Nutritional Composition And Phytochemistry Profile Of Seaweeds Collected From Rameshwaram Coast

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Abstract : The present study was undertaken to analysis the nutritional composition and phytochemistry profile of seaweeds collected form Rameshwaram coast (Jania rubens, Sargassum wightii, Halimeda tuna and Chondrus crispus). Total carbohydrate was found high in all seaweeds species was found to be 12, 6, 7 and 8.6 %, protein was recorded second in Chondrus crispus, Halimeda tuna, Sargassum wightii and Jania rubens as 4, 3.4, 4.5 and 3.2% and lipid was found to be low in all species. In qualitative phytochemistry estimation, Saponins, Cardiac glycosides and Phenolic was recorded in high level, Alkaloids and Terpenoids was found moderate level. The recorded seaweeds species having more nutritional and pharmaceuticals important constituents in consider level.

Keywords; Seaweeds, nutrient composition and phytochemistry.

1. INTRODUCTION

Seaweeds are commonly called as macroalgae and main part of marine environment, the group of plants are called as algae. Seaweeds are classified there types by depending on nutrient and chemical composition as Chlorophyta (Green Algae), Phaeophyta (Brown Algae) and Rhodophyta (Red Algae). Seaweeds constitute to the essential division of marine environment ecosystem [1]. Seaweeds are recognized a big source of polyphenols, enzymes, pigments, polysaccharides and carotenoids and are important source of several vitamins namely A, B1, B12, C, D and E [2]. Macroalgae have been produced to active metabolites including lipids, polysaccharide, polyketides, quinines, cyclic peptide, sterols, glycerols, alkaloids, phlorotannins and diterpenoids that have wide range of biological activities [3]. Seaweeds are used to medical potential due to the bioactive compounds which they have involved to the notice of pharmaceutical industries [4] [5]. They are usually produce biologically active compound and its will grow in the all seas but expert polar region. Plenty of researchers have been discovered the antibacterial, antiviral, antioxidant, cytotoxic, anti inflammatory, antidiabetic and antifungal potentials of seaweeds [6] [7]. The macroalgae extract shows to be used to antifungal and antibacterial activities [8] [9].The macroalgae are present in different types of biological active compound. It will be used to the extract on different solvents with different polarity.The bioactive compound which is recorded to biological activity were fatty acids, phenolic compounds, ketones, alkanes, acrylic acid, terpenoids, and phlorotannins [10]. Sargassum sp. is distribution of the temperate and tropical oceans of the world there are biological activities and secondary metabolites [11]. They are usually enclose terpenoids that exhibit biological activities such as vasodilatory effects, larval settlement of hydrozoan, cell toxicity and antioxidant activity [12] [13].

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The present study was under taken to investigate the proximate composition and qualitative estimation of phytochemicals of seaweeds from Rameshwaram coastal area.

2. MATERIAL METHODS

2.1 Sample Collection

The seaweeds were collected from Rameshwaram in two stations (Pamban and Olakuda) southern coast of India. After the collection, sample was thoroughly washed with seawater to remove all the extraneous sand particles, shells and impurities and transported to the laboratory in plastic bags aseptically in the ice box (4˚C). Then the samples are washed with tap water followed by distilled water. Seaweeds samples were identified by their morphological key characters with genus and species level. Washed samples were blotted in blotting paper then shadow dried in 2 days after samples grounded into a fine powder. Then samples were stored in refrigerator (4˚C) for further examinations.

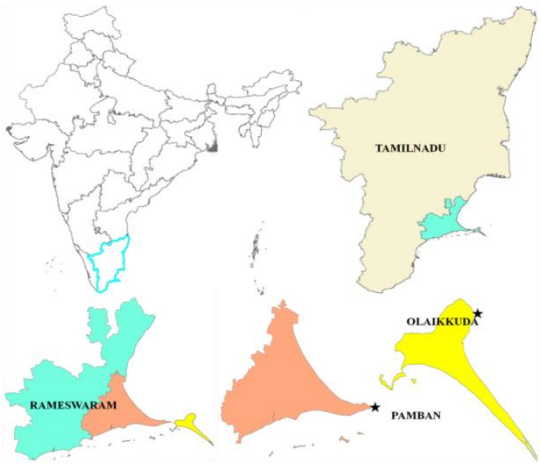

Fig.1. *Sampling spot of seaweeds collection*

2.2 Estimation of biochemical

The biochemical composition such as protein, lipid and carbohydrates content of seaweeds Jania rubens, Sargassum wightii, Halimeda tuna and Chondrus crispus was determined [14] [15] [16].

2.3 Preparation of algal extraction

The extraction of metabolites was carried out by soaking the dried seaweeds powder of Jania rubens, Sargassum wightii, Halimeda tuna and Chondrus crispus in Methanol (Merck) in a conical flask. Then the sample was kept on a shaker at 120 rpm for three days at room temperature (28˚C). The mixture was filtered through the Whatman No.1 filter paper and the the samples were taken to dryness under reduced pressure at 50˚C. Then the crude extract was stored for further studies.

2.4 Qualitative phytochemical screening

The phytochemicals such as tannins (NaOH test), alkaloids, saponins (Frothingtest), cardiac glycosides (Killerkillani'stest), steroids (Salkowskitest), terpenoids, phenolic content of the seaweeds Jania rubens, Sargassum wightii, Halimeda tuna and Chondrus crispus methanol extract was estimated qualitatively by followed the standard protocol [17] [18] [19].

Table.1*. List of Seaweeds recorded*

SL.No	Seaweed	Kingdom	Order	Family	Genus	Species
1	Jania rubens	Plantae	Corallinales	Corallinaceae	Jania	rubens
2	Sargassum wightii	Chromista	Fucales	Sargassaceae	Sargassum	wightii
3	Halimeda tuna	Plantae	Bryopsidales	Halimedaceae	Halimeda	tuna
4	Chondrus crispus	Plantae	Gigartinales	Gigartinaceae	Chondrus	crispus

3. RESULT AND DISCUSSION

Seaweed contributes to its efficacy as nutraceutical and traditional medicine based on the presence of their chemical components. Some factors like climatic condition, season, species, subspecies, harvest and the method used for extraction of compounds will devastate the chemical compositions of the extract [20].Seaweeds are primitive non-flowering plants without roots, stems, and leaves. They contain different vitamins, minerals, trace elements, proteins and bioactive substances [21]. Proteins, lipids and carbohydrates are major biochemicals and majorly played a vital role in human nutrition for development of cells and fundtions. In the present study, the total protein, lipids and carborbohydarte content was estimated and the results were shown in Table 2 and Fig.2. From the results, the total carbohydrate was found high in all seaweeds species Chondrus crispus, Halimeda tuna, Sargassum wightii and Jania rubens as 12, 6, 7 and 8.6 % respectively. Protein was recorded second biochemical in all species Chondrus crispus, Halimeda tuna, Sargassum wightii and Jania rubens and it was found to be 4, 3.4, 4.5 and 3.2% respectively. The total lipid was found to be lesser level for 3, 2.9, 3.5 and 3.3% in Chondrus crispus, Halimeda tuna, Sargassum wightii and Jania rubens respectively. [22] have been reported lower nutritional compositions of Seaweeds namely, chlorophyte (Ulva lactuca), the rhodophytes (Asparagopsis taxiformis, Chondrus crispus, Galaxaura rugosa, Grateloupia lanceola and Nemalion elminthoides), and the phaeophyte (Zonaria tournefortii) were collected in Madeiran south coastline. Similarly [23] have been studied the biochemical composition of six seaweeds, Enteromorpha compressa, E. intestinalis, Dictyota dichotoma, Turbinaria ornata, Gracilaria corticata and Hypnea musciformis and reported the protein content ranged from 9.47% and 14.68%. High protein content was found in the brown seaweed T. ornata and low protein content in the red seaweed G. verrucosa and Carbohydrate content of seaweeds ranged from 10.63% and 28.58%. Whereas Acanthophora spicifera was showed 28.6±0.53 % dry/wt high amount of protein content. Similarly, [24] recorded highest protein content in brown alga Tubinaria ornate from Gulf of Mannar region, and [25] reported more protein content in red alga Hypnea valentiae.[20] [26] reported that high carbohydrate content (64.00% dry weight) present in Caulerpa lentillifera, Similarly, we have a high percentage of carbohydrate in Portieria hornemannii (51.2±0.78 %) and Acanthophora spicifera (45.4%). Quantitative analysis of protein content ranged from 28.5 % and 4.4 %. [27] reported that proximate biochemical composition of some seaweed from Mandapam which revealed that Padina gymnospora contained maximum protein (17.08±0.28%) including Enteromorpha intestinalis (16.38±0.50%) and Sargassum tenerimum (12.42±0.63%).

Table 2. *Nutritional composition of seaweeds*

Sl. No	Name of biochemicals	Chondrus crispus	Halimeda tuna	Sargassum wightii	Jania rubens
1	Protein (%)	4	3.4	4.5	3.2
2	Lipid (%)	3	2.9	3.5	3.3
3	Carbohydrate (%)	12	6	7	8.6

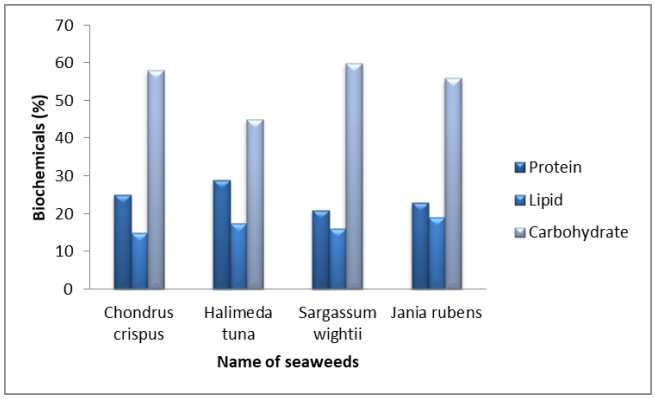

Fig 2. *Biochemicals composition of seaweeds*

An alkaloid, flavonoids are having various medicinal properties and detected in the extracts are compounds that have been documented to possess a variety of medicinal properties and health-promoting effects. Alkaloids were absent in all the selected seaweeds; Phenols found to be plentiful as reported by [28]. In this study results, Saponins, Cardiac glycosides and Phenolic was recorded in high level in methanolic extracts of Chondrus crispus, Halimeda tuna, Sargassum wightii and Jania rubens respectively. Alkaloids and Terpenoids was found moderate level in Chondrus crispus, Halimedatuna, Sargassum wightii and Jania rubens respectively. Similarly [17] recorded same phytochemicals in mangroves from Tamilnadu coast and reported the high amount of alkaloids, saponins, caadiac glycosides and terpenoids. [29] studied the phytochemistry profile of Red Alga, Laurencia papillosa and documented the high amount presence of phenols, flavonoids and tannins by qualitative estimation.

Table 2. *Qualitative determination of phytochemicals*

SL. No	Photochemical	Chondrus crispus	Halimeda tuna	Sargassum wightii	Jania rubens
1	Tannins	+	--	+	+
2	Alkaloids	+++	+	++	+
3	Saponins	++	+++	++	--
4	Cardiac glycosides	+++	++	+++	++
5	Steroids	++	++	--	+++
6	Terpenoids	--	++	+++	+++
7	Phenolic	+++	+++	++	+++

-- = Negative,+ = Positive, ++ = Moderate, +++ = Highly Positive

4. CONCLUSION

The present study concluded that the collected seaweeds were identified as Chondrus crispus, Halimeda tuna, Sargassum wightii and Jania rubens and the seaweeds having more nutritional composition such as protein, lipids and carbohydrates in considerable level and also its hold pharmaceutical and commercial important secondary metabolites and further purification and in vitro study is needed for drug development

5. ACKNOWLEDGEMENT

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