International Journal of Bio-pharmacology, Biotechnology and Allied Sciences

IJBBAS, May, 2020, 1(2): 244-253 Research Article www.ijbbas.in

STUDIES ON ANTIMICROBIAL ACTIVITY OF EXTRACTS OBTAINED FROM *BAMBUSA INDICA* AGAINST PATHOGENIC MICROORGANISMS

Bharti M[1], Bharti P[2]

[1]Department of Biotechnology, A.N College, Patna, Bihar, India.

[2]Department of Physics, B.N Mandal University Laloo Nagar, Madhepura, Bihar, India.

***Corresponding Author: Madhulika Bharti**

Email ID: pallavi.mrdls@gmail.com

Available online at: www.ijbbas.in.

Received 18th Feb. 2020; Revised 23th March. 2020; Accepted 30th April. 2020; Available online . May 2020

ABSTRACT

Bambusa indica is belongs to the family Poaceae. It is one of the fastest growing plants in the world allowing it to colonize large areas of land quickly, out competing species. The plants were tested for the antimicrobial property detection of the flowers extract of *Bambusa indica* against bacterial microorganisms. As a result it was obtained that the ethylacetate was more efftective as compared to other solvents and when the extract was treated in the presence of metals then,1% $MgSO_4$ and 1.5% $CaCl_2$ expresses best results by enhancing its properties.

Keywords: *Bambusa indica,* Antimicrobial, Synthetic Drugs, Anti- Inflammatory, Anti-Tumor.

INTRODUCTION

The use of herbal drug in curing various illnesses has been in reality from the ancient days. Therapeutic plants are able as natural sources of a large proportion of drugs for the treatment of several human diseases **[1,2]**. *Bambusa indica* is belongs to the family Poaceae **[3]**. It grows very fast and colonize in large area very rapidly as compare to other species all over the world **[4]**. In Australia, North and South America, Asia and Africa almost 1500 species of Bamboo was found **[5]**. For bamboo the tropical climate is favourable and lots of efforts are not required for its cultivation. The sunlight was absorbed in maximum amount by the leaves of Bamboo so, the rate of photosynthesis increased and drip tips filter water to the ground **[6]**. The bamboo flowers only once in its lifetime and then dies, the duration among flowering is very long, 65-120 years in some species, this protect it from rodents and increasing the survival of seeds **[7,8]**. Rizomes presents in the root helps it to increase the uptake of more nutrients and helping it to grow quickly. Bamboo consumes mor CO_2 as compare to other plants and releases 30% more O_2 into the atmosphere. The purchasing of herbs and herbal drugs are cheaper to purchase within the rural people means **[9]** as compared to synthetic drugs, which are very expensive and not available at peoples discarding and need capability for their application. Researchers have found that extracts of plant prevent the toxicity and protect against many health issues and it also has less side effects as compared to other forms of medicines **[10,11]**. Bamboo leaves and shoots shows antioxidant property by preventing free radicals, it also protects from birth disorders, digestive system and asthma. It control the cortical cerebral neuronal migration during a fetal brain **[12]**. It also prevent the effect thyroid hormones such as tri- idothyroxine and thyroxine, during a period of fetal neuronal cell migration in baby meternal hypothyroxine is also prevented. In recent years, pathogenic bacteria shows resistance against drug has been commonly reported from all over the world **[13,14,15,16,17]**. Hence, the condition is alarming in developing as well as developed countries due to in differentiated use of antibiotics. The drug resistant microorganisms such as bacterial and fungal pathogens have make complications in the treatment of contagious diseases in immune- compromised, cancer and AIDS patients **[18,19].**

Anti- microbial properties of different parts of medicinal plants such as leaves ans stem of bamboo are being increasingly reported from different parts of the world **[20,21,22].** It is expected that the extracts of plant shows target sites other than the antibiotics will be active against drug- resistant microbial pathogens. Very little information is available on such activity of medicinal plants **[23,24]**. In this work aims at the phytochemical screening of these extract for their biological activities such as anti- bacterial effect of crude extracts of *Bambusa indica* flower.

METHODOLOGY

Sample collection:

The flowers of *Bambusa indica* was collected and then air dried after washing with distilled water. the flowers were grinded and converted to powder.

Extract Preparation:

The powder was dipped in the polar and non polar solvents in 1:10 ratios. After dipping the samples were incubated for 48 hours. Afterwards, the solvents were removed and the extracts obtained were stored **[25]**.

Determination of Antimicrobial Activity:

The samples were screened for the antibiotic sensitivity test using agar well diffusion method or cup plate method (Perez et al., 1990, Deore and Khadabadi 2009). The samples were delivered into wells of nutrient agar plates containing pathogenic bacteria and incubated at 37°C for 24 hours. The antimicrobial activity was expressed as the average diameter of zone of inhibition **[26]**.

Effects of metal ions:

The metal ions such as Ca, Pb, Mg, Fe was added to the samples at different concentrations for enhancing their acivity and then antimicrobial activity was checked **[27]**.

Minimum Inhibitory concentration assay:

It was carried out by using broth dilution method. The samples were diluted at different concentrations and then the cultures were inoculated. Incubated at 37°C for 24 hours after that the absorbance was checked at 620 nm **[28]**.

Phytochemical analysis:

For the detection of phytocompunds, the qualitative assay for various compounds was performed **[29,30]**.

RESULTS

Sample Collection & Extract Preparation:

Bamboo flowers of reddish pink colour was collected, after that grinded and converted into powder once sundried. The extract was prepared in four polar and non-polar solvents such as petroleum ether, ethyl acetate, benzene and acetone and peseverd at -20°C for further use.

a) Bamboo flowers **b) Plant extracts**

Figure 1. Plant samples and extracts of *Bambusa indica* **(**Bamboo flowers)

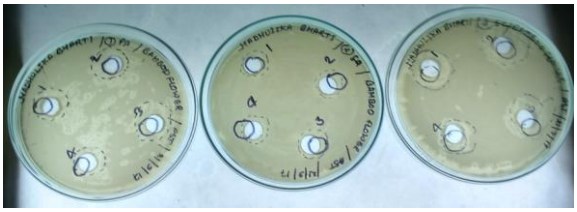
Antibacterial sensitivity test:

After performing the antibacterial sensitivity test we found that on average extract of ethylacetate shows maximum zone of inhibition for best results. So the ethyl acetate extract was analysed for enhancing its property.

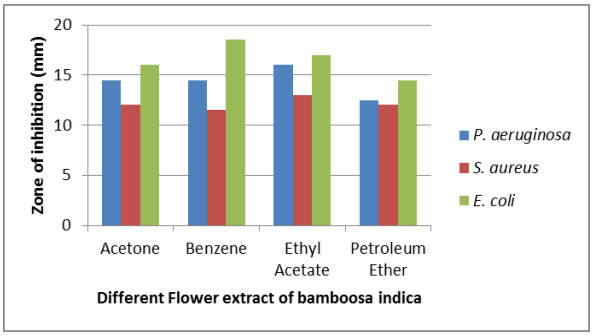
Table 1: Antibiogram analysis of acetone, benzene, ethyl acetate and petroleum ether extracts of *Bambusa indica***.**

Pathogens	Zone of inhibition (mm)			
	Ac	Bn	Ea	Pe
Pa	14.5	14.5	16	12.5
Sa	12	11.5	13	12
Ec	16	18.5	17	14.5

Note: *Pa= P. aeruginosa, Sa= S. aureus, Ec= E. coli,* Ac=Acetone, Bn=Benzene, Ea=Ethyl acetate, Pe=Petroleum ether.



a) Plates showing the clear zones.



b) Graphical representation of Zone of inhibitions.

Figure 2. Above figureand graph shown result of antibiogram analysis of acetone, benzene, ethyl acetate and petroleum ether extracts of *Bambusa indica against P. aeruginosa, S. aureus and E. coli.*

Minimum Inhibitory Concentration test:

The MIC value was obtained after getting the absorbance of microorganisms growth in the presence of extracts.

Table 2: Minimum inhibitory concentration test of extracts against *P. aeruginosa, S. aureus and E. coli.*

Extracts	MIC values (µg/ml)		
	E. coli	***P. aeruginosa***	***S. aureus***
Ea	150	210	100
Pe	250	290	300
Ac	320	410	150
Bn	400	210	350

Note: Ac=Acetone, Bn=Benzene, Ea=Ethyl acetate, Pe=Petroleum ether.

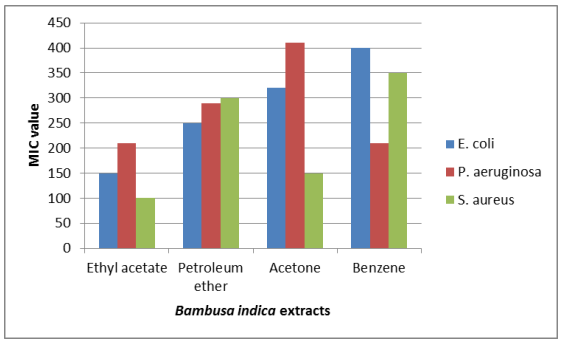


Figure 3: Graphical representation of minimum inhibitory concentration value of extracts against *P. aeruginosa, S. aureus and E. coli.*

Effects of Metals :

Different metals were used for the enhancement of the antimicrobial activity of ethylacetate extract of *Bambusa indica* flower against *P. aeruginosa, S. aureus* and *E. coli.* Where 1% $MgSO_4$ and 1.5% $CaCl_2$ shows effective results by inhibiting maximum microbial growth.

Table 3: *Effect of* metal ions *on antibiogram analysis of ethyl acetate extract of Bambusa indica* flower *against P. aeruginosa, S. aureus and E. coli.*

Metal ions	***Pa***	***Sa***	***Ec***
Control	15	11.8	15.6
$MgSO_4$	0	0	0
0.5% $MgSO_4$	10	13	10.5
1% $MgSO_4$	15.5	19.5	20
1.5% $MgSO_4$	0	13.5	10.5
$FeSO_4$	10	11	10
0.5% $FeSO_4$	10.5	10	11
1% $FeSO_4$	12	11.5	12.5
1.5% $FeSO_4$	10	11	10.5

Metal ions	*Pa*	*Sa*	*Ec*
$CaCl_2$	0	0	0
0.5% $CaCl_2$	14	16	15.5
1% $CaCl_2$	10.5	10.5	10
1.5% $CaCl_2$	18.6	21	16.4
$PbNO_3$	10	9	9.6
0.5% $PbNO_3$	0	0	0
1% $PbNO_3$	18	13.5	13
1.5% $PbNO_3$	10	11	11

Note: *Pa= P. aeruginosa, Sa= S. aureus, Ec= E. coli*

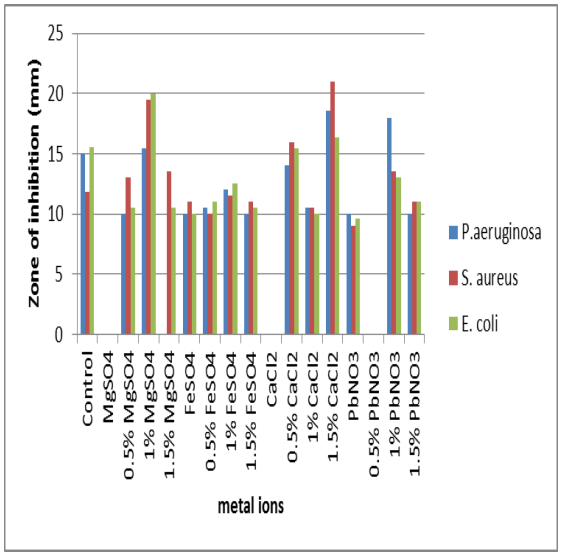


Figure 4: The above graph represents the effects of metal ions *against P. aeruginosa, S. aureus and E. coli.*

Phytochemical Analysis:

The antimicrobial properties was given by various chemical compounds present in the plants. The detection or presence or absence of some phytocompounds were carried out. Qualitative analysis were performed.

Table 4: Phytochemical screening of ethyl acetate extract of *Bambusa indica* flower

S no.	Tests	Results
1	Alkaloid	Positive
2	Flavonoid	Positive
3	Saponin	Negative
4	Carbohydrate	Positive
5	Tannin	Positive

DISCUSSION AND CONCLUSION

With the modernization of the world and advancement in technology we have a great increase in medicines. Plants are known to best source for the isolation of the antimicrobial products. Over 270,000 species of plants have been identified and classified, but scientists believe that there are millions more waiting to be discovered. Plants are essential for any ecosystem. Entering in this gateway I choose *bambusa indica* in which there flowers are used. For checking their medicinal property, firstly there extracts was prepared by using solvent extraction method.

After that the antibiogram analysis was performed by using agar well diffusion method. On the basis of their results further the samples were selected for the metal ion test, for enhancing their property. On the basis of their best results observation, the ethyl acetate extract of *Bambosa indica.*

The plants which were shown the best results, are used for metal ions test. The metals which was used for the analysis were $MgSO_4$, $FeSO_4$, $CaCl_2$, $PbNO_3$. In which the Mg^{++} ions and Ca^{++} ions are responsible for the enhancement of their medicinal property.

Based on above research work it can be concluded that *Bambosa indica* can be the good source for the medicinal drug and can be explored further with purification of the bioactive components by using various chromatographic techniques. And it can also be eplored toward the nanoparticles in order to increase the antimicrobial effect.

Further work also includes the further purification of the metabolites responsible for antibacterial properties using sophisticated purification procedure, and the nanoparticle preparation. Pharmacologically evaluation of extracts with the nanoparticles of the various metal ions, for human consumption and also investigation of Phytochemical responsible for antibacterial properties.

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