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Evaluation of antimicrobial activity and phytochemical screening of *Gelidium acerosa*

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Abstract
Seaweeds has become a recognized potential natural product in pharmaceutical industries. The *Gelidium acerosa* contain large amount of valuable phytochemicals like sapononins, flavinoids and alkaloids etc., which are known for its medicinal uses. The preparations of the seaweeds are also useful for the common ailments, includes dysentery, hypertension, urinary tract infection, and some other microbial infections among people. The extracts of seaweeds are prepared with three different solvents like ethanol, methanol and acetone and tested against bacteria like *staphylococcus aureus, Bacillus cereus,Micrococcus luteus, Klebsiella pneumonia,Psudomononas aeruginosa,* fungs like *Aspergillus flavus, Aspergillus niger, Aspergillus fumigates,C. albicans, C.tropicalis*. In this study Ethanolic extract showed a varying degree of inhibition to the growth of tested organism, than acetone and methanolic extracts, presences of phytochemical *Gelidium acerosa* is confirmed.

Key words: phytochemicals, Seaweeds, Antimicrobial activity

Introduction

Seaweeds are one of the commercially, important living marine resources that belongs to the primitive groups of non flowering plants[1]. These marine algae grow abundantly along the Tamilnadu coast.[2] About 700 species of marine algae have been reported from different parts of Indian coast. *Gelidium acerosa* is the genus of red algae with a high economic value, found in subtidal area in many parts of Tamilnadu, So far *Gelidium acerosa* is known for its production of high grade agar in food industries, and pharmaceutical industries. Recently secondary metabolites known as phytochemicals have been extensively investigated as a source of medicinal agents[3]. This phytochemicals plays an important role in anti microbial activity and used as a treatment for many microbial infection [4, 5]. In the present study the phytochemical and antimicrobial activity of *Gelidium acerosa* are investigated which would throw light on the possible mechanism of action and justify the use as anti-microbial agents by using three different solvents like ethanol methanol, and acetone.

Materials and methods

Sea weeds collection

Gelidium acerosa were collected from the cost of mandabam region, Tamilnadu. India and used for this study. All the laboratory works are done in Microlabs, Institute of Research and Technology, Arcot, Tamilnadu, India.

Extract preparation:

Gelidium acerosa were cleaned of epiphytes, extrageneous matter and necrotic particles are removed. Then the samples were rinsed with distilled water and were shaded dried, cut into small pieces and powdered in a mixer grinder. Then this powdered samples (10g/100ml) in ethanol methanol, and acetone for over night at room temperature. Soxhelt apparatus are used for this extraction [5, 6]. The extract from three consecutive soaking are pooled and evaporated under pressure.

Phytochemical analysis

The extracted samples were stirred with diluted Hcl and filtered. This filtrated is tested carefully and used for compound analysis. In this alkaloids (Mayer's test), carbohydrates, glycosides (Molish test), saponins (Chloroform and H2SO4 test), protein, amino acid (Millon's test), Phytosterols (Libermann- Burchard's test), phenolic compound and tannin (Ferric chloride test and Lead acetate test), Adopting the procedures described by Stephen (1970)[7] and Parekh and Chanda (2007) [8], are analyzed.

Antimicrobial Activity

The Antimicrobial activity was determined by well diffusion method .[9 - 12] Muller Hinton Agar (MHA) and Potato agar (PDA) with lawn culture using desire test organism. The inoculated plates were kept aside for few minutes, using well cutter. Two wells are made in those plates at required distance. In each step of well cutting, the

well cutter was thoroughly wiped with alcohol, using sterilized micropipettes 20 µl of different solvents with selected *Gelidium acerosa* was added in to one well and in another well the same volume of corresponding controls (solvent without *Gelidium* extracts) were added. After diffusion, the plates were incubated at 37o for 24 hrs. After incubation, the inhibition of growth was analyzed and results were recorded. The main characteristics of the medium to support the growth of the organism normally tested and not contain antagonist of antimicrobial activity. The medium allow the free diffusion of plant extracts from the well. Using sterilized swabs, even distribution of lawn culture was prepared using test bacteria such as *S.aerues, B. cereus, M.luteus, K. pneumonia, P. aeruginosa.* And fungi such as *A.flavus,A. niger, A. fumigates ,C. albicans, C.tropicalis.*

Result and discussion

In the Present investigation three different solvents extracts of *Gelidium acerosa* (methanol, ethanol, and acetone) are used for the qualitative analysis was summarized in the above Table-1.In this ethanol extracts shows the presences of biochemical compounds, when compare to acetone and ethanol extracts. Methanol extracts shows the minimum Presence of compounds.

Table 1: Phytochemical analysis of *Gelidium acerosa* with three different solvents extracts

Phytochemicals	Methanol extract	Ethanol extracts	Acetone extracts
Alkaloids	+	+	+
Carbohydrates	+	+	+
Saponins	-	+	+
Glycosides	-	-	-
Proteins& aminoacids	-	-	+
Phytosterol	+	+	-
Phenolic compounds	+	+	+
Flavinoids	-	+	+
Terpinoids	-	+	-
Tannins	-	-	+

(+) –Positive (-) – Negative

Table 2: Antibacterial activity of Gelidium species with three different solvents extracts

S.No	Organisms (Bacteria)	Zone of Inhibition (mm)			
		Control	Methanol	Ethanol	Acetone
1	*Staphylococcus aerues*	No zone	5	7	10
2	*Bacillus cereus*	No zone	5	6	15
3	*Micrococcus luteus*	No zone	7	6	12
4	*Klebsiella pneumonia*	No zone	No zone	5	No zone
5	*Psudomononas aeruginosa*	No zone	No zone	No zone	No zone
6	*E. coli*	No zone	No zone	No zone	No zone

Table: 3 Antifungal activities of Gelidium species with three different solvent extract

S. No	Organism(fungi)	Zone of Inhibition (mm)			
		control	methanol	ethanol	acetone
1	*C. albicans*	No zone	5	6	7
2	*C.tropicalis*	No zone	No zone	7	No zone
3	*Aspergillus niger*	No zone	No zone	7	No zone
4	*Aspergillus flavus*	No zone	5	5	5
5	*Aspergillus fumigates*	No zone	No zone	No zone	No zone

Antimicrobial activity

In Table 2 *Gelidium acerosa* showed varied in the exploitation of antibacterial activity of zone of inhibition from 5-15 mm against all tested bacteria. In methonal extract showed a maximum activity against *Bacillus cereus* (7mm) and minimum activity in *S.aerues* (5mm), it has no activity against the pathogens like *M.luteus, K. pneumonia, P.aeruginosa, E. coli.* In extracts obtained using ethanol showed a max activity against pathogen like *S. aerues* (7mm)and minimum activity against *M.luteus*(6mm), *B. cereus* (6mm), *K.pneumonia* (5mm).And no activity against the pathogen like *E. coli*, *P. aeruginos* and *B. cereus* .

In acetone extracts showed a maximum activity against *M.luteus*(15mm), *B.cereus*(12mm)and minimum activity in *S. aerues* (10mm). It has no activity against the pathogens like *M. luteus, K. pneumonia, P.aeruginosa, E. coli.* In Table 3, The Gelidium extracts are obtained from three different solvents like methanol, ethanol, and acetone and various anti fungal activities was observed. In methanolic extracts the maximum activity is seen *C. albicans* (5mm) and *Aspergillus flavus*(5mm) . No Activity is seen in *C.tropicalis, A. fumigates, A. niger.* In Ethanol extract the maximum activities is seen in *C. albicans* (7mm) *C.tropicalis*(7mm)and minimum activities are seen in *A. flavus*(5mm)and no activities in *A. fumigates.* The Extracts obtained using against *C. albicans* (6mm) and minimum activities against pathogen *C.tropicalis, A. fumigates, A. niger*

Conclusion

The Phytochemical and Antimicrobial activities of the seaweed *Gelidium acerosa* were analyzed in the present study by using three different solvent like ethanol, methanol, and acetone, [13,14,15,16]. In this Growth Inhibition of several bacteria and fungi by *Gelidium acerosa* has been reported. The seaweeds show the important source of bioactive natural substance [17]. The identification and isolation of the metabolites with biological activities has recently received the significant attention for their anti oxidant properties. The phytochemicals which are identified has the free radical scavenging effects[18, 19].the phenolic compound plays an important role in antimicrobial, anti inflammatory, and anti cancer activity [20, 21, 22]. A single solvent extraction may not be may not be enough to exhaustively extract certain compounds responsible for the activity[24].Using sterilized swabs even distribution of lawn culture was prepared using test bacteria such as *S.aerues, B.cereus, M. luteus, K. pneumoni, P. aeruginosa* (MHA plates). And fungi such as *A.flavus, A. niger, A. fumigatus, C.albicans, C.tropicalis* (PDAplates) out of three different solvents, ethanol fraction of seaweeds are found to be more active than methanol and acetone, indicating that most of the compounds are polar in nature. However, methanol and acetone fractions were also found to be active against some bacteria indicating the Intermediary and non polar in nature of some active compounds comparatively less active than against fungi and their different solvents fractions were found. The finding of the current works appears to be useful for the further

investigation and this study may be extended in various aspects like Anti oxidant activity, anti cancer activity.

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