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ANTIEMETIC ACTIVITY OF *IYENGARIA STELLATA* AND *VALONIOPSIS PACHYNEMA* IN CHICKS

Salman Ahmed[1], Muhammad Mohtasheem-ul-Hasan[1*], M. Shaiq Ali[2] & Iqbal Azhar[1]

[1]*Department of Pharmacognosy, Faculty of Pharmacy, University of Karachi, Karachi-75270*
[2]*H.E.J. Research Institute of Chemistry, International Centre for Chemical & Biological Sciences, University of Karachi, Karachi-75270, Pakistan*

ABSTRACT

Current study was conducted to explore the antiemetic activity of two marine algae, *Iyengaria stellata* Børgesen (Phaeophycota) and *Valoniopsis pachynema* Børgesen (Chlorophycota) by chick emesis model. Emesis was induced by copper sulphate (50 mg/kg) and the extracts were tested at the dose of 150 mg/kg orally. Chlorpromazine (150 mg/kg orally) was used as standard antiemetic drug. The results showed that methanol extracts of both the seaweeds have antiemetic activity.

Keywords: Algae, *Iyengaria stellata*, *Valoniopsis pachynema*, Antiemetic activity, Chicks.

INTRODUCTION

Natural product research is rapidly turning towards marine plants, animals and microbes as these organisms are sources of numerous pharmacologically active compounds (Konig & Wright 1995). Marine algae possess useful biochemical compounds having pharmaceutical and medicinal value (Zaneveld 1959, Fenical 1982, Stein & Borden 1984). Pakistan has a rich algal flora in the coastal and inshore water of the Northern Arabian Sea (Shameel & Tanaka 1992). Taxonomically *Iyengaria stellata* (Børgesen) Børgesen belongs to the family Scytosiphonaceae, order Scytosiphonales, class Laminariophyceae, phylum Phaeophycota, while *Valoniopsis pachynema* (G. Martens) Børgesen belongs to the family Siphonocladaceae, order Siphonocladales, class Siphonocladophyceae, phylum Chlorophycota (Shameel 2012). Sterols have been isolated from *I. stellata* (Khan 2000), whereas *V. pachynema* possesses diterpenes, fatty acids and sterols (Aliya & Shameel 1999**)**. Crude extracts of *I. stellata*, collected from the coast of Pakistan, showed antibacterial, anticancer, antifungal, anti-inflammatory, antileishmanial, cytotoxicity, hypolipidemic and nematicidal activities, while inhibition of edema is reported from *V. pachynema* (Khan *et al.* 2012). Chick emesis model is used for evaluation of antiemetic activity of terrestrial plants and marine algae (Farah *et al.* 2011, Muhammad *et al.* 2012). Therefore, the study was undertaken to explore the antiemetic potential of two seaweeds *Iyengaria stellata* and *Valoniopsis pachynema* in *chick* emesis model following the protocols of Akita *et al.* (1998).

MATERIALS & METHODS

Chemicals

Copper sulphate was purchased from Scharlau Chemie S.A. Barcelona, Spain, chlorpromazine was obtained from ICN, USA, dimethyl sulfoxide (DMSO) and methanol were supplied by Merck, Darmstadt, Germany.

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Table I. Antiemetic effect of methanol extracts of *Iyengaria stellata* and *Valoniopsis pachynema* by using chick emesis model.

Groups	Mean Number of Retches ± S.E.M.	Inhibition (%) of Emesis
Control (0.9 % saline)	70.10 ±3.88	-
Std. (CP) 150 mg/kg p.o.	45.40 ±1.02	35.23*
IS 150 mg/kg p.o.	58.75 ±3.19	16.19
VP 150 mg/kg p.o.	53.0 ±4.21	24.39

CP = Chlorpromazine, **N** = 7 for each group, **IS** = *Iyengaria stellata*, **VP** = *Valoniopsis pachynema*, **p.o.** = per oral, **S.E.M.** = Standard Error of Mean, *p<0.05 vs. control showing significant values using unpaired students' *t*-test.

Collection of algal material

The seaweed material of *Iyengaria stellata* and *Valoniopsis pachynema* were collected from Manora and Buleji, the coastal areas of Karachi and dried under shade. Samples were deposited in the herbarium of Department of Pharmacognosy, Faculty of Pharmacy, University of Karachi for further reference.

Preparation of the extracts

The dried algae were crushed and soaked in methanol for seven days. The extracts were evaporated under reduced pressure at 35° C (following the protocol of Rizvi & Shameel 2005).

Animals

Young male chicks, 4 days old and weighing from 32-52 g were obtained from local market for antiemetic activity. All chicks were kept under laboratory conditions of room temperature and allowed free access to food and water. The groups of animals were transferred in different cages and marked with their identification. Chicks were randomly divided into four groups of seven animals each.

Antiemetic activity

The anti-emetic activity was determined following the protocols of Akita *et al.* (1998). Each chick was set aside for 10 minutes to stabilize in a large beaker. The extracts of *I. stellata* and *V. pachynema* were dissolved in 0.9 % saline containing 5 % DMSO and 1 % tween 80 and administered at a dose of 150 mg/kg body weight abdominally in a volume of 10 mL/kg to the test animals. Control group received only saline 0.9 %. After 10 minutes, copper sulphate pentahydrate (as an emetic agent) was administered orally at 50 mg/kg, then the number of retching was observed during next ten minutes. Chlorpromazine in a dose of 150 mg/kg was used as standard antiemetic drug. The percentage inhibition was calculated as follows:

$$\% \text{ Inhibition} = (A\text{-}B/A) \times 100$$

where: A= Frequency of retching in control group, B= Frequency of retching in test group.

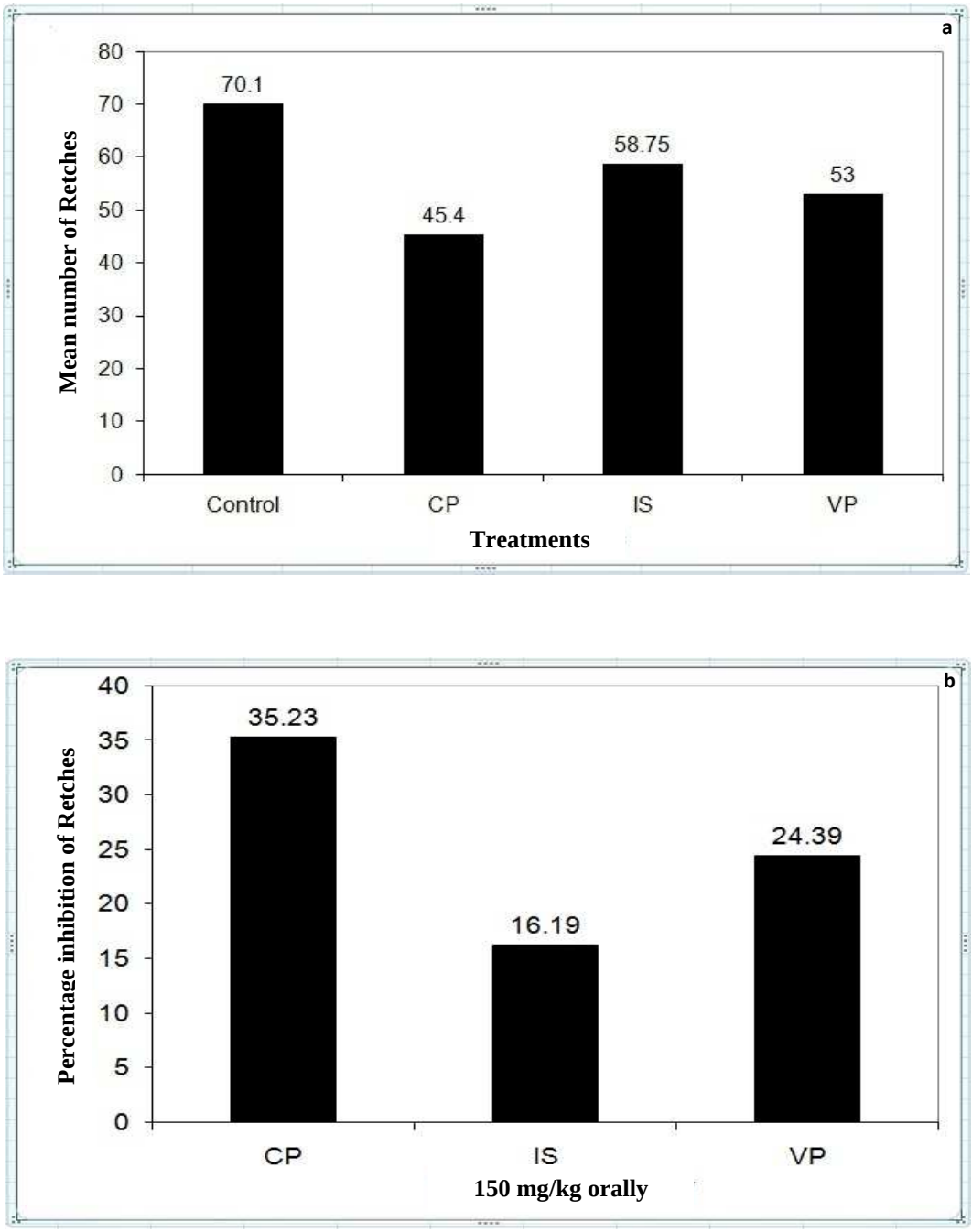

Fig. 1. Comparison of anti-emetic activity of *Iyengaria stellata* and *Valoniopsis pachynema* against chlorpromazine as an anti-emetic effect in chicks: **(a)** Graphical presentation of mean number of retches versus dose 150 mg/kg, **(b)** Graphical presentation of % inhibition of retches versus dose 150 mg/kg (CP= Chlorpromazine, IS= *Iyengaria stellata*, VP=*Valoniopsis pachynema*).

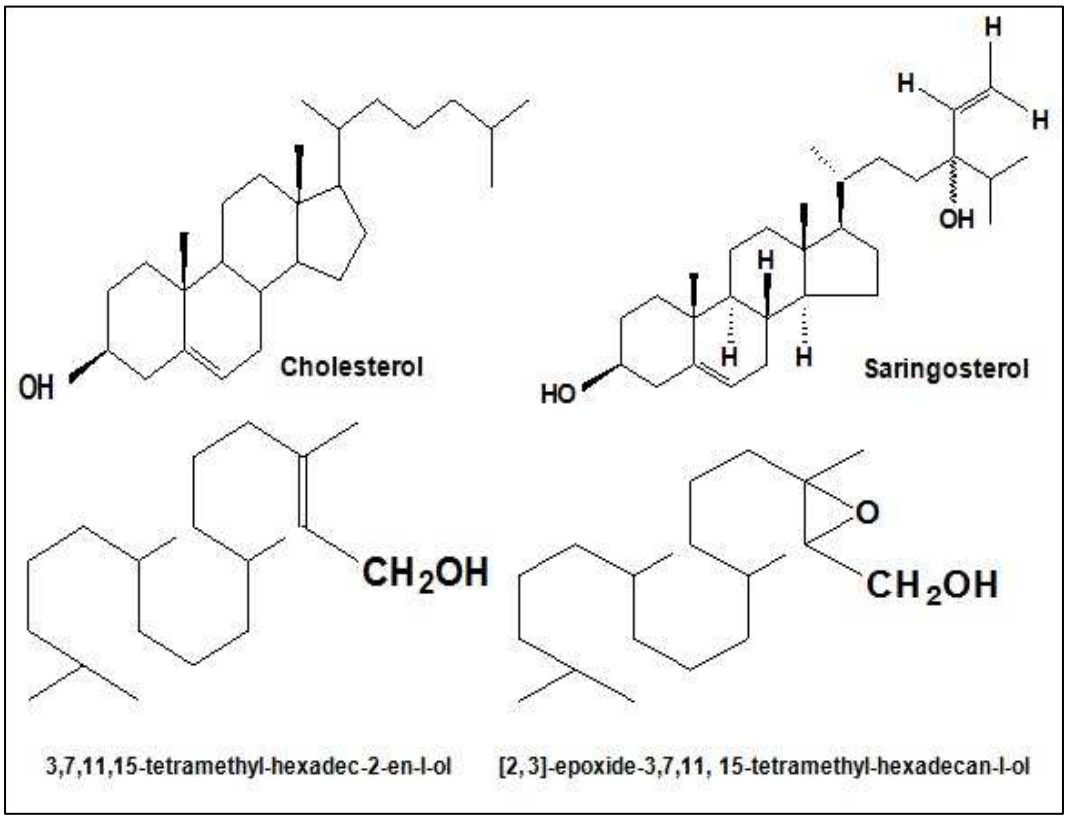

Fig. 2. Structure of constituents isolated from *Iyengaria stellata* and *Valoniopsis pachynema* (after Aliya & Shameel 1999, Khan *et al.* 2012).

Statistical analysis

All numerical data are expressed as the mean ± S.E.M. The statistical significance of the difference was determined by an unpaired student's *t*-test value. The $p<0.05$ shows significant values as compared to the control.

RESULTS & DISCUSSION

The mean number of retches in control was 70.10. Standard antiemetic drug chlorpromazine showed 45.40 mean numbers of retches whereas *Iyengaria stellata* and *Valoniopsis pachynema* showed 58.75 and 53.00 mean number of retches respectively (Fig.1). The % inhibition of emesis was recorded as 16.19 of *I. stellata* and 24.39 of *V. pachynema* whereas chlorpromazine showed 35.23 % inhibition of emesis (Table I).

On the basis of these results it may be said that tested extracts of *I. stellata* and *V. pachynema* have antiemetic potential. Although the results are comparable with standard chlorpromazine but the exact mode of action is not known. However, as the oral copper sulphate induces emesis by peripheral action, and peripheral 5- HT_4 plays an important role in the copper sulphate induced emesis (Bhandari *et al.* 1991, Fukui *et al.* 1994) the extracts were able to effectively prevent their effect, it could be implied that the extracts have a peripheral antiemetic action. Sterols are reported

as active antiemetic principles (Yang *et al.* 1999, Shin *et al.* 2002) and are found in both *I. stellata* and *V. pachynema* (Usmanghani *et al.* 1987, Ahmad *et al.* 1992, Aliya *et al.* 1994, Shaikh *et al.* 1995, Aliya & Shameel 1999, Khan 2000). So, the investigated antiemetic potential may be due to the presence of sterols and acyclic diterpene alcohols (Fig. 2). However compound targeted antiemetic activity is further required.

CONCLUSION

It may be said that the methanol extracts of *Iyengaria stellata* and *Valoniopsis pachynema* have an antiemetic potential. Further studies are required to explore responsible antiemetic compound(s) and mechanism of action.

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