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EVALUATION OF ANTIPYRETIC ACTIVITY OF METHANOL EXTRACT OF *ULVA RIGIDA* C.AG (GREEN SEAWEED) IN HARE ISLAND, THOOTHUKUDI, TAMIL NADU, INDIA

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ABSTRACT

The aim of the present study was to investigate the antipyretic activity of the methanol extract of *Ulva rigida* C.Ag. collected from Hare island, Thoothukudi, Tamil Nadu, India on albino mice. The antipyretic activity of *Ulva rigida* C.Ag. was studied in Brewer's yeast induced pyrexia on albino mice. Paracetamol (10mg/kg) was taken as standard drug. The various doses of methanol extract used are 200mg/kg and 400mg/kg body weight of *Ulva rigida* C.Ag. 400mg/kg methanol extract showed significant decrease in elevated body temperature while 200mg/kg methanol extract showed less effect. 400mg/kg methanol extract exhibited closely significant ($p<0.05$) decrease in elevated body temperature as compared to standard drug.

Keywords: Green seaweed, *Ulva rigida*, Antipyretic, Pyrexia, Paracetamol.

INTRODUCTION

Marine macro algae commonly referred to seaweeds are categorized by the pigmentation, morphology, anatomy and nutritional composition as red (Rhodophyta), brown (Phaeophyta) and green seaweeds (Chlorophyta). Seaweeds have important valuable medicinal components such as antibiotics, laxatives, anticoagulants, antiulcer products and suspending agents in radiological preparations [1]. Seaweeds have recently received much attention for the potential secondary metabolites. Most of the metabolites isolated from seaweeds have bioactive effects [2-3]. Seaweeds have a lot of phytoconstituents with functional properties including anticancer, hypocholesterolemic, anithelminthic substances and antimicrobial activities of seaweeds [4]. Seaweeds are considered to produce a great variety of secondary metabolites characterized by a broad spectrum of biological activities. Compounds with cytostatic, antiviral, antihelminthic and antifungal activities have been detected in green, brown and red algae [5-6].

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Pyrexia or fever is caused as a secondary impact of infection, malignancy or other diseased states. It is the body's natural defence to create an environment where infectious agent or damaged tissue can not survive [7]. Normally the infected or damaged tissue initiates the enhanced formation of pro-inflammatory mediator's (cytokines like interleukin 1a and TNF- a) which increase the synthesis of prostaglandin E2 (PGE2) near peptic hypothalamus area and thereby triggering the hypothalamus to elevate the body temperature [8]. As the temperature regulatory system is governed by a nervous feedback mechanism, so when body temperature becomes very high, it dilate the blood vessels and increase sweating to reduce the temperature; but when the body temperature become very low hypothalamus protect the internal temperature by vasoconstriction. High fever often increases faster disease progression by increasing tissue catabolism, dehydration and existing complaints as found in HIV [9]. Most of the antipyretic drugs inhibit COX-2 expression to reduce the elevated body temperature by inhibiting PGE-2 biosynthesis. Moreover, these synthetic agents irreversibly inhibit COX-2 with high selectivity but are toxic to the hepatic cells, golmeruli, cortex of brain and heart muscles, whereas natural COX-2 inhibitors have lower selectivity

with fewer side effects [10]. Among the various groups of seaweeds, Chlorophyceae members are present throughout the year. *Ulva rigida* C.Ag. is an important green seaweed shows much attention in the recent years due to native vegetation [11]. Therefore the present study was undertaken to investigate the antipyretic properties of methanol extract of *Ulva rigida* C.Ag. from Hare island, Thoothukudi in the south east coast of Tamil Nadu, India.

MATERIALS AND METHODS

Collection of Sample

Ulva rigida C.Ag. (Figure 1) is green seaweed belonging to Chlorophyceae member shows much attention in the recent years. *Ulva rigida* C.Ag. were collected from Hare island, Thoothukudi in the south east coast of Tamil Nadu, India during the month of January 2014. The collected plant samples were rinsed with marine water to remove debris and epiphytes. The entire epiphytes were removed using soft brush. The plants were brought to the laboratory. In the laboratory, the plants were once again washed in freshwater and stored in refrigerator for further analysis [12].

Preparation of methanol extract

For the preparation of extract, the collected plant specimens were washed thoroughly and placed on blotting paper and spread out at room temperature in the shade condition for drying. The shade dried samples were grounded to fine powder using a tissue blender. The powdered samples were then stored in the refrigerator for further use. 3g powdered sample was packed in Soxhlet apparatus and extracted with methanol for 8h separately. The excess amount of methanol was evaporated and fine methanol crude powder was prepared and stored in the refrigerator for the antipyretic activity [13].

Experimental animals

Swiss albino rats were weighing (150-240 gm) and male albino rats (15-18 gm) were procured from Venkateswara Enterprises, Bangalore, Karnataka, India. The animals were housed in the departmental animal house under standard conditions (26±2°C and relative humidity 30-35%) in 12 hours light and 12 hours dark cycle respectively for 1 week before and during the experiments. Animals were provided with standard rodent pellet diet and had free excess to water. The composition of diet is 10% protein, 4% *Arachis* oil, 1% fibers, 1% calcium, 1000 IU/gm vitamin A and 500 IU/gm vitamin D. All the animals were acclimatized to the laboratory conditions prior to experimentation. All the experiments were conduct between 10.00 and 17.00h and were in accordance with the ethical guidelines of the International Association for Study of Pain [14]. All experiments were carried out according to the guidelines for care and use of experimental animals and approved by Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA).

EXPERIMENTAL PROTOCOLS

Treatment was carried out as;

Group I: Control group animals Normal saline 5ml/kg
Group II : Paracetamol (10mg/kg) p.o.
Group III : 200mg/kg methanol extract p.o.
Group IV : 400mg/kg methanol extract p.o.

ANTIPYRETIC ACTIVITY

Yeast induced pyrexia method

A suspension of Brewer's yeast (15%) in saline (0.9%) was prepared. Four groups each containing 6 rats of either sex were taken. The thermocouple was inserted 2cm deep into the rectum and the rectal temperatures were recorded. The animals were fevered by injection of brewer's yeast suspension (10mg/kg) subcutaneously in the back below the nape of the neck. The sight of injection was massaged in order to spread the suspension beneath the skin. The room temperature was kept at 22-24°C. Immediately after yeast administration, food was withdrawn and the rise in rectal temperature was recorded. The measurement was repeated after 30 minutes. The dose of the test compound and standard drug was given orally. The rectal temperature was recorded again after 1, 2 and 4 hours. Paracetamol (10mg/kg) was selected as a standard drug. The various methanol extracts were dissolved in saline with the help of 2% w/v Gum acacia. The data were analyzed for significance using the unpaired two-tailed student's t-test [15-16].

RESULTS AND DISCUSSION

Antipyretic potential of methanol crude extract of *Ulva rigida* C.Ag. was evaluated by determining its effect on yeast-induced pyrexia in albino rats. The methanol extract of *Ulva rigida* C.Ag. provided the highest marked antipyretic activities which was also dose dependent. The result showed methanol extract of different doses caused lowering of the body temperature up to 4 hr following its administration. The effect of methanol extract on yeast-induced pyrexia showed that the rectal temperature was markedly elevated to 41.4°C, 18h after the subcutaneous injection of yeast suspension decreased to 39.2°C within 1 hr of methanol extract (400mg/kg) of *Ulva rigida* C.Ag. treatment respectively, and reduced till 4 hours showing a sizeable decrease and was comparable to paracetamol. At 200 and 400mg/kg marked anti-pyretic activity detected which were significantly different than the controls ($p<0.05$). Generally, for all concentration of methanol extract of *Ulva rigida* C.Ag. showed marked anti-pyretic activities. This result reveals that methanol extract of *Ulva rigida* C.Ag. have marked antipyretic activity as compare with standard paracetamol**.**

Plants have been the major source of drugs in Indian system of medicine and other ancient systems in the world. Earliest description of curative properties of medicinal plants is found in Rig-Veda, Charaka Samhita and Sushrusha Samhita give extensive description on

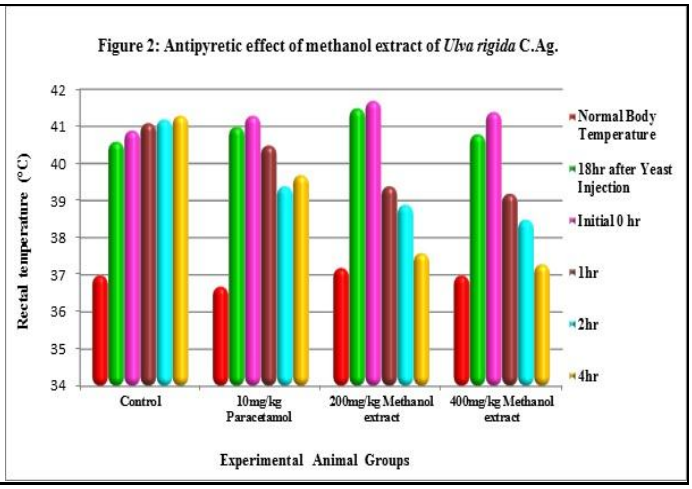
various medicinal herbs [17]. Information on medicinal plants in India has been systematically organized. India has an ancient heritage of traditional medicine. The materia medica of India provides a great deal of information on the folklore practices and traditional aspects of therapeutically important natural products. Indian traditional medicines based on various systems including Ayurveda, Siddha, Unani and Homeopathy [18]. The evaluation of these drugs is primarily based on phytochemical, pharmacological and allied approaches including various instrumental techniques such as chromatography, microscopy and others. With the emerging worldwide interest in adopting and studying traditional systems and exploiting the potential based on different health care systems, the evaluation of the rich heritage of traditional medicine is essential. In this regard, an attempt was made in the present work to study detail pharmacological action, particularly antipyretic activity of *Ulva rigida* C.Ag. belonging to Chlorophyceae (Green seaweed). The animal was subjected for hot plate and tail immersion analgesic activity. Methanolic extract showed significant antipyretic activity. The animals were also fevered by injection of Brewer's yeast suspension (10mg/kg) subcutaneously in back below the nape of neck for the antipyretic activity. The extract showed significant decrease in elevated body temperature as compared to standard drug paracetamol.

Table 1: Antipyretic effect of methanol extract of *Ulva rigida* C.Ag.

Groups	Rectal temperature (°C)		Time after administration			
	Normal Body Temperature	18hr after Yeast injection	Initial 0hr	1hr	2hr	4hr
Control	37.0±0.02	40.6±0.17	40.9±0.31	41.1±0.10	41.2±0.29	41.3±0.27
Paracetamol	36.7±0.06	41.0±0.21	41.3±0.15	40.5±0.11	39.4±0.24	39.7±0.34
200mg/kg Methanol extract	37.2±0.03	41.5±0.11	41.7±0.11	39.4±0.09	38.9±0.15	37.6±0.22
400mg/kg Methanol extract	37.0±0.04	40.8±0.01	41.4±0.07	39.2±0.17	38.5±0.13	37.3±0.19

Significantly different from the control at P<0.05, Standard drug – Paracetamol

Figure 1. Natural Habit of *Ulva rigida* C.Ag.



CONCLUSION

Herbal medicines derived from the plant extracts are being increasingly utilized to treat a wide variety of clinical diseases, though relatively little knowledge about their mode of action is available. In conclusion, the present study provides evidences for the antipyretic activity of *Ulva rigida* C.Ag. which could partly contribute to its ethno medical use. However, further investigation is required to isolate the active constituents responsible for the antipyretic activities and to elucidate the exact mechanisms of action.

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