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ANTIPYRETIC ACTIVITY OF METHANOL EXTRACT OF GRACILARIA DURA (AG.) J.AG. (RED SEAWEED) IN HARE ISLAND, THOOTHUKUDI, TAMIL NADU, INDIA

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ABSTRACT

The present study was aimed to investigate the antipyretic activity of the methanol extract of *Gracilaria dura* (Ag.) J.Ag. collected from Hare island, Thoothukudi, Tamil Nadu, India on albino mice. Paracetamol (10mg/kg) was used as standard drug. The antipyretic activity of *Gracilaria dura* (Ag.) J.Ag. was determined by Brewer's yeast induced pyrexia on albino mice. The various methanol extract doses used were 200mg/kg and 400mg/kg body weight of mice. 400mg/kg methanol extract of *Gracilaria dura* (Ag.) J.Ag. showed significant decrease in 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. From the study it was concluded that the methanol crude extract of *Gracilaria dura* (Ag.) J.Ag. can be used for antipyretic activity.

INTRODUCTION

Marine macro algae or seaweeds are an important resource in marine environment and also it is useful to human in health care. Seaweeds have a number of structurally novel and biologically active secondary metabolites. Secondary metabolites produced by seaweeds may be potential bioactive compounds of interest in field of pharmaceutical research. From the literature, it was observed that the edible seaweeds contain a significant amount of the carbohydrates, proteins, vitamins and minerals essential for the human nutrition [1]. Many natural unique chemical compounds of seaweed origin with various biological actions have been predicted and some of the substances are under investigation and are being used to develop various new pharmaceuticals. The compounds isolated from seaweeds probably have diverse simultaneous functions for the seaweeds and can act as allelopathic, antimicrobial, antifouling and herbivore deterrents [2]. The phytoconstituents are also used by the pharmaceutical industry in drug development to treat diseases like cancer, acquired immune-deficiency syndrome (AIDS), inflammation, pain, arthritis, infection for virus, bacteria and fungus [3].

Fever may be a result of infection or one of sequelae of tissue damage, inflammation, graft rejection or other disease states. The regulation of body temperature requires a delicate balance between the production and loss of heat. The hypothalamus regulates the set point at which body temperature is maintained. In fever this set point is elevated and a drug like paracetamol does not influence body temperature when it is elevated by factors such as exercise or an increase in ambient temperature [4].

An antipyretic is a type of medication that will prevent or reduce fever by lowering body temperature from a raised state. Antipyretic will not affect normal body temperature if the patient does not have a fever. Generally,

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most of the non steroidal anti-inflammatory drugs (NSAIDs) work by inhibiting prostaglandin synthetase within the hypothalamus. Fever or pyrexia occurs when the body temperature reaches above what is considered "average" [5]. Bear in mind, however, that the "average" temperature can vary from person to person within certain parameters. It is generally accepted fever exists at a temperature above 37 degrees Celsius when the thermometer is placed under the armpit or over 37.5 degrees Celsius when measured orally or rectally. Fever usually results from microbes such as bacteria or viruses triggering the body's defence mechanisms. Antipyretics (literally "against the fire") are drugs that reduce fever [6]. The literature survey revealed that there are very less number of reports on antipyretic properties of seaweeds. The present study is therefore undertaken to study the antipyretics activity of the methanol extract of *Gracilaria dura* (Ag.) J.Ag. collected from Hare Island, Thoothukudi in the south east coast of Tamil Nadu, India.

MATERIALS AND METHODS

Collection of Sample

Gracilaria dura (Ag.) J.Ag. (Figure 1) is red seaweed belonging to Rhodophyceae member shows much attention in the present study for antipyretic activity. *Gracilaria dura* (Ag.) J.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 [7].

Preparation of methanol extract

For the preparation of methanol 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 [8].

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 [9]. 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

The experimental 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 methanolic extract p.o.
Group IV : 400mg/kg methanolic 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 [10-11].

RESULTS AND DISCUSSION

Antipyretic potential of methanol crude extract of *Gracilaria dura* (Ag.) J.Ag. was estimated by determining its effect on yeast-induced pyrexia in albino rats. The methanol extract of *Gracilaria dura* (Ag.) J.Ag. showed the highest noticeable antipyretic activities which was also dose dependent on albino mice. The result expressed that methanol extract of different doses caused lowering of the body temperature up to 4h following its administration. The effect of methanol extract on yeast-induced pyrexia showed that the rectal temperature was markedly elevated to 41.7°C, after 18h the subcutaneous injection of yeast suspension decreased to 40.3°C within 1h of 200mg/kg

methanol extract of *Gracilaria dura* (Ag.) J.Ag. treatment and reduced till 4h showing a considerable decrease and was comparable to paracetamol.

In the same way, 400mg/kg methanol extract also showed the decreased temperature from 41.4°C to 39.6°C. When the time was increased up to 4h, the results were observed significant reduced temperature to 37.1°C. Both 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 *Gracilaria dura* (Ag.) J.Ag. showed marked anti-pyretic activities, hence, 400mg/kg methanol extract was more effective than 400mg/kg. This result reveals that methanol extract of *Gracilaria dura* (Ag.) J.Ag. have discernible antipyretic activity as compare with standard paracetamol**.**

The data presented here suggests that the methanol extract of *Gracilaria dura* (Ag.) J.Ag. possesses antipyretic activities. Fever may possibly be due to infection or one of the sequel of tissue damage, inflammation, graft rejection or other disease states. Antipyretic are the agents which reduce the elevated body temperature. Yeast-induced fever is called pathogenic fever. Its etiology includes production of prostaglandins which set the thermoregulatory center at a lower temperature [12]. Antipyretic activities of various plant extracts were previously tested [13] particularly *Alstonia macrophylla* [14] and *Borassus flabellifer* [15]. The present results showed that methanol extract of *Gracilaria dura* (Ag.) J.Ag. has a significant antipyretic effect in yeast-provoked elevation of body temperature in mice and its effect is comparable to that of paracetamol (standard drug). So inhibition of prostaglandin synthesis could be the possible mechanism of antipyretic action as that of paracetamol. Also, there are several mediators or multi processes underlining the pathogenesis of fever. Inhibition of any of these mediators may bring about antipyresis [16].

Natural Habit of *Gracilaria dura* (Ag.) J.Ag.

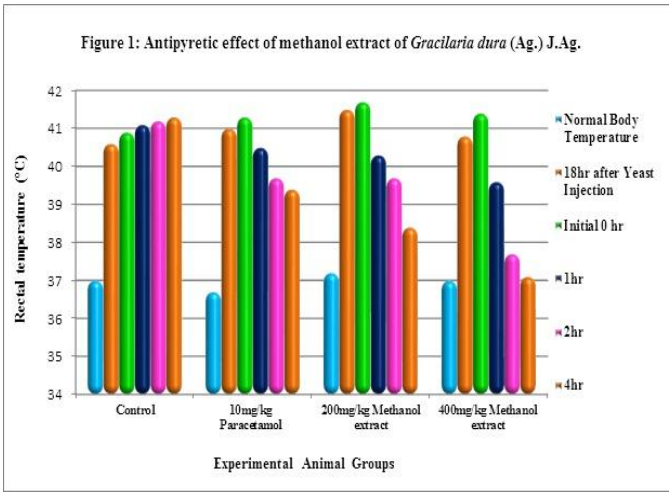

Table 1. Antipyretic effect of methanol extract of *Gracilaria dura* (Ag.) J.Ag.

Groups	Rectal temperature (°C)		Time after administration			
	Normal Body Temperature	18hr afterYeast injection	Initial0hr	1hr	2hr	4hr
Control	37.0±0.02	40.6±0.17	40.9±0.31	41.1±0.13	41.2±0.18	41.3±0.14
Paracetamol	36.7±0.06	41.0±0.21	41.3±0.15	40.5±0.24	39.7±0.09	39.4±0.11
200mg/kg Methanol extract	37.2±0.03	41.5±0.11	41.7±0.11	40.3±0.12	39.7±0.23	38.4±0.19
400mg/kg Methanol extract	37.0±0.04	40.8±0.01	41.4±0.07	39.6±0.08	37.7±0.07	37.1±0.18

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

CONCLUSION

The results obtained in the study indicated that the methanol extract of *Gracilaria dura* (Ag.) J.Ag. possesses potent antipyretic properties which are mediated via peripheral and central inhibitory mechanisms. This piece of evidence accentuates its use in the treatment of fevers of unknown cause in traditional medicine in India. In conclusion, the present study could provide a rationale for the use of the plant in fever in folk medicine.

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