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Phytochemical Screening of Marine Brown Algae *Sargassum squarrossum Greville*

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ABSTRACT
The development and finding of bioactive substances and their potential qualities from marine algae has accelerated dramatically in recent years. The coastal area contains a tremendous reservoir of beneficial algae. It is an undeniable fact that the impact of marine algae as a source of various substances is growing.The focus of this research was to look into the phytochemical profile of Sargassum squarrossum Greville. The secondary metabolites in methanolic extracts of Sargassum squarrossum Greville were detected using the standard method. A spectroscopic UV-Visible and Fourier transform infrared (FTIR) analysis was done to demonstrate the presence of the functional ingredients in the methanolic extracts of Sargassum squarrossum Greville. Alkaloids, terpenoids, phenolics, Steroids, reducing sugar, flavonoids and tannins were found in the early phytochemical investigation of Sargassum squarrossum Greville. The compounds were separated at nm 222, 372, 411, 549, 583, 632, and 666, with absorption values of 3.993, 0.746, 1.043, 0.337, 0.355, 0.111, and 0.218. Following that, the functional groups in the methanolic extract of Sargassum squarrossum Greville were analysed using fourier transform infrared spectroscopy.The existence of Alcohol, Phenol hydroxyl group, Alkanes, Aldehydes, Carboxylic acids, Aromatics, Alkene methylene group, Carboxylic acid, and Aliphatic amines was discovered using FTIR spectral data. As an outcome, the obtained findings suggest that the methanolic extract of Sargassum squarrossum Greville contains potentially bioactive components that can be employed to investigate various biological activities.
KEY WORDS: *Sargassum squarrossum Greville, methanolicextract, Phytochemical analysis, UV-VIS, FTIR.*

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INTRODUCTION

The variable marine environment is a complex process, and investigators are interested about marine biodiversity and pharmaceutical product identification[1]. Several new functional compounds have been isolated and characterised from natural sources and around 30% of active ingredients are derived from natural sources, with 10% coming from marine sources[2].

Biologically active nutraceuticals abundant in marine algae (e.g., carbohydrates, proteins, minerals, fatty acids, antioxidants, and pigments). Algae produce primary and secondary metabolites in response to biotic (plants, microbes) and abiotic (temperature, pH, salinity, light intensity) variables[3].

Brown macroalgae (Class Phaeophyta) have been reported to have a higher percent of bioactive component, especially in comparison with red (Class Rhodophyta) and green (Class Chlorophyta) macroalgae[4].

Sargassum is a tropical and subtropical brown seaweed with 150 species that can be found in subtidal and intertidal regions. Water, temperature, tidal levels, water flow, and substrate types all influenced the distribution and population structure of Sargassum species (i.e., rocky shores)[5].

Seaweed has a huge potential in the nutraceutical and pharmaceutical industries because they are a very good source of nutrients and bioactive compounds such asvitamins (A, Bl, B2, B3, B12, C, D, E), carotenoids, dietary fibers, proteins, minerals, polyunsaturated fatty acids and amino acids. Many pharmacologically and biologically active substances as sterols, flavonoids, sargaquinoic acids, polyphenols, terpenoids,protein, pheophytine, sulfated polysaccharides,have been extracted, isolated and characterized from variousspecies of Sargassum[6].

These compounds seemed to be effective antibacterial, antipyretic, analgesic and anti-inflammatory,cytotoxicity, and antitumor activity[7].
As a result, emphasise that Sargassum is an excellent source for phytochemical research to determine the presence of biomolecules.With this understanding, the current work was designed to use UV-VIS, Fourier transform infrared spectroscopy (FTIR) to determine the phytochemical profiles of *Sargassum squarrossumGreville*.

MATERIALS AND METHODS

Collection and identification of algae

The Marineseaweedwas collected from the Mandapam coast, Gulf of Mannar, India andthe samples was identified as ***Sargassum squarrossumGreville*.**

Fig.1 ***Sargassum squarrossumGreville***

All contaminants, sand particles, and epiphytes were removed from the seaweed samples by washing them completely in seawater. The excess water was removed by draining and spreading the algal material on newspaper then they were shade dried. The dried seaweeds were pulverised in a commercial grinder and the powdered seaweed samples were preserved for further investigation[8].

Preparation of Extracts

With methanol fine powder of brown seaweed *Sargassum squarrossumGreville* was extracted. For 21 days, the samples were incubated in the dark with intermittent shaking. Following incubation, the solution was filtered through Whatmann No. 1 filter paper, and the filtrate was concentrated to dryness using a rotary evaporator under reduced pressure and the final methanolic extracts were kept at 4 °C in air tight container until further use[9].

Preliminary Phytochemical Analysis

The phytochemical analysis was carried out to determine the presence or absence of steroids, phenolic compounds, saponins, tannins, flavonoids, alkaloids, and anthraquinones in the methanolic extracts of *Sargassum squarrossum Greville*, according to the method described[10].

UV – Visible Spectral analysis

The methanolic extract of *Sargassum squarrossum Greville* was scanned in the wavelength range of 200–800 nm using a (Shimadzu UV1800) UV-Visible double beam Spectrophotometer and the distinctive peaks with their absorption values were recorded[11].

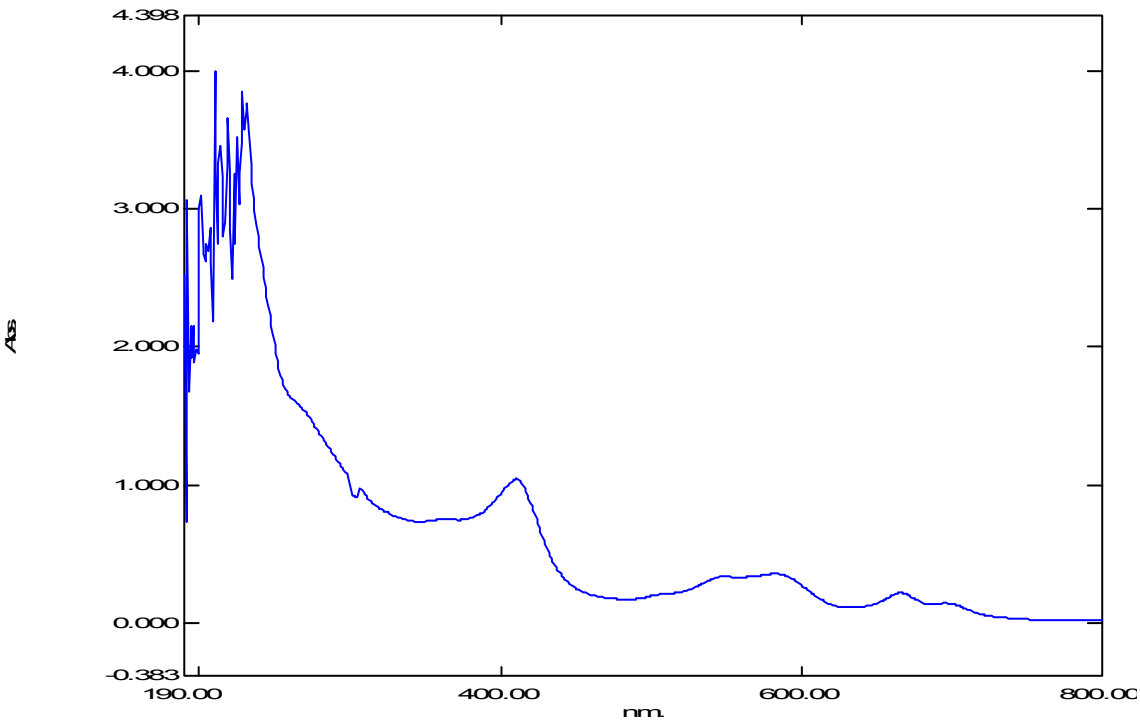

Fig.2 UV-Visible spectrum of methanolic extract of *Sargassum squarrossum Greville*.

FT-IR Analysis

On a Perkin Elmer Spectrophotometer system, the methanolic extract of *Sargassum squarrossum Greville* was centered in the transmittance range of 400-4000cm^{-1} for FTIR analysis, and the characteristic peak values and functional groups were detected.

By applying consistent pressure, a small amount of *Sargassum squarrossum Greville* extract was positioned directly on the sample container of the infrared spectrometer, and data of infrared absorbance was collected over the wave number ranging from 4000 cm^{-1} to 400 cm^{-1}. The FT-IR peak values were recorded. Every analysis was double-checked to ensure that the spectrum was correct[12].

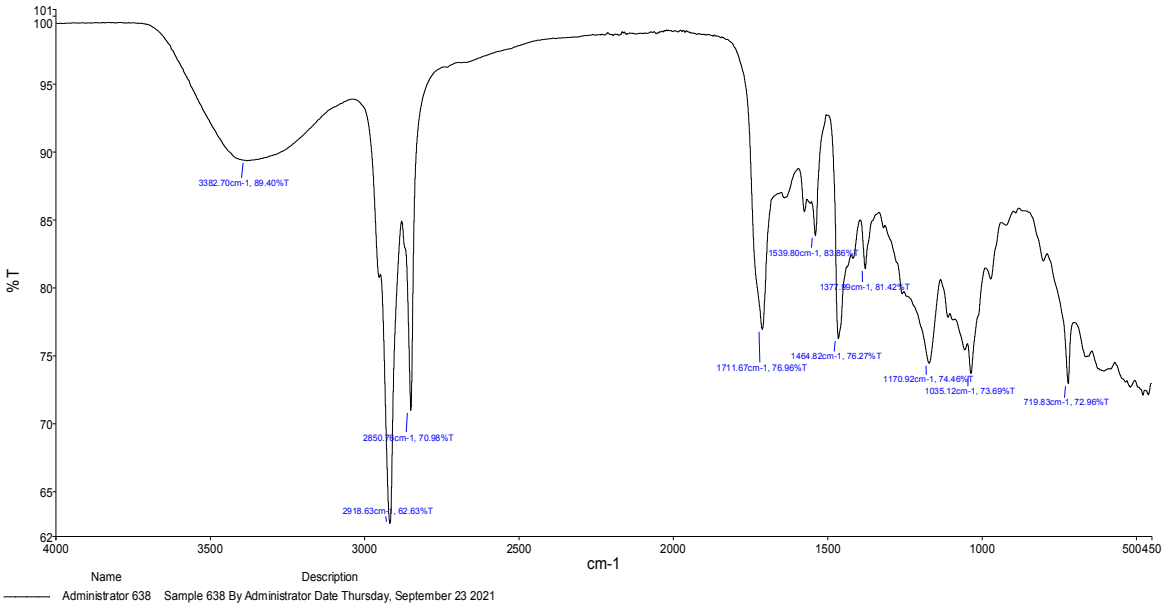

Figure 3: FTIR spectrum of methanolic extract of *Sargassum squarrossum Greville.*

RESULT AND DISCUSSION

Preliminary Phytochemical Analysis

Alkaloids, terpenoids, phenolics, Steroids, reducing sugar, flavanoids, and tannins were found in the preliminary phytochemical investigation.

Table 1 Phytochemical profile obtained from methanolic extract of *Sargassum squarrossum Greville*.

Bioactive compounds	Test	Present/absent
Alkaloids	Dragendorff's test	+
Glycosides	Keller-kiliani test	-
Reducing sugar	Fehling's test	-
Terpenoids	Salkowski's test	+
Phenol and tannins	Ferric chloride test	+
Steroids	Liebermann-Burchard reaction	+
Saponin	Frothing test	-
Reducing Sugars	Fehling's test	+
Flavonoids	Alkaline reagent test	+

('+' present& '- 'absent)

UV visible spectral analysis of sample: The UV-Vis spectra of methanolic extract *Sargassum squarrossum Grevill*ewas chosen at wavelengths ranging from 200 to 800 nm. The compounds were separated at nm 222, 372, 411, 549, 583, 632, and 666, with absorption values of 3.993, 0.746, 1.043, 0.337, 0.355, 0.111, and 0.218(Figure-2& Table-2).

Table 2: UV Visible spectrum of methanolic extract of *Sargassum squarrossumGreville*

Wavelength nm	Abs
222.00	3.993
372.00	0.746
411.00	1.043
549.00	0.337
583.00	0.355
632.00	0.111
666.00	0.218

FT-IR Analysis

The FTIR spectrum was used to determine the functional group of the active components based on the peak value in the infrared radiation area. Based on the peak ratio of the methanolic extract of *Sargassum squarrossum Greville* in the FTIR, the functional groups of the components were separated. The FTIR analysis methanolic extract of *Sargassum squarrossum Grevill*eshowing separate peaks at 3382.70, 2918.63, 2850.76, 1711.67, 1539.80, 1464.82, 1377.99, 1170.92, 1035.12, and 719.83cm^{-1}. Functional groups such as Alcohol or Phenol hydroxyl group (O-H stretch), Alkanes (-CH stretch), Aldehydes, Carboxylic acids (C=O stretch), Aromatics (C=C stretch), Alkene methylene group (C–H bending), Carboxylic acid (C-O stretch), and Aliphatic amines (C-N stretch) were verified (Figure-3 & Table-3).

Table 3. FTIR spectrum of methanolic extract of *Sargassum squarrossum Greville*

Peak Value	Spectroscopic Assignments	Functional Group
3382.70	O-H stretch	Alcohol, Phenol hydroxyl group
2918.63	-CH stretch	Alkanes
2850.76	-CH stretch	Alkanes
1711.67	C=O stretch	Aldehydes, Carboxylic acids
1539.80	C=C stretch	Aromatics
1464.82	C–H bending	Alkene methylene group
1377.99	C=H stretch	Alkanes
1170.92	C-O stretch	Carboxylic acid
1035.12	C-N stretch	Aliphatic amines
719.83	C-H Stretch	Alkanes

CONCLUSION

According to the findings of this study, the UV-Visible spectrum, as well as FTIR analysis, can be utilised to identify phytochemicals. It was also indicated that *Sargassum squarrossum Greville* is one of the richest sources of phytochemicals, which can be extracted and evaluated for various biological activities depending on therapeutic uses. Isolation and characterization of active principles responsible for biopotential will be pursued in the future.

It may be inferred from this research that the prominent bioactive compounds found in brown algae *Sargassum squarrossum Grevilleca*n treat a variety of serious disorders. Furthermore, the potential biological activity of a particular bioactive compound may pique interest in the pharmaceutical, cosmeceutical, and functional food industries.

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CONFLICTS OF INTEREST
The authors have declared no conflicts of interest for this article.

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