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RESEARCH ARTICLE

STUDY OF CNS DEPRESSANT ACTIVITY OF METHANOL EXTRACT OF *LAURENCIA PAPILLOSA* (FORSSAKAL) GREVILLE (RED SEAWEED) IN KANYAKUMARI COAST, TAMIL NADU, INDIA

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ABSTRACT

The present study was aimed to detect the CNS depressant activity of the methanol extract of *Laurencia papillosa* (Forssakal) Greville collected from Kanyakumari coast, Tamil Nadu, India on albino rats. Chlorpromazine (3mg/kg) was used as standard drug. The CNS depressant activity of *Laurencia papillosa* (Forssakal) Greville was predicted by hole cross test on albino rats. The various methanol extract doses used were 200mg/kg and 400mg/kg body weight of rats. 400mg/kg methanol extract of *Laurencia papillosa* (Forssakal) Greville showed significant decrease in the movement of rats while 200mg/kg methanol extract showed less effect. 400mg/kg methanol extract exhibited closely significant ($p<0.05$) decrease in elevated movement as compared to standard drug. From the study it was concluded that the methanol crude extract of *Laurencia papillosa* (Forssakal) Greville can be used for CNS depressant activity.

INTRODUCTION

About 90% of the world's living biomass is found in the oceans with marine species comprising approximately half of the total global biodiversity (Kim and Wijesekara, 2010). This wide diversity of organisms is being accepted as a reservoir of potent molecules which are elicited by marine organisms to help them survive in the hostile environment (Alonso *et al.,* 2005). Among marine organisms, marine algae have been identified as an under-exploited plant resources (Heo *et al.,* 2009). The term marine algae, as used herein, generally refer to marine macroalgae or sometimes referred to as seaweeds. Marine algae can be classified into three classes based on their pigmentation namely brown, red, and green algae which are referred to as Phaeophyceae, Rhodophyceae and Chlorophyceae respectively (Khan *et al.,* 2010). Seaweeds are known as rich sources of structurally diverse biologically active compounds with great pharmaceutical and biomedical potential. Researchers have revealed that seaweeds originated compounds exhibit various biological activities such as anticoagulant (Athukorala *et al.,* 2007), anti-viral (Artan *et al.,* 2008), anti-oxidant (Zou *et al.,* 2008), anti-allergic (Li *et al.,* 2008), anti-cancer (Kong *et al.,* 2009), anti-inflammatory (Kim *et al.,* 2009), anti-obesity (Maeda *et al.,* 2007), *etc*. Furthermore, several scientific studies have provided insight into neuroprotective properties of seaweeds. Many species of marine algae have long been used in food diets as well as traditional remedies in various countries around the world and more recently in Europe and America. Hence, the present study is undertaken to predict the CNS depressant activity of the methanol extract of *Laurencia papillosa* (Forssakal) Greville collected from Kanyakumari coast, Tamil Nadu, India on albino rats.

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MATERIALS AND METHODS

Collection of Plant Sample: *Laurencia papillosa* (Forssakal) Greville is red seaweed belonging to Rhodophyceae member showed much attention in the present study for CNS depressant activity. *Laurencia papillosa* (Forssakal) Greville were collected from Kanyakumari coast in the south east coast of Tamil Nadu, India. 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 (John Peter Paul and Shri Devi, 2014).

Preparation of methanol extract: For the preparation of methanol extract of *Laurencia papillosa* (Forssakal) Greville, 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. 30g 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 CNS depressant studies (John Peter Paul and Yuvaraj, 2013).

Experimental Animals: Wistar albino rats (160-200g) and Swiss albino rats of either sex were procured from Venkateswara Enterprises, Bangalore, Karnataka, India. The selected animals were acclimatized for 7 days under standard husbandry conditions, i.e. room temperature 35±1°C, relative humidity 45-55% and light/dark cycle 12/12h. 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 (Zimmerman, 1983). 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).

Acute toxicity test: Acute oral toxicity study was performed as per OECD-423 guidelines (Ecobichon, 1997). Albino rats (n=6) of either sex selected through random sampling technique was used for acute toxicity study. The animals were kept fasting for overnight providing only water, after which the extract (50% methanolic extract) was administered orally at the dose level of 5 mg/Kg body weight by gastric intubation and observed for 14 days. If mortality is observed in 2 out of 3 animals, then the dose administered would be assigned as toxic dose. If mortality is observed in 1 animal, then the same dose would be repeated again to confirm the toxic dose. If mortality is not observed, the procedure would be repeated for further higher doses such as 50, 300 and 2000 mg/Kg body weight. According to the results of acute toxicity test, the doses were chosen for experiments.

CNS depressant activity

Hole cross test: The most consistent behavioral change is a hyper emotional response to novel environment. The aim of this study was to characterize the emotional behavior of rats using the hole cross test. The methanol extracts of *Laurencia papillosa* (Forssakal) Greville were administered to the rats. Then the spontaneous movement of the animals through the hole from one chamber to another chamber of a box was counted in this test. The method was carried out as described by Takagi *et al.* (1971). The effect of the methanol extract of *Laurencia papillosa* (Forssakal) Greville was determined by actophotometer performance on the locomotor activity. A steel partition was fixed in the middle of a cage having a size of 30×20×14 cm. A hole of 3 cm diameter was made at a height of 7.5 cm in the center of the cage. Thirty animals were divided into five groups with six rats in each group. The group I animals received normal saline, animals of group II received Chlorpromazine (3mg/kg), while group III and group IV were treated with 200 and 400 mg/kg body weight of the methanol extracts of *Laurencia papillosa* (Forssakal) Greville. The number of passages of a mouse through the hole from one chamber to another was counted for a period of 30min after oral administration of test drugs and the percentage of change in activity was calculated.

RESULTS AND DISCUSSION

The methanol extracts of *Laurencia papillosa* (Forssakal) Greville were evaluated for Central Nervous System (CNS) depressant activity at various dose levels, i.e., 200 and 400 mg/kg in rats. At all dose, after 30min of administration, decreased immobility period was occurred significantly in a dose-dependent manner and indicated the significant depressant like activity. The activity was compared with that observed in the control group as well as with the group treated with the standard depressant drug Chlorpromazine (3mg/kg).

Table 1. CNS depressant activity of methanol extract of *Laurencia papillosa* (Forssakal) Greville

Animal groups	Locomotor activity in minutes		
	Before drug treatment	After drug treatment	% change in activity
Control	62.9±1.87	61.5±3.35	2.22±0.70
3mg/kg Chlorpromazine	18.5±1.11	6.5±2.06	64.86±9.95
200mg/kg Methanol extract	57±2.1	51±3.2	10.52±1.4
400mg/kg Methanol extract	59±2.8	40.5±2.7	31.35±2.1

The CNS depressant potential of various doses of the methanolic extract of *Laurencia papillosa* (Forssakal) Greville was studied (Table-1). CNS depressant activity was noted to be the highest in the methanol extract at the dose of 200mg/kg with respect to control. The dose of 200mg/kg methanol crude extract produced a significant decrease in locomotor activity from 57.0 to 51.0 which was found the 10.52% of change in activity as compared with the control group. The dose of 400mg/kg methanol crude extract also produced a significant decrease in the locomotor activity from 59.0 to 40.5 which found to be 31.35% of change in activity compared with control group. Depression is an extremely common psychiatric condition, about which a variety of neurochemical theories exist and a number of synthetic antidepressant drugs are available in practice, however their effectiveness does not hold true with the entire range of population suffering from this disorder.

Moreover the side effects and the drug interactions are major restrictions in its clinical utility. On the other hand, herbal medicines are widely used across the globe due to their wide applicability and therapeutic efficacy coupled with least side effects. The present study was conducted to evaluate the antidepressant activity of *Laurencia papillosa* (Forssakal) Greville which showed the positive response.

Conclusion

The methanolic extracts of *Laurencia papillosa* (Forssakal) Greville, an important red seaweed (Rhodophyceae) showed significant CNS depressant activity which is evident by the results received. Among the two concentration of methanol extracts studied, 400mg/kg methanol extract had the highest effect than 200mg/kg. However further studies required to elucidate the exact mechanism of action and the structure of the secondary metabolites which is responsible for the CNS depressant activity for the development as potent depressant drug.

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