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Research Article

Antimicrobial Evaluation of *Caesalpinia decapetala*

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ABSTRACT

Objective: The present work is an attempt to assess the *in vitro* antimicrobial activity of the leaves of *Caesalpinia decapetala* (Roth) fabaceae family collected from forest area of Tamilnadu, India. Methods: The crude drug was successively extracted by Soxhlet assembly using Petroleum ether, dichloromethane, ethyl acetate and methanol as solvents. Preliminary phytochemical screening of different extracts was carried out using several colour and precipitative chemical reagents as per described methods. Antimicrobial activity of the extracts was evaluated against fungal strains (*Aspergillus fumigatus* and *Candida albicans)*, Gram +ve bacteria (*Staphylococcus aureus* and *Streptococcus pyogenes*) and Gram –ve bacteria (*Escherichia coli* and *Pseudomonas aeruginosa*) using agar wells dilution method. Nutrient agar medium at37 ºC and sabouraud dextrose e agar medium at 28 oC were used in antimicrobial activity evaluation and antifungal activity evaluation respectively. Results: Preliminary phytochemical screening of *C. decepetala* leaves showed the presence of alkaloids, glycosides, phenols, phytosterols, saponins and flavonoids crude drug. *C. decapetala* leaf extracts exhibited marked dose dependent antibacterial activity in vitro against tested bacteria. Methanolic extract was found to be more potent particularly against *Staphylococcus aureus* (Gram +ve bacteria) and *staphylococcus aeruginosa* (Gram -ve bacteria). Conclusion: Various phytochemicals were found to be present in *C. decepetala* leaves. Methanolic extract of *C. decepetala* leaves exhibited better antimicrobial activity in vitro and can be used as a good therapeutic approach for infectious disease management and therapy. Further studies on isolation of phyto-constituents and both in vitro and in vivo evaluation of pharmacological activities of isolated bioactive constituents of the crude drug are recommended as future works.

Keywords: *C. decapatala*, Fabaceae, phytochemical screening, antibacterial, agar well method.

INTRODUCTION

The plant-determined medicines have been utilized since antiquated circumstances and considered as a feature of our wellbeing cures. The propensity of utilizing natural products for the treatment of genuine life-debilitating ailments has been increasing[1-5]. It is expressed that natural products are effectively biodegradable, have slightest natural dangers, speak to least reactions and are accessible at moderate costs. Albeit the majority of therapeutic exercises of the plants have been all around archived, the others are yet to be verified[6].

Caesalpinia decapetala is generally known as Roth[7]. It is a pantropical sort which has a place with the group of Caesalpiniaceae having 120-150 types of trees, bushes, and lianas[2]. The class comprises of a few individuals from animal categories that are utilized generally for the treatment of irritation, hepatotoxicity and also diabetes[8,9]. C. decapetala is broadly spread in subcontinent areas. It is prickly climber up to 25 m in stature and its leaves are 11-37.5 cm long. Blossoms are yellow in shading and 1.2-1.8 cm long. Its branches are bushy with snared or straight prickles. Customarily, *C. decapetala* has had numerous restorative properties. A shower with decoction of C. decapetala is important for the treatment of jaundice[10]. Leaves are utilized for the treatment of consumes, biliousness and stomach issue. Leaves and roots are likewise utilized as a laxative and emmenagogue. Different employments of *C. decapetala* are as diuretic, tonic, against pyretic and carminative[11]. The counter oxidant, anti-tumor and against richness exercises of *C.decapetala* have been reported[10-13]. Experimental review on gallic corrosive segregated from the *C. decapetala* is in charge of the antitumor and cancer prevention agent activities[13]. The leaves of *C. decapetala* contain a few dynamic constituents including cassane diterpenoid, squalene, caesaldecan, spathulenol, lupeol, resveratrol, quercetin, stigmasterol and astragalin[14]. Presence of phenolic mixes in *C. decapetala* makes this plant significant, yet constrained logical writing is accessible online to demonstrate its conventional utilization.

Albeit different reviews have been led on *C. decapetala* to assess its belongings in the treatment of different maladies, no adequate logical writing is accessible online

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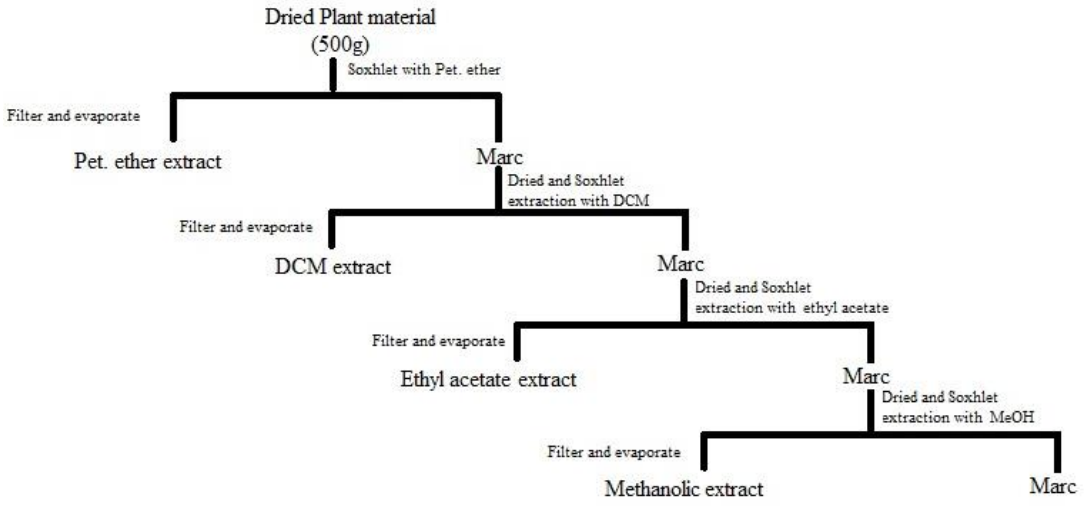

Schematic extraction process

Table 1: Minimum inhibitory concentrations of Ethyl acetate and methanolic extract against bacteria and fungi.

Test organism	Concentration mg ml^{-1}					
	25	50	100	25	50	100
	(Ethyl acetate extract)			(Methanolic extract)		
Staphylococcus aureus	-	-	+	+	+	++
streptococcus pyogenes	-	-	-	-	-	+
staphylococcus aeruginosa	-	-	+	+	+	++
Escherichia coli	-	-	-	-	-	+
Candida albicans	-	-	-	-	-	-
Aspergillus fumigatus	-	-	-	-	-	-

to demonstrate its pain relieving, mitigating and hostile to pyretic exercises. The present review is meant to concentrate on the assessment of pain relieving, calming and hostile to pyretic exercises of methanolic and n-hexane concentrates of *C. decapetala* utilizing rats as trial creature models.

MATERIAL AND METHODS

Plant collection

Leaves of *C. decapetala* were used for this study. The leaves of *Caesalpinia decapetala* were procured from M/S Sheikh international, Dindigul, Tamilnadu. The medicinal plant was identified and authenticated by plant taxonomist Dr. Sunita Garg, chief scientist at RHMD, CSIR-NISCAIR, New Delhi. Voucher specimen (voucher specimen No. 3015) was deposited at Lovely Professional University for future reference. The plant was dried under shade at temperature between 21 to 30 °C for 15 to 20 days and grounded to course uniformity.

Preparation of plant extracts

The coarsely dried plant material (500g) was successively extracted with petroleum ether (2000ml) at 60ºC for 12 hours using Soxhlets apparatus and then the plant material was dried at room temperature. The dried plant materials were extracted with D.C.M (2000ml) at 40ºC for 12 hours and then dried at room temperature. Again the same process was repeated with Ethyl acetate at 77ºC, was dried at room temperature. Finally, extraction was performed with polar methanol at 78ºC and dried[15-19].

Antibacterial activity

This activity was carried out by agar well diffusion method[21]. According to this method, 0.1 ml of diluted inoculums (10^6 CFU ml-1) of test organism was thoroughly mixed with 20 ml of molten sterile tryptic soya agar and poured into pre-sterilize Petri dishes under sterile condition. All plates were left to set at 4°C for 30-40 minutes. Holes of 6 mm diameter were made in the center of each seeded plates. Holes were then filled aseptically with 0.1 ml of test solution (various extract in various conc.) reference standard and negative control (i.e., solvent only) respectively and marked accordingly. All plates were then incubated at 37 ±1°C for 24h and zone of inhibition exhibited by the different extracts in various concentration measured and recorded accordingly. All plates were run in triplicates.

Antifungal Activity

This activity was determined by agar tube dilution method[22]. Test tubes having sterile sabouraud dextrose agar were inoculated with test solution of different concentration and kept in slanting position at room temperature for solidification. Test fungal cultures were inoculated on slant incubated at 25°C for 7 days and growth inhibition were observed after 7 days incubation period[23]**.** Nystatin was used as standard antifungal drug.

Statistical analysis

Data are expressed as mean ± standard errors of the mean. All statistical tests (e.g mean, SD and correlation) were computed by MS excel- 2013. The value less than 0.5% is considered as significant.

RESULTS AND DISCUSSION

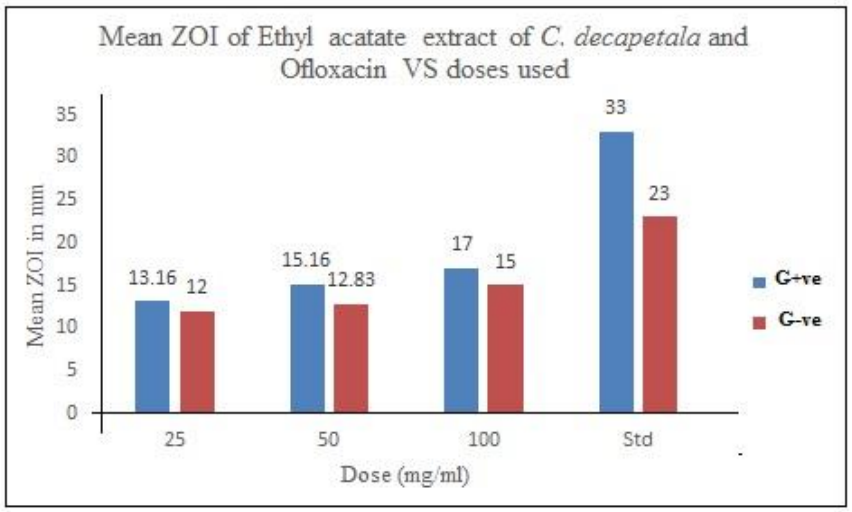

Figure 1: Mean ZOI of Ethyl acetate extract *C. decapetala* leaf extracts and Ofloxacin vs. Doses used.

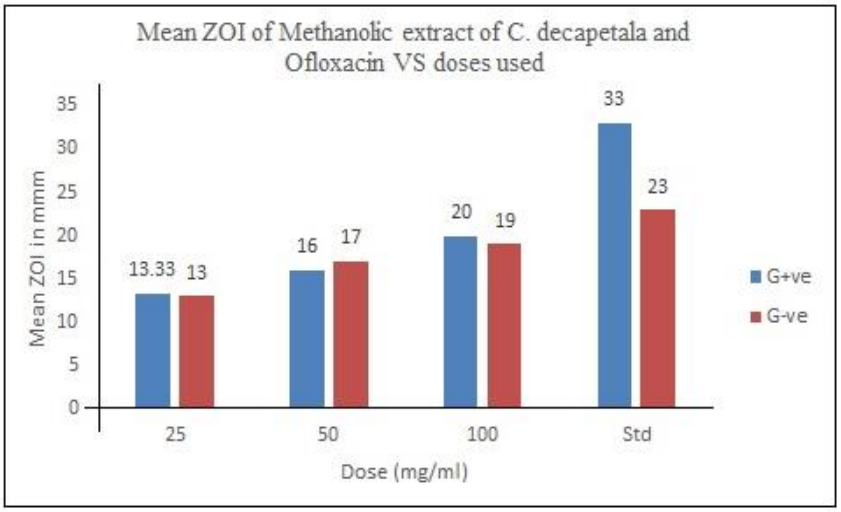

Figure 2**:** Mean ZOI of Ethyl acetate extract *C. decapetala* leaf extracts and Ofloxacin vs. Doses used.

In the present study, methanolic extract of leaves of *C. decapetala* were tested against some pathogenic bacteria and fungi. The antibacterial activity of extract was quantitatively assessed by the presence or absence of inhibition zone and diameter, respectively (Figure 1 and Figure 2). *C. decapetala* extract showed activity against various organisms at 100mg ml^{-1} concentration while at 50mg ml^{-1} and 25mg ml^{-1} concentrations showed no activity respectively. All these concentrations showed significant difference ($p > 0.05$) at 100mg ml^{-1} concentration. In gram +ve organisms, extract showed the dose dependent activity (25, 50 and 100mg ml^{-1}) comparable to standard antibiotic ofloxacin. Among fungi none showed significant activity at highest concentration 100mg ml^{-1}.

CONCLUSION

It may be concluded safely that ethanol extract of *C. decapetala* have the most active antibacterial components than antifungal and can be a good source of chemical compound.

CONFLICT OF INTEREST STATEMENT

We declare that we have no conflict of interest.

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REFERENCES

1. Akash MSH, Rehman K, Rasool F, Sethi A, Abrar MA, Irshad A, et al. Alternate therapy of type 2 diabetes mellitus (T2DM) with Nigella (Ranunculaceae). J Med Plants Res 2011;5: 6885-9. 2.
2. Rehman K, Akash MSH, Azhar S, Khan SA, Abid R, Waseem A, et al. A Biochemical and histopathologic study showing protection and treatment of gentamicin-induced nephrotoxicity in rabbits using vitamin C. Afr J Tradit Complement Altern Med 2012; 9: 360-5.
3. Hussain L, Ikram J, Rehman K, Tariq M, Ibrahim M, Akash MSH. Hepatoprotective effects of malva

sylvestris L. against paracetamol-induced hepatotoxicity. Turk J Biol 2014; DOI: 10.3906/biy-1312-32.
4. Akash MSH, Rehman K, Chen S. Effects of Coffee on type 2 diabetes mellitus. Nutrition 2013; DOI:10.1016/j. nut.2013.11.020.
5. Akash MSH, Rehman K, Chen S. Spice plant Allium Cepa: Dietary supplement for treatment of type 2 diabetes mellitus. Nutrition 2014; DOI: 10.1016/j.nut.2014.02.011.
6. Savitri S, Sundara RS, Sujan GPS, Ravi SBE, Dhananjaya BL. Evaluating the antimicrobial activity of methanolic extract of Rhus succedanea leaf cell. BioImpacts 2013;3:195-8.
7. Haq F, Ahmad H, Alam M. Traditional uses of medicinal plants of Nandiar Khuwarr catchment (District Battagram), Pakistan. J Med Plant Res 2011;5:39-48.
8. Shi-Jin L, Dian-Xiang Z, Lin L, Zhong-Yi C. Pollination ecology of Caesalpinia crista (Leguminosae: Caesalpinioideae). Acta Bot Sinica 2004;46:271- 8.
9. Narkhede MB, Ajimire PV, Wagh AE, Mohan M, Shivashanmugam AT. In vitro antidiabetic activity of Caesalpina digyna (R.) methanol root extract. Asi J Plant Sci Res 2011;1:101-6.
10. Bhadoriya U, Sharma P, Solank SS. In Vitro free radical scavenging activity of gallic acid isolated from Caesalpinia decapetala wood. Asi Pacific J Trop Biomed 2012;2:S833-6.
11. Pawar CR, Surana SJ. Optimizing conditions for gallic acid extraction from Caesalpinia decapetala wood. Pak J Pharm Sci 2010;23:423-5.
12. Xiao HW, Sheng JY, Na L, De YH, Lin HJ, Wei X, et al. Chemical constituents of Caesalpinia decapetala (Roth) alston. Molecules 2013;18:1325-36.
13. Keshri G, Singh MM, Lakshmi V, Mehrotra BN, Gupta DN. Antifritility activity of Ceasalpinia decapetala—a preliminary report. Indian J Med Res 1988;87:377-8.
14. Kiem PV, Minh CV, Huong HT, Lee JL, Kim YH. Asaldecan; cassane diterpenoid from the leaves of Caesalpinia decapetala. Chem Pharm Bull 2005; 3:428-30.
15. Ansari SH. Essential of Pharmacognosy. 3rd ed. Delhi: 2008. p. 815.
16. Harborne AJ. Phytochemical Methods: A guide to modern Techniques of Plant Analysis. 3rd ed. Springer. p. 31 – 36, 41, 51, 56, 60 – 62, 80, 90, 106, 110.
17. Siddiqui AA, Siddiqui S. Natural Products Chemistry Practical Manual (For Science and Pharmacy Cources), 1st ed., New Delhi: CBS; 2008: 5 – 7, 49, 58 – 59, 212.
18. Kokate CK. Pharmacognosy. 2010. p. 6.15 – 6.16, 6.18 – 6.19, 7.4, 8.33.
19. Suttee A, Rana S. Phytochemical investigation and evaluation of Free Radical scavenging potential of *Benincasa hispida* peel extracts. Int J Current Pharm Rev Res 2012; 3: 43-46.
20. Harjit Kaur, Mohammad Humayoon Amini, Pranav Kumar Prabhakar, Amritpal Singh, Ashish Suttee. Phytochemical Screening and Antimicrobial Activity of *Caesalpinia sappan* L. Leaves. International Journal of Pharmacognosy and Phytochemical Research. 2016; 8(6): 1064-1069.
21. Ahmed I. Mehmood, Z. and Mohammad, F.1998. Screening of some Indian medicinal plants for their antimicrobial properties. J. Ethanopharmacology. 1998; 62:183-193.
22. Paxton, J.D. Assay for anti fungal activities.In:Dey,T.M. and Harborne, J.B. (eds.) Methods in Plant Biochemistry. 1991; Academic Press, London,UK
23. Washington, J.A. and Sutter, V.L.Dilution susceptibility test: Agar and microbroth dilution procedures In: Lennette E.H. Balws, A. Hauster, W.J Jr. and Traunt, J.P. (eds.) Manual of Clinical Microbiology, American Society for Microbiology. 1980; Washington DC, USA.p. 453-458