

ANTI INFLAMMATORY ACTIVITY OF MARINE PLANTS A REVIEW

Balai, N., Selva Naveen and M. Vasanthan

Dept. of Biotechnology, Madha Engineering College, Kundrathur, Chennai-69.

ABSTRACT

Inflammation is a part of the human body's vascular tissues defense mechanism against hazardous stimuli such as pathogens, germs, damaged tissues, and irritants. Redness, swelling, heat pain, loss of tissue function, etc. were its hallmarks. Non-steroidal anti-inflammatory drugs (NSAIDs) are the most common form of treatment for inflammation (NSAIDs). However, these medications will make heart attacks and strokes more likely. So natural plants that have milder effects could take the place of pharmaceutical medications. The following plants have anti-inflammatory properties, according to pharmacological and phytochemical investigations. The goal of the current review is to compile information on prospective phytochemicals from medicinal plants that have been studied in inflammatory models with the use of contemporary scientific methodology.

KEYWORDS: Marine plants, Non-Steroidal Anti Inflammatory Drugs (NSAIDs), phytochemical studies, Inflammation .

INTRODUCTION

Inflammation is the generic response present in the human body so it is considered as the innate immunity and act as the defensive mechanism against harmful pathogens, microbes, chemical agents etc [1]. Toxin exposure, auto immunological diseases, and untreated acute inflammation are some of its potential causes. There are two different types of inflammation:

ACUTE INFLAMMATION

Acute inflammation is a quick-acting reaction to tissue damage that lasts only a few minutes or hours. By receiving a signal from cytokines and chemokines, neutrophils and macrophages move to the area of inflammation. Some signs of acute inflammation include heat, swelling, pain, and flushed skin at the site of damage.

CHRONIC INFLAMMATION

Chronic inflammation is the long term inflammation which last for several years. Depend on the origin of injury the severity and consequences of inflammation varies. Chronic inflammation are treat to the human health. Some of the chronic inflammation disorders include diabetes, cardiovascular disease, rheumatoid arthritis, allergies and chronic obstructive pulmonary disease (COPD). Traits of chronic inflammation are the infiltration of the primary inflammatory cells such as macrophages, lymphocytes and plasma cells in the tissue cite, produces inflammatory cytokines, growth factors, enzymes and hence leads to the progression of tissue damage and secondary repair including fibrosis and granuloma formation etc [2-3].

Chronic inflammation can be of two types. They are Non specific proliferative and Granulomatous inflammation. Non specific proliferative are the chronic inflammation were the infiltration of the mononuclear cells and proliferation of fibroblast, connective tissue, vessels, epithelial cells leads to the formation of non specific granulation tissue. To confirm the existence of chronic inflammation, CPR test can be performed.

MARINE PLANTS AS ANTI INFLAMMATORY AGENTS

Plants have been used to treat severe diseases because they contain large amounts of active compounds. To treat a variety of diseases, a plant sample's crude extract was used. In comparison to allopathic medications, the side effects of the plant extract will be less. Marine plants are used as a source of therapeutic agents, food crops, waste water treatment, bio assessment, and other uses. The anti-inflammatory properties of the plant's bioactive compounds. The unpurified extract can be turned into a medicine [4-5].

S.NO	SCIENTIFIC NAME	COMMON NAME	FAMILY	PLANT PART	TYPE OF EXTRACT
1.	<i>Laminaria spp.</i>	Algae	Laminariaceae	Leaf	Aqueous Extract
2	<i>Alternanthera philoxeroides</i>	Alligator Weeds	Amaranthaceae	Leaf	Petroleum Ether, Chloroform, Methanol, Ethyl Acetate
3	<i>Azolla pinnata</i>	Mosquitofern	Salviniaceae	Leaf	Ethanol
4	<i>Ceratophyllum demersum</i>	Hornwort	Ceratophyllaceae	Whole Plant	Methanol
5	<i>Eichhornia crassipes</i>	Common Water Hyacinth	Pontederiaceae	Leaf Shoot Portion	Petroleum Ether, Ethyl Acetate, Aqueous
6	<i>Lythrum salicaria</i>	Purple Loosestrife	Lythraceae	Aerial Parts	Petroleum Ether, Ethyl Acetate, Methanol, 50% Aqueous Methanol
7	<i>Nelumbo nucifera</i>	Sacred Lotus	Nelumbonaceae	Rhizomes	Methanol
8	<i>Nepenthes ampullaria</i>	Narrow-Lid Pitcher Plant	Nepenthaceae	Branches, Leaves	Methanol
9	<i>Nymphoides indica</i>	Marshwort	Menyanthaceae	Whole Plant	Methyl Alcohol
10	<i>Potamogeton perfoliatus</i>	Clasping Leaf Pondweed	Potamogetonaceae	Whole Plant	Aqueous Ethanol

ALGAE:

Laminaria digitata occurs in north Atlantic from Greenland south to Cape Cod and north east Atlantic from north east Russia and Iceland south to France. Seaweed sample was collected, cutted into small pieces and mixed in a blender. Finely powdered sample was packed in the small bags of Whatmann paper and the bags were sealed and macerated with water at room temperature and filtered to remove debris. Then the macerated solution was lyophilised. The crude extract was administered to male adult Wister rats [6]. The oedema was induced by injecting 0.05 ml of 1% carrageenan subcutaneously into the sub-plantar region of the left hind paw. This study confirms the anti-inflammatory activity of the *Laminaria sp.*

ALLIGATOR WEEDS :

This species belong to the temperate regions of south America, which includes Argentina, Brazil, Paraguay and Uruguay. The leaf were collected, washed, dried, and grinded to powder, and extracted using petroleum ether, chloroform, methanol, ethyl acetate by cold maceration. The extract were concentrated by using rotary flash evaporator. Male Wister rats were used for studies. The oedema was introduced by the administration of carrageenan. The anti-inflammatory effect may be due to the inhibition of cyclooxygenase enzyme which catalyses the biosynthesis of prostaglandins and thromboxane from arachidonic acid.

AZOLLA PINNATA :

It is native to Africa, Asia includes Brunei Darussalam, China, India, Japan, Korea and Philippines and parts of Australia. The fresh, green leaves were collected, dried, crushed into a powder, and then steeped in ethanol for 48 hours while being gently shaken in an incubator shaker set at 37°C. Whatmann No. 1 filter paper was used to filter the material, and the filtrate was allowed to evaporate until the ethanol was removed. The anti-inflammatory activity was established after they were administered to the rats. The flavonoids that are responsible for the anti-inflammatory effect were discovered to be abundant in the *A.pinnata* ethanol extract.

CERATOPHYLLUM DEMERSUM :

The species belong to US and Canada in North America, Norway in Europe, China, Siberia, Burkina Faso and in the Volta River in Ghana, Vietnam and New Zealand. The entire plant was gathered, dried, ground, and extracted with methanol extract before being let to evaporate. Carrageenan was injected into the rat to cause oedema. The rat was then given the sample, and the consequences were seen by the reduction in paw volume. This demonstrates the extract's anti-inflammatory properties [7].

EICHHORNIA CRASSIPES

The entire plant was collected, the root was removed, and impurities were removed by rinsing it under running water. The root and stalk section was chopped up into small pieces. The young plant was extracted using petroleum ether, aqueous, and ethyl acetate using the traditional refluxing method after being left to dry in the shade for two weeks. After that, the extract was compressed in a rotary evaporator before being chilled. The administration of formaldehyde was applied to induce oedema in male Swiss albino mice. The presence of flavonoids in the petroleum ether extract as well as anthraquinone and petroleum ether in the ethyl acetate extract was then used to determine the outcome. The aqueous extract contained

alkaloids, flavonoids, sterols, anthroquinone, anthocyanins, proteins, and quinones. Among these the Anthroquinone was showed high anti-inflammatory property. Then the ethyl acetate extract shows highest property[8].

LYTHRUM SALICARIA

The plant sample were collected and its aerial parts were dried, powdered. Using a Soxhlet apparatus, the extraction was carried out using petroleum ether, ethyl acetate, methanol, and 50% aqueous methanol. The extract was filtered and dried out using evaporation. To cause oedema, carrageenan was given to male Swiss albino mice. After giving the plant extract to mice, the plant's ability to reduce inflammation was confirmed.

NELUMBO NUCIFERA

The plant rhizomes were collected, dried and powdered. Then the extraction were done by percolation method using methanol. The percolation was distilled under reduced pressure. A brown solid mass obtained was gave three spots in the TLC over silica plate in chloroform: methanol: solvent system. Then it was diluted using water and extracted with petroleum ether. Then the aqueous phase were diluted using dilute sulphuric acid and extracted five times with chloroform. Then they were subjected to column chromatography and different fractions were collected. Fractions having similarity after TLC were combined and concentrated. Male albino Wister rats were used and edema was administered by inducing carrageenan at the dose of 0.05ml of 1 % (w/v) in normal saline. The anti-inflammatory activity of the plant extract was confirmed[9].

NEPENTHES AMPULLARIA

N. ampullaria branches and leaves were gathered and dried. After that, it is crushed, and methanol was used for the extraction. To separate the components in the extract, the chromatography method was used. The ability of this extract to decrease the production of pro-inflammatory cytokines and TNF at different concentrations was examined. The outcome of this investigation demonstrates *N. ampullaria*'s anti-inflammatory properties.

NYMPHOIDES INDICA

The entire plant was gathered and dried by air. The samples were chopped into bits and extracted with 95% methyl alcohol after being air dried. Distilled water was used to dissolve the extract. Utilizing silica gel column chromatography, the extract was separated. This analysis proves the anti-inflammatory effect of UVB stimulation on the overexpression of inflammatory factors. This could be applied to the treatment of chronic inflammatory skin infections[10].

POTAMOGETON PERFOLIATUS

The whole plant sample was collected and roots were removed. Then it was washed and allowed to dry in air. Then the extraction was done by hot boiling distilled water. The filtrate was reduced under vacuum and it was re – extracted using ethanol to remove impurities.

Then the aqueous ethanol extract were allowed to dry. Carrageenan was injected into male albino mice to cause edema. After injecting the extract into the mice, a reduction in paw size was noticed. This demonstrates the plant extract's anti-inflammatory properties [11-12].

CONCLUSION

A source of medicine to treat a number of ailments is marine flora. They include phytochemicals with anti-inflammatory, anti-diabetic, anti-allergic, anti-cancer, anti-pyretic, and other effects. Here, we've covered a few medicinal plants with anti-inflammatory qualities. This may be the best alternative to medications and their adverse effects. These herbs have the power to treat conditions like inflammatory bowel disease, asthma, rheumatoid arthritis, obesity, fatty liver disease, certain skin inflammation, and other diseases that are brought on by inflammation. It will function as a natural remedy to treat these illnesses.

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