

Anticancer Potential in *Acanthophora* Sp Crude Extracts

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ABSTRACT

Acanthophora sp specimens were collected from a seashore and washed with distilled water. The washed specimens were then air-dried and ground into a fine powder. The powdered samples were extracted with methanol, using the Soxhlet extraction method. The extracted solutions were concentrated using a rotary evaporator and freeze-dried to obtain crude extracts. Phytochemical tests on *Acanthophora spicifera* extracts, with different reagents, can be used depending on the class of compounds being tested. Cell viability tests are used to evaluate the cytotoxicity of algal extracts on cancer cells. These tests involve the incubation of cancer cells with different concentrations of algal extracts, followed by the assessment of cell viability using a colorimetric assay such as the MTT assay. The study reveals the presence of phytochemical compounds in *Acanthophora spicifera* and its anti-cancer activity.

KEYWORDS: *Acanthophora* seaweeds; secondary metabolites; antioxidant; antidiabetic; anti-inflammatory; cytotoxicity; anticancer

INTRODUCTION

Seaweeds are marine plants that are found abundantly in the coastal areas. They are a rich source of bioactive compounds that have been widely explored for their therapeutic potential. One such seaweed that has garnered considerable interest in recent years is *Acanthophora spicifera*. This species of seaweed is known for its anti-cancer properties and has been extensively studied for its potential as an anti-cancer agent. *Acanthophora spicifera* belongs to the family Rhodophyta and is commonly found in the tropical and subtropical regions of the world. It is a red seaweed that grows on rocks, coral reefs, and other hard substrates in shallow waters. It has been traditionally used in Asian countries like Indonesia, Malaysia, and the Philippines for its medicinal properties.

Scientific studies have shown that *Acanthophora spicifera* is a rich source of bioactive compounds like polysaccharides, phlorotannins, flavonoids, and alkaloids that have potent anti-cancer properties. These compounds have been shown to inhibit the growth and proliferation of cancer cells, induce apoptosis (programmed cell death) in cancer cells, and prevent the formation of new blood vessels that are necessary for the growth and spread of tumors. Several studies have been conducted to investigate the anti-cancer potential of *Acanthophora spicifera* crude extracts. One such study conducted by Dhayanithi et al. (2016) demonstrated that the methanol extract of *Acanthophora spicifera* exhibited significant cytotoxicity against breast cancer cells. The study also showed that the extract induced apoptosis in breast cancer cells by activating the intrinsic pathway of apoptosis.

Another study conducted by Yuan et al. (2017) investigated the anti-cancer properties of a polysaccharide extracted from *Acanthophora spicifera*. The study showed that polysaccharide inhibited the growth and proliferation of colon cancer cells by inducing apoptosis and inhibiting the formation of new blood vessels.

The reason for the research on the anti-cancer potential of *Acanthophora spicifera* crude extracts is that cancer remains a major health concern worldwide. Despite advances in cancer treatment, the disease continues to be a leading cause of death globally. Moreover, conventional cancer therapies like chemotherapy and radiation therapy often have debilitating side effects that affect the quality of life of cancer patients. Therefore, there is a need to explore alternative therapies that are safe and effective.

The deficiency that this research will fulfill is the need for natural anti-cancer agents that are effective and have minimal side effects. *Acanthophora spicifera* crude extracts have the potential to fulfill this need by providing a safe and effective alternative therapy for cancer.

The aim and objective of the study is to investigate the anti-cancer potential of *Acanthophora spicifera* crude extracts and to identify the bioactive compounds responsible for its anti-cancer properties. The study will also explore the mechanism of action of these compounds and their potential as anti-cancer agents.

In conclusion, *Acanthophora spicifera* is a promising source of natural anti-cancer agents that have been extensively studied for their therapeutic potential. The bioactive compounds present in *Acanthophora spicifera* crude extracts have been shown to have potent anti-cancer properties and have the potential to provide a safe and effective alternative therapy for cancer. The research on the anti-cancer potential of *Acanthophora spicifera* crude extracts aims to identify the bioactive compounds responsible for their anti-cancer properties and explore their mechanism of action, which could lead to the development of new and effective anti-cancer drugs.

MATERIALS AND METHODS

Acanthophora spicifera, Solvents-methanol, distilled water, and water Chemicals: DPPH, Gallic acid Hydrochloric acid, Con. Sulphuric acid, ferric chloride, Dragendorff reagent.

Instruments: Soxhelt apparatus, Phase contrast microscope, and Spectrophotometer. The red algae *Acanthophora spicifera* commonly known as spiny weed was collected from the Rameswaram coast. The weeds were washed thoroughly with water. The algae were then dried in shade at room temperature for 2 to 3 days. The dried algae were then powdered and stored. of dried algae was mixed with methanol to prepare the crude extract.

Soxhelt Phytochemical Test: Phytochemical test helps to find out the presence of phytochemical compounds such as flavonoids, steroids, alkaloids, saponins, terpenoids, and tannins.

Alkaloid test: Few drops of Dragendorff's reagent is added to the crude extract. The formation of an orange-red precipitate indicates the presence of alkaloids.

Flavonoid test: In this test, a few drops of Hydrochloric acid are added to the extract. Following this few pinch of Magnesium powder is added. If pink colour is observed, it shows the presence of flavonoids.

Saponin test: To the extract 10 ml of distilled water is added and shaken well. Then the solution is allowed to rest for 30 minutes. Observation of stable froth or honeycomb-like structure indicates the presence of saponin.

Tannin: This test involves adding a few drops of Ferric chloride to the extract. The formation of a bluish-black precipitate shows the presence of Tannin.

Terpenoid: To extract a few drops of concentrated Sulphuric acid are added followed by the addition of chloroform. Terpenoid is present If the solution turns red-brown in colour.

Phenolic compounds: In this test, a few drops of ferric chloride are added to the extract. The formation of blue-black or green colouration indicates the presence of phenolic compounds.

Cell Viability: The cell viability test is used to assess the cytotoxicity of plant extract on cancer cells. To perform cell viability tests in *Acanthophora specifera* extract, cancer lines such as MCF-7 or Hep G2 can be used. The cancer cells are placed on plates and treated with different concentrations of the extract for 24 to 36 hours. After treatment, the plates seeded with cells and extracted are incubated with MTT reagent. The result may be interpreted by a bar graph.

The ability of the algal extract to induce cell death was estimated by cell inhibition Assay. 100/glm UglmL extract was added to cancer cells. The treated cells were kept for 24 hrs and then observed under a Phase contrast microscope to study the results.

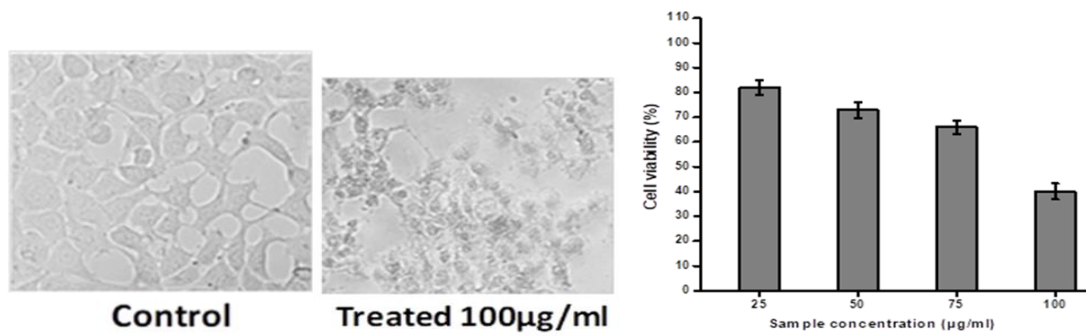
RESULTS

Test for phytochemical compounds in *Acanthophora specifera* crude extract was done with various chemicals and reagents. The tests revealed that the extract contains Phyto-chemical compounds.

Phytochemical Test

Test	Acanthophora	Crude extract
	Presence	Absence
Tannins	+	
Saponin	+	
Steroids	+	
Flvanoids		
Terpenoids		
Alkaloids	+	

Tests on Phytochemical compounds in the crude extract proved the presence of Saponins, Steroids, Flavonoids, and Alkaloid.



The anti-cancer potential and anti-microbial activity were also proved. In the MTT assay on cancer cells, the Bar chart represents cell viability after treatment in the various concentrations of crude extract. The mean values of cell viability of three independent experiments are plotted with SEM values. Prominent effects are seen at 5 and 10µ concentrate. The ability of the algal extract to induce cell death was estimated by cell inhibition Assay. After a gap of 48 hours of treatment in 100 µg/mL extract discernable changes, were observed under a Phase contrast microscope. Changes found include cell shrinkage and altered cell morphology. This indicates the anti-cancer activity of *Acanthophora specifera* crude extract.

CONCLUSION

My research on *Acanthophora specifera* collected from Rameswaram Coast indicates the presence of some of the Phyto chemical compounds. It also proved their anti-cancer, potential nature. The research was done by various people on this subject. Preliminary Phytochemical tests done by Lavanya Kumar suggest that *Acanthophora* sp. has phytochemical compounds like Flavanoids, steroids, tannin etc. The presence of Phytochemical compounds, Anti-cancer, and Anti-oxidant properties is exhibited in *Acanthophora* sp collected on the Western Libyan coast proved by researchers, Rabia Alghazer, Mahboba Nalli, and others.

Research by S D Shankar in July 2015 reported that *Acanthophora* red algae are a rich source of bioactive compounds such as terpenin, phorotannin, flavanoids, tannin, steroids, alkaloids, saponins and phenolic acid, etc. SD Shankar research also evaluated the high scavenging activity of *Acanthophora spicifera*.

A study was done by Veeresh Kumar, Malarvizhi, R.Vasanthi, Hannah, and V.M Manikandamadhavan in administering crude alcoholic extracts of *Acanthophora spicifera* orally exhibited anticancer properties by decreasing the weight of the tumor, it's volume.

Further investigation is required to assess the molecular mechanism of the potential anti-cancer cancer activity of this algae. Research has to be done to identify bioactive compounds in the algal extracts. Further research has to be done to evaluate the commercial potential, and application in medicine (especially for cancer) and in the food and cosmetic industry because Chemicals used in all industries lead to many disorders in living organisms.

Treatment of cancer by surgery and chemotherapy is appealing because the cancer cells may spread to other parts of the body. Many natural compounds, vegetable leaves, and fruits have shown excellent

effects on cancer. Now scientists have realized the treasure that is hidden in the sea, especially three algae red, brown, and green algae. *Acanthophora spicifera* is currently viewed for its nutritional value. Now it is not exploited much. Scientists can use this opportunity to find anti-cancer medicines from *Acanthophora*.