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EXTRACTION OF ANTI DIABETIC AND CYTOTOXICITY POTENTIAL COMPOUNDS FROM *ULVA LACTUCA* SEAWEED.

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ABSTRACT

AIM:The aim of this study is to investigate the extracting methods for isolating bio active compounds with anti diabetic properties from *Ulva lactuca* sea weed.

INTRODUCTION:*Ulva lactuca*, commonly known as sea lettuce, is a green macroalgae that belongs to the family Ulvaceae. It is widely distributed in marine environments around the world. This seaweed species has gained significant attention in recent years due to its potential as a source of bioactive compounds with various pharmacological properties.

MATERIALS AND METHODS:

Seaweed samples will be collected from a suitable coastal location, and proper preparation methods will be employed to ensure the preservation of its chemical integrity. Different solvent systems, such as ethanol, methanol, and water, will be used to extract the bioactive compounds from *Ulva lactuca*.

RESULTS:

The extract of the green seaweed exhibited significant inhibition with alpha glucosidase and alpha amylase when compared to the standard anti-glycation drug:aminoguanidine.The GC-MS analysis confirms the presence of bio active compounds like Ethyl 13 methyl tetradecanoate

DISCUSSION:

The antidiabetic activity of seaweeds might be due to the presence of different phytochemical compounds such as polyphenols which bind to the active sites of the diabetic enzymes and alter their catalytic activity, so that correlated to the antioxidant activity.

RESULTS:

The seaweed *Ulva lactuca* shows ability as a source of cytotoxic and anti-diabetic chemicals. These bioactive chemicals must be extracted and evaluated utilising a number of procedures, such as solvent-appropriate extraction, biological tests, and chemical characterisation.

KEY WORDS: Anti diabetic,Cytotoxicity,Ulva lactuca,sea weed,

INTRODUCTION:

In the realm of natural products, the marine environment has proven to be a prolific source of bioactive compounds with diverse medicinal properties. (1)Among the treasures hidden beneath the waves, *Ulva lactuca*, a common green seaweed known as sea lettuce, has recently emerged as a promising candidate for its remarkable biochemical composition and potential health benefits.(2) This unassuming marine organism has piqued the interest of researchers due to its potential to yield compounds capable of addressing two pressing global health concerns: diabetes mellitus and cancer.(3)

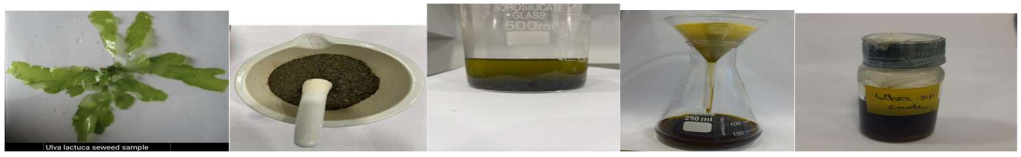
Ulva lactuca, a member of the Ulvophyceae class, thrives in coastal waters worldwide and plays a crucial role in marine ecosystems. However, it is not merely an ecological cornerstone; it is a reservoir of bioactive molecules, including polysaccharides, polyphenols, and secondary metabolites, that exhibit a wide range of biological activities.(4) Of particular note is its potential to combat diabetes and cancer, making it a tantalizing subject of investigation.Diabetes mellitus, a chronic metabolic disorder characterized by persistent hyperglycemia, poses a significant public health challenge. Traditional medicine and natural remedies have long been explored for their potential to manage this condition effectively.(5) *Ulva lactuca* has recently emerged as a potential source of anti-diabetic agents, as its bioactive constituents demonstrate the ability to regulate glucose metabolism and enhance insulin sensitivity.(6)

Conversely, cytotoxicity refers to the capacity of a substance to induce cell death, with particular relevance to cancer cells. The search for novel anti-cancer agents from natural sources has gained

considerable momentum due to their potential to mitigate the adverse effects associated with conventional cancer therapies.(7)Preliminary studies have indicated that *Ulva lactuca* harbors intriguing cytotoxic properties against various cancer cell lines, thus igniting interest in the field of oncology research.(8)

This study aims to shed light on the bioactive compounds present in *Ulva lactuca* and their potential as sources of anti-diabetic and cytotoxic agents. It will delve into the underlying molecular mechanisms responsible for these effects and assess the feasibility of harnessing Ulva lactuca as a valuable reservoir of natural compounds for the development of anti-diabetic medications and cancer therapies.(9) Furthermore, it underscores the importance of sustainable harvesting practices and marine conservation efforts to ensure the continued availability of this marine resource for future pharmaceutical applications and research endeavors.(10)As we embark on this exploration, we open the door to a world of possibilities where sea lettuce might hold the key to addressing some of humanity's most pressing health challenges.(11)

MATERIALS AND METHODS:



Ulva lactuca **Powdered sample** **Preparation of Crude extract** **Crude extract**

Seaweed sample **Filtration**

Ulva sp.sea weed is used in this study is collected from Chennai marine water.

(A)Washed the seaweed with distilled water and allowed to dry at 60 degree Centigrade in hot air oven.

(B)Followed with plant powder preparation.

©Crude extract of plant material that is lactuca seaweed is prepared. 50gm of powered material is added with 200 mL of 70% ethanol.Placed in orbital shaker with 1000 rpm for 2 days and filtered the extract and Heated for 60 degree Centigrate and prepared the crude extract.

CYTOTOXIC ASSAY:.500µL of serum free medium incubating the cells in serum free medium for 3 hours at 37C.Cells were treated with seaweed extract in different concentrations for 24 hours then the intensity of colour developed was assayed using a micro ELISA plate reader at 570nm. 250 µL of each extract were added to 250 µL of 1 mM phosphate buffer (pH 7.3 with 30 mM CaCl2) containing 0.5 mg/mL α-amylase (porcine pancreatic alpha-amylase Sigma, St. Louis, USA) then, the solution was incubated for 10 min at 25 °C. After incubation, 250 µL of 1% soluble starch solution in 1 mM phosphate buffer (pH 7.3 with 30 mM CaCl2) were added and incubated

again at 25 °C for 10 min. The reaction was shut-off by adding 500 µL of dinitrosalicylic acid color reagent.

The isolated compounds will be evaluated for their anti-diabetic potential using in vitro assays, such as glucose uptake studies and α-amylase inhibition assays. Promising compounds will be further assessed in animal models of diabetes to understand their effects in a more physiological context.

RESULTS

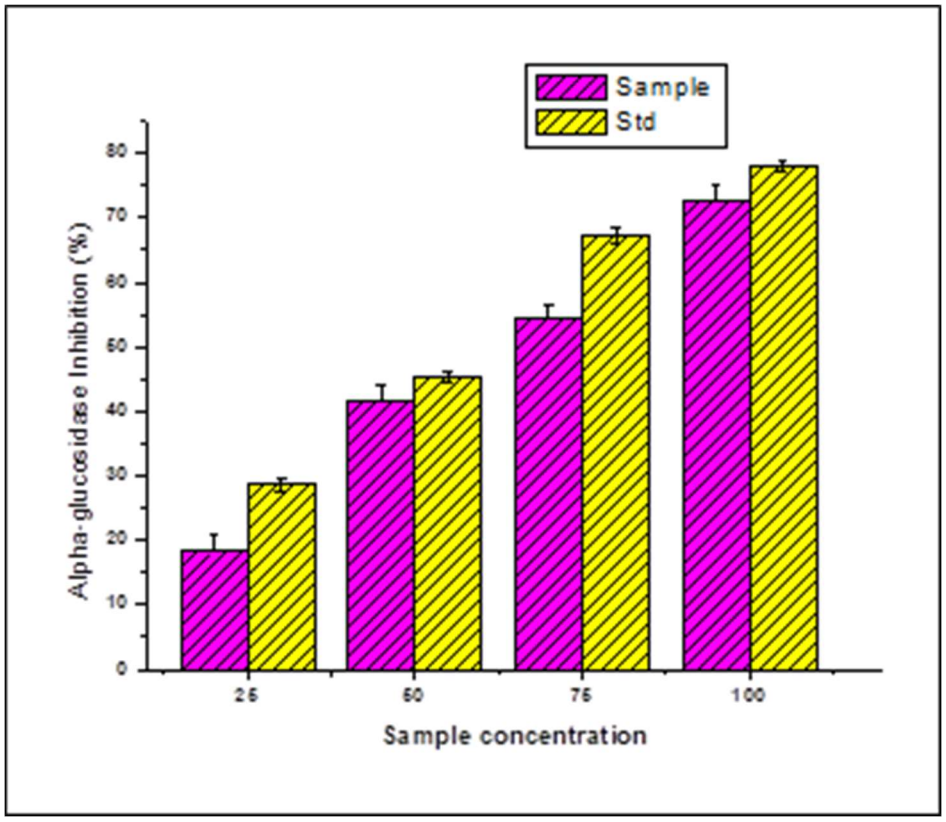


Fig 1Alpha glucosidase inhibition

Alpha-glucosidase Inhibition (%)				
α-G	Sample	St.Er	Control	St.Er
25	18.25	2.5	28.7	1.1
50	41.73	2.4	45.3	0.8
75	54.28	2.1	67.2	1.2
100	72.57	2.7	78.1	0.9

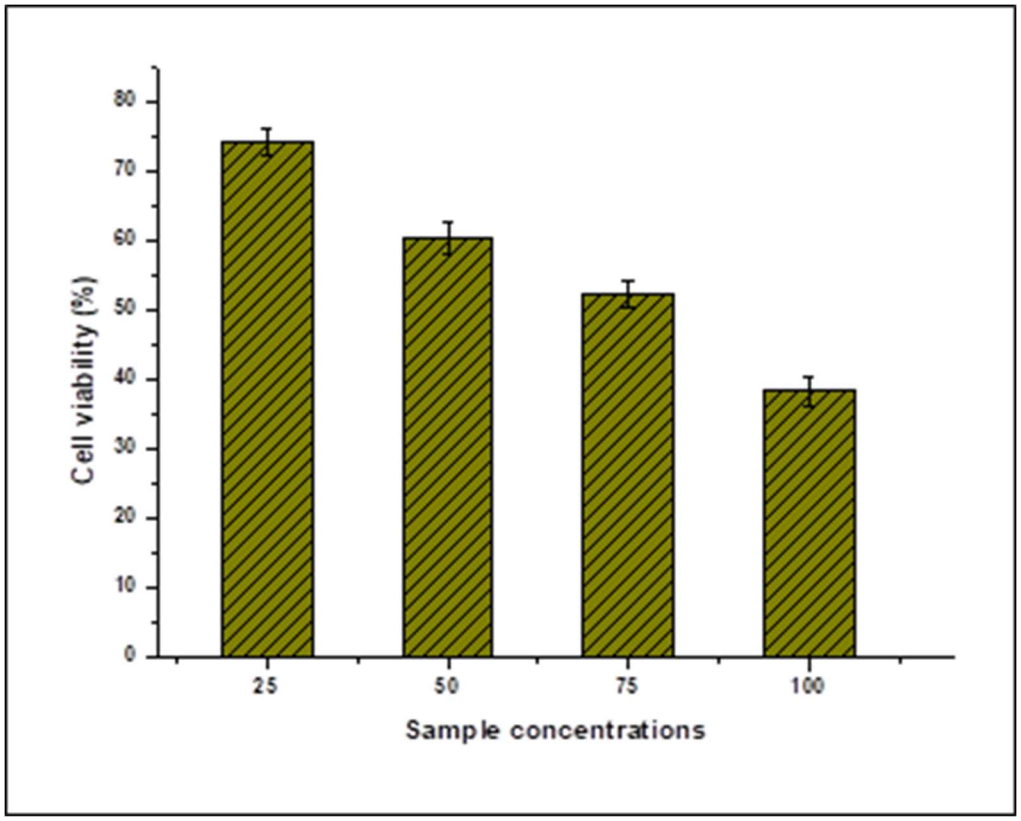


Fig 2 Cytotoxicity activity -MTT assay against MCF cell line(Breast cancer)

Sample concentration µg/ml	of cell viability	SE
25	74.2	1.8
50	60.4	2.2
75	52.3	2
100	38.4	2.1

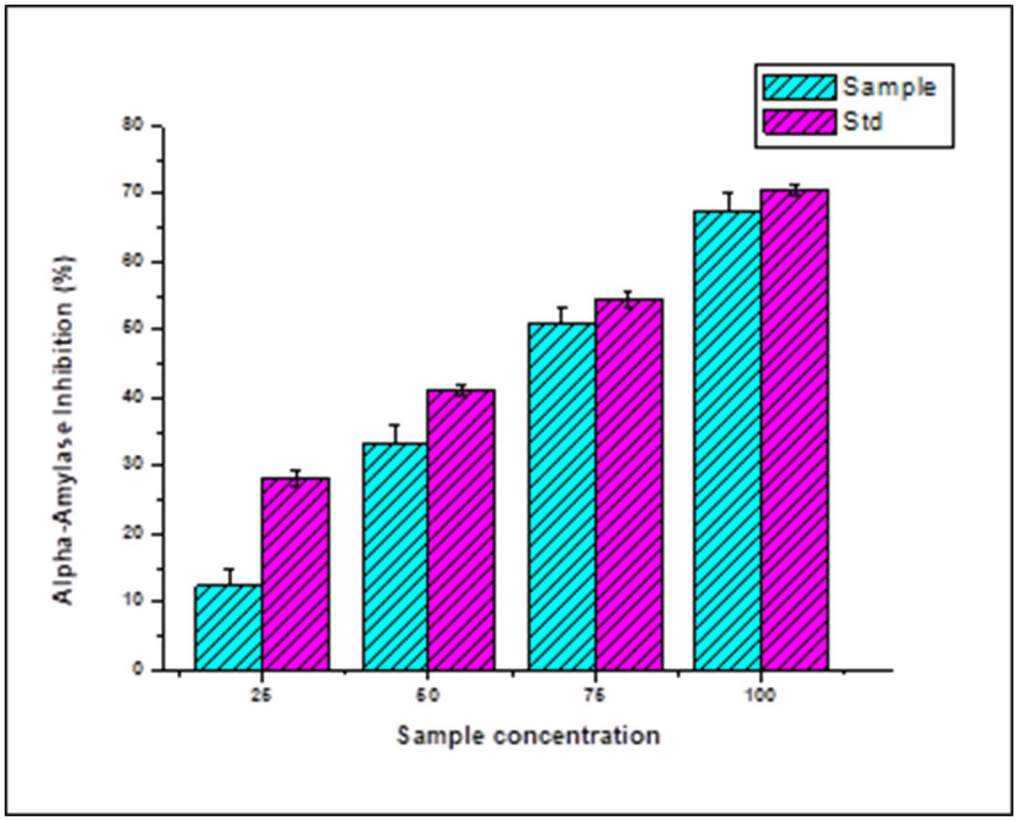
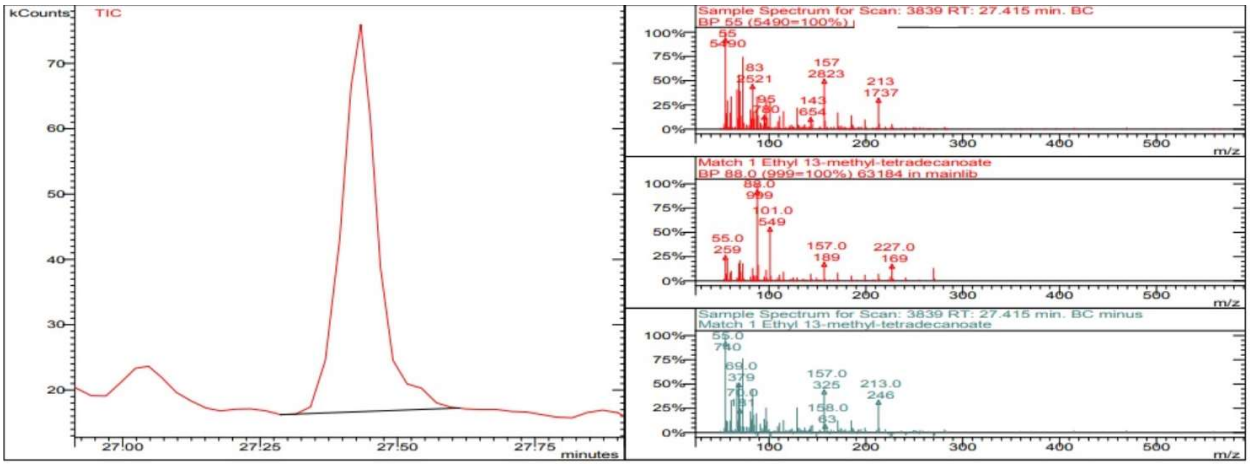


Fig 3 Alpha Amylase Inhibition

Anti diabetic activity				
Alpha-Amylase Inhibition (%)			µg/mL	
	%			
α-A	Sample	St.Er	Control	St.Er
25	12.37	2.3	28.2	1.1
50	33.41	2.7	41.2	0.8
75	50.92	2.2	54.4	1.2
100	67.53	2.5	70.5	0.9



GC-MS Analysis

The extract of the green seaweed exhibited significant inhibition with alpha glucosidase and alpha amylase when compared to the standard anti-glycation drug:aminoguanidine.The GC-MS analysis confirms the presence of bio active compounds like Ethyl 13 methyl tetradecanoate.

DISCUSSION:

The antidiabetic activity of seaweeds might be due to the presence of different phytochemical compounds such as polyphenols which bind to the active sites of the diabetic enzymes and alter their catalytic activity, so that correlated to the antioxidant activity. (12)The same correlation was observed in this study where the acetone extract of *Ulva lactuca* had the highest phenolic content between the other tested seaweeds.*Ulva lactuca* and its anti diabetic potential has been conducted in laboratory setting or in animal models.(13)Human clinical trials are still limited,and more research is needed to determine the optimal dosage,safety,and long term effects of *Ulva lactuca* as an anti diabetic intervention. Several studies have focused on the extraction of anti diabetic compounds from *Ulva lactuca*.The sea weed contains various bioactive components such as polyphenols,polysaccharides,and peptides that have shown promising anti diabetic activity.

CONCLUSION:

The seaweed *Ulva lactuca* shows ability as a source of cytotoxic and anti-diabetic chemicals. These bioactive chemicals must be extracted and evaluated utilising a number of procedures, such as solvent-appropriate extraction, biological tests, and chemical characterisation. New therapeutic drugs for the management of diabetes and the treatment of cancer may be developed as a result of additional study in this area.

CONFLICT OF INTEREST:

No conflict of interest

ACKNOWLEDGMENTS:

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DURATION OF THE STUDY:

The study was conducted for 3 months

ETHICAL CLEARANCE NUMBER:

As it's an in vitro study ethical clearance number is not required

SOURCE OF FUNDING:

The funds required for this study was proposed by Sri Sri dental specialities.

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