International Journal of PharmTech Research
CODEN (USA): IJPRIF ISSN : 0974-4304
Vol.6, No.7, pp 2022-2027, November 2014

Pharmacognostical study and phytochemical evaluation of *Sargassumilicifolium (Turner) C.Agardh*.

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Abstract : Aim Marine algae exploring in pharmaceutical field for its valuable medicinal importance. An attempt was focused to highlight the pharmacognostic and phytochemical importance of *Sargassumilicifolium (Turner) C.Agardh, a brown algae.*
Material and Methods The phytochemial screening , macroscopy, powder microscopy, transverse section of whole plant, inorganic and mineral analysis, extractive value, ash values and HPTLC of *Sargassumilicifolium* as per WHO guide lines.
Result and discussion In this study, the macroscopy of the algae showed the presence of Linear-lanceolate leaves with sinuate margin, distinct midrib and small numerous irregularly placed cryptostomata.Ash values , powder microscopy, transverse section of leaf , inorganic and mineral estimation of the extract helps to standardize the algae and based on this information, further attempt would be taken to study its pharmacological importance.
Key words: Sargassumilicifolium, macroscopy, microscopy, pharmacognostic studies.

Introduction

Marine algae are ecologically important and have been used as food and medicines for centuries. Today various species of marine algae provide not only food but also produce extracts such as agar, carrageenans, and alginates. These extracts are used in numerous foods, pharmaceutical, cosmetic and industrial applications.[1,2]

Seaweeds are the only source of algin, alginic acid, carageenin.Algin like phycocolloids manufactured fronsargassum species one of the brown algae, has medicinalimportance, confectionary, paper, paint, varnish and textile industries.Sargassum has protein rich content used as food in South East Asian countries in form of salad, jelly, jam, chocolate, pickle and wafers.[3]

Sargassumilicifolium is a gulf seaweed has elongated much branched axis on which lateral branches are bornebelonging to Sargasaceae familyand Pheophyaceae division available in Mannar coast in Tamilnadu and abundant in South Asian countriesin form of salad, jelly, jam, chocolate, pickle and wafers.

Collection and authentification

Sargasssumilicifolium (Turner)C.Agardh was collected from Rameshwaram coast and authentified by Dr. P. Jayaraman, Director, Plant Anatomy Research Center, (PARC) Tambaram and Chennai.

Procesing of collected sample

The sea weeds collected were cleaned well with sea water to remove do\irts and debris along with epiphytes, sand particles and shells.Then thoroughly washed with tap water followed by distilled water, drained

and shade dried at room temperature. It was coarsely powdered (passing through 40 size sieve) and utilized for pharmacognostic and phytochemical studies.

Macroscopic analysis

The organoleptic properties like shape, colour, dimension, upright or creeping and , taxonomy of *Sargassumilicifolium (Turner) C.Agardh* was studied. [4]

Powder microscopy[5]

Coarse powder of *Sargassumilicifolium* (Turner (C.Agardh)was prepared and soaked in warm water to remove air bubbles then, a pinch was immersed in 10% sodium hydroxide to make the cells transparent and washed in water. Another sample was directed in diluted glycerine. Mounted samples were viewed under microscope.

Microscopic analysis[6]

Microscopic evaluation was conducted in both qualitative and quantitative studies of whole plant *Sargassumilicifolium* (Turner (.C.Agardh). In this study, both powder microscopy (O,Brein et al., 1964.) and transverse section of leaf was carried outas per Staininig the specimen using Toludine blue dye and and various characters were studied.

The dried specimen was powdered to screen phytochemical parameter and powder microscopy.

Physico-Chemical Constants[7]

The procedures recommended in Indian Pharmacopoeia and WHO guidelines were followed to calculate the physico-chemical constants.

a. Determination of Ash values

Dried coarsely powdered whole algae of *Sargassumilicifolium*was subjected to determine ash values .Total ash, water soluble ash, sulphated ash and acid insoluble ash by standard procedure.

b. Loss on Drying

Loss on drying is the loss of mass expressed as percent w/w and can be determined by the following procedure.

About 2 gm of drug was weighed and transferred to a dry stoppered weighing bottle. The weight of the bottle and the drug was taken accurately. After removing the stopper, the bottle containing drug was placed in an oven for 1 hour at 120^{o}C. After 1 hr, the bottle was removed and cooled in a desiccator and weighed by replacing the stopper which was continued until difference between two successive weighing is not more than 0.25% of constant weight.

c. Inorganic Mineral Analysis[8]

A study of inorganic constituents of plants is of interest to research workers in several fields, such as nutrition medicine and , which are essential to animals including man (**Sizer, 2000**). Therefore, the plant material was subjected to inorganic mineral analysis.

Extraction

The powdered plant material (1 kg) was macerated with 70% v/v of ethanol for 72 hrs, then filtered and evaporatedand extractive value was determined .

Phytochemical screening

The ethanolic extractwas subjected to screen the presence of alkaloids, glycosides, tannins, terpenoids, steroids, carbohydrates, fats and oils, flavanoids and gums and resins.

Results

In India, pheophyceae distributed along the sea coast line.Brown algae are multicellular with well developed nucleus and distinct chromophore. Among 50 species of sargassum, 12 species have been reported in India. The commonest are *Sargassum tennerium, Sargassum caryophyllum, Sargassum plagiophyllum, Sargassum wightii, Sargassum ilicifolium Turner (C.Agardh), Sargassum christifolium, Sargassum myriocystum ,Sargassum rinerium and Sargassum duplicatum.*[9]

Brown algae characterized by presence of golden brown xanthin pigment (fucoxanthin) imparting a colour variation. They occur in all seacoast but attain their greatest development in the colour.Sargassum are abundant in warmer areas and often attached to rocks (lithophytes).

In this study, the marine specimen *Sargassumilicifolium (Turner) C.Agardh*was selectedfor the proposed study then it was collected from Mandabam coast, Rameshwaram and authentified.

To ensure quality of herbal medicine proper control of starting material is almost essential.Initially, authentification followed by creating numerical values of standards for comparision.Pharmacognostic parameters like powder microscopy, extractive values, transverse section, physicochemical parameters like loss on drying, ash values, inorganic constituents and mineral analysis are some of the basic protocol for standardization of herbs.[10]

The preliminary phytochemical constituents reveals the presence of steroids, alkaloids, terpenoids, tannins, flavanoids, phenolic compounds and tannins. The total ash value, extractive value will be helpful in identification and authentification of the plant material and to scrutinize adulterants from original species of biological importance.[11,12]

Macroscopic characters

Sargassumilicifolium Turner C.Agardh

They are generally brown or dark green in color and consist of a holdfast, a stipe and a frond.Oogonia and antheridia occur in conceptacles embedded in receptacles on special branches[10] Branchlets are separate modified stalks on which berry like bladders are borne. Linear-lanceolate leaves posses a dentate sinuate margin, distinct midrib and small numerous irregularly placed cryptostomataarises.The vesicles are in globular shape or in small peas shape often they are without prolongation at the top.The receptacles are cylindrical,filiform and irregularly ramified.Sargassum begins its life cycle as an attached thallus but soon becomes afloat and continue to multiply by fragmentation.

The plant body is radially symmetrical. It multiplies exclusively by fragmentation of the thallus.

Microscopy

Powder microscopy

Prismatic typeof calciumoxalate crystals are frequently seen in the powder. They are 250x150µm in size with irregular shape.

Starch grains are elliptical ovoid and triangular in shape and turned to blue when stained with iodopotassium iodide.

Starch grains (stained) **Starch grains (unstained)**

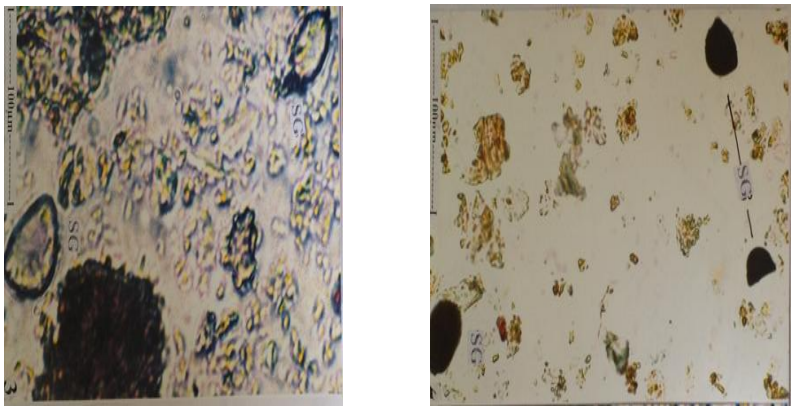

Fig 1.1 (Cr-crystals: St-starch grains)

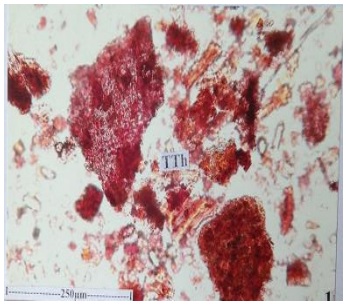

Fig-1.3 Fragments of thallus tissue

The cells are thick walled and squarish in shape. The walls have dense small pits seen in regular parallel rowsand some are in vertically elongated and rectangular in outline and are beaded in appearance.

Transverse section of *Sargassum ilicifolium*

Anatomy of thallus[11]

The leaf thallus is isolateral in section view.It is 20-30µm in size. Inner to epidermis, vertically oblong cylindrical cells with dense accumulation of chromophores were noticed.The middle zone is thin walled parenchymal cells The cortical zone has 8-10.

Air bladder[12]

The air bladder is circular in sectionwith wide empty central space has shallow ridges on the surface.The bladder has thick epidermal layer of squarish cells with inner compact parenchymals cells with no cell inclusions.

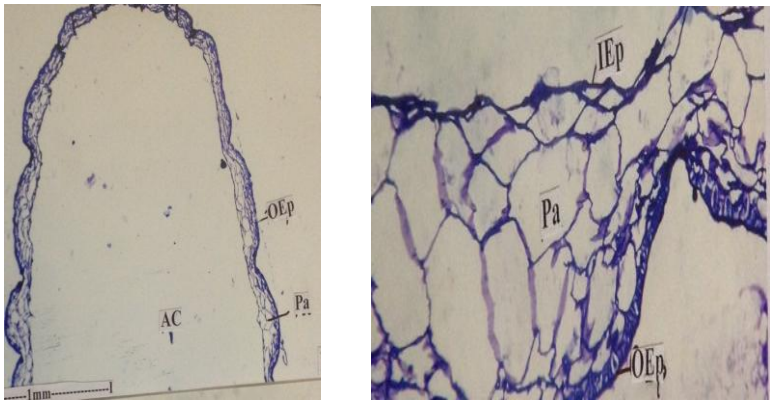

Fig-2.2 Anatomy of air bladder

Physicochemical constituents

The phtochemicals alkaloids, steroids, phenolic compounds, terpenoids, and tannins were present in the extract. Physicochemical constants total ash -22.32%, water soluble ash-7.40%, acid insoluble ash-12.22%, sulphated ash-1.38% and loss on drying-3.84% were observed. Inorganic analysis showed the presence of calcium and iron in milligram level and other minerals are in microgram level within the limit showed that the species is free from toxic level.All the parameters noted are pharmacognostic importance and utilized to differentiate between adulterant and original species.

Conclusion

Marine algae are good source of unsaponifiable non toxic steroids and other secondary metabolites. Among the species of *Sargassum, Sargassum ilicifolium(Turner) C. Agardh*is an emerging one in pharmaceutical field for which evidence of pharmacognosy is lacking, so in present study, Pharmacognostic standards has been exposed to highlight biological importance in Pharmaceutical field.

Table-1Physico-chemical constants of *Sargassum ilicifolium*

S.No	Name of the parameter	% of result
1.	Total ash	22.32
	Water soluble ash	7.40
	Acid insoluble ash	12.22
	Sulphated ash	1.38
2	Loss on drying	3.84

Table-2 Inorganic analysis of *Sargassum ilicifolium* (Turner)C.Agardh

S. No	Parameters	Contents/gm of sample
1	Cadmium	0.004 µg
2	Calcium	0.72mg
3	Chromium	0.0002 µg
4	Copper	0.244 µg
5	Iron	1.14mg
6	Lead	0.0002 µg
8	Magnesium	0.088mg
9	Nickel	0.001 µg
10	Zinc	0.028 µg
11	Phosphorus	0.05 µg
12	Potassium	3.450µg
13	Sodium	1.340µg

Table-3 Phytochemical analysis of ethanolic extract of *Sargassum ilicifolium*

S.No	Name of chemical test	70% ethanolic extract
1.	Alkaloids	+
2.	Carbohydrates	_
3.	Proteins	_
4.	Glycosides	_
5.	Proteins& Amino acids	_
6	Phenolic compounds	+
7.	Flavanoids	_
8	Terpenoids	+
9	Steroids	+
10	Saponins	_
11	Tannins	+
12	Oils and fats	_
13	Resins	_

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