



Short Communication

Evaluation of antimicrobial activity of *Cinchona calisaya* bark on *Staphylococcus* by agar well diffusion method

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ABSTRACT

Cinchona is an important genus and comprises a large number of evergreen trees and shrubs, flowers white and pinkish arranged in panicles, very fragrant. *Calisaya* yields the largest amount of this alkaloid of any of the species - often 70 to 80 per cent of the total alkaloids contained in the bark which is not collected from trees growing wild, but from those cultivated in plantations. The present study was conducted to investigate the antibacterial activity of *Cinchona* bark. The antibacterial activity was tested against *Staphylococcus* using agar disc diffusion method.

Keywords: *Cinchona*, Antibacterial activity, Agar, Disc diffusion, *Staphylococcus*

Introduction

Infectious diseases account for high proportion of health problems in the developing countries like India. Microorganism has developed resistance to many antibiotics and this has created immense clinical problem in the treatment of infectious diseases. The resistance of the organism increased due to the indiscriminate use of commercial antimicrobial drugs commonly used for the treatment of infectious diseases. This situation forced the scientist to search for new antimicrobial substances from various sources including medicinal many of the plants used today were known to the people of ancient culture throughout the world for their preserved medicinal powers. However several plants are used in India in the form of crude extracts, infusions or plaster to treat common infections

without scientific evidence of efficacy.¹ *Cinchona* consist of commercially valuable bark obtained from various species, races and hybrid of *cinchona*, family rubiaceae.² It is dried bark of the cultivated trees of *Cinchona calisaya* Wedd.³ Extracts of *C. Calisaya* bark have been reported to possess anti-malarial and anti-parasitic activities.⁴ In this context, the objective of this study was to show the antimicrobial activity of *Cinchona* bark on *Staphylococcus* by agar well diffusion method.

Materials and Methods

Collection of plant material

The bark of *Cinchona calisaya* were collected from local areas of Khargone, M.P. The air-dried bark of *C. calisaya* Linn. were reduced to fine powder (40 size mesh) and around 100 gm of powder.

Preparation of *Cinchona calisaya* bark extract⁴

The plant extracts were prepared as per the methods explained by Mattana et al. (2012). *C. calisaya* bark powder was weighed in Erlenmeyer flasks of 250 ml capacity. To this hexane was added and extraction process performed with constant percolation for 24-48 h at 150 rpm. Then the extract was decanted and the solvent was allowed to evaporate. This was successively extracted with petroleum ether, chloroform, ethyl acetate, acetone, and methanol. The extracts thus obtained were stored in airtight screw capped vials at -10°C until used.

Agar well-diffusion method⁵

Agar well-diffusion method was followed to determine the antimicrobial activity. Nutrient agar (NA) and Potato Dextrose Agar (PDA) plates were swabbed (sterile cotton swabs) with 8 h old -broth culture of respective bacteria and fungi. Wells (10 mm diameter and about 2 cm a part) were made in each of these plates using sterile cork borer. Stock solution of plant extract was prepared at a concentration of 1 mg/ml in plant extracts viz., Ethanol, About 100 µl of different concentrations of plant solvent extracts were added sterile syringe into the wells and allowed to diffuse at room temperature for 2 h. Control experiments comprising inoculums without plant extract were set up. The plates were incubated at 37°C for 18-24 h for bacterial pathogens and 28°C for 48 hours fungal pathogens. The diameter of the inhibition zone (mm) was measured and the activity index was also calculated.

Results and Discussion

The present study the antibacterial effect of is showed in Table 1 of *C. calisaya* showed antibacterial activity against all test bacteria with zone of inhibition ranged from 8 – 18 mm. The maximum zone of inhibition ranged from 9 – 17 mm. The maximum zone of inhibition was against gram positive bacteria *Staphylococcus aureus* (18 mm). Maximum zone of inhibition was at 100 µl for the bacterial cultures. It indicates that zone of inhibition increases as the

concentration of *C. calisaya* extract increased. The search for antimicrobials from natural sources has received much attention and efforts have been put in to identify compounds that can act as suitable antimicrobials agent to replace synthetic ones.⁷ When tested by the disc diffusion method, extract of *C. calisaya* showed significant activity against *S. aureus*, at 4 mm, 6 mm, 9 mm and 17 mm respectively. Antimicrobial activity of *C. calisaya* increases as the concentration increases against for bacteria.

Table 1: Antibacterial activity of *C. calisaya* extract against *S. aureus*.

S.No.	Name of Bacteria	Zone of inhibition (mm)			
		25 µl	50 µl	75 µl	100 µl
1	<i>Staphylococcus aureus</i>	4	6	9	17

Conclusions

The present study has revealed the importance of natural products to control antibiotic resistant bacteria, which have been a threat to human health it may be concluded from the present studies that *Cinchona calisaya* extracts can be used as a potential source of natural antimicrobial compound.

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References

1. Murugan S, Uma devi P, Kannika parameswari N, Mani KR. Antimicrobial activity of syzygium jambos against selected human pathogens. 2011;3:975-1491.

2. Vinod RD. Pharmacognosy & Phytochemistry. 2009: 451.
3. Kokate CK, Purohit AP, Gokhale SB. Pharmacognosy. 2012: 56.
4. Ezekwesili S, Ogbunugafor HA, Ezekwesili-Ofilo JO. Anti-diabetic Activity of Aqueous Extracts of Vitex doniana Leaves and Cinchona calisaya Bark in Alloxan-Induced Diabetic Rats. International Journal of Tropical disease & Health. 2012;4:290-300.
5. Mattana CM, Satorres SE, Escobar F, Sabini C, Sabini L, Fusco M. et al. Antibacterial and cytotoxic activities of Acacia aromaextracts. Emir J Food Agric. 2012; 24(4): 308-13.