

IN VITRO EVALUATION OF ANTIBACTERIAL ACTIVITY OF *PTEROCARPUS MARSUPIUM* ROXBKACHHAWA J.B.S.¹, SHARMA N.¹, TYAGI S.¹, GUPTA R.S.², SHARMA K.K.^{1*}

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ABSTRACT

Present study was designed to evaluate the antibacterial activity of *Pterocarpus marsupium* (Stem) methanol extract. Antimicrobial activity was tested against Gram-positive bacteria i.e. *Bacillus coagulans* and *Escherichia coli*, gram negative bacteria. Evaluations were based on the inhibition zone using disc diffusion assay. Results showed that *Pterocarpus marsupium* showed highly significant results against both the bacteria.

Keywords: Antibacterial activities, *Pterocarpus marsupium*, *Bacillus coagulans*, *Escherichia coli*, Disc diffusion assay

INTRODUCTION

In the recent few years, researchers have attention on medicinal plants for the development of new drug. Many of evidences are available to demonstrate the potential of medicinal plants used in various traditional, complementary and alternative systems of medicines. The world health organization estimates that plant extracts or their active constituents are used as folk medicine in traditional therapies of 80% of the world population¹. Over 50% of all modern clinical drugs are of natural product origin². Interest in plant derived drugs has been increasing, mainly due to the current widespread belief that "green medicine" is safer and more dependable than costly synthetic drugs, many of which have adverse side effects³.

Aromatic and medicinal plants are known to produce certain bioactive molecules which react with other organisms in the environment, inhibiting bacterial or fungal growth^{4,5}. The substances that can inhibit pathogens and have little toxicity to host cells are considered candidates for developing new antimicrobial drugs. The determination of potential antimicrobial activities for plant extracts may be information for further use in food industry. Therefore, in this preliminary antimicrobial assay, we now wish to report on the antimicrobial activity of the methanol extract of *Pterocarpus marsupium*. Antibacterial activity of this plant was evaluated against Gram positive and Gram negative bacteria using the disc diffusion assay.

MATERIAL AND METHODS**Plant materials**

Pterocarpus marsupium Roxb, commonly known as Vijyasara in Hindi, is a moderate size to large tree. It is belonging to family Fabaceae, grown in deciduous and evergreen forests of central, western and southern parts of India^{6,7}. Various phytochemical studies showed that the plant is rich in active constituents^{8,9,10}. Maurya *et al.*¹¹ prepared aqueous extract of heartwood of *Pterocarpus marsupium* and isolated five new flavanoid C-glucosides: pteroside, pteroisoaurosides, marsuposide, flavon C-glucoside, vijayosin and two known compounds, C- β -D-glucopyranosyl-2,6-dihydroxyl benzene and sesquiterpene.

Various therapeutic studies on *Pterocarpus marsupium* showed that plant have potent medicinal value. *P. marsupium* is antidiabetic¹², antihyperglycaemic^{13,14,15}, hypoglycaemic¹⁶, antihyperinsulinaemic¹⁷, anti-hyper-triglyceridaemic¹⁸, antifungal¹⁹ cardioprotective^{20,21}, anti-cataract²², COX-2 inhibitor²³ and hepatoprotective²⁴ in nature. It is also showed its antimicrobial activity against *Stahylococcus aureus*, *Pseudomonas aeruginosa* and *klebsiella pneumonia*²⁵.

Preparation of plant extracts

Fresh stems of *Pterocarpus marsupium* were purchased from local market of Jaipur and a specimen samples was identified from National Institute of Ayurveda, Jaipur. Stems were washed with running tap water and then shade dried at room temperature for about 15 days. These air dried material of experimental plant were then powdered and extracted with 100% methanol solvent. The filtrates were evaporated under reduced pressure to get a thick residue. This residue treated as experimental drug for the present study.

Test microorganism

The antimicrobial activity was individually tested against Gram-positive bacteria i.e. *Bacillus coagulans* and Gram-negative bacteria i.e. *Escherichia coli*. Both test strains were maintained on nutrient agar (Hi-media Laboratory Pvt. Ltd., Mumbai, India) and were sub-cultured every two weeks. The bacteria *B. coagulans* was obtained from Sporlac tablets and *E. coli* was procured from Institute of Microbial Technology, Chandigarh, India.

Antibacterial activity assay

The disc diffusion method was adopted to test the antibacterial activity where Ciprofloxacin was used as a standard drug to compare the results of experimental plants.

Paper disc diffusion method

The disc diffusion method was used to determine the growth inhibition of bacteria by the plant extracts. Discs containing different concentration (200, 100, 50 and 25 mg/ml) of dissolved plant extract and prepared by using sterile Whatman filter paper No. 1 (6 mm in diameter). The discs were dried at 50°C. Overnight cultures of each of bacterial isolates was diluted with sterile normal saline to give inoculum size of 10⁶ cfu/ml. Nutrient agar medium was prepared, sterilized, cooled and poured in to sterile petri dishes to a depth of 4 mm about 25 ml/plate to solidify. Pure cultures of the test organism were used to inoculate the petri dishes. This was done by spreading the inocula on the surface of the prepared nutrient agar plate using sterile cotton swabs which have been dipped in the diluted suspension of the organism. The discs were then aseptically placed evenly on the surface of the inoculation and gently pressed down to ensure contact using a pair of forceps. The plates were finally incubated at 37°C for 18-24hrs. The plates were examined after 24 hrs for clear zone of inhibition. All measurements were taken in mm.

RESULT AND DISCUSSION

Figure-1 shows the results of antimicrobial activity against the *B. coagulans* and figure-2 against *E. coli* with different concentrations of methanol extract of *Pterocarpus marsupium*. All concentrations showed varying degrees of inhibition against

both the bacterial strains. 100 mg/ml concentration showed higher zone of inhibition as compared with the standard drug with both the tested bacteria. These results are of interest since they have been obtained from the crude extract, which may exhibit a lower activity than the purified active compounds. In

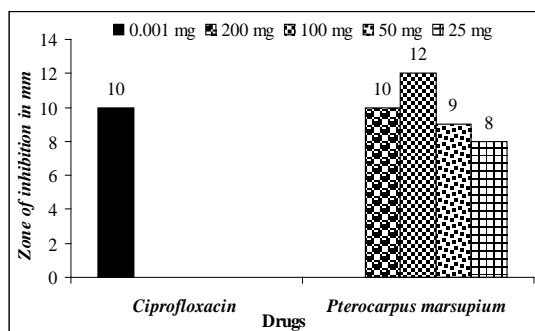


Fig. 1: Antibacterial activity of different concentrations of methanol extract of *Pterocarpus marsupium* against *B.coagulans*

conclusion: *P. marsupium* may be a potential antibacterial agent. Further studies are required to discover the active compound(s) of this plant. These findings therefore support the usage of this plant as an alternative treatment of common ailments such as skin infections.

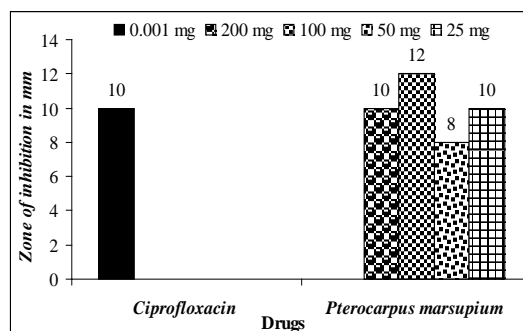


Fig. 2: Antibacterial activity of different concentrations of methanol extract of *Pterocarpus marsupium* against *Escherichia coli*

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