



Studies on phytochemical and antibacterial potential of *Cymodocea serrulata*

B Meena*, K Durgadevi, V Ramamurthy

Department of Biochemistry, Marudupandiyar College, (Affiliated to Bharathidasan University), Tiruchirappalli, Tamil Nadu, India

Abstract

The current review was intended to assess the antibacterial and anti-inflammatory capability of three different concentrate of *Cymodocea serrulata*. The concentrate of the seagrass were tried against *Streptococcus bovis*, *Staphylococcus aureus*, *Escherichia coli*, *Salmonella typhi*, *Chlamydia pneumoniae* and *Helicobacter pylori* by agar strategy. The calming action of *C. serrulata* was finished by protein denaturation strategy. Phytochemical screening uncovered the presence of carbohydrates, decreasing sugars, alkaloids, saponins, phenolic mixtures and flavonoids in fluid seagrass remove. The consequences of the current review infer that the concentrated on plant has expansive range antibacterial and cell reinforcement properties and may go about as a strong cancer prevention agent for organic systems helpless to free extremist interceded responses.

Keywords: *Cymodocea serrulata*, seagrass extract, anti-inflammatory, antibacterial activity, phytochemical activity

Introduction

Regular items have been a significant asset for the support of life for a very long time. Some life-saving medications are made from plants. The plant kingdom offers an endless source of regenerating plants that were originally used in their raw structure, such as natural tea, syrup, prints, treatments, mucous membranes and powders. Natural remedies and selected recipes are used around the world, and in the past, herbs have always been the primary source of most medicines. Marine species are known to produce a myriad of different auxiliary metabolites (Sundaram Ravikumar *et al.*, 2011) [22, 27]

Seagrasses, a gathering of marine blossoming plants, possess the flowing and sub-flowing zones of shallow and protected areas of oceans, inlets, bayous, backwaters, tidal ponds, and estuaries along mild and tropical shorelines of the world (Green and Short, 2003; Short *et al.*, 2001) [12, 26]. With somewhere around 72 species and 13 genera, seagrasses assume key environmental parts in fisheries creation, residue amassing, and adjustment (Ronnback *et al.*, 2007) [24] and have direct worth to humankind as food, feed, green fertilizer, and medication (Newmaster *et al.*, 2011; Ragupathi *et al.*, 2013) [17, 20]. Phytochemical examinations of seagrass species have shown that they are likely wellsprings of cell reinforcements (Ragupathi *et al.*, 2010; Rengasamy *et al.*, 2011) [19, 23]. Antibacterial, antifungal and mitigating specialists (Puglisi *et al.*, 2007 and Yuvaraj *et al.*, 2012) [18, 31] and wellspring of anticancer mixtures (Folmer *et al.*, 2010). The current review the antiinflammatory of significant seagrasses (*Cymodocea serrulata*) of Thanjavur, Tamilnadu, India, alongside an assessment of phytochemical and antimicrobial movement.

Materials and Methods

Sample Collection

Sea grasses examples will be gathered from Thanjavur region, east costal of TamilNadu. The sea grasses were recognized by standard as per their morphologies (Menez *et al.*, 1983 and Coles *et al.*, 2004) [15, 3]. Wet sea grasses species will be first washed with sea water to eliminate the garbage like sand, sea shells, bits of wood and minuscule stones.

It will be conceal dried for 24 hours and afterward at long last dried in a plate drier at 60°C to eliminate the water content. Dry green growth acquired will be finely slashed into pieces and afterward ground into fine powder utilizing mortar and pestle. Microwave drying makes the drying system quicker with practically no corruption of cell parts.

Preparation of extract

For extraction, various solvents, for example, methanol, ethanol and chloroform were added to 100 g of powdered leaves independently and put in Soxhlet device for 24 h. The concentrates were separated with what man 40 channel paper and afterward focused utilizing a rotating evaporator to bring about a semi-strong mass. Every dissolvable extraction strategy was rehashed threefold with the end goal of exactness. The build ups acquired were put away in cooler for additional investigation.

Phytochemical Screening

Subjective phytochemical screenings have been executed making use of preferred structures (Sofowora, 1993; Trease and Evans, 1989) [28, 29]. The event of phytochemicals within the unrefined concentrates of *Cymodocea serrulata* nevertheless up in the air.

Screening of Antibacterial Activity

Antibacterial action of the *Cymodocea serrulata* was tried utilizing the agar dispersion technique depicted by Collin and Lyne (1970) [4]. The concentrates were tried for the antibacterial action against the six bacterial species, for example, *Streptococcus bovis*, *Staphylococcus aureus*, *Escherichia coli*, *Salmonella typhi*, *Chlamydia pneumoniae* and *Helicobacter pylori*. *Cymodocea serrulata* were ready and tried utilizing Nutrient agar medium. The plates were hatched at 37°C for 24 hours and the zones of restraint estimated.

Anti-inflammatory activity

Mitigating movement of the seagrass not entirely set in stone by in vitro strategy like protein denaturation (Mizushima *et al.*, 1968, Elias and Rao, 1988) [16, 7].

Result and Discussion

Preliminary Phyto-chemical Screening

Phytochemicals have been interrupted subjectively by comprising standard conventions in various dissolvable concentrates of marine grasses or sea grasses. The protein, diminishing sugar, phenol, tannins, amino corrosive and steroids were found in every one of the concentrates. The flavonoids, anthraquinones and terpenoids were available in methanol and chloroform removes. Tanins, amino acids, alkaloids, steroids and phenol were available in the ethanol concentrate of *C.serrulata*. The saponins, resin and glycosides were available just in the methanol concentrates of sea grass *C.serrulata*.

That is consistent with the discoveries of Ragupathi *et al.* (2013a) [21] who had introduced the subjective investigation of the above phytoconstituents inside the methanolic concentrates of 5 seagrasses like *Enhalus acoroides*, *Thalassia hemprichii*, *Halodule pinifolia*, *Cymodocea serrulata* and *Cymodocea rotundata* from Chinnapallam shore of Tamil Nadu. Athiperumalsami *et al.* (2008) [2] screened 4 seagrasses, for instance, *Halophila ovalis*, *S. isoetifolium*, *C. serrulata* and *H. pinifolia* and unique 15 phytochemicals from benzene and oil ether listen of *S.isoetifolium* accrued from Gulf of Mannar. The after effects of the contemporary overview is also in accordance with the effects of Girija *et al.* (2013a) [11] who discovered the presence of ten phytoconstituents inside the methanol concentrates of *C. serrulata* amassed from the review site.

Table 1: Qualitative phytochemical analysis for the extracts of *C.serrulata*

| Sl. No | Phytochemicals | Solvents | | |
|--------|----------------|----------|---------|------------|
| | | Methanol | Ethanol | Chloroform |
| 1 | Proteins | + | + | + |
| 2 | Resins | + | - | - |
| 3 | Tannins | + | + | + |
| 4 | Saponins | + | + | + |
| 5 | Flavonoids | + | + | + |
| 6 | Alkaloids | + | + | + |
| 7 | Amino acids | + | + | + |
| 8 | Steroids | + | + | + |
| 9 | Reducing sugar | + | + | + |
| 10 | Glycosides | + | + | + |
| 11 | Anthraquinones | + | - | + |
| 12 | Terpenoids | + | + | + |
| 13 | Phenol | + | + | + |

Antibacterial analysis

The zone of restriction assessed for organisms using commendably scattering methodology. The antibacterial examination (Table 2) showed a remarkable activity against the clinical pathogenic microorganisms with different concentrate of *C.serrulata*. The best development diverged from the control shows the ability of the seagrass and is a pointer for choosing the importance of the activity against the organisms. The overall antibacterial examination uncovers most prominent against the *H. pylori* and least development was noted against the *E.coli*. By and large insight uncovers that the seagrass has inhibitory development against all of the microorganisms mulled over. *C.serrulata* is a normal wellspring of far reaching range antibacterial experts due to the presence of flavonoids, which have been represented to be locked in with limitation of nucleic destructive biosynthesis and other metabolic cycles (Cushnie and Lamb, 2005) [5].

A portion of the seagrasses have been utilized in conventional medication for instance in India for intestinal sickness, skin diseases and the beginning phase of uncleanliness (Kumar *et al.*, 2008) [2]. A few concentrates additionally have antibacterial action (Engel *et al.*, 2006; Ross *et al.*, 2008 and Ravikumar *et al.*, 2011) [8, 25, 11].

During the significant stretch of co-advancement, a helpful relationship has been shaped between each endophyte and its host plant. Some endophytes can deliver comparative bioactive mixtures to those that start from their earthbound host plants (Zhao *et al.*, 2011) ^[32].

Table 2: Antibacterial activity of *C.serrulata* extract against pathogens

| Pathogens | Crude extracts (Zone of inhibition-mm) | | | Standard |
|------------------------------|--|-------------|-------------|-------------|
| | Methanol | Chloroform | Ethanol | |
| <i>Staphylococcus aureus</i> | 17.5 ± 0.22 | 11.2 ± 0.18 | 13.5 ± 0.21 | 17.9 ± 0.62 |
| <i>Streptococcus bovis</i> | 15.7 ± 0.38 | 10.6 ± 0.21 | 12.2 ± 0.14 | 16.2 ± 0.18 |
| <i>Escherichia coli</i> | 12.9 ± 0.12 | 09.2 ± 0.12 | 10.6 ± 0.25 | 13.8 ± 0.25 |
| <i>Salmonella typhi</i> | 17.1 ± 0.32 | 11.5 ± 0.17 | 13.9 ± 0.32 | 15.2 ± 0.15 |
| <i>Chlamydia pneumoniae</i> | 15.6 ± 0.25 | 10.3 ± 0.24 | 12.1 ± 0.13 | 16.8 ± 0.22 |
| <i>Helicobacter pylori</i> | 19.5 ± 0.18 | 14.4 ± 0.15 | 16.9 ± 0.25 | 21.7 ± 0.29 |

Each value is the Mean ± SD of three replicates

Anti-inflammatory activity

The level of protein denaturation for diclofenac concentrate and standard drug was performed independently at 100 µg/mL, 200 µg/mL, 300 µg/mL, 400 µg/mL and 500 µg/mL as indicated in Table 3 showing minimal change of 21.8% at 100 µg/mL and the most outrageous change of 35.3% at 500 µg/mL shown in Table 3. Diclofenac sodium was used as the standard. Synthetic lysosomal compounds were transferred during the exacerbation, causing a number of problems, and these proteins must be associated with extreme or unrelenting discomfort. Diclofenac drugs work by controlling these synthetic lysosomal junctions or compensating for the lysosomal layer. The concentrates of the sea grasses of *C.serrulata* showed biphasic effects for the protein denaturation process. In the present review, the results show that methanolic concentrates of *C. serrulata* have calming properties in vitro in certain models such as containment of protein denaturation, 5LOX, COX and ROS. Aggravation, which is an extremely puzzling pathophysiological reaction, includes the creation of free revolutionaries obtained from neutrophils, NO, ROS, cytokines and prostaglandins upon its interaction (Mannan *et al.*, 2008).

Protein denaturation is the cycle by which proteins lose their tertiary design and optional construction. Protein denaturation is one of the recorded causes of irritation (Anoop and Bindu, 2015) ^[1]. In several inflammatory and hypersensitive problems, COX and 5LOX are the fundamental proteins of the mixture of prostanoids and eicosanoids from unsaturated polyunsaturated fats. The possible decrease in constant provocative circumstances is significant for the double containment of LOX and COX (De Gaetano *et al.*, 2003) ^[6]. substances in shape for creating twofold restraint of COX and five-LOX with next big decrease in leukotriene and prostaglandin introduction produce a wide range of mitigating motion and can be taken into consideration to have a remarkable profile of pharmacological safety in scientific practice (Frey and Meyers, 2010) ^[10]. The *C.serrulata* shows least adjustment 21.8% at 100µg/ml and best adjustment 35.3% at 500µg/ml which become introduced in desk 3. % restraint of protein denaturation motion turned into shown primarily based on fixation subordinate way. Sodium diclofenac became applied as a norm. all through infection the lysosomal catalysts is added which created an collection of issues and those proteins is meant to be linked with excessive or ongoing aggravation. The diclofenac tablets act either via hindering these lysosomal proteins or by way of settling the lysosomal layer. those outcomes are legitimized by using the way that combinations, as an instance, betulinic corrosive disconnected from *D. thollonii* have an in vitro restraint belongings of cyclooxygenase (COX-1 and COX-2) and leukotriene B4 development intervened by 5-LOX (Wenzig *et al.*, 2008) ^[30].

Table 3: Anti-inflammatory activity of *C.serrulata*

| S. No. | Concentration (µg/ml) | % inhibition of protein denaturation | | |
|--------|-----------------------|--------------------------------------|-------------|-------------|
| | | Methanol | Ethanol | Chloroform |
| 1. | 100 | 20.5 ± 0.03 | 19.2 ± 0.14 | 18.3 ± 0.16 |
| 2. | 200 | 22.4 ± 0.15 | 21.7 ± 0.23 | 20.5 ± 0.32 |
| 3. | 300 | 26.1 ± 0.21 | 24.3 ± 0.12 | 23.1 ± 0.18 |
| 4. | 400 | 30.5 ± 0.18 | 28.6 ± 0.26 | 27.2 ± 0.25 |
| 5. | 500 | 34.8 ± 0.39 | 32.4 ± 0.18 | 30.9 ± 0.12 |
| 6. | Standard | 74.2 ± 0.16 | 70.8 ± 0.25 | 68.5 ± 0.22 |

Each value is the Mean ± SD of three replicates

Based on the outcomes acquired in the current review, it is presumed that methanol concentrate of *C.serrulata* has strong mitigating and antibacterial exercises.

Accordingly the *C.serrulata* concentrate might be credited to the presence of phenolic mixtures and flavonoids and so on, hence, further examination is expected to segregate and recognize the dynamic mixtures present in the plant extricate and its viability.

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