Biochemical composition of *H.dilatata* and *L.ceranoides* from Indian coast, Tamil Nadu

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Abstract- Red algae, or Rhodophyta, are the largest class of seaweeds, with around 6000 different species. Because of this, there is conjecture that they may contain medicinal compounds. The two most significant and often utilized sulfated polysaccharides found in red algae are agar and carrageenans. Seaweed biomass has the potential to develop into a substantial supply of raw materials for the bio based sector. This paper helps to evaluate the biochemical compositions of the seaweeds *L.cranoides* and *H.dilapidated*, including their lipid, protein, and carbohydrate levels. Dietary fiber and carbohydrates were found in significant concentrations in *H.dilatata L. cranoides* has a greater protein content. The lipid content of *H.dilatata* is high. This study focused on the role that seaweeds chemical composition plays in their use as food and significant medicinal products.

Keywords: *H.dilatata* and *L.ceranoides*, Biochemicals, Applications

INTRODUCTION

Marine macro algae and marine biotechnology, sometimes referred to as red, blue, and green biotechnology, is the use of biological resources from the sea for commercial, therapeutic, or environmental goals (Thompson *et al.* 2017). Macroalgae and microalgae have attracted a lot of attention because of their natural supply of bioactive compounds that may be employed in food products and other industrial processes (Sudhakar *et al.,* 2018). Seaweed are an excellent source of vitamins (A,B,B12,C, D and E), riboflavin, niacin, folic acid and amino acid. The fatty acid(PUFA) is an important constituent of seaweeds. Macro algae have been extensively utilized as ingredients in human and animal food preparation owing to their high content of polyunsaturated fatty acid(PUFA). The studies on cytotoxic, antiviral, antifungal and antibacterial activities have been detected in the all macro and micro algae.

As a result, seaweed intake has increased and study into their possible health advantages has intensified (Rudtanatip *et al.,* 2018). Macro algae have a high water content, high protein and carbohydrate content, and a high lipid percentage, according to Sudhakar *et al.,* 2018. They are members of the differential composition phylum. Rhodophyta is the class of algae with the highest percentage of bioactive chemicals, with approximately 1600 unique compounds, or 53% of all bioactive compounds known to science (Leal *et al.*, 2013).

Red algae is the largest group of seaweeds, with approximately 6000 different species. In terms of biology, red seaweeds are mostly found in intertidal zones in equatorial climates and are smaller than brown and green algae. Red algae have a specific combination of pigments, such as carotenoids, phycobili proteins, and chlorophyll a and d, since they are categorized based on their (Cian *et al.,* 2015). These factors suggest that, given red algae's advantages for nutrition and the economy, more has to be done to promote their utilization and spread throughout Western countries. Thus, this is an explanation of the chemical composition of red algae, focusing on the parts that might be health-promoting. The biological properties of red algal extracts are explained in detail, with a focus on the extracts' roles as metabolic regulators, antioxidants, anti-inflammatories, and antidiabetics.

A detailed description of the extraction processes required to separate and create bioactive chemicals is also provided in order to illustrate the advantageous qualities of these marine species that may be used to a variety of culinary, cosmetic, and pharmaceutical compositions.

Because of their chemical and nutritional composition, marine algae are great additions to diets. According to Belghit *et al.*, 2017 the majority of the more than 3000 marine natural compounds extracted from them have been identified.

CARBOHYDRATE

Monosaccharides have been found in red algae; nevertheless, despite their limited characterization, little research has been done on these molecules. Many free sugars, including fucose, xylose, mannose, galatose, and glucose, have been found in red algae (Gomez-Ordoñ̲ez *et al.*, 2014). On the other hand, because polysaccharides make up the majority of marine algae, including red algae, red algae can command a higher price on the market.

Sulfated polysaccharides known as phycocollooides, which are present in agar carrageenan and may account for up to 40–50% of the dry weight of red seaweeds, are the most important source of carbohydrates (Torres *et al.*, 2019). Sulphated galactens, porphyrans, and xylans are polysaccharides that are present in notably reduced quantities (Overland *et al.*, 2019).

Carrageenan is a crucial component of red algae and one of the most significant elements of algal cell walls. The a and b-D-galatopyranose subunits are joined by two different types of glycosidic connections to form this polysaccharide, which is a sulfated polygalactan. The different ratios of these bonds account for about 15 kinds that are now considered to have commercial importance (Cunha and Grenha *et al.*, 2016).

PROTEIN

The algae found in coastal habitats, red seaweeds have the highest protein content, followed by green and brown algae (Overland *et al.*, 2019). Algae typically contain a protein content of 5% to 20%, while red algae can attain larger proportions, with peak values reaching 47% of total dry weight (Praveen *et al.*, 2019).

LIPIDS

Marine algae typically have a low lipid content, making up 1% to 5% of their dry weight. They do, however, contain a sizable quantity of polyunsaturated fatty acids (PUFAs) and sterols (Praveen *et al.*, 2019). Additionally, they support a range of heterogeneous chemicals, such as phospholipids and glycolipids (Torreset *et al.*, 2019).

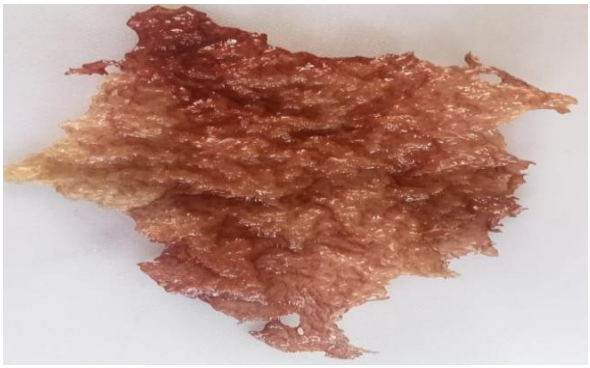
EXTRACTION TECHNOLOGIES FOR BIOACTIVE COMPOUNDS

Red seaweeds have useful compounds that have been extracted with the use of diving techniques. The purpose of pre-treatment, which is usually the first stage of the extraction procedure, is to degrade algal cell walls and boost the amount of material that is recovered. Previous treatments, which fall into the mechanical, physical, thermal, and enzymatic categories, are greatly influenced by the physicochemical composition of the target molecules (Jacobsen *et al*., 2019).

MATERIALS AND METHODS

Collection of seaweeds

Liagora ceranoides and *Halymeniya dilatata*, two marine algae, were gathered from the coastal region. The taxonomic literature for the region was consulted in order to identify the collected species based on their morphological traits. Before being stored, the collected seaweeds were gently pressed or wiped with tissues, depending on their morphology, to eliminate any extra water.



Halymeniya dilatata

Liagora ceranoides

Preparation of algal extract

50 mL of ethanol was used to extract ten grams of dried algal powder from each of the two species *Halymeniya dilatata* and *Liagora ceranoides*—over

the course of three days. It is soaked at room temperature for the entire night. The material was subsequently passed through a Buchner funnel filled with What man filter paper. The filtered solution was dissolved in ethanol after being vacuum-evaporated to a constant weight at 40°C in a rota-vator. Until it was used, the solution was kept in the refrigerator.

Estimation of carbohydrate (Dubois *et al*., 1956)
The carbohydrate content was estimated by Dubois method. To 1mL of algal extract, 1mL of 5% phenol solution &5mL of concentrated sulphuric acid were added. They were kept in a dark room for 30 minutes. Absorbance was taken at 490nm.

Estimation of protein (Lowry *et al.,*1951)
The protein content was estimated by (Lowry *et al.,*1951) 0.5g of algal biomass was extracted and centrifuged. To the supernatant, 5mL of solution was added to 1mL of sample followed by 0.5mL of folin phenol reagent was added. Absorbance was read at 650 nm.

Estimation of lipid (Barner and Black stock *et al*., 1973)
0.5g of fresh thallus was weighed, ground well, 1mL of sample were homogenized. Then the algal extract with 6mL of chloroform :methanol(2:1)was transferred to separating funnel. 2mL of 0.9%NacL solution was added &mixed well mixture was left undisturbed for 12 hours from lower chloroform phase containing lipid. 50mL was collected in clean vial and solvent was allowed to evaporate at room temperature. The pellet was collected after evaporate. To the pellet, 0.5 mL of con.H_2SO_4 was mixed thoroughly the sample tubes were closed &kept in boiling H_2O bath for 10 minutes & allowed to cool at room temperature 0.2 mL of sample 5mL of vanillin reagent was added mixed well &allowed to stand for 30 mints in the spectrophotometer measured at 520 nm.

DISCUSSION

According to Gomez-Ordoìn̨ez *et al.*, 2014, red algae contains a number of free sugars, including fucose, xylose, mannose, galactose, and glucose. Aspartic acid and glutamic acid are the most common residues in red algae proteins, making up as much as 22-44% of the overall amino acid content (Cian *et al.*, 2015). This indicates that red algal proteins have a high quantity of important amino acids. Sterols are lipids, but they also comprise other heterogeneous molecules such glycolipids and phospholipids (Torres *et al.*, 2019).

RESULTS

The biochemical constituents were showed in varying extraction like Methanol, Ethanol, Aqueous showed the *H.dilatata* at methanol and ethanol extract concentration lag phase carbohydrate showed the highest peak with methanol 72.1 ±1.24 lowest concentration showed the aqueous 70.6 ±0.73. The protein showed highest peak with methanol 59.25 ±1.92 lowest concentration showed the aqueous 57.21± 1.18. The lipid showed highest peak with methanol 2.16 ±0.03 lowest concentration of biochemicals were extracted in aqueous 1.86 ±0.03. The biochemical constituents showed in varying extraction of *L.ceranoides* like Methanol, Ethanol, Aqueous showed that methanol and ethanol extract had a lag phase while carbohydrate showed highest peak value of methanol 69.18 ±1.08 lowest concentration showed the aqueous 56.4±0.82.The protein showed highest peak with methanol 60.62±0.77 lowest concentration showed the aqueous 58.58 ±0.77 . The lipid showed highest peak with methanol 2.17±0.04 lowest concentration showed the aqueous 1.18 ±0.03.

Estimation of carbohydrate from *H.dilatata* and *L.ceranoides* extracts

S.No	Methanol	Ethanol	Aqueous
H.dilatata	72.1 ±1.24	71.59 ±0.90	70.6 ±0.73
L.ceranoides	69.18 ±1.08	56.4±0.82	56.93± 1.64

Estimation of Protein from *H.dilatata* and *L.ceranoides* extracts

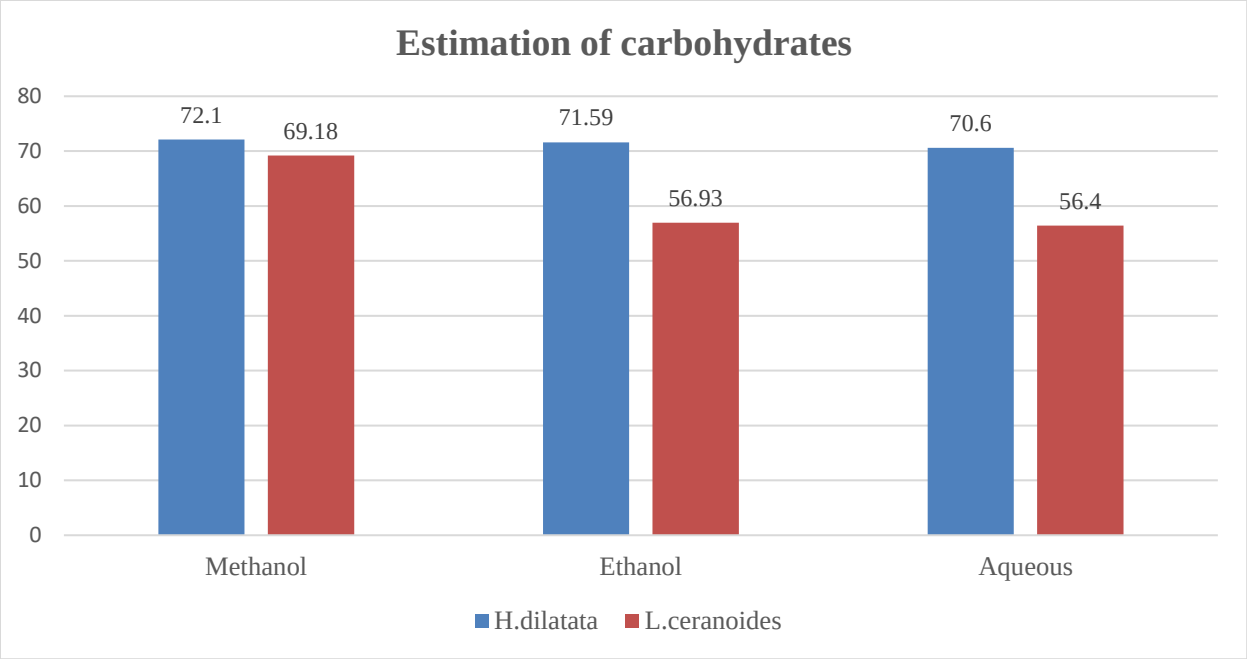
S.No	Methanol	Ethanol	Aqueous
H.dilatata	59.25 ±1.92	58.75± 1.06	57.21 ±1.18

L.ceranoides	60.62±0.77	58.58±0.77	58.58 ±0.77

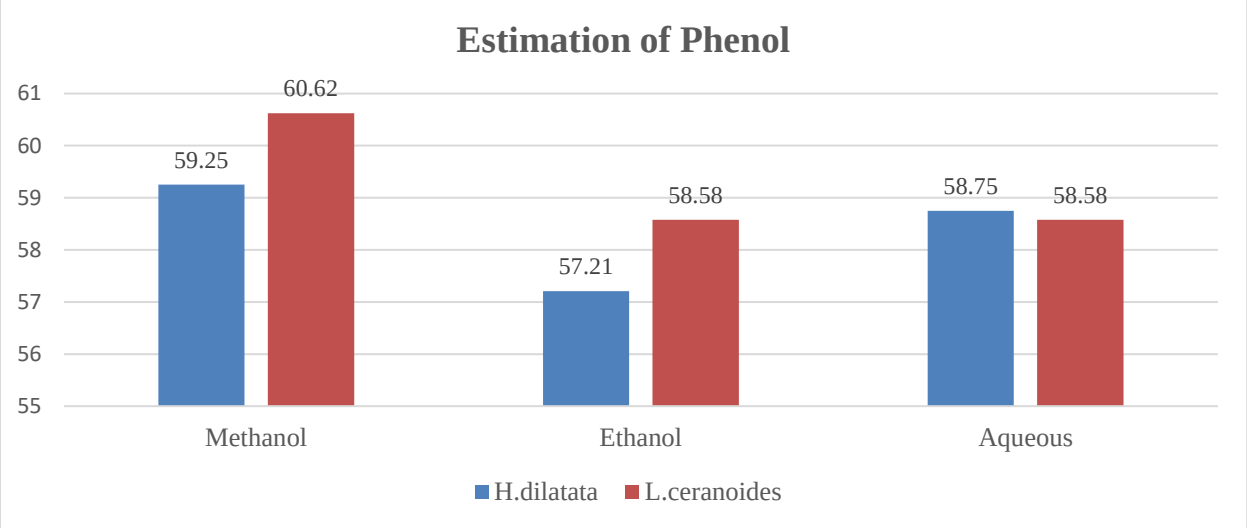
Estimation of Lipid from *H.dilatata* and *L.ceranoides* extracts

S.No	Methanol	Ethanol	Aqueous
H.dilatata	2.16 ±0.03	1.90±0.01	1.86 ±0.03
L.ceranoides	2.17±0.04	1.86 ±0.03	1.18 ±0.03

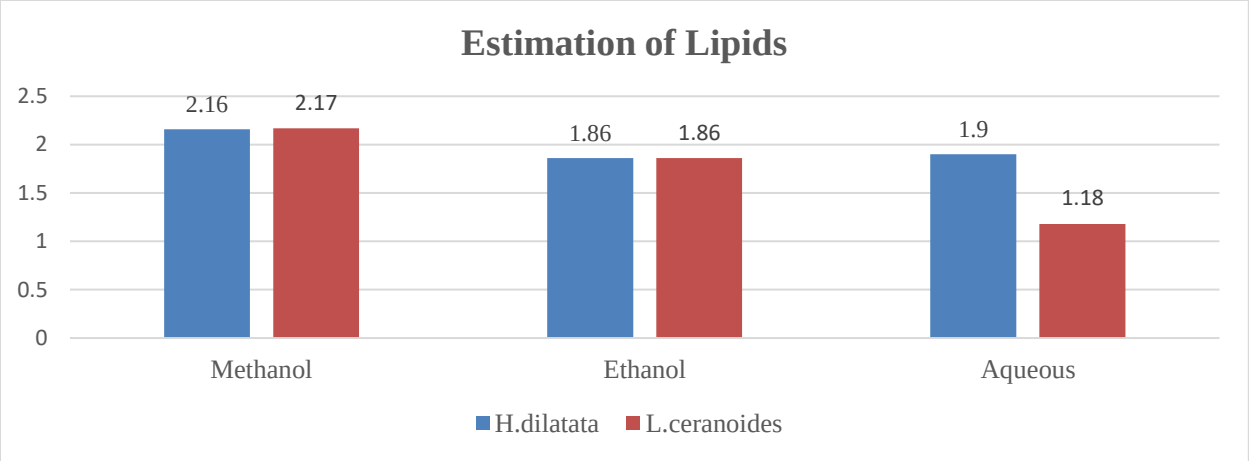
Estimation of carbohydrate from highest peak value of methanolic extract from *H.dilatata* and *L.ceranoides*



Estimation of protein from highest peak value of methanolic extract from *H.dilatata* and *L.ceranoides*



Estimation of protein from highest peak value of methanolic extract from *H.dilatata* and *L.ceranoides*



CONCLUSION

Studies on red algal extract showed highest value of lipids in methanolic extract followed by carbohydrates and protein. Aqueous extract of seaweeds showed lesser amount of biochemicals, These biochemicals are more significant which might fetch a high price on the market. Total biochemical studies in seaweeds becomes significant for further analysis of seaweed potentials both in pharmacology and in industry. The extract counterparts with anticancer and antifouling studies. They can also used as food, feed and nutrient supplements which can be used as ready source of dietary supplements.

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