International Journal of Pharmaceutical and Bio-Medical Science

ISSN(print): 2767-827X, ISSN(online): 2767-830X

Volume 03 Issue 10 October 2023

Page No: 517-520

DOI: https://doi.org/10.47191/ijpbms/v3-i10-02, Impact Factor: 6.858

Proximate Composition and Phytochemical Analysis of *Gracilaria Corticata* (J.Agardh) J. Agardh

Amitha T.V.[1], Aleena B. Eluvathingal[2], Dr. J. Carolin Joe Rosario[3]

[1,2]Research Scholar, Department of Botany, Nirmala College for Women, Coimbatore

[3]Assistant Professor and Head, Department of Botany, Nirmala College for Women, Coimbatore

ABSTRACT

Aquatic areas, especially marine ecosystems, provide an abundance of plant life that can be very beneficial. As a result, these resources have been used for hundreds of years. Seaweeds have long been closely associated with human life as a source of food, fodder, fine chemicals, fertilizer and pharmaceutically significant drugs. Seaweeds are primitive, non- flowering plants with an immense source of secondary metabolites and the pharmacological activity of seaweeds is believed to be due to the presence of these compounds. There are several compounds in seaweeds that have the property to treat deadly diseases like cancer, arthritis and diabetics etc. Phytochemical screening is an effective method for discovering thebioactive compounds of the selected sample with pharmacological value. The current study isbased on the nutritional benefits and pharmaceutical capacities of selected algae. Therefore, based on the results, *Gracilaria corticata* is a good source of dietary supplement and they contain a high number of secondary metabolites are useful for pharmaceutical applications.

KEYWORDS: Seaweeds, Secondary metabolites, phytochemical screening, Dietary supplement,Drug

ARTICLE DETAILS

Published On:
10 October 2023

Available on:
https://ijpbms.com/

INTRODUCTION

The coast of Kerala bears a luxuriant growth of algae and in the coastal waters, they grow like grass in large areas, extending over hundreds of kilometers. An alga comprises a diverse group of chlorophyll-bearing organisms, ranging from unicellular to multicellular forms. The algae range from minute microscopic forms (microalgae) to large macroscopic forms (macroalgae). Algae are a group of ubiquitous organisms that are present in diverse habitats such as water (aquatic forms), land (terrestrial forms) and some extreme conditions. Algae are predominantly aquatic and they are found in freshwater or marine ecosystems. The fresh water forms may be free-swimming, free-floating or attached and they occur in ponds, lakes, streams, ditches, tanks, etc. The marine forms may be free-floating or attached. The minute floating and free-swimming algal species with other similar organisms constitute benthons. Some terrestrial algae grow in wet situations, such as on damp shaded sides ofwalls and trees, damp soil and even on rocks. They also live as epiphytes as well as epizoic. A few occur in symbiotic association with fungi.

Algae are an important group of organisms with immense industrial, human and agricultural value. Seaweeds have been closely associated with human life and are being Usedin numerous ways as a source of food, fodder, fine chemicals, fertilizer and pharmaceutically important drugs. They are the producers in marine ecosystems and also release oxygen. Seaweeds are used in a wide variety of commercial applications and they are the source of agar-agar, carrageenan and algin, which are extensively used in various industries. For example, they are used as gelling, thickening and stabilizing agents, especially in foodproducts such as frozen desserts, chocolate milk, yogurt, jellies and sauce preparations. Hence, they are used as herbal medicines, fertilizers, fungicides and herbicides as well as for direct human nutrition. Chlorellin, an antibiotic produced from chlorella, has high demand in the market.

In pharmacology, certain species of algae, such as red and brown algae, have demonstrated remarkable potential as sources of bioactive compounds like polysaccharides, polyphenols and pigments with antioxidant, anti-inflammatory and antiviral properties. Thesecompounds have been explored for their therapeutic applications, including the development of novel drugs and dietary supplements. Additionally, microalgae like spirulina and chlorella are renowned for their nutritional benefits, being rich sources of essential vitamins, minerals, and high-quality proteins. Their use as dietary supplements has surged, offering

health-conscious consumers a natural source of nutrients. Thus, algae continue to play a pivotal role in advancing both pharmacological research and nutritional supplementation, contributing to the broader fields of health and wellness.

The biggest problem facing the world right now is the growing population and declining availability of food. To feed the increasing world population, we need more food and its supplements. Normal agricultural practices alone will not be able to satisfy the hunger of a growing population. Marine algae are considered as very healthy and nutritious food. Based on these results, further studies could be carried out as a search for new compounds
from algae to develop alternatives against diseases. Thus, compared to other forms of plants, the lower forms, such as seaweeds, are found to have biochemical and nutritive properties. Hence, these seaweeds can be used as alternative food substances for present and forthcoming generations. Phytochemical screening is an effective method for discovering the bioactive compounds of samples with pharmacological value. It involves the extraction, screening and identification of bioactive compounds of algal origin. Flavonoids, alkaloids, phenolic compounds, catechins, carbohydrates, glycosides, proteins, saponins, terpenoids, anthraquinones and tannins are some of the phytochemical constituents. Thus, the present study is based on the Proximate and phytochemical analysis of selected macroscopic marine algae collected from the Kannur coast, Kerala.

MATERIALS AND METHODSSTUDY AREA:

Dharmadam Beach is located in Kannur district. The tranquil atmosphere of that area makes the place a favorite for tourists. The sample were collected from Dharmadam Beach, Kerala.

SAMPLE

The algal sample collected for the present study is *Gracilaria corticata (*J.Agardh) J.Agardh

Taxonomic position Division: Rhodophyta Order: Gracilariales Family : GracilariaceaeGenus: *Gracilaria*
Species: *G. corticata* (J.Agardh) J.Agardh

Gracilaria corticata (J.Agardh) J.Agardh is a red alga that belongs to the family Gracilariaceae. It possesses an erect thallus 10 to 12 cm long, arising from a discoid holdfast. The branching pattern is dichotomous in young blades. In older plants, numerous marginal projections ½ to 2 cm long line the edges of the segments in a pinnate fashion. Branching became denser in the upper parts of the plant. They have linear and smooth blades that are 15 cm long and 4 mm wide. The apices are generally obtuse, but they may be acute in linear branches. The colour of the thalli ranges from purple to green. The agar obtained from *Gracilaria sp.* has high demand in the market. The solid waste from agar extractions is extensively used in the papermaking industry. Since they are rich in micronutrients, they are used by space travelers as food in the form of tablets.

PREPARATION OF THE SAMPLE

The collection of the algal sample was carried out at Dharmadam Beach, Kannur district, Kerala. The collected sample were first rinsed with sea water to remove impurities and sand particles. Then the sample are shade-dried, powdered and stored in airtight containers for further analysis.

PHYTOCHEMICAL ANALYSIS (HARBORNE, 1998)

The algal samples were subjected to qualitative phytochemical analysis according to standard procedures (Harborne, 1998). The preliminary phytochemical screening of aqueous, ethanol and chloroform extracts of *Gracilaria corticata* (J.Agardh) was carried out and their bioactive compounds were determined.

PROXIMATE ANALYSIS (AOAC, 2022)

The proximate analysis of seaweeds was carried out to determine the crude protein, fat, ash and total carbohydrate contents of the sample and it was carried out on a dry basis according to the basic standard method approved by AOAC in 2022.

RESULTS AND DISCUSSION

In the present study, the preliminary phytochemical screening was carried out on the selected edible algal sample, active constituents such as alkaloids, saponins, carbohydrates, glycosides, flavonoids, proteins, catechins, terpenoids, tannins, anthraquinones and phenolic groups were identified by using aqueous, ethanol and chloroform as solvents. The phytochemical compounds, namely carbohydrates, glycosides, saponins, proteins and catechins were present in all three solvents. Alkaloids, flavonoids, terpenoids and phenolic groups were present in chloroform and ethanolic extracts. Tannins were present only in chloroform extract and anthraquinones were completely absent in all three solvents. Thus, from the present study, among the two extracts, the maximum phytochemical constituents were found in the ethanolic extract when compared to the aqueous and chloroform extracts.

Table: 1 phytochemical screening of *Gracilaria corticata* (j.agardh) j.agardh (+ Present, - Absence)

S. No	Types of compounds	Extract of G. *corticata*		
		Aqueous	Ethanol	Chloroform
1	Alkaloids	+	-	+
2	Saponins	+	+	+
3	Carbohydrates	+	+	+
4	Glycosides	+	+	+

5	Flavonoids	+	-	+
6	Proteins	+	+	+
7	Catechin	+	+	+
8	Terpenoids	+	-	+
9	Tannins	-	-	+
10	Anthraquinone	-	-	-
11	Phenolic groups	+	-	+

Recently, several studies have been reported on the phytochemical screening of marine algae across the world. Based on phytochemical screening, ethanol, methanol, acetone and diethyl ether extracts of *Gracilaria corticata* reveal the presence of carbohydrates, glycosides, tannins, phenols, proteins, steroids and flavonoids (Rashida Qari *et al*., 2018). Several researchers have used different solvents to extract bioactive principles from seaweeds and arrived at varying conclusions. Gopalan Rajkumar *et al.* (2017) confirmed methanol as a suitable solvent to extract the active compounds. From the present study, the identified phytochemical constituents are bioactive and they have great medicinal value and are extensively used in the drug and pharmaceutical industries. Hence, these phytochemicals can be further screened for different kinds of biological activities depending on their therapeutic uses.

Proximate, content of *G. corticata* is shown in Table.2. The Carbohydrate content found for *G. corticata* was 52.97 g/100 g. The moisture content is 8.10 g/100 g. The sample also contains 26.84 g/100 g of proteins, 8.40 g/100g of ash and 7.07 g/100g of fat. With respect to proximate composition, the carbohydrate and protein content were significantly higher in *G. corticata*.

Table: 2. proximate composition of *Gracilaria corticata* (J.Agardh) J.Agardh (g/100 g dry weight seaweed)

S. No	Proximate composition	*Gracilaria corticata*
1	Carbohydrates	52.97± 0.62
2	Protein	26.84 ± 0.87
3	Moisture	8.10 ± 0.69
4	Ash	8.40 ± 0.39
5	Fat	7.07 ± 0.73

Proximate analysis of *Gracilaria corticata* provides a valuable information about its nutritional composition and suitability for different applications. Carbohydrates are considered as the most important biochemical constituents in algae since they represent the main energy source for the metabolic routes. Diet rich in complex carbohydrates can prevent heart diseases, cancer, diabetes and intestinal disorders. Proteins are important for the formation of regulatory compounds. Few hormones, enzymes and most other regulatory materials in the body are proteinaceous substances. Protein defends the body against diseases.

Seaweeds are relative un- explored and promising sources of novel molecules for its use as functional food and nutraceuticals including proteins and carbohydrates (Tomas Lafarga, 2020). In algae, carbohydrates are considered as the most important biochemical compound which represents the main energy source for the metabolic processes. In addition to supplying energy, they are also responsible for maintaining the structure and function of cells, tissues and organs. Seaweeds are considered as the viable source of protein. The proteincontent of seaweeds varies greatly with species and seasons. The seaweeds are known to contain protein level similar to traditional protein sources such as meat, egg, soybean and milk etc. So that algal protein is considered as an essential nutritional component in thehuman diet (Padraigin Harnedy- Rothwell, 2011). So more attention is given to the seaweeds for compensating the food problem to some extent and fulfils the deficiency of nutrition for erecting the economy of several countries (Mark *et al*, 2016). Thus, from the present study the seaweeds can provide dietary alternatives in order to improve the nutritional value of human diet.

CONCLUSION

The present study mainly focuses on the nutritional benefits and pharmaceuticalcapacities of selected algae. The biggest problem facing the world right now is the growing population and declining availability of food. To feed the increasing world population, we need more food and its supplements. Normal agricultural practices alone will not be able to satisfy the hunger of a growing population. Marine algae are considered a very healthy and nutritious food. Based on these results, further studies could be carried out as a search for new compounds from algae to develop alternatives against diseases. Thus, compared to other forms of plants, the lower forms, such as seaweeds are found to have pharmaceutical and nutritive properties. Hence, these seaweeds can be used as alternative food substances and in the pharmacological field for present and forthcoming generations.

REFERENCES

I. Baby Ushakiran M S, Sr. Merlee Treasa M V, Sathianandan T V and Kaladharan P, 2017, Marine macro algal resources from nine beaches along the

Kerala coast, India,Marine biological association of India, Vol 59(01), Pg: 73-81, ISSN: ISSN: 1660-3397.

II. Carolin Joe Rosario J, Dr. Mary Josephine R, 2016, A survey on macrophytic marine algae inElathur and Kappad beach, Kerala coast, International journal of advanced science and research, Vol 01(06), Pg: 42-44, ISSN: 2455-4227.

III. Gopalan Rajkumara, Periyakali Saravana Bhavanb, Veeran Srinivasanc, Rajendran Udayasuriyand, 2017, Phytochemical Screenings of the Marine Red Alga Gracilaria Corticata, Noble International Journal of Scientific Research, Vol 01(08), Pg: 90-97, ISSN (e): 2521-0246.

IV. Harborne J B, 1973, Phytochemical methods: A guide to modern technique to plant analysis, Chapman and Hall Ltd, London, Vol 193(01), Pg: 265- 275, ISBN: 9780412572609.

V. Research, Vol 09(06), Pg: 37- 41, ISSN: 0975-7066.

VI. Lowry O H, Rosebrough N J, Farr A L and Randall R J, 1951, Protein measurement with thefolin phenol reagent, J Biol Chem, Vol 193(01), Pg: 265- 275, ISSN: 0021- 9258.

VII. Manchu N, Melpha Y, Jeeva S and Edwin J James, 2015, Phytochemical analysis and antibacterial activity of *Chaetomorpha antennina* from Rasthacaud coast, Tamilnadu, India, World Journal of Pharmaceutical Research, Vol 04(03), Pg: 1337-1351, ISSN: 2277– 7105.

VIII. Mark L Wells, Philippe Potin, James S Craigie, John A Raven, Sabeeha S Merchant, Katherine E Helliwell, Alison G Smith, Mary Ellen Camire and Susan H Brawley, 2016, Algae as nutritional and functional food sources: revising our understanding, Journal of applied phycology, Vol 29, Pg: 949- 982, ISSN: 1573- 5176.

IX. Nagai T and Yukimoto T, 2003, Preparation and functional properties of beverages made from the sea algae, Food Chem, Vol 81, Pg: 327- 332, ISSN: 1873- 7072.

X. Oohusa T, 1993, The cultivation of Porphyra nori, in seaweed cultivation and marine ranching, Pg: 57-7 3

XI. Rashida Qari and Abdul Rahim Khan, 2018, Studies on Antibacterial Activity and Phytochemical Analysis of *Gracilaria corticata* (J. Agardh), Gracilaria dentata (J. Agardh) and Gracilaria pygmaea (Børgesen) against Diarrhea causing pathogen E. coli and Salmonella typhi, Acta scientific microbiology, 2018, Vol 02(03), Pg: 03-11, ISSN: 2581-3226.

XII. Ruperez P, 2002, Mineral content of edible marine seaweeds, Food chem, V (79), Pg: 23-36.

XIII. Samina Hyder Haq, Ghaida Al-Ruwaished, Moudhi Abdullah Al-Mutlaq, Sundus Ali Naji, Maha Al-Mogren, Sarah Al-Rashed, Qura Tul Ain, Abir Abdullah Al-Amro, AdnanAl-Mussallam, 2019, Antioxidant, anticancer activity and phytochemical analysis of green algae, *Chaetomorpha* collected from the Arabian gulf, Scientific reports, Pg: 01- 07.

XIV. Subathraa K and Poonguzhali T V, 2013, Effect of different extracts of *Chaetomorpha antennina* and their phytochemical screening, Research article, Vol 06, Pg: 39- 35, ISSN: 2250-1770.

XV. Tomas Lafarga, Francisco Gabriel Acien-Fernandeza and Marco Garcia-Vaquerob, 2020, Bioactive peptides and carbohydrates from seaweed for food applications: Natural occurrence, isolation, purification, and identification, Algal Research, Vol 48, Pg: 01-10, ISSN: 2211-9264.

XVI. Whankatte V R, Jondhale V R Game P S and Dr. J S Ambhore, 2018, Study of phytochemical and antioxidant activities of green alga *Chaetomorpha antennina* collected from Raigad coast of Konkan, International journal of pharmacy and pharmaceuticalresearch, Vol 02(03), Pg: 221- 227, ISSN: 2349 – 7203.

XVII. Yem E W and Willis A J, 1954, The estimation carbohydrates in plants by anthrone, Biochem. J, Vol 57(03), Pg: 508- 514, ISSN: 0264- 6021.