Original Article

Evaluation Of Bioactive From Marine Brown Algae Sargassumilicifolium For Antiulcer Activity Using Isolatedchicken Stomachmodel -An Alternative Approach

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Abstract

Sargassumilicifolium, family Phaeophyceae, commonly known as brown algae,the most interesting phyla with respect to pharmacological active compounds. The ethno -medicinal uses of Sargassumspecies have been reported on chronic gastric ulcer, lump, dropsy, painful scrotum, and urination problems. A number of pharmacological activities have been reported for Sargassum sp. viz antitumor, cytotoxic,anthelmintic, anticoagulant, hepatoprotective effects and inhibition of enzymes like DNA polymerase& xanthine oxidase.

Based on these ethno-botanical clues, the present study is to evaluate the bioactivity screening of crude sulphated polysaccharide from marine brown algae S.ilicifolium for its antiulcer activity using isolated chick stomach model. Since there is restriction of usage of animals, there is a need for an alternative approach to explain the action of drug. Hence an attempt was made to find and explain the antiulcer activity using isolated gizzard and proventriculus (stomach) from Gallus gallusdomesticus (Chicken) obtained from slaughter house.

Antiulcer activity was evaluated by inducing ulcer with 0.1N HCl in isolated gizzard and proventriculus from chick using Omeprazole -400µg/ml as standard and crude sulphated polysaccharide fromSargassumilicifolium (400µg/ml) as test. There was a significant reduction in ulceration of the isolated proventriculus tissue from Gallus gallus which was administered with crude sulphated polysaccharide (SPS) and Omeprazole when compared to control which showed a complete damage of the proventriculus. **It has been concluded that on comparsion with standard and control, crude sulphated polysaccharide from Sargassumilicifoliumshowed antiulcer activity at moderate dose.**

KEY WORDS: 0.1N HCl, gizzard, Crude sulphated polysaccharide, antiulcer activity.

Introduction:

Brown alga is one of the most interesting phyla with respect to pharmacological active compounds. The ethnomedicinal uses of Sargassum sp. have been reported form Vietnam,China and Korea. It is used for chronic gastric ulcer, lump, dropsy, swollen and painful scrotum, and urination problems. In India, Sargassum sp. is used for the treatment of goiter. A number of pharmacological activities is reported for Sargassum sp. vizantitumor,analgesic and anti-inflammatory activity, cytotoxic antioxidant, anthelmintic, anticoagulant, antibacterial antifungal, hepatoprotective effects and inhibition of DNA polymerase and xanthine oxidase.Due to restriction of animal usage, An alternative approach using isolated gizzard and proventriculus (stomach) from Gallus gallusdomesticus (Chicken) obtained from slaughter house was used to explain the antiulcer effect of the bioactive isolated from Sargassumilicifolium.Brown algae like Sargassum sp. and Fucus sp. can be used to extract fucoidan, a sulfated polys accharide that is high in fucose.[1-3]

Fucoidan and alginic acid are the two primary compounds that brown algae can now extract.
Numerous research has been conducted recently on fucoidan, mostly to assess its potential bioactivity, which might i nclude usage as an anticancer drug, an antioxidant, an antiinflammatory medicine, an anticoagulant, an antiviral age nt, and an immune system regulator.
The findings of this study demonstrate that fucoidan has biomedical uses in addition to its original biological activity . Since Taiwan is an island nation surrounded by crystalclear saltwater, there are a lot of brown algae in the intertidal zone that may be harvested for extraction in the spring.
Uronic acid, galactose, xylose, mannose, rhamnose, glucose, and fucose are also components of the chemical compo sition of fucoidan[4].Based on these ethnobotanical cues, the current study aims to assess the bioactivity screening of marine brown algae S. ilicifolium methanolic extract for its analgesic and anti-
inflammatory activity in laboratory animals. Brown algae are one of the most interesting phyla with respect to phar macological active compounds, and have been extensively investigated in the last decade[5-8].Marine macroalgae, often known as seaweeds, are found along the shore between high tide and low tide as well as in the subtidal zone up to a depth where 0.01% photosynthetic light is present.Marine macroalgae have established a prospective relevance in the biomedical field, mostly due to the bioactive chemicals their contain.A wide spectrum of pharmacological characteristics, including anticancer, antiinflammatory, antibacterial, antiviral, antioxidant, hypo glycemic, hepatoprotective, and neuroprotective actions, are displayed by polysaccharides, terpenoids, phlorotanins, fucoidans, sterols, and glycolipids.
In addition, several sea creatures and marine macroalgae appeared to have the potential to yield novel pharmaceutica ls for the treatment of neurological illnesses[9].
Compared to manufactured drugs, marine flora is thought to have less negative side effects and higher efficacy beca use of its natural components and availability.With several aetiologies, ulcers are a serious gastrointestinal condition that affects 10% of the global population. The main causes of peptic ulcer, which include inflammation, mucosal bleeding, and abdominal discomfort in patients, are chronic alcohol use, smoking, excessive stress, chronic use of non-steroidal anti-inflammatory medicines, and H. pylori bacterial infection[10-12].

When the aggressives (acid, pepsin, bile salts, and Helicobacter pylori bacteria) are outnumbered by the gastroprotectives (mucus, bicarbonate, and prostaglandins), ulcers can form.The most modern treatment for peptic ulcers involves reducing the production of stomach acid, encouraging gastro-protection, preventing apoptosis, and promoting the proliferation of epithelial cells for efficient repair. Histamine receptor antagonists, prostaglandin analogues, proton pump inhibitors, cytoprotective agents, antacids, and anticholinergics are some of the conventional drugs used to treat ulcers, but most of these medications have negative side effects or interact with other medications when used repeatedly, and they may even change the body's biochemical processes in chronic cases. In the stomach, an imbalance between harmful and protective components frequently makes peptic ulcers worse[13].

The exogenous causes include excessive alcohol use, indiscriminate NSAID usage, stress, smoking, an

d Helicobacter pylori infection. The endogenous damaging agents in the stomach include HCl, pepsin, biliary reflux, lipid peroxidation, and the generation of reactive oxygen species (ROS). The mucusbicarbonate barrier, mucin prod uction, surface phospholipids, prostaglandins (PGs), nitric oxide (NO), mucosal blood flow, cell renewal, growth ho rmones, and antioxidant enzymes are examples of the protective components[14-17].

Alternatives that regulate acidic hypersecretion and its direct effects on the stomach mucosa are used i n effective treatments for peptic ulcers. Proton pump inhibitors (PPIs), which block the histamine type 2 receptor on parietal cells in order to prevent hydrogen ion release, and histamine type 2 receptor antagonists (H2RAs), which blo ck the receptor on parietal cells, are the two main classes of medications used to treat acidrelated disorders.PPI is on e of the most often given medications in the world, yet it has been linked to parietal cell hyperplasia of the gastric gl ands.

The development of negative side effects including gynecomastia and galactorrhea as well as changes i n the bacterial flora of the body are linked to long-term usage of H2RAs.
Furthermore, the numerous cytochrome enzyme interactions of these drugs can potentially have an impact on the the rapeutic concentrations of other drugs. Researchers are looking at different medical plants that might be a great sour ce for novel compounds that could be more safe, effective, and affordable due to the limits of the therapeutic agents already accessible, their interaction, and their side effects[18].

Objective

The present study is to evaluate the bioactive, Crude sulphated polysaccharide from marine brown algae Sargassumilicifolium for its antiulcer activity using 0.1N HCl induced ulcer in isolated chick gizzard and proventriculus model- an alternative approach.

Experimental method:

EXTRACTION OF CRUDE SULPHATED POLYSACCHARIDE:

The extraction of polysaccharide from the marine brown algae was carried out according to the method described by Takoet al with some modifications. 10 g of dry algae was suspended in 200 mL of 0.05 M Hcl and stirred at room temperature for 2 h. Then centrifuged at 3575 rpm for 20 min and the supernatant filtered. The filtered fraction was then neutralized with 0.5 M NaOH and the crude polysaccharide precipitated in two volumes of ethanol. After concentration in a rotoevaporator, the Crude Sulphated polysaccharide was freezedried**.**

GROUPING :

Group 1 (Control) : 0.1N HCl (5ml)+ vehicle

Group 2 (Test) : 0.1N HCl (5ml)+ Crude sulphated polysaccharide(SPS)(400µg/ml)

Group 3 (Standard) :0.1N HCl (5ml)+ Omeprazole (400µg/ml)

0.1N HCl INDUCED ULCER MODEL:

The gizzard and proventriculus were isolated from Gallus gallusdomesticus and placed in tyrode solution with continuous aeration . The posterior end of the gizzard was tied with suture thread and through the anterior end of the proventriculus the test, standard and control were given, and kept undisturbed with continous aeration for 8 hours for ulcer formation.

The tissue were taken out of the tyrode solution after 8 hours and washed. The tissue were given a mid -line incision and the content of the gizzard were emptied. The inner walls of the tissue was pinned to the disection board , and checked for the ulceration in both control and drug treated tissue and displayed[19] .

Result and Discussion:

The primary function of the proventriculus is to secrete hydrochloric acid and pepsinogen into the digestive compartments that will churn the ingested material through muscular mechanisms. Pepsinogen produces pepsin, which breaks the peptide bonds found in amino acids. The muscle contractions of the gizzard push material back into the proventriculus, which then contracts to mix materials between the stomach compartments. This transfer of digested material can occur up to 4 times per minute, and the compartments can hold the stomach contents for thirty minutes to an hour.

The gastric mucosa is continuously exposed to noxious agents(HCl)and the maintenance of its integrity is ensured by a complex defense system, involving mucus and bicarbonate secretions, modulation of pH, gastric microcirculation, antioxidant factors, PG generation, NO and H2S release, and HO-1 pathway induction. The pathogenesis of HClinduced gastric ulcer involves direct necrotizing action, mitigation of defensive factors, such as the secretion of bicarbonate and production of mucus, depletion of antioxidant defense, increased oxidative stress, such as free radicals formation and lipid peroxidation, and changes in permeability of mitochondrial membrane prior the increased cell death by apoptosis.

Present Studies have shown that SPS that is extracted from seaweed exhibited a potential therapeutic effect for ulcer and related gastromucosal disorder. However, studies correlating the gastroprotective action of this polysaccharide are scarce in the literature. In this study,theproventriculus treated with crude sulphated polysaccharide (SPS) extracted from the marine alga S.ilicifolium showed the potential to antagonise the effect of HCl induced ulcer in this model.

Conclusion:

1. From the evaluation it can be concluded that Crude Sulphated Polysaccharide from Sargassumilicifolium (SPS) has potent antiulcer activity at moderate dose in comparison with the standard marketed drug Omeprazole at the same concentration.
2. This Alternative model using isolated Proventriculus from gallusgallusdomesticus can be effectively used to demonstrate as the preliminary screening model for antiulcer activity of the drugs. Further standardisation of the protocol is needed for deriving the mechanistic pathway.

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