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ANTIEMETIC ACTIVITY OF BERGENIN FROM *PELTOPHORUM ROXBURGHII* L.

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ABSTRACT

Presented study was an initial attempt to discover bergenin as an antiemetic compound isolated from *Peltophorum roxburghii* L., leaves. It is the extension of antiemetic activity from methanol extract of *Peltophorum roxburghii* L., leaves. Antiemetic activity was assessed using copper sulfate induced emesis in chick's model. Bergenin (25 mg/kg, p.o.) exhibited significant antiemetic activity when compare with standard drug, chlorpromazine. This is the first time that, bergenin declares antiemetic activity. Bergenin has already been evaluated positively for its anti-inflammatory activity and now this paper going to report its antiemetic activity. Both the activities of same compound may be beneficial for drug designing against the disease having anti-inflammatory and antiemetic both symptoms just like migraine. The preliminary antiemetic evaluation of bergenin was conducted on single dose due to the low yield of Bergenin. However the result was significant with reference to the standard used. Further, isolation and purification of Bergenin is in process to establish a detail data on having different doses of Bergenin.

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INTRODUCTION

The natural flavonoid bergenin [1] is a colorless crystalline polyphenol [2,3]. Bergenin reported to possess anti-inflammatory, antitussive, hypolipidemic, anti-HIV, antiarrhythmic [4], antidiabetic, antifungal, antoxidant, anti tumor promoting [5], antimalarial [6], antinarcotic [7], hepatoprotective, neuroprotective, and gastroprotective [4] activities. Bergenin was isolated from *Bergenia crassifolia* (Linn.) Fritsch., *Mallotus japonicas* (L.f.) Müll.Arg., *Mallotus philippensis* (Lam.) Muell. Arg., *Corylopsis spicata* Siebold & Zucc., *Caesalpinia digyna* Rottler., *Sacoglottis gabonensis* (Baill.) Urb.[8].

The bark of *Peltophorum roxburghii* Degener., (family Mimosaceae) is used in dysentery, toothache, pains and sores. The hexane and methanol extracts of plant showed anti-microbial activity. The antiemetic potential of leaves (methanol extract) has previously reported by using copper sulphate emesis in chicks [9]. In the present attempt, we evaluate the antiemetic effect of its isolate bergenin by using the same assay to confirm the responsible antiemetic compound.

MATERIALS AND METHODS

Plant material

The leaves of *Peltophorum roxburghii* was collected from Karachi University campus, Karachi, Pakistan in the month of May. After identification and authentication the collected sample was deposited as G.H.No. 86199 at Karachi University Herbarium.

Extraction and isolation of Bergenin

The crushed and methanol soaked leaves (15 days at room temperature) of *P. roxburghii* were used. This procedure was repeated three times. Methanol was removed by evaporation under reduced pressure and a dark extract was obtained. This dark brown extract (concentrated material) was partitioned between methanol and chloroform. After fractionation it was extracted out as crystals at CH_3Cl_3; MeOH (83:17) mobile phase. A pure compound bergenin monohydrate was weighed and dissolved in DMSO for use.

Characterization

Bergenin has confirmed by NMR, Mass spectra [10] and Single-crystal x-rays diffraction data [11,12] with that of available data in literature.

Chemicals used

Copper sulfate (Scharlau Chemie S.A. Barcelona, Spain), chlorpromazine (ICN, USA), DMSO, methanol and Tween 80 from Merck, Darmstadt, Germany was used in the experiment.

Animals used

Young 4 days old male chicks(32-52 g), used for the study after acclimatization and 24 hrs of fasting, All animals were kept under laboratory conditions at room temperature with 12h light and dark cycles and were allowed free access to food and water. The study permission and approval were obtained from University of Karachi (BASR. Res. No.09(46)-2006).

Experimental/ Methodology

Antiemetic activity

The antiemetic behavior was determined by following the protocols of Akita *et al.*, 1998[13]. Each chick was set aside in a large beaker for 10 minutes to stabilize. Chlorpromazine and bergenin were dissolved in 0.9 % saline containing 5 % DMSO and 1 % tween 80 and administered orally at a dose of 150 and 25 mg/kg b.w. After 10 minutes copper sulfate was administered abdominally at 50 mg/kg b.w., to each chick, then the retching count was observed during the next 10 minutes.

The percentage retching inhibition was calculated as:

Retching Inhibition (%) = [(a-b)/a] x 100

Where a = Retching count in control group

b = Retching count in test groups

Statistical Analysis

The data was analyzed by using unpaired Student's *t*-test. The *P* value < 0.05 vs. control shows significant value.

RESULTS AND DISCUSSION

Chemical structure of Bergenin

Following isolation of bergenin monohydrate, the compound was analyzed using NMR, Mass spectra and Single-crystal x-rays diffraction data. The molecular formula $C_{14}H_{18}O_{10}$ was deduced and suggested the following structure **(Figure 1).**

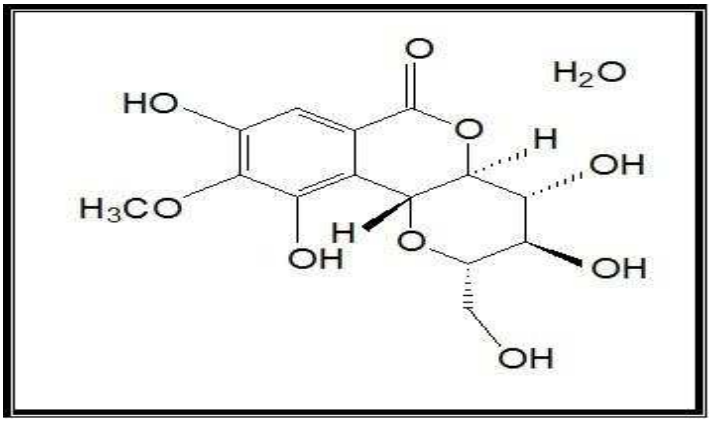

Figure 1: Bergenin monohydrate.

Antiemetic activity

The results of antiemetic effect are shown in Table 1 and Figure 2 . Bergenin (25mg/Kg p.o.) showed 20.20 numbers of retches with 70.84% inhibition whereas standard drug chlorpromazine showed 46.62 with 32.70 % inhibition. Bergenin and chlorpromazine both showed significant ($p < 0.05$) effect. Galangin, kaempferide, pachypodol and retusin showed antiemetic activity through 5-HT_3, 5-HT_4 or NK_1 receptor antagonism. Quercetin and rutin showed the similar effect via their antioxidant actions. The protective effect of the bergenin against copper sulfate induced retching in chicks is possibly by peripheral action as the oral copper sulfate induces emesis by peripheral action through excitation of visceral afferent nerve fibers of the GIT (peripheral antiemetic action)[14]. It may be said that bergenin (flavonoid) produced antiemetic effect by receptor antagonism and / or antioxidant effect and also has peripheral antiemetic action (Figure 3). Bergenin has already been evaluated positively for its anti-inflammatory activity and now this paper going to report its antiemetic activity. Both the activities of same compound may be beneficial for drug designing against the disease having anti-inflammatory and antiemetic both symptoms just like migraine.

Table 1: The antiemetic effect of bergenin.

Treatment	Dose (mg/kg) p.o.	Number of Retches (Mean ± SEM)	%Inhibition of retches
Control	------	69.28 ± 4.18	--------
CPZ	150	46.62 ± 3.84*	32.70
BRG	25	20.20 ± 3.89*	70.84

CPZ = Chlorpromazine ; BRG = Bergenin ; N=7 ; *P< 0.05 vs. control showing significant value(s) using un paired students' *t*-test

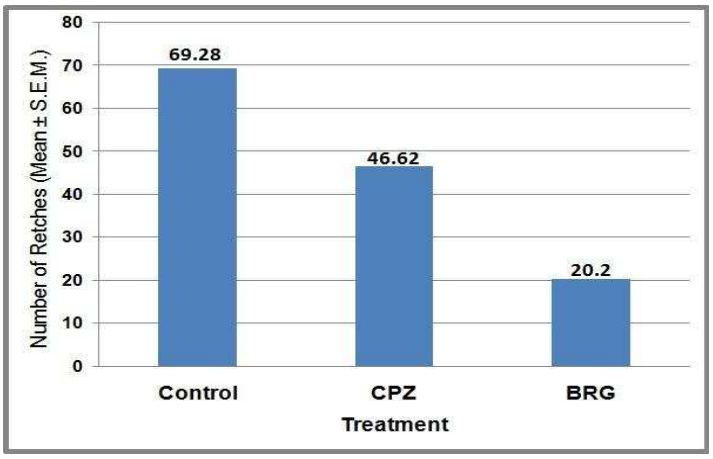

Figure 2: The antiemetic effect of bergenin.

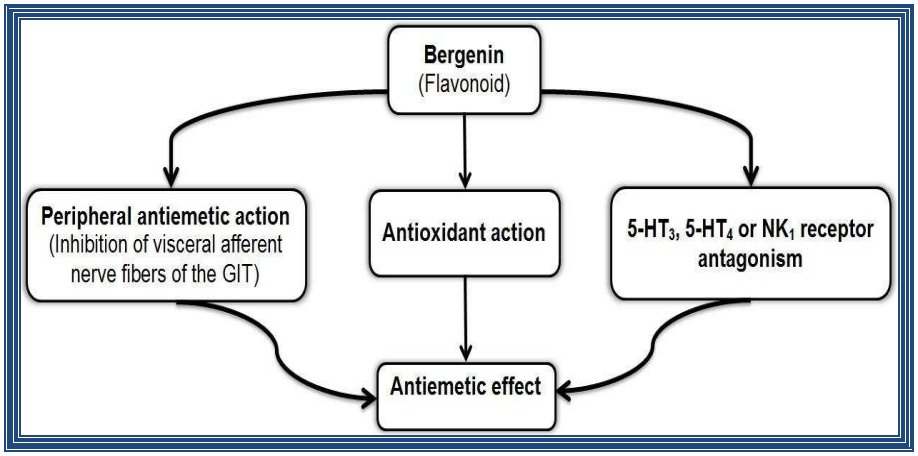

Figure 3: Proposed antiemetic action of Bergenin.

CONCLUSION

The preliminary antiemetic evaluation of Bergenin was conducted on single dose due to the low yield of bergenin. However the result was significant with reference to the standard used (Chlorpromazine). Further, isolation and purification of Bergenin is in process to establish a detail data to evaluate exact mode of action at different doses and different available antiemetic assays.

Authors' Statements

Competing Interests

The authors declare no conflict of interest.

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