Journal of Neonatal Surgery
ISSN(Online): 2226-0439
Vol. 14, Issue 20s (2025)
https://www.jneonatalsurg.com

OPEN ACCESS

Antimicrobial activity of herbal extracts: Water borne Pathogenic bacteria

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Cite this paper as: Reshma Wagh, Nilatai Patil, Girish Pathade, (2025) Antimicrobial activity of herbal extracts: Water borne Pathogenic bacteria. *Journal of Neonatal Surgery*, 14 (20s), 691-696.

ABSTRACT

This study investigated the antimicrobial activity of various herbal extract Against common Waterborne pathogenic Bacteria, including *& E. coli*, *Salmonella paratyphi*, *Micrococcus luteus*, *Pseudomonas aeruginosa*, *Micrococcus roseus.* Herbal extract from plant Such as Tulsi and Piber Bettel were evaluated by using Agar well diffusion Method. Result demonstrated Significant Antibacterial activity and When Tulsi and Piper Bettel the strongest effects. The findings Suggest that these herbal remedies could serve as alternative treatment for Managing Waterborne infections pathogen. Highlighting their potential as natural antimicrobial agents in public health application.

Keywords: *Herbal plant,waterborne pathgen,MIC*

1. INTRODUCTION

Plants are prospective source of antimicrobial agents in different countries (Alviano DS *et al.*,2009). About 60 to 90% of populations in the developing countries use plant-derived medicine. Traditionally, crude plant extracts are used as herbal medicine for the treatment of human infectious diseases (Zhang R, Eggleston K, Rotimi V, Zeckhauser RJ.2006). Plants are rich in a variety of phytochemicals including tannins, terpenoids, alkaloids, and flavonoids which have been found *in vitro* to have antimicrobial properties (Dorman HJ, Deans SG. 2000). Although the mechanism of action and efficacy of these herbal extracts in most cases is still needed to be validated scientifically, these preparations mediate important host responses (Santos *et al.*, 2007).

Now a day using antibiotics to subside infection produces adverse toxicity to host organs, tissues and cells. The toxicity produced by the antimicrobial agents can be cured or prevented or antagonize with herbs (Lin and Song, 1989). Herbal molecules are safe, will overcome the resistance produced by the pathogens since they are in combined form or in pooled form of more than one molecule in the protoplasm of the plant cell (Sengupta *et al.*, 2004). Some herbs have antibacterial and antifungal properties which will be useful to clinical use (Kalemba and Kunicka, 2003). The use of plant extracts and phytochemicals, both with known antimicrobial properties, can be of great significance in therapeutic treatments. In the last few years, a number of studies have been conducted in different countries to prove such efficiency.

For a long period of time in history, plants have been valuable and indispensable sources of natural products for the health of human beings and they have a great potential for producing new drugs. Even today people who live near to the forests use plant products to cure chronic diseases. Tropical and sub-tropical areas of the world are bestowed with abundant flora and herbs which have untapped properties, such as antimicrobial, antiviral and antifungal. According to the World Health Organization, plants are a source of compounds that have the ability to combat disease, antimicrobial, antiviral and antifungal activities[Kalemba D *et al.*, 2003]. In addition, medicinal plants have been used for centuries as remedies for human ailments and diseases because they contain components of therapeutic value(Gazim ZC, *et al.*, 2008). Also they are less toxic to humans and environmentally friendly due to less pollutants produced in production and have minimal health hazards(Panda SK *et al.*, 2009).

2. MATERIAL AND METHODS

A) Collection of plant samples

For the present study leaf of plant material were collected from local area of Karad.

B) Preparation of Herbal extract

The Herbal extracts were prepared in two ways

1. Extraction of fresh plant material without drying

2. Extraction after drying plant part

Water Extraction

10. gm of each plant part was macerated in mortar & pestle with 100 ml Dlw. At Filtrate obtained was again filtered using muslin cloth Filter paper No. 1 under strict aseptic conditions & the Filtrate was collected in far sterilized glass tubes & used within 24 hrs for evocation of antibacterial activity.

Organic solvent Extraction -

10 g of each plant part was thoroughly mixed with 100 ml organic solvent. The mixture thus obtained was filtered through muslin cloth & then re- filtered by passing through Whatman's Filter No. The Filtrate was then concentrated. By complete evaporation of solvent at room temp to yield the pure extract stock solutions of crude extracts were prepared by mixing well the appropriate amount of boric exhaust with appropriate solvent to obtain a final concentration of 100 mg /ml. Each solution was stored at 4" c after collecting in sterilized glass tubes until use.

Dry Powder Exaction

Crude dry powder extract plant material by first air drying the plant material & then powdered using sterilized mortar & pestle under strict a septic conditions. The power was further subjected for aqueous and organic solvent extraction protocols as described above.

C) Selection preservation of microorganism

A total of five cultures including both gram negative & Gram positive butteries (*Escherichia coli salmonella paratyphi, micrococcus lutes Micrococcus roseus*, *pseudomonas aeruginosa*) were selected to study antimicrobial activity against the extracts prepared in the present study. The bacterial cultures were maintained in nutrient agar slant at 37°c

D) Assay method for antimicrobial activity(Du Toit, *et al.*, 2000)

Microbial assay method was done by agar well diffusion method.

For this purpose the nutrient agar medium was prepared and poured in to sterile Petri plates.

The different plates were spread inoculated with the different microbial suspensions. TER-IV

The wells were made on plates by cork borer in sterile condition ULTS AND

In the well 1ml of plant extract was added.

For the diffusion the plates were kept in refrigerator for 20 minutes.

The plates were then incubated for 24 hrs at 37 °C

After 24 hrs zone of inhibitions were measured and recorded

3. RESULTS AND DISCUSSION

Results of the present investigation reveal the antimicrobial nature of herbal extracts of leaf of Ocimum sanctum and Piber betel each plant leaf was extracted in its dry powder form & fresh state using both organic and aqueous solvents

Data obtained demonstrates that the antimicrobial activity of plants leaves as shown in table no. 4.1 and 4.2

Table. No.4.1 antimicrobial activity of dry powder extracts.

Extract	**Effective zone of inhibition (in mm diameter)**					
	organism	***E. coli***	***S. paratyphi***	***M. luteus***	***M. roseus***	***P. aeruginosa***

Leaf extract of Ocimum Sanctum	Ethanol Methanol Water	1.8 - -	1.8 1.4 -	- - -	1.2 - -	1.4 1.4 -
Leaf extract of Piber Bettel	Ethanol Methanol Water	1.8 - -	1.2 - -	1.2 - -	- - -	1.8 1.2 -

Table.no.4.2 Antimicrobial activity of extracts prepared from fresh leaves.

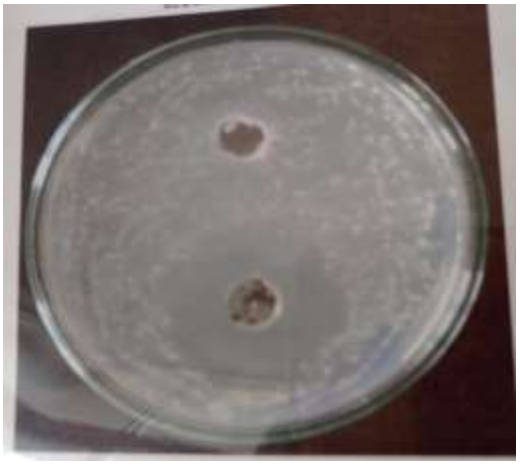
Extract	**Effective zone of inhibition (in mm diameter)**					
	organism	***E. coli***	***S. paratyphi***	***M. luteus***	***M. roseus***	***P. aeruginosa***
Leaf extract of Ocimum Sanctum	Ethanol Methanol Water	1.8 - -	1.8 - -	- - -	1.5 - -	1.4 - -
Leaf extract of Piber Bettel	Ethanol Methanol Water	- - -	- - -	- - -	- - -	- - -
Positive control	Tetracyclin	1.7	1.5	1.3	1.2	1.4
Negative control	Distilled Water solvent	- -	- -	- -	- -	- -

Results indicates that extracts perpared from dried parts exhibited better antimicrobial activities than those extracts prepared from fresh plant leaves.

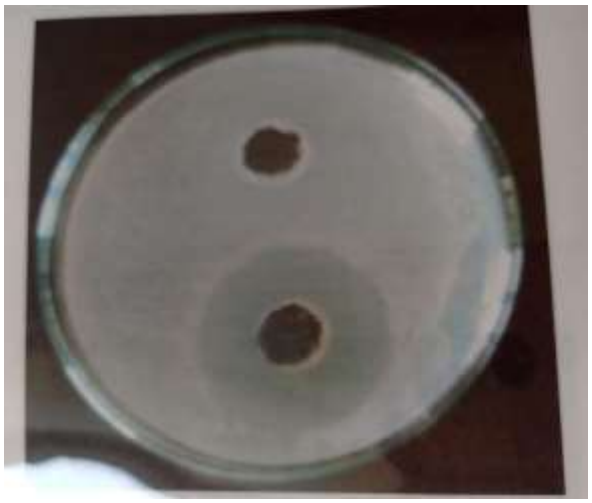
The leaf dry powder extract prepare methanol shows the highest inhibitory zone for salmonella paratyphi. organic extracts were found ethanol was found to be a more suitable solvent for the maximum extraction

Photograph 4.1 Antimicrobial activity of plant extract against *Salmonella paratyphi* organisms

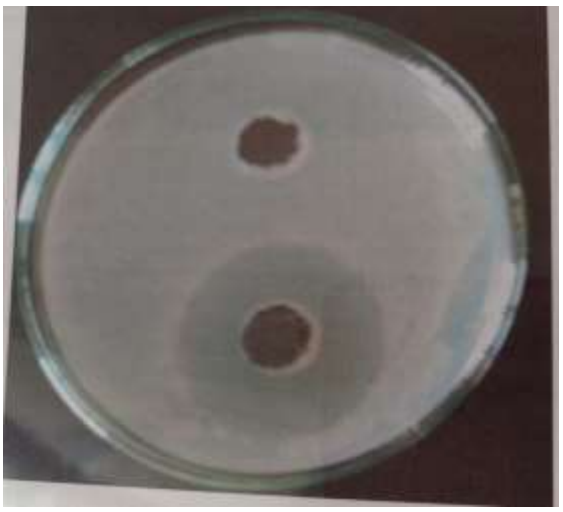
Photograph 4.2 Antimicrobial activity of plant extract against *E.coli* organisms



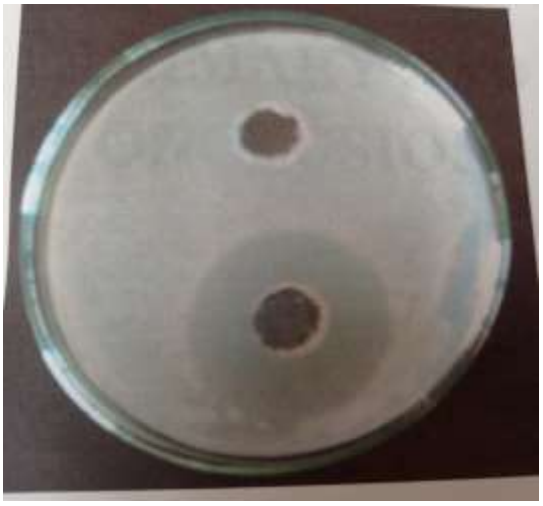
Photograph 4.3 Antimicrobial activity of plant extract against *Micrococcus roseus* organisms



Photograph 4.4 Antimicrobial activity of plant extract against *Micrococcus luteus* organisms



Photograph 4.5 Antimicrobial activity of plant extract against *Pseudomonas aeruginosa* organisms



Summary And Conclusions

1. Leaf of oscimum santum & piber bettel collected from the garden & was for present investigation.

2. Two method were used for extraction of plant material termed as aqueous extraction & solvent extraction so with these two method were used to assess their antimicrobial activity against some selected organism antimicrobial activity were tested by agar well diffusion method. From results It was seen that Ocimum santum & Piber bettel leaves extract shows maximum antimicrobial activity against microorganisms.

Dry powder extract shows maximum antimicrobial activity than the fresh extract.

From the above result it can be concluded that Ocimum santum & Piber bettel have great potential as antimicrobial agents so they can be used in the treatment at infectious diseases caused by organism under study. In this further study on Ocimum santum & Piber bettel may be undertaken in future with to evaluate its effects in vivo.

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