

A study on the antimicrobial activity of some herbal drugs used in Unani system of medicine on selected human pathogens

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ABSTRACT

Background: The use of herbal medicine is increasing with the increase in the development of drug resistance among the bacterial population. Herbal medicines are safe with no side effects and have significant action against bacteria and other microorganisms. Study the antimicrobial activity of the ethanolic extract of *Cyperus rotundus* and *Operculina turpethum* on select human pathogens such as *Enterococcus faecalis*, *Staphylococcus aureus*, and *Pseudomonas aeruginosa*. **Materials and Methods:** Bacterial strains used are multidrug-resistant of *E. faecalis*, *S. aureus*, and *P. aeruginosa* that are obtained from the Department of Microbiology, Saveetha Dental College and maintained in nutrient agar slope at 4°C. Moreover, extracts are taken from plant leaf powder. **Results:** The investigation of antibacterial activity of ayurvedic preparations on *E. faecalis*, *S. aureus*, and *P. aeruginosa* was done by agar well diffusion method. Mean zones of inhibition of different concentrations were measured and compared with the control. **Conclusion:** Based on the results recorded in the present findings, it is concluded that Unani system of medicine has a potential antimicrobial agent on human pathogenic microorganisms and hence the herbal drug may serve as one of the potential antimicrobial agents. Further studies on isolation of active principles from the plant are needed.

KEY WORDS: Antimicrobial activity, Human pathogens, Unani system of medicine

INTRODUCTION

Unani system of medicine traces its origin to ancient Egypt. This method of medicine was effectively followed in Mughal Empire of India. It is still being practiced in modern India. Unani medicine is based on the teachings of Hippocrates and Galen.^[1] Unani system of medicine is one of the greatest medical practices in India. Phlegm, blood, yellow bile, and black bile are the main classical components of this system. It also considers the imbalance in air, water, earth, and fire to be the reasons for the occurrence of diseases and disorders in human.^[2] Unani system uses herbal formulas containing a variety of natural substances for the treatment of diseases. The Unani herbal drugs such as *Cyperus rotundus* and *Operculina turpethum*

are used in our study. *C. rotundus* is a perennial plant and belongs to the Cyperaceae family. It traces its origin to Africa, Southern Asia, and Central Europe.^[4] It is also called as coco-grass and nut grass. They are rich in carbohydrates. It contains a wide variety of phytoconstituents. They have wide medicinal values. They are used to treat stomach disorders and fever. Medicinally, *Cyperus* was used internally for minor digestive problems and externally for hemorrhoids and painful joints (seeds).^[5] It has got a great antibacterial activity that it helps to prevent tooth decays, cavities, and gum diseases. In spite of its bitter taste, they were eaten by people in the ancient time. Sometimes, they were also used as a sleeping mattress.^[6] *O. turpethum* is also a herbaceous perennial plant.^[7] They are seen in abundant number in India. The root bark of the plant contains a glycosidic resin, which has the insoluble glycoside turpethin.^[8,9] It also contains a large number of secondary metabolites including saponins, flavonoids, and phenolics as well as some amount of essential oil, glucose, and fructose.^[10] Its root is

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Table 1: Showing efficacy of antimicrobial activity of ayurvedic preparations on human pathogenic microorganisms

Concentration of extracts	Zone of inhibition (diameter in mm)			Percentage of zone inhibition (%)		
	<i>E. faecalis</i>	<i>S. aureus</i>	<i>P. aeruginosa</i>	<i>E. faecalis</i>	<i>S. aureus</i>	<i>P. aeruginosa</i>
50 µg/ml	19	10	9	76	58	60
100 µg/ml	21	13	13	84	76	87
150 µg/ml	25	17	15	100	100	100

E. faecalis: *Enterococcus faecalis*, *S. aureus*: *Staphylococcus aureus*, *P. aeruginosa*: *Pseudomonas aeruginosa*



Figure 1: Culture of *Enterococcus faecalis*, *Staphylococcus aureus*, and *Pseudomonas aeruginosa*

administered to treat obesity, hemorrhoids, cough, and asthma.^[3] They are very useful in treating jaundice, ulcers, and constipation. In this study, the antibacterial activity of these drugs is tested.

MATERIALS AND METHODS

Test Microorganisms

The bacterial strains such as *Enterococcus faecalis*, *Staphylococcus aureus*, and *Pseudomonas aeruginosa* obtained from the Department of Microbiology, Saveetha Dental College, Saveetha University are used for the research. They were maintained in nutrient agar slope at 40°C.

Collection of Plant Powder

The plants, *C. rotundus* and *O. turpethem* are obtained in powder form from a registered Unani medical shop in Arumbakkam, Chennai.

Preparation of Extracts

The powders obtained are subjected to extraction. Soxhlet extractor is used for this purpose. After the completion of process of extraction, the solvent is distilled and the extracts were kept in a desiccator after being concentrated to dry residue on a water bath.

Assessment of Antimicrobial Activity by Agar Well Diffusion Method

Agar well diffusion method is used for assessing the antimicrobial activity of the extracts of *C. rotundus* and *O. turpethem*. The nutrient broth

is inoculated with bacterial strains *E. faecalis*, *S. aureus*, and *P. aeruginosa*. The broth is incubated at 37°C for overnight. The culture is then adjusted to 0.5 McFarland turbidity standard. Muller-Hinton agar plates [MHA-HiMedia M1084] are used for the Lawn culture of the test organism. This is done with the help of sterile cotton q tips. The plates are then kept for drying. Then, a 6 mm diameter well is bored by a sterile cork for different concentrations of the extracts (50 µg/ml, 100 µg/ml, and 150 µg/ml). The extracts are introduced into the wells with the help of micropipettes. The culture plates are allowed to stand on the working bench for 30 min for pre-diffusion and are then incubated in an upright position for 24 h at 37°C. After 24 h, antibacterial activity was determined by measurement of the diameter of zones of inhibition (mm). To minimize the test error, all the tests are done in triplicate.

RESULTS

Efficacy of Antimicrobial Activity of Herbal Drugs on Human Pathogenic Microorganisms

The investigation of the antibacterial activity of ayurvedic preparations on pseudomonas, enterococci, and staphylococci was done by agar well diffusion method. Mean zones of inhibition of different concentrations were measured and compared with the control. In this study, herbal extract dose-dependently increased bacterial growth inhibition. However, 100% inhibition was observed against *E. faecalis* than the standard drug ciprofloxacin. Finally, the extract showed potential antibacterial activity [Figure 1 and Table 1].

The extracts of *C. rotundus* and *O. turpethem* have shown 100% inhibition against the strains *E. faecalis*, *Streptococcus aureus*, and *P. aeruginosa* on 150 µg/ml concentration.

DISCUSSION

Global burden of infectious diseases caused by bacterial agents is a serious threat to public health.^[10] Antibiotic treatment is a preferred choice to treat bacterial infections; however, the emergence of antimicrobial resistance and toxicity issues subside the use of antibacterial agents.^[11,12] Safety and efficacy-related limitations to antibiotics augment biological research

on the antimicrobial role of plants due to comparable toxicity and efficacy.^[13] In the present study, the samples namely were tested for their antibacterial properties against the various bacterial human pathogens, and this may be due to the presence of active principles present in the polyherbal preparations recorded in the present investigations. In this regards, Tambekar and Dahikar^[14] reported in a study on the antibacterial activity of some Indian ayurvedic preparations against enteric bacterial pathogens and they have reported that supports the use of the ayurvedic drugs preparations can be used as agents to prevent or control enteric bacterial infections.^[15] The extracts of *C. rotundus* and *O. turpethem* have shown 100% inhibition against the strains *E. faecalis*, *S. aureus*, and *P. aeruginosa* on 150 µg/ml concentration.

CONCLUSION

Unani system of medicine is a great system which has natural components as its main ingredients. It proves to be safe with no side effects. From our study, it is proved that the Unani drugs *C. rotundus* and *O. turpethem* are found to be a potential antimicrobial agent on selected human pathogenic microorganisms. Further studies on the isolation of active principles from the plant are needed.

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