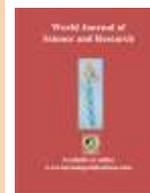




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Research Article

Zoology

ANTI-BACTERIAL AND ANTI-FUNGAL ACTIVITY OF MUSCLE TISSUE IN *Catla catla* FISH

B. Duraimanickam, S. Chinnamani, M. Maheswari and Dr. S. Sivasuriyan

P.G and Research Department of Zoology, Rajah Serfoji Government College, Thanjavur - 613 005, Tamil Nadu, India.

ABSTRACT

In the present study was to investigate the antimicrobial activity of *Catla catla*. The results showed that the antimicrobial activity was directly proportional to the concentration of *Catla catla*. The *Catla catla* shows highest antibacterial activity was observed against *E. coli*, when compared with *Bacillus subtilis*, *Pseudomonas aeruginosa* and *St. auerus*. The *Catla catla* shows highest antifungal activity was observed against *C. albicans*, when compared with *Aspergillus flavus*, *Aspergillus niger* and *Aspergillus fumigatus*. The higher doses (150µl) of *Catla catla* possess similar activity to standard drug as chloromphenical for bacteria and Fluconazole for fungi. Overall, the *Catla catla* is potential antimicrobial activity that can be important in infectious disease prevention and health preservation.

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***Corresponding author**
Dr. S. Sivasuriyan,
P.G and Research
Department of
Zoology, Rajah Serfoji
Government College,
Thanjavur - 613 005,
Tamil Nadu, India

INTRODUCTION

Microorganisms are very diverse and include all bacteria, archaea and most protozoa. This group also contains some fungi, algae, and some micro-animals such as rotifers. Many macroscopic animals and plants have microscopic juvenile stages. Some microbiologists classify viruses and viroids as microorganisms, but others consider these as nonliving (Madigan and Martinko, 2006).

Infectious diseases represent an important cause of morbidity and mortality among the general population, particularly in developing countries. Therefore, pharmaceutical companies have been motivated to develop new antimicrobial drugs in recent years, especially due to the stantemergence of microorganisms resistant to conventional antimicrobials. Apparently, bacterial and fungalspecies present the genetic ability to acquire and transmit resistance against currently available antibacterials since there are frequent reports on the

isolation of bacteria that are known to be sensitive to routinely used drugs and became multiresistant to other medications available on the market. Consequently, common strategies adopted by pharmaceutical companies to supply the market with new antimicrobial drugs include changing the molecular structure of the existing medicines in order to make them more efficient or recover the activity lost due to bacterial resistance mechanisms (Lwoff, 1956).

The drug-resistant bacteria and fungal pathogens have further complicated the treatment of infectious diseases. In recent years, drug resistance to human pathogenic bacteria has been commonly reported from all over the world. However, the situation is alarming in developing as well as developed countries due to indiscriminate use of antibiotics. In the present scenario of emergence of multiple drug resistance to human pathogenic organisms, this has necessitated a search for new antimicrobial substances from natural sources including plants. Plant and plant products play a wide range of antimicrobial properties. Keeping in view, the present study to investigate the antibacterial activity of *Catla catla* against *Escherichia coli*, *Staphylococcus aureus* and *Bacillus subtilis*, *Pseudomonas aeruginosa* and antifungal activity in *Catla catla* against *Candida albicans*, *Aspergillus niger*, *Aspergillus flavus* and *Aspergillus fumigatus*.

MATERIALS AND METHODS

Collection of sample:

The *Catla catla* were collected from fish market, R.R. Nagar, Thanjavur, Tamil Nadu, India. The tissues of *Catla catla* were homogenized (10%) with phosphate buffer and used for antimicrobial activity.

Determination of antimicrobial activity

Antibiogram was done by disc diffusion method (NCCLS, 1993; Awoyinka et al., 2007) using plant s. Petri plates were prepared by pouring 30 ml of NA/PDA medium for bacteria/fungi. The test organism was inoculated on solidified agar plate with the help of micropipette and spread and allowed to dry for 10 mins. The surfaces of media were inoculated with bacteria/fungi from a broth culture. A sterile cotton swab is dipped into a standardized bacterial/ fungi test suspension and used to evenly inoculate the entire surface of the Nutrient agar/PDA plate. Briefly, inoculums containing *Staphylococcus aureus*, *Bacillus subtilis*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Candida albicans*, *Aspergillus flavus*, *Aspergillus niger* and *Aspergillus fumigatus* were spread on potato dextrose agar for fungus strains. Using sterile forceps, the sterile filter papers (6 mm

diameter) containing the crude s (50µl) were laid down on the surface of inoculated agar plate. The plates were incubated at 37°C for 24 h for the bacteria and at room temperature (30±1) for 24-48 hr. for yeasts strains. Each sample was tested in triplicate. The antimicrobial potential of test compounds was determined on the basis of mean diameter of zone of inhibition around the disc in millimeters. The zones of inhibition of the tested microorganisms by the samples were measured using a millimeter scale.

RESULTS AND DISCUSSION

Antimicrobial activity

Worldwide, infectious disease is the number one cause of death accounting for approximately one-half of all deaths in tropical countries. Perhaps it is not surprising to see these statistics in developing nations, but what may be remarkable is that infectious disease mortality rates are actually increasing in developed countries, such as the United States. Death from infectious disease, ranked 5th in 1981, has become the 3rd leading cause of death in 1992, an increase of 58% (Pinner et al. 1996). It is estimated that infectious disease is the underlying cause of death in 8% of the deaths occurring in the US (Pinner et al. 1996). This is alarming given that it was once believed that we would eliminate infectious disease by the end of the millennium. The increases are attributed to increases in respiratory tract infections and HIV/AIDS. Other contributing factors are an increase in antibiotic resistance in nosocomial and community acquired infections. Furthermore, the most dramatic increases are occurring in the 25–44 year old age group (Pinner et al. 1996). These negative health trends call for a renewed interest in infectious disease in the medical and public health communities and renewed strategies on treatment and prevention. Proposed solutions are outlined by the CDC as a multi-pronged approach that includes: prevention, (such as vaccination); improved monitoring; and the development of new treatments. It is this last solution that would encompass the development of new antimicrobials (Fauci 1998).

This situation forced scientists to search for new antimicrobial substances from fish. *Catla catla* was screened against bacteria and fungi were evaluated using the standard agar disc diffusion method. The disc diffusion method is used to detect the antimicrobial activity of plant. The solidified Nutrient agar plates were swapped with the test organism and the samples were impregnated. After the incubation the zone was measured. The antimicrobial activity of plant s was detected by the indication of zone around the

disc. The in vitro antimicrobial activity of the *Catla catla* against these bacteria and fungi were qualitatively assessed by the presence of inhibition zones represented in the photographic Fig 1. The inhibitory activities in culture media of the *Staphylococcus aureus*, *Bacillus subtilis*, *Escherichia coli* *Pseudomonas aeruginosa*, *Candida albicans*, *Aspergillus flavus*, *Aspergillus niger* and *Aspergillus fumigatus* reported in Table 1 were comparable with standard antimicrobiotic viz. chloromphenical and fluconazole.

E. coli, *Bacillus subtilis*, *Pseudomonas aeruginosa* and *St. auerus*, which already known to be multi-resistant to antibiotics, were resistant to tested plant . The activity is dose dependent manner The mean inhibition zone of *catla catla* was highest in higher concentrations.

C. albicans, *Aspergillus flavus*, *Aspergillus niger* and *Aspergillus fumigatus* were strongly influenced with a mean inhibition zone was highest in higher concentrations. This result is

very interesting because *C. albicans* *Aspergillus flavus*, *Aspergillus niger* and *Aspergillus fumigatus* has been the most extensively studied pathogen in antifungal resistance because of their morbidity and mortality associated with infections in immunocompromised patients (Casalnuovo et al., 2004; Redding, S. et al., 1993).

The results showed that the antimicrobial activity was directly proportional to the concentration of *Catla catla*. The *Catla catla* shows highest antibacterial activity was observed against *E. coli*, when compared with *Bacillus subtilis*, *Pseudomonas aeruginosa* and *St. auerus*. The *Catla catla* shows highest antifungal activity was observed against *C. albicans*, when compared with *Aspergillus flavus*, *Aspergillus niger* and *Aspergillus fumigatus*. The high doses (150µl) of *Catla catla* possess similar activity to standard drug as chloromphenical for bacteria and Fluconazole for fungi.

Table: 1 Antimicrobial activities of *Catla catla*

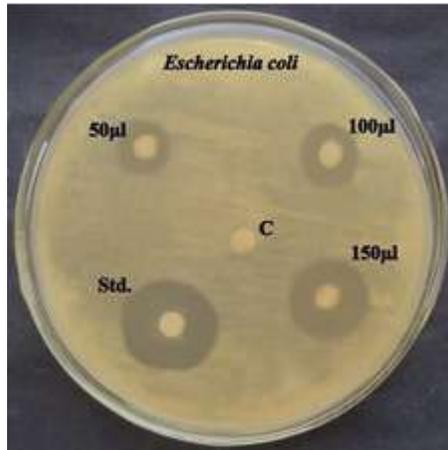
Microbial Organism	50µl	100µl	150µl	Standard	Control
<i>Escherichia coli</i> (mm)	2.70±0.18	5.10±0.35	7.60±0.53	11.20±0.78	0
<i>Staphylococcus aureus</i> (mm)	1.10±0.07	3.10±0.21	6.90±0.48	11.10±0.77	0
<i>Bacillus subtilis</i> (mm)	0.30±0.02	2.60±0.18	5.30±0.37	9.70±0.67	0
<i>Pseudomonas aeruginosa</i> (mm)	0.20±0.01	1.20±0.08	4.50±0.31	9.90±0.69	0
<i>Candida albicans</i> (mm)	0.90±0.06	3.20±0.22	6.70±0.46	10.30±0.72	0
<i>Aspergillus flavus</i> (mm)	0.50±0.03	2.50±0.17	5.30±0.37	10.40±0.72	0
<i>Aspergillus niger</i> (mm)	0.10±0.01	2.10±0.14	4.90±0.34	8.40±0.58	0
<i>Aspergillus fumigatus</i> (mm)	0.20±0.01	2.00±0.14	5.10±0.35	8.80±0.61	0

Values were expressed as Mean ± SD.

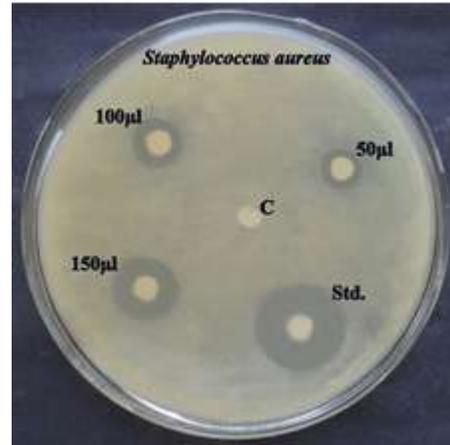
Control - Water

Bacterial standard - Chloramphenicol

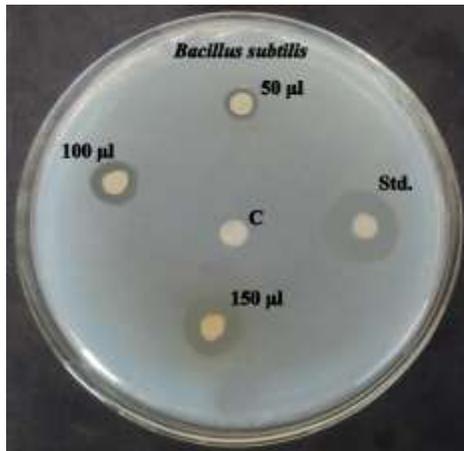
Fungal standard - Fluconazole



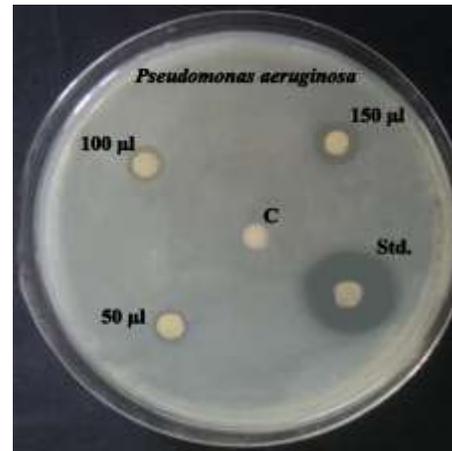
Escherichia coli



Staphylococcus aureus

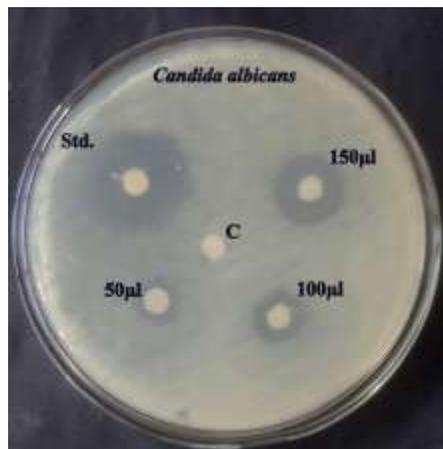


Bacillus subtilis

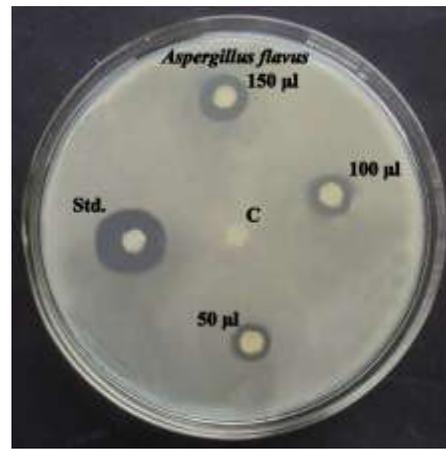


Pseudomonas aeruginosa

Fig: 1 Antibacterial activities of *Catla catla*



Candida albicans



Aspergillus flavus

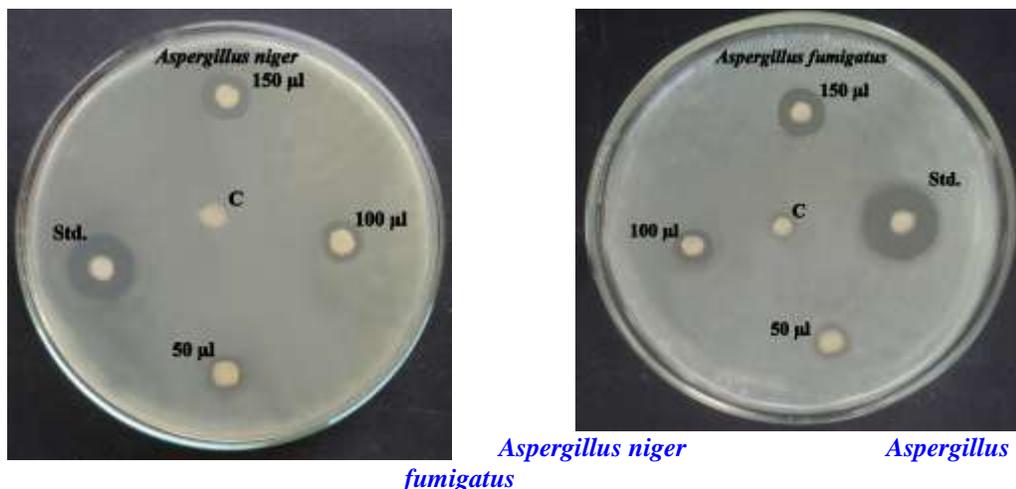


Fig. 2 Antifungal activities of *Catla catla*

CONCLUSION

Overall, the *Catla catla* is potential antimicrobial activity that can be important in infectious disease prevention and health preservation.

References

- Madigan M; Martinko J, eds. (2006). Brock Biology of Microorganisms (13th ed.). Pearson Education. p. 1096.
- Lwoff A (1956). "The concept of virus". J. Gen. Microbiol. 17 (2): 239–53.
- NCCLS. (1993) National Committee for Clinical Laboratory Standards. Performance standards for antimicrobial disc susceptibility tests. PA: NCCLS Publications 25.
- Awoyinka, O.A., Balogun I.O. and Ogunnow, A.A. (2007). Phytochemical screening and in vitro bioactivity of *Cnidocolus aconitifolius* (Euphorbiaceae). J. Med. Plant Res, 1: 63-95
- Pinner, R., S. Teutsch, L. Simonsen, L. Klug, J. Graber, M. Clarke, and R. Berkelman.

1996. Trends in infectious diseases mortality in the United States. J. Am. Med. Assoc. 275:189–193.

- Fauci, A. 1998. New and reemerging diseases: The importance of biomedical research. Emerging Infectious Diseases. (www.cdc.gov/ncidod/EID/vol4no3/fauci). 4:3.
- Casalinuovo, I.A., P. Di Francesco and E. Garaci, (2004) Fluconazole resistance in *Candida albicans*: a review of mechanism. European Review Medical Pharmacological Sciences, 8(2): 69-77.
- Redding, S., J. Smith, G. Farinacci, M. Rinaldi, A. Fothergill, J. Rhine-Chalberg and M. Pfaller, (1993). Resistance of *Candida albicans* to Fluconazole During Treatment of Oropharyngeal Candidiasis in a Patient with AIDS: Documentation by In Vitro Susceptibility Testing and DNA Subtype Analysis. Clinical Infectious Diseases, 18(2): 240-242.

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