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# ANTIMICROBIAL AND ANTIFUNGAL ACTIVITY OF *CUCUMIS MELO L.* (CUCURBITACEAE) AND *PERGULARIA DAEMIA* FROSK. (ASCLEPIADACEAE) AN ETHNOMEDICINAL PLANTS

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**Abstract:** In the present study the aqueous, heptane, petroleum ether and acetone extract of the whole plant of *Cucumis melo L.* (Cucurbitaceae), *Pergularia daemia Frosk.* (Asclepiadaceae) was screened for the antibacterial and antifungal activity. The crude extract was screened for activity against bacterial strains like *E. coli, K. pneumoniae, S. paratyphi, S. aureus* and a fungal strain *C. albicans.* Highest zone of inhibition was shown by whole plant and fruit extract of *Cucumis melo L.* with aqueous and acetone with *C. albicans* and E. coli 08 and 12 mm respectively. Very poor response was observed with acetone and aqueous extract in other bacterial and fungal stains. Highest zone of inhibition was shown by whole extract of *Pergularia daemia* with heptane with *E. coli,* and C. *albicans*, 16 and 21 mm respectively. Very poor response was observed with Petroleum ether extract in other bacterial and fungal stains.

**Key Words:** Antimicrobial activity, *Cucumis melo L.*, Pergularia *daemia Frosk. E. coli, K. pneumoniae, S. paratyphi, S. aureus, C. albican*

## INTRODUCTION

Plants are the basic source of knowledge of modern medicine. Nature has been a source of medicinal agents for thousands of year and an impressive number of modern drug have been used for years in daily life to treat disease all over the world. They have been used medicinal plants as a source of medicine. The use of medicinal plants as a source for relief from illness can be traced over five millennia to written documents of the early civilization in India.

Medicinal plants are the local heritage with global importance**,** world is endowed with a rich wealth of medicinal plants. Herbs have always been principle form of medicine in India and presently they have become popular throughout the developed world, as people strive to stay healthy in the face of chronic stress and pollution and to treat illness with medicines that work in concept with the body's own defenses .People in Europe, America and Australia are consulting trained herbal professionals and are using the plant medicines. Medicinal plants also play an important role in the lives of rural peoples, particularly in remote parts of developing countries with few health facilities. The Significance of traditional medicine and the importance of the distribution of chemical constituents in ethno medicine (Victor Njoku and Chidi obi. 2009)

The variety of plants with therapeutic properties is quite astonishing. It is estimated that, around 70,000 plant species from lichens to flowering trees have been used at one time or another for medicinal purposes. The herbs provide the standing material for the isolation or synthesis of conventional drugs. In Ayurveda about 2000 plant species are considered to have medicinal value, while the Chinese Pharmacopoeia lists over 5,700 traditional medicines, most of which are of plant origin. About 500 herbs are still employed within conventional medicine, although whole plants are rarely used .Many infectious diseases have been known to be treated with herbal remedies throughout the history of mankind (Jigna Parekh, Sumitra V. Chanda 2007)

Medicinal plants play a vital role in health care system of human being and animals. They have medicinal values due to substances present in various plant tissues. These substances used as therapeutic agent or an active ingredient for medical preparation & they are rich sources of bioactive compounds & thus serves as important raw material for drug production. These plants contribute substantially to health cultural integrity & local economics particularly among the tribe.

*Pergularia daemia* also called as *Pergularis extensa* or *Daemia extensa* belongs to a milky weed family Asclepiadaceae includes more than 2000sps. Classified under 280 genera are distributed worldwide in the tropical and subtropical regions of Asia and Africa. The plant is often found covering other shrubs and trees.

The whole plant possesses high medicinal value, commonly called as Rankaral or Kurmuda and traditionally uses in treating various ailments for human beings. Some of the folklore people used this plant to treat jaundice, laxative, expectorant and in diarrhea

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*Cucumis melo* is commonly known as Sherani or Shendode. It is an annual climber belongs to family Cucurbitaceae. The fruits can be used as a cooling light cleanser or Moisturizer for the skin and has stomachic properties. They are also used as a first aid treatment for burns and abrasions. Seeds are antitussive, digestive, febrifuge and vermifuge. The extract of seed oil was reported for Antifungal activity. So our present study was carried out to evaluate the antimicrobial activity of *Pergularia daemia* and *Cucumis melo* for their therapeutic potential values.

## MATERIALS AND METHODS

***Collection of plant material***

Fresh whole ethnomedicinal plants were collected from tribal region Surgana of Nasik district of Maharashtra. The taxonomic identity of these plants was determined with the help of local flora. Plant material was washed under running tap water then air dried and homogenized to fine powder and showered in air tight bottles.

***Aqueous extraction***

For aqueous extraction 50gm of air dried powder was placed in thimble and extracted successfully solvent like distilled water, Acetone, Petroleum Ether, Hexane in Soxhlet extractor for 48 hrs. The extract concentrated under rotary evaporator machine and fill air tight bottle until further use.

***Antimicrobial activity of plant extract***

To study antimicrobial activity following four bacterial strains were used

1. *Escherichia coli (ATCC 25922)*
2. *Klebsiella pneumonia (ATCC 15380)*
3. *Salmonella paratyphi*
4. *Staphylococcus aureus (ATCC 25923)*
5. *Candida albicans* (Fungi).

The bacterial isolates were cultured on nutrient agar and incubated at 37° c for 24 hrs and the microorganisms were repeatedly sub- cultured in order to obtain pure isolation. Morphological and biochemical reactions were carried to ascertain proper identification. They were inoculated into nutrient agar slants and stored at 4°c.

Overnight broth culture of the respective bacterial strains was adjusted to turbidity equivalent to 0.5 McFarland standards. (0.2ml culture of the organisms was dispensed into 20ml sterile nutrient broth and incubated for 24hrs and standardized at 1.5 x 10 CFU/ml by adjusting the optical density to 0.1at 600 nm PERKIN ELMER UV-spectrophotometer) 16.

***Media preparation***

As per composition following media were prepared.

**Potato dextrose agar Medium (for fungi)**

| | | | |
|---|---|---|---|
| 1. | Potato | - | 200 gm |
| 2. | Dextrose | – | 20 gm |
| 3. | Agar | – | 15 gm |
| 4. | Distilled water | – | 1000 ml |

**Nutrient Agar Medium (for bacteria)**

| | | | |
|---|---|---|---|
| 1. | Yeast extract | - | 0 gm |
| 2. | NaCl | - | 05 gm |
| 3. | Peptone | - | 10 gm |
| 4. | Distilled water | - | 1000 ml |
| 5. | Agar | - | 20 gm |

The antimicrobial assay was performed by following method:

***Agar well diffusion method for solvent extract***

Agar well diffusion method for solvent extract the media (Mueller Hinton Agar no 2) along with the inoculums was poured into the Petri plate (Hi-media).

For agar well diffusion method a well was prepared in the plates with the help of a cork borer, the freshly prepared inoculum was swabbed all over the surface of the MHA plate using sterile cotton swab. Four wells of 6mm diameter were bored in the medium with the help of sterile cork borer having 6mm diameter and were labeled properly and fifty micro liters of the working suspension / solution of different medicinal plant extract and same volume of extraction solvent for control was filled in the well with the help of micropipette. Plates were left for some time till the extract diffuse in the medium with the lid closed and incubated at 37° c for 24 hour and measured using scale and mean were recorded after incubation plates were observed for zone of inhibition. Antimicrobial tests were done in triplicates and diameter of zone of inhibition (mm) is expressed as means.

***Antimicrobial activity***

An antimicrobial is substance that kills of inhibits the growth of microorganisms such as bacteria fungi or protozoan. Antimicrobial drugs either kill microbes (microbicidal) or prevent the growth of microbes (microbistatic). Disinfectants are antimicrobial substances used on non- living object.

The history of antimicrobials begins with the observations of Pasteur and Joubert, who discovered that one type of bacteria could prevent the growth to another. They did not know at that time that the reason one bacterium failed to grow was that the other bacterium was producing an antibiotic. Technically,

antibiotics are only those substances that are produced by one microorganism that kill, or prevent the growth of another microorganism. Of course, in today's common usage the term antibiotic is used to refer to almost any drug that attempts to rid your body of a bacterial infection. Antimicrobials include not just antibiotics, but synthetically formed compounds.

The discovery of antimicrobials like penicillin and tetracycline gave the way for better health for millions around the world. The future effectiveness of antimicrobial therapy is somewhat in doubt. Microorganism, especially bacteria are becoming resistant to more and more antimicrobial agents. Bacteria found in hospitals appear to be especially resilient, and are causing increasing difficulty for the sickest patients those in the hospital.

In the present study the antimicrobial activity of different solvents of crude extract of whole and fruit of *Cucumis melo L.* was evaluated (Table 1). The crude extract were screened for activity against bacterial strains like *E. coli, K. pneumoniae, S. paratyphi, S. aureus* and a fungal strain *C. albicans*.

**Table 1:** *In vitro* antimicrobial activities of different extracts of *Cucumis melo L. whole plant.*

| *Cucumis melo L.* | *Escherichia coli.* | | *Staphylococcus aureus* | | *Klebsiella pneumonia* | | *Salmonella paratyphi* | | *Candida albicans* | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Aq. | Ace. | Aq. | Ace. | Aq. | Ace. | Aq. | Ace. | Aq. | Ace. |
| Activity | Nil | 12 | Nil | NIL | Nil | Nil | Nil | Nil | 08 | Nil |
| control | Nil | 11 | Nil | Nil | Nil | Nil | Nil | 15 | Nil | 13 |

**Table 2:** *In vitro* Antimicrobial activities of different extracts of *Pergularia daemia Frosk. Whole plant.*

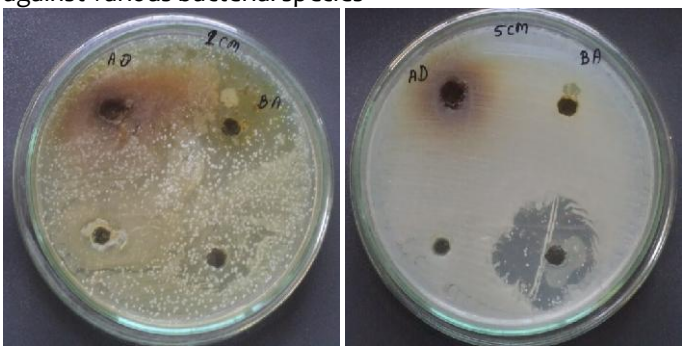
| *Pergularia daemia Frosk.* | *Escherichia coli* | | *Staphylococcus aureus* | | *Klebsiella pneumonia* | | *Salmonella paratyphi* | | *Candida albicans* | |
|---|---|---|---|---|---|---|---|---|---|---|
| | P.E. | Hep. | P.E. | Hep | P.E. | Hep | P.E. | Hep. | P.E. | Hep. |
| Activity | Nil | 16 | Nil | NIL | Nil | Nil | Nil | Nil | Nil | 21 |
| control | Nil | Nil | Nil | Nil | Nil | Nil | Nil | Nil | Nil | Nil |

Highest zone of inhibition was shown by whole extract with aqueous, fruit extract in acetone with *S. paratyphi* and *E. coli* 08 and 12 mm respectively. Very poor response was observed with aqueous extract in all bacterial and fungal stains. The study of antimicrobial activity *Pergularia daemia Frosk.* shows by whole extract with only heptane with *E. coli* and *C. albicans* of 16 and 21mm respectively. The results shown that plant extracts were effective against both gram negative and gram positive bacteria and with fungal strain also. The demonstration of antibacterial activity and antifungal activity against bacteria and fungi may be indicative of presence of broad spectrum antibiotic compounds.

## RESULTS AND DISCUSSION

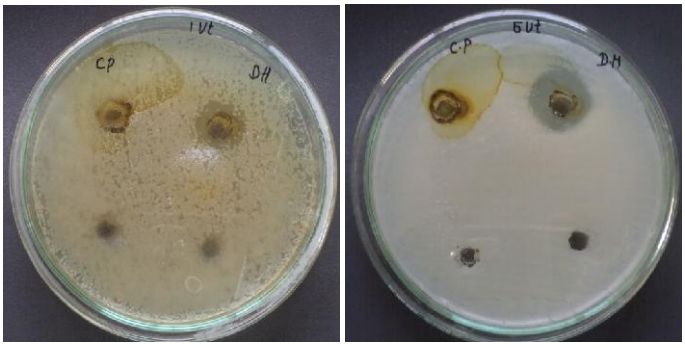
The presence of antimicrobial substances in the higher plants is well established (Srinivasann, 2001). Plants have provided a source of inspiration for novel drug compound's as plants derived medicines have made significant contribution towards human health. The current scenario of antibiotics is very threatening with significant emergence of resistance among bacterial pathogens against available antibiotics. The present investigation reveals that *Cucumis melo L.* and *Pergularia daemia Frosk.* Plants would be the major source in finding metabolites with greater efficacy against resistant bacteria pathogens. The present study focused to the discovery of novel Antibacterial / antimicrobials that can lead to the development of pharmaceuticals of plant origin. Since, the present study was focused only to examine the antibacterial potential of crude extract.

**Plate A-D:** plant extracts showing inhibition zones against various bacterial species



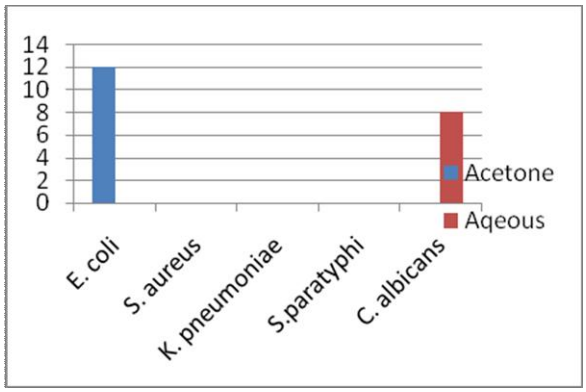

A. B.

*A - Cucumis melo* extract showng inhibition zone against *E. coli*
*B - Cucumis melo* extract showng inhibition zone against *C. albicans*

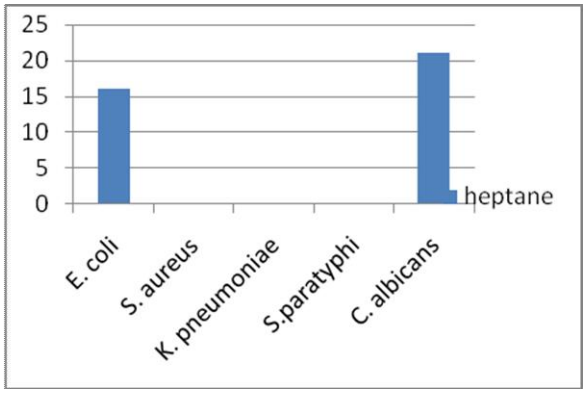



C D

*C- Pergularia daemia* extract showng inhibition zone against *E. coli*
*D. Pergularia daemia* extract showng inhibition zone against *C. albicans*




Graphical representation of *Cucumis melo* showing antimicrobial activity




Graphical representation of *Pergularia daemia* showing antimicrobial activity

Based on results described, we may conclude that the Acetone extract of *Cucumis melo L.* shows highest antimicrobial activity against the bacteria *E. coli.* The Aqueous extract of *Cucumis melo L.* shows minimum antimicrobial activity against the *Candida albicans*. In other solvents like Aq. *of E. coli,* Aq., and acetone in *S. aureus*, Aq., and acetone in K. *pneumoniae* and Aq. and acetone in *S. paratyphi* do not shows antimicrobial activity.

The plant *Pergularia daemia Frosk.* shows high antimicrobial activity against the bacteria *E. coli* and *Candida albicans.* In other solvents like petroleum ether of *E. coli*., petroleum ether and heptane in *S. aureus*, petroleum ether and heptane in *K. pneumoniae*, petroleum ether and heptane in *S. paratyphi* and P.E. in *Candida albicans* do not shows antimicrobial activity. This plant can be further subjected to isolation of therapeutic antimicrobials and carry out further pharmacological evaluation.

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