus	*Butea*
Species	*Monosperma* (Lam)

Materials and methods:-

2.1. Sample collection:-

Butea monosperma flowers were collected from a Aurangabad region Maharashtra. India. It was authentified and get Accession number(0696).

2.2. Preparation of plant extract :-

Plant flowers sample was air dried at room temperature (25 ℃). The collected flowers were grinded by mixer to get coarse texture. Sample powder filled in air tight container for further use.

2.2.1. Distilled water and organic solvent extraction:-

All the extractions were done by following the methods mentioned elsewhere with slight modification. For water extraction,50gm of sample was mixed with 100 mL distilled water into sterile conical flask. It was placed in a shaker water bath at 130 r/min at 37 ℃ overnight. The liquid samples were then filtered with Whatman No. 1 filter paper.
Organic solvent extraction was done by Soxhlet extraction method. The sample was mixed with organic solvent at a ratio of 1:4. The extracted samples were stored in universal bottles and refrigerated at 4 ℃ prior to use.The organic solvents used for extraction were Methanol.ethanol,Petroium ether and Chloroform.

2.3. Microorganisms :-

The test organisms include five Gram negative bacteria: *Pseudomonas spp.,* (*ATCC 27853), Vibrio cholerae (V. cholerae),* (MTCC-17562) *Klebsiella spp.*,(ATCC-13883) *Escherichia coli (E.coli*),(ATCC 25922), *Salmonella spp.*(734 MTCC)., *and two Gram positive bacteria Staphylococcus aureus (S. aureus)* (25923ATCC) and *Micrococcus luteus* (ATCC-9341) They were previously isolated, identified and collected from Dept. Of Clinical Microbiology Department Govt. Ghati Hospital Aurangabad.It was stored in incubator at 37^0c still use.

2.4. Agar well diffusion assay :-

The antimicrobial activity of the flower extracts were evaluated by agar well diffusion method. Bacteria were grown in Nutrient broth (HiMedia Laboratories Ltd., India) to match the turbidity of 0.5 McFarland standards to be inoculated on nutrient agar agar plates (HiMedia Laboratories Ltd., India)[7]. After inoculation, plates were dried for 15 min, and the wells were punched using sterile cork borers. Once wells were formed, they were

filled with 100 µL of plant extracts and negative control DMSO. Commercially available Streptomycin (10 µg) discs were used as a positive control in this study. Plates were incubated for 24 h at 37 ℃ to allow flower extracts to diffuse through the agar media to form zones of inhibition. The diameters of the zone of inhibition for different extracts against different bacteria were measured in millimetre for further analysis. An agar well (6 mm) showing no zone of inhibition was considered as no antimicrobial activity. All experiments were done in triplicate and the average values were used for drawing bar diagrams.

3. Results :-

Butea monosperma extracts showed some antibacterial activity against the selected pathogens, but they varied in different extraction process. The ethanol extract of *B. monosperma* flower was most potent against(17mm) against *E.coli*, by Well Diffusion Method. The chloroform and aqueous extracts did not showed any activity against *E.coli.* The Pet.ether and ethanol were moderate activity against tested bacteraia.The streptomycin was more efficient against *E.coli* (20mm). The Aqueous extract was most effective against *K. pneumoniae*(15mm), approximately as like standard.The ethanol was inactive. Chloroform was least effective against *K. pneumoniae*. The *P.aeruginosa* and *S.aureus* were more susceptible to aqueous extract (14mm).

But methanol and ethanol extracts were inactive against *P.aeruginosa*.The chloroform extract was moderate inhibition while Pet. Ether showed least inhibition zone. The Pet.ether and chloroform extracts were inactive against *S.aureus*. The *M. luteus* and *V.cholerae* pathogens also more susceptible against aqueous extract.The other showed moderate activity. The *butea monosperma* flowers extracts were not that much effective against *S. typhi*. But streptomycin (22mm) proved effective.

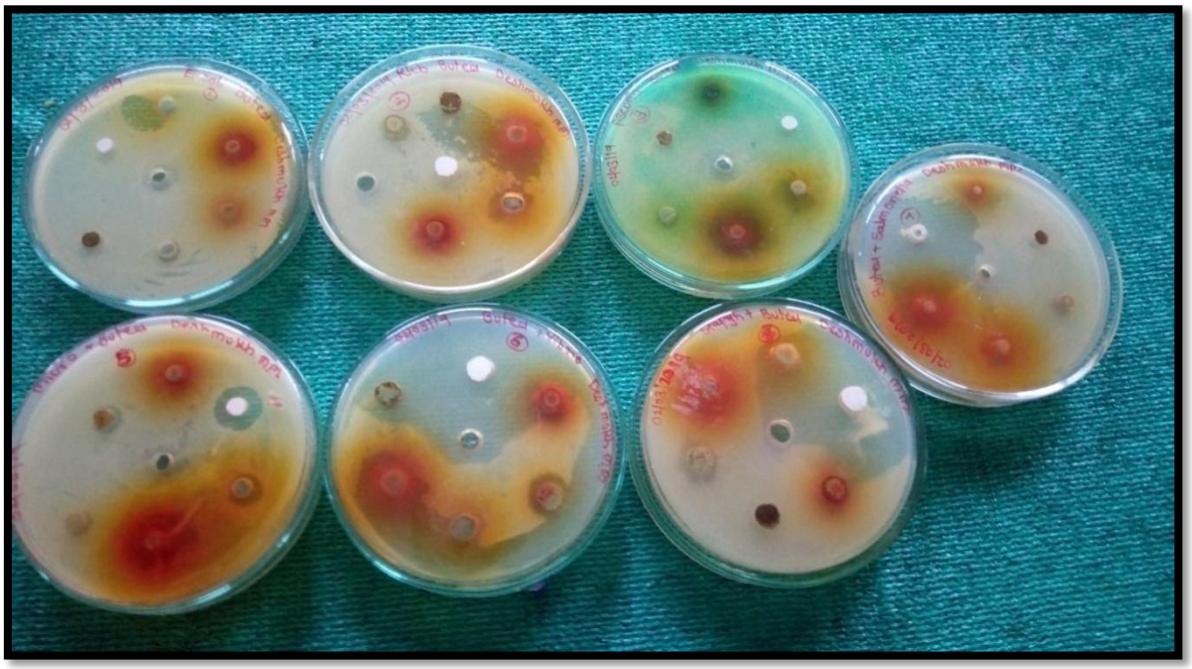
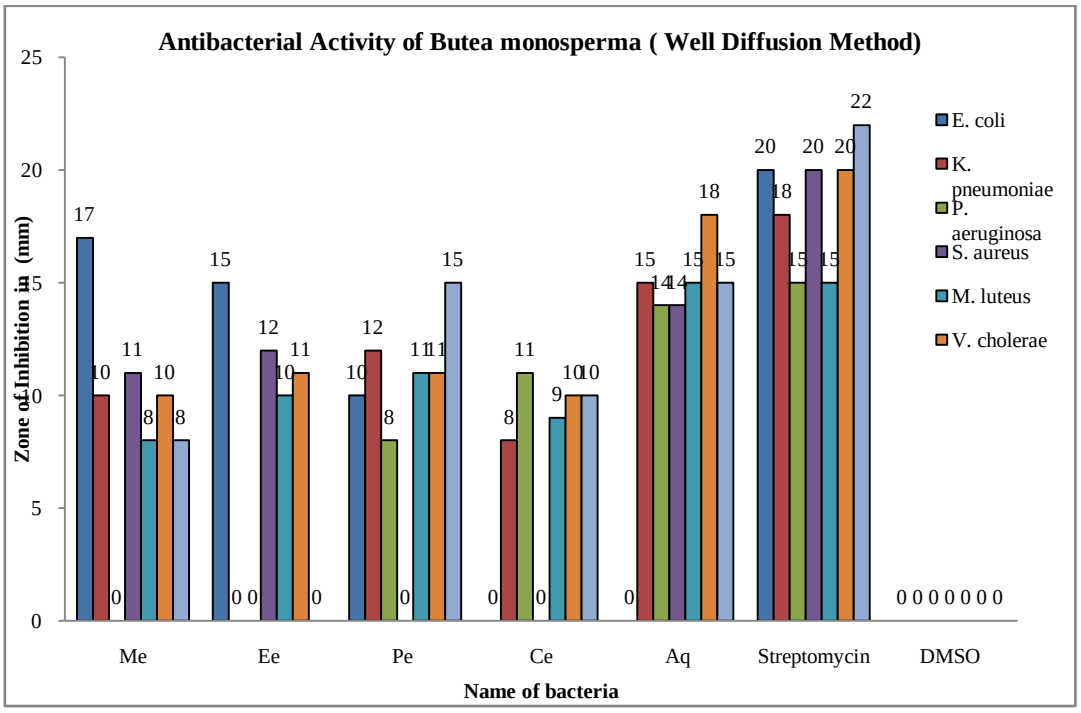


Plate No.2. Antibacterial Activity Of *B. monosperma* extracts against (MDR) human pathogens by using Well Diffusion Method.

Table No. - 2. Antibacterial Activity of Butea monosperma (Well Diffusion Method).

Sr. No.	Name of bacteria	Zone of Inhibition in (mm)						
		Me	Ee	Pe	Ce	Aq	Streptomycin	DMSO
1	*E. coli*	**17**	15	10	nil	nil	20	Nil
2	*K. pneumoniae*	10	nil	12	08	**15**	18	Nil
3	*P. aeruginosa*	nil	nil	08	11	**14**	15	Nil
4	*S. aureus*	11	12	nil	nil	**14**	20	Nil
5	*M. luteus*	08	10	11	09	**15**	15	Nil
6	*V. cholerae*	10	11	11	10	**18**	20	Nil
7	*S. typhi*	08	nil	15	10	15	22	Nil

Graph No.1. Graphical Representation of ZOI of B. monosperma extracts.(WD)



4. Discussion :-

Natural antimicrobial agents have been more popular due to their efficacy against antibiotic resistant microorganisms and campaign for consumption of natural products. Plants have provided a source of inspiration for novel drug compounds as plant-derived medicines have made significant contribution towards human health.

Conflict of interest statement :-

We declare that we have no conflict of interest.

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