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On

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22nd April -2022

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CERTIFICATE

This is to certify that Prof. / Dr. / Mr. / Ms. / T. KUMARAN, ASSISTANT PROFESSOR IN ZOOLOGY DEPT.
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ANNONA MURICATA LEAVES: PHYTOCHEMICAL ASSESSMENT AND MEDICINAL PROPERTIES

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Abstract

Natural materials derived from plants, particularly phytochemicals, operate not only as curative agents but, more importantly, as disease preventatives. The screening for antimicrobial activity of medicinal plants is very important at an innovative compound for tackling virulent and hazardous fungal and bacterial pathogen. *Annona muricata* is a tropical plant species in the Annonaceae family that has a variety of medicinal purposes. This review focuses on the plant's traditional applications, phytochemicals, pharmacological properties, and isolated compounds, with the goal of spurring more research on this plant for human consumption and therapy. *Annona muricata* extracts appear to be some of the safest and most promising therapeutic agents of the 21st century, and they need to be explored more in order to develop better pharmacological formulations and treat disorders.

Key words: *Annona muricata*, phytochemical, medicinal purpose, therapeutic agents

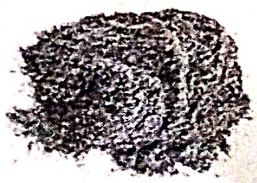
Introduction

Medicinal plants have been explored therapeutically in traditional medicines to alleviate human ailments for several millennia. Medicinal plants are defined as those which produce one or more active constituents capable of preventing or curing an illness. Natural products play a major role as active substances, model molecules for the discovery and validation of drug targets. Phytochemicals are constitutive metabolites that are produced using different parts of plants via their primary or secondary metabolism, which have essential functions in the plant for general growth and defense against animals, insects and microorganisms.

A. hydrophila causes a disease known as haemorrhagic septicaemia or ulcer disease in fish, and belongs to the most common bacteria present in aquatic environments throughout the world. The bacterium is naturally found in the intestinal tract of the fish, and does not cause the disease under natural conditions (Swann and White 1989). *Annona muricata*, a traditional medicinal plant was investigated and showed that the phytochemical constituents and the bioactive compounds possess the medicinal properties which makes them to be a potential species in the family of Annonaceae and this can be play a significant role in treatment of serious diseases (Asma *et al.*, 2020). The aim of the present study was to investigate the phytochemical and antimicrobial activities of the extract from *A. muricata* using experimental animal models.

Methodology

Ten gram dried powders of *Annona muricata* plant leaf material filtering the extracts were prepared. In order to study the functional groups of the active extracts, they will be analysed through Phytochemicals, TLC and FTIR.



An aliquot (10 µL) of each extract (1 mg/mL) obtained from leaves and roots of *Annona muricata* was subjected to qualitative phytochemical analysis to ascertain the presence of secondary metabolites such as: alkaloids, coumarins, anthracene and cinnamic acid derivatives, flavonoids, monoterpenoides, sesquiterpenoids, diterpenoids; tannins, triterpenoids and steroids; proanthocyanidins and leucoanthocyanidins; reducing sugars and saponins (Kuklinski.,2000) respectively.

Extract of *Annona muricata* was tested for antibacterial activity by Muller-Hinton agardiffusion method. Broth bacterial cultures, 24 hrs old, grown on nutrient agar plates were used. An aliquot (0.05 ml) of inoculums was introduced to the molten agar medium was poured into a Petri-

dish by pour plate technique. After solidification, the appropriate wells were made on agar plate using sterile cork-borer, 6.0 mm diameter wells were punched over the agar plates using sterile gel puncher. In agar, 0.1ml of each extract was introduced serially. Incubation period of 24-48 hrs at 28°C for fungal growth and 30°C for bacteria were maintained for observation of antimicrobial activity.

Results

The result of the phytochemical analysis showed that the *A. muricata* had the presence of tannin, saponin, steroids and flavanoids (Table.1). Thin layer chromatographic analysis of the hot water extract of *A. muricata* revealed that, the R_f value spot 0.164, 0.275 and 0.611 (Fig.1) was confirmed as the active compounds. The active fraction of *A. muricata* extract have the functional groups in the I-R spectrum. The broad peak around 2922 cm^{-1} may be the –OH stretching or -NH stretching the one peak at 1041 cm^{-1} may be due to C-O stretching. The one at 673 cm^{-1} may be due to C≡C-H. The one at 1624 cm^{-1} may be due to $RONO_2$.

The observation revealed that it may be inferred that the compound is alkenes or ketones. Thus the extract may contain a free carbonyl group where the OH group is hydrogen bonded. The extract is also suspected to contain a carbonyl species in conjugation with O= bond (Fig 2). The antibiogram studies of the *Aeromonas hydrophila* against the selected Antibiotics (zone of inhibition in cm) the maximum values were got for strain by using the antibiotic Chloramphenicol at 1.5 cm in diameter. *A. muricata* were effectively suppressed the pathogens at 0.7, 0.8 and 2 cm of zone of inhibition to *A. hydrophila* (Fig 3).

Table 1. Phytochemical analysis of hot water extract of *A. muricata* by standard protocols

Sl.No	Phytochemical constituents	Hot water extract
1	Alkaloid	-
2	Saponin	+
3	Steriods	+
4	Tannin	+
5	Terpenoids	-
6	Flavonoids	+

Fig 1. Thin Layer chromatogram of the *A. muricata* extract by iodine development

Fig 2. Fourier Transform Infrared Spectroscopy analysis for the *A. muricata* extract

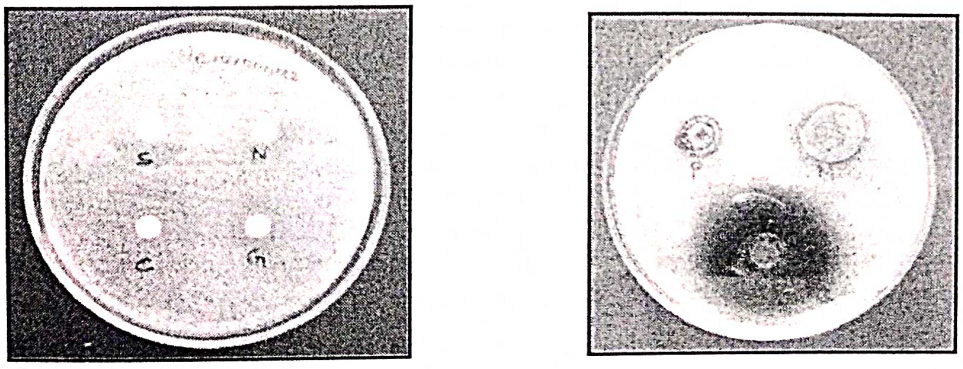


Fig 3. Antibacterial activity (zone of inhibition mm) of the antibiotics and *A. muricata* extract.

Discussion

Nowadays the chemical and synthetic vaccines have some demerits including high cost and some side effects. The antibacterial compound from herbal origin are advisable in aquaculture operations due to its versatile characterizers are safety, eco-friendly and create no side effects. In the present study, the phytochemical analysis of the *A. muricata* leaf extracts revealed the presence of saponin, steroid, tannin and flavanoids. The major active constituents of root extract *A. muricata* are steroidal saponins namely shatavarins apart from alkaloids, flavonoids, sterols and terpenes (Kumaran and Citarasu, 2015).

The extract of *A. muricata* was separated into its constitutive fractions by preparative thin layer chromatography (TLC). The R_f value obtained was 0.164, 0.275 and 0.611 and the fractions may be active compounds. The FTIR study revealed that, *A. muricata* had primary or secondary amine or an amide or substituted amide, olefininc band, cumulated system, C-F and C-Br bond (Bremer and Geesey, 1991). Phytochemicals with adequate antibacterial efficacy can be used for the treatment of bacterial infections (Pathak *et al.*, 2010). The herbal antibacterial compound along with the *A. hydrophila* helped to improve the immune system. Hence, this study would lead to the development of some stable, biologically active compounds which can be employed in the formulation of antimicrobial agents.

References

- Bremer, P. J and G. G. Geesey, 1991. An evaluation of biofilms development utilizing non-destructive attenuated total reflectance Fourier transform infrared spectroscopy. *Biofouling*; 3:89-100.
- Kuklinski C. España: Omega SA; 2000. Farmacognosia.
- Kumaran. T and Citarasu.T 2015. Phytochemical screening, bioautography and antibacterial evaluation of the methanolic extract of *glycine max* (soybean). *Global journal of medicine and public health* 4(3): 1–7.
- Pathak P, Saraswathy Dr, Vora A, Savai J, 2010. In vitro antimicrobial activity and phytochemical analysis of the leaves of Annona muricata. International Journal of Pharma Research and Development. 2(5).
- Swann, L., and White, M.R. 1989. Diagnosis and treatment of *Aeromonas hydrophila* infection of fish. Aquaculture extension- Illinois-Indiana Sea Grant Program. pp.91-92.