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Analyzing phytochemicals activity of *Colocasia esculenta* and *Prunus persica* against *Proteus mirabilis*

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ABSTRACT

Serious infection of UTI is predominantly cause by *Proteus mirabilis* which is gram negative and motile bacteria with this if it contains antimicrobial resistance gene than it become a big problem which cannot be tackle with primary antibiotics mainly Beta-lactam antibiotics. Currently global health sector also faces antibiotic crisis. Two plants *Colocasia esculenta* and *Prunus persica* utilized for analysis of antimicrobial activity which can used to make therapy that could use against Proteus. Different-different extract of phytochemicals such as ethanol, methanol and chloroform show activity in different concentration against *Proteus mirabilis*.

Keywords: Proteus, Phytochemicals, Resistance, Antibiotics, Antibacterial Activity.

INTRODUCTION

Proteus mirabilis is well known motile rod-shaped bacterium which can adhere to the surface of catheter by its 17 different fimbriae. It's urease activity also make, it responsible for catheter associated urinary tract infection (CAUTIs) [1]. Infection of Proteus is life threatening due to development of antimicrobial resistance in which extended-spectrum β-lactamase producing Proteus is prominent against penicillin and its derivatives which are generally used as primary antibiotics against Proteus infections [2-4]. In current scenario, resistant in Proteus also indicate about the antibiotics crisis because it becomes the biggest problem for world health sector. Minor and major resistance in Proteus is due to presence of some genes which help organisms against antibiotics. Now world require other sources of antimicrobial agents which help world health sector to tackle against resistance. There are some genes which can target with drug potentially such as rpoB, tufB, fusA and ropoA but instead of antibiotics, phytochemicals may can also be used to counter these [5,6]. Benefits of bioaction used for human health which are commonly plant secondary metabolites that modulate human immune with improve therapeutic value and avoid toxicity as compare to antibiotics because they are already reported for its multiple properties [7]. Antimicrobial agent and phytochemicals in combination neutralize the mechanism that help microbes to resist, but for all this we have to analyse the different phytochemicals activity against Proteus [8]. Because there is great diversity of phytochemicals which have been used from ancient time in human civilization but potent and effective phytochemicals are required to prevent and cure to these resistant microbial diseases [9]. Different phytochemicals such as phenolics, alkaloids, terpenoids and flavonoids have antimicrobial activity against organism in vitro, with this some phytochemicals shows anti quorum sensitivity because quorum sensing also responsible for pathogenicity of bacteria that help it in grow rapidly on host body [10].

MATERIALS AND METHODS

Collection and identification of plants

Plants specimens for phytochemicals extraction were collected from local place in Dehradun.

Figure 1: Leaf's collected for phytochemicals extraction; a). *Colocasia esculenta* leaf; b). *Prunus persica* leaf's

Testing microorganism and inoculum preparation

Proteus mirabilis was used as test organism for phytochemicals analysis. Fresh clinically isolated bacteria cultured in nutrient broth and incubated at 37℃ in incubator.

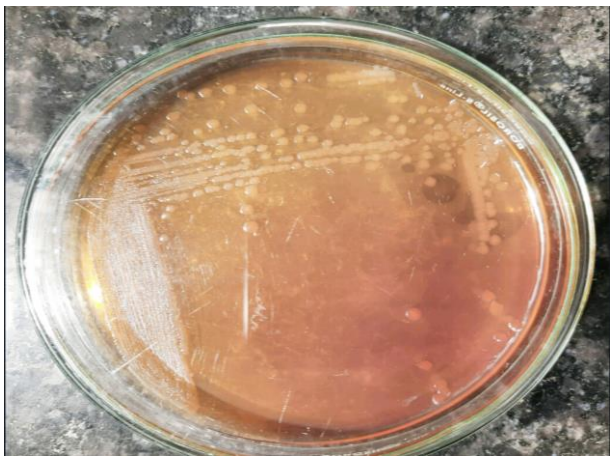

Figure 2: Clinically isolated (from urine) test organism *Proteus mirabilis*

Plants preparation and phytochemicals extraction

Firstly, plants leaf was clean by classical method in which leaf's of both plants washed with antimicrobial and antifungal agents, later plants leafs placed for 15 days to get dried. After 15 days later, dried leaf's crushed into fine powdered form with the help of mortar and pestle. 10 grams of powdered material soaked in methanol, ethanol, distilled water and chloroform at room temperature for 48hrs in shaker. Filtered phytochemicals were collected with the help of filter paper and dried form collected through evaporation. All extract stored at 4℃ for later further use.

Percentage yield (%) = dry weight of extract x 100/ dry weight of plant material

Phytochemicals analysis

The qualitative analysis of different - different phytochemicals of leaf's extract was carried out by method described by software [11].

Antimicrobial determination

Overnight incubated broth was seeded on plates of Muller Hinton agar through spread plate method. With the help of corn borer, 4 holes of 10mm was punch gently in Petri dishes. All cut portions were thrown on 5% hypochlorite containing beaker. Later different-different concentration of extracted phytochemicals added in punched well such as 10ul, 20ul, 40ul and 60ul. Incubate all Petri dishes at 37℃ in lid-up position. After 24hrs, zone of inhibition was observed for determination of antimicrobial activity of extracted phytochemicals on tested organisms.

RESULTS

Phytochemicals characterization of both plants was summarized in table 1 and 2.

Table 1: Qualitative phytochemicals analysis of *Colocasia esculenta* extracts

S. No.	Test performed	Distilled water	Chloroform	Methanol	Ethanol
1.	Flavonoid	-	+	+	+
2.	Tannins	-	-	+	+
3.	Phenol	-	+	-	-
4.	Sterol	+	-	+	+
5.	Phytosterols	+	-	+	-
6.	Saponi's	-	+	+	+
7.	Protein	-	-	-	-

Table 2: Qualitative phytochemicals analysis of *Prunus persica* extracts

S. No.	Test performed	Distilled water	Chloroform	Methanol	Ethanol
1.	Flavonoid	+	+	+	+
2.	Tannins	-	-	+	+
3.	Phenol	-	-	+	+
4.	Sterol	+	-	-	-
5.	Phytosterols	+	-	-	-
6.	Saponi's	-	+	+	+
7.	Protein	+	-	+	+

Antimicrobial activity of phytochemicals on *P. mirabilis* was recorded as per diem of zone of inhibition which was measured in millimeter shown in below tables.

DISCUSSION

In this study, the results obtained from the antimicrobial investigation of extract from *Colocasia esculenta and Prunus persica* leafs against *Proteus mirabilis.* We can say most extract not shows appreciable activity on test organism shown on table 3 and 4 except chloroform extract of *Colocasia esculenta* while ethanol and methanol extract of *Prunus persica* shown in figure 3, 4 and 5. Result of Minimum inhibitor concentration (M.I.C.) and minimum bactericidal concentration (M.B.C.) also obtained in this study, with variation in these both MIC with MBC values due to small quantity of active compounds which present in extracted phytochemicals. Chloroform extract of *Colocasia esculenta* show zone of inhibition of 11mm, 12mm, 13mm diameter by 20ul, 40ul and 60ul concentration respectively, against test organism. While *Prunus persico's* 2 phytochemicals extract on ethanol and methanol also show zone of inhibition, in which ethanol extract shows 12mm and 17mm diameter of zone of inhibition by 40ul and 60ul concentration respectively. But with this methanol also show zone of inhibition that are 11mm, 12mm and 15mm for 20ul, 40ul and 60ul concentration respectively.

Table 3: Antimicrobial Sensitivity Test by using extract of *Colocasia esculenta* leaf.

S. No.	Different concentration of extract (in ul)	Zone of inhibition			
		D/W	EtOH	MtOH	Chl.
1.	10 ul	Negligible	Negligible	Negligible	Negligible
2.	20 ul	Negligible	Negligible	Negligible	10 mm
3.	40 ul	Negligible	Negligible	Negligible	12 mm
4.	60 ul	Negligible	Negligible	Negligible	13 mm

Table 4: Antimicrobial Sensitivity Test by using extract of *Prunus persica* leaf's

S.no.	Different concentration of extract (in ul)	Zone of inhibition			
		D/W	EtOH	MtOH	Chl.
1.	10ul	Negligible	Negligible	Negligible	Negligible
2.	20ul	Negligible	Negligible	11 mm	Negligible
3.	40ul	Negligible	12 mm	13 mm	Negligible
4.	60ul	Negligible	17 mm	15 mm	Negligible

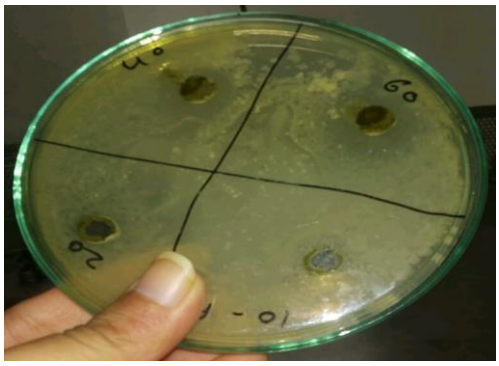

Figure 3: Zone of inhibition due to antimicrobial activity of chloroform extract of *Colocasia esculent* leaf

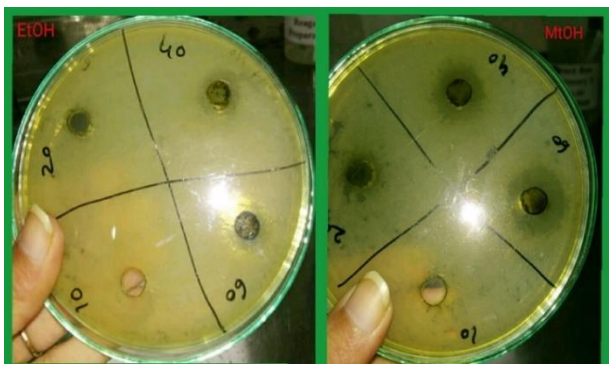

Figure 4: Zone of inhibition due to antimicrobial activity of ethanol and methanol extract of *Prunus persica* leaf's

CONCLUSION

Extracted phytochemical from *Colocasia esculenta* and *Prunus persica* shows minimal antimicrobial activity against Proteus but if we compare activity of both plants then we clearly say that antimicrobial activity of *Prunus persica* was greater than *Colocasia esculenta* and both are usable. Further investigation can be conducted to check chemistry of action of the phytochemicals compounds with their toxicity which can help and clear the way to make an antimicrobial therapy against Proteus UT infection.

Conflict of Interest

None declared.

Financial Support

None declared.

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