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ANTIMICROBIAL ACTIVITY OF LEAF EXTRACTS OF *PELTOPHORUM PTEROCARPUM* (DC) : AN IN-VITRO STUDY

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ABSTRACT:

The antibacterial activity of crude extract of leaves of *Peltophorum pterocarpum* belonging to family Caesalpinaceae, was evaluated *in-vitro* against some selected clinical isolates including *Escherichia coli*, *Pseudomonas aeruginosa*, *Klebsiella spp*, *Proteus vulgaris*, *Proteus mirabilis* *Staphylococcus aureus* and *Candida albicans* by disc diffusion and agar-well diffusion method. Two solvents chloroform and methanol were used for extraction of bioactive constituents from fresh leaves by maceration technique. The yield (%) of crude extract was 2.8 and 4.88 respectively. The potency of crude extract was determined by measuring diameter of zone of inhibition. It was concluded from the results that methanolic as well as chloroform extracts of *Peltophorum pterocarpum* were significant effect against the all clinical isolates which are serious human pathogen causing UTI and wound infections. Therefore, the leaf extracts of this plant can be selected for further investigation to determine their therapeutic potential.

KEY WORD: Antimicrobial, Crude extract, Clinical isolates, Zone of inhibition, UTI.

INTRODUCTION:

Antibiotics are the heart of the modern healthcare system. The use & misuse of antibiotics accelerates the antibiotic resistant strains. New resistance

mechanism spread in the world resulting inability to treat a common infection .i.e. UTI, Wound infection. Infection caused by resistant strain reduced the effectiveness of treatment, increase the mortality rate, increase the health care costs & economic burden on families. There are some adverse effects of antibiotics on the host. This condition forced to search for new alternatives & need for safer, effective therapeutic agent to combat infections caused by resistant strain.

About 80 % population of developing countries depends on medicinal plants for primary health care. Recently there has been more focus on the biomolecules isolated from plants used as herbal medicine, which has enormous therapeutic potential. Researchers have proved that plant parts can be used to cure many health ailments. There have been some intensive studies on extracts and biologically active compounds used for natural therapies. In past few years, several researchers reported the extraction and phytochemicals screening of different plant has antibacterial, antifungal and antioxidant activity (Venkata & et. al., 2010; Bharath, G. and Farzin, P., 2011; Vaghasiya, Y. and et.al., 2011).

Peltophorum pterocarpum is one of the Indian road avenue trees, grow up to 25 meter tall, and belongs to Caesalpiniaceae family. The leaves are long, bipinnate with 16-20 pinnae, each having 20-40 oval leaflets. It bears large compound racemes up to 20 cm long, bright yellow flowers, which produces a 10 cm long & 2.5 cm broad, rusty copper color pods. R. C. Jagessar et. al. (2007), Rahman, S. T. et. al. (2007), Sukumaran S. et. al. (2011), Ganga Rao et. al. (2015) and Jean Tony et.al. (2015) has already reported that Flowers, shoot and leaf extract possess antibacterial, antifungal and antioxidant activity.

It can be claimed that medicinal plants are the valuable sources for new safer, cheaper therapeutic agents in near future to combat resistant strain. The aim of the present investigation was to evaluate and determine the antimicrobial efficacy of leaf extracts of *Peltophorum pterocarpum* against clinical isolates and most common multi-drug resistant *Escherichia coli* and *Staphylococcus aureus*. The leaves of this plant are used for the study and extraction was carried out by maceration technique using chloroform & methanol. Extract was tested against some clinical isolates.

MATERIALS AND METHODS:

Plant Material

Fresh diseased-free leaves of *Peltophorum pterocarpum* were collected from Vyara, Dist. Tapi, Gujarat. The plant was identified and authentication was carried out by Dr. T. G. Gohil & Prof. Dr. Mino Parabia. The leaves of *Peltophorum pterocarpum* were washed thoroughly under tap water and then dried in a hot air oven at 55°C for 24 hours. The dried plant material was pulverized to fine powder in a grinder. & then it was stored in air tight bottle in a dark at room temperature.

Extraction

The dried powder (5 g) was soaked separately in 50 ml of chloroform & methanol in a flask. The flasks were plugged with cotton and allowed to stand in a dark for 72 hrs for extraction. These extracts were filtered through Whatmann filter paper and evaporated at 55°C in a hot air oven to obtain dark greenish residue (crude extract), which was stored at 4°C prior to use. This crude extract was further dissolved in DMSO to prepare the stock solution of 100 mg/ml. Decoction (Hot aqueous extract) was also carried out for extraction.

Sources of clinical isolates

The antimicrobial activity of leaf extract of *Peltophorum pterocarpum* was tested against *Escherichia coli*, *Pseudomonas aeruginosa*, *Klebsiella spp*, *Proteus vulgaris*, *Proteus mirabilis*, *Candida albicans* and *Staphylococcus aureus*. These microbes were isolated from urine & pus sample of a patient suffering from UTI & wound infection respectively and identified by various biochemical tests. AntibioGram of each clinical isolate was also carried out & it was compared with control strain. These clinical isolates were stored in nutrient agar slants at 4°C.

Screening the Antibacterial Activity

Screening of leaf extract (methanol and chloroform) of *Peltophorum pterocarpum* was done using agar-well diffusion method. Nutrient agar medium (Beef extract 1g, Sodium Chloride 1g, Peptone 5g, Agar 20g, Distilled Water 1000 ml) was used throughout the investigation. The medium was autoclaved at 121.6°C for 30 minutes and poured into sterile petriplate.

A 100µl of bacterial suspension of 0.5 McFarland standard was spread on each nutrient agar plate. Wells of 7 mm diameter were punched into agar with the help of sterilized stainless steel cork borer in each petriplate. The wells in each plate were loaded with 40 µl of crude extract (100 mg/ml) of *Peltophorum pterocarpum*. The plates were incubated at 37± 2°C for 24 hours in the incubator. Different aliquots of crude extract were also tested by disc diffusion method against multi-drug resistant *E. coli* and *Staphylococcus aureus*. The growth inhibition was calculated by measuring the diameter of the inhibition zone around the well (in mm) including the well diameter.

RESULT AND DISCUSSION:

5 gm dried powdered were extracted in chloroform and methanol, the percentage recovery of crude extract was 140 mg (2.8 %) & 244 mg (4.88 %) respectively. AntibioGram of clinical isolates of clinical isolates showed that, there was a less degree of zone of inhibition against various antibiotics than the control strain. *E. coli* and *Staphylococcus aureus* was multi-drug resistant. The both crude extract showed good activity against tested clinical isolates which was shown in Table 1. Methanol extract showed significant activity than chloroform extract. Result showed that crude extract has good activity against *Klebsiella spp*. & least against *E. coli*. Result of different aliquots of crude extract

tested by disc diffusion method which was shown in Table 2. It showed that crude extract has antibacterial potential against both multi-drug resistant *Staphylococcus aureus* and *E. coli*. Decoction also supported the antibacterial potency.

CONCLUSION:

It was concluded from the results that both chloroform as well as methanol extract of leaf of *Peltophorum pterocarpum* were significant antimicrobial activity against all the clinical isolates. Methanol extract has more potential than chloroform extract. Methanol extract has good antibacterial potential against both multi-drug resistant *Staphylococcus aureus* and *E. coli*. Decoction also supported the antibacterial potency. Crude extract has good antifungal potency.

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Table 1. Antimicrobial activity of chloroform & methanol extract of leaves of *Peltophorum Pterocarpum* against clinical isolates

Clinical isolates	Diameter of zone of inhibition (mm)				
	Well diffusion method *		Disc diffusion method **		
	Chloroform extract	Methanol extract	Chloroform extract	Methanol extract	Amikacin 30 µg/disc
<i>E. coli</i>	11	17	--	10	24
<i>P. vulgaris</i>	18	20	--	08	38
<i>P. mirabilis</i>	12	18	--	11	26
<i>Klebsiella</i>	18	22	08	11	21
<i>P. aeruginosa</i>	16	18	--	10	23
<i>Staph. aureus</i>	16	18	--	12	25
<i>C. albicans</i>	11	18	--	13	--

Note: * 7 mm well was loaded with 40 µl of crude extract (100mg/ml).

Table 2. Antibacterial activity of methanol extract of leaves of *Peltophorum pterocarpum* against multi-drug resistant *Staph. aureus* and *E. coli*. by disc diffusion method

Clinical isolates	Diameter of zone of inhibition (mm)				
	20 %	40 %	60 %	80 %	Decoction
<i>E. coli</i>	11	12	13	14	11
<i>S. aureus</i>	12	12	13	13	14

Note: * 6 mm sterile disc was loaded with 10 μ l of crude extract (100mg/ml).

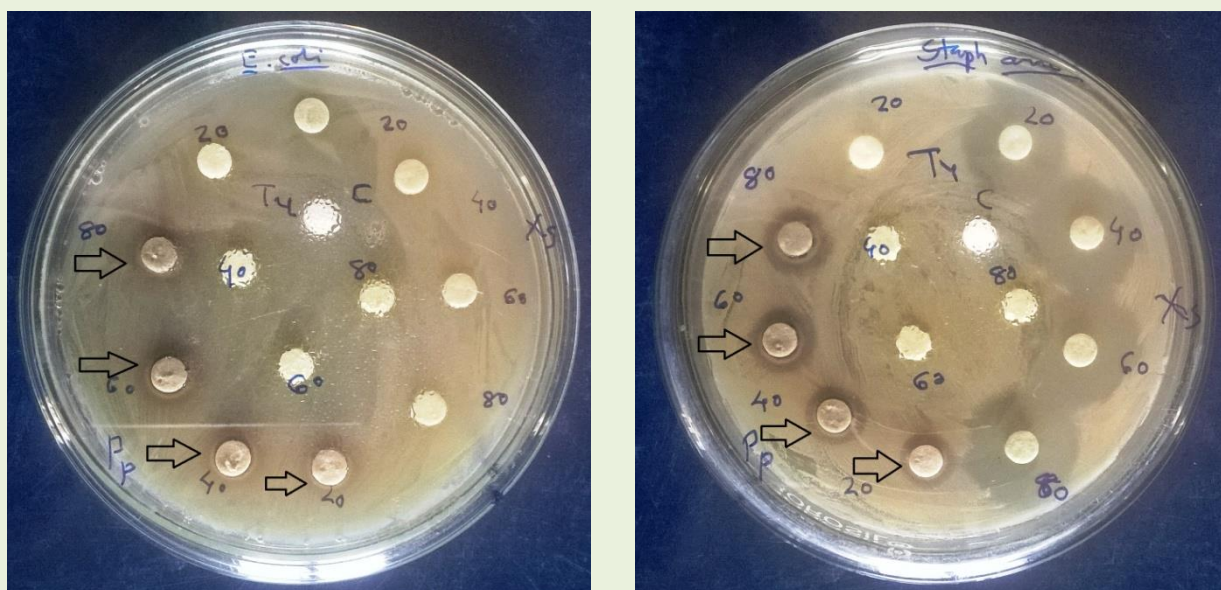


Figure 1. Antibacterial activity of methanol extract of leaves of *Peltophorum pterocarpum* against multi-drug resistant *E. coli*. and *Staph. aureus* by disc diffusion method