

Original Research Article

EVALUATION OF ANTIEMETIC POTENTIAL OF AQUEOUS BARK EXTRACT OF CINNAMON LOUREIROI

Imran Ahmad Khan^{1*}, Abdul Aziz¹, Hafiz Shoaib Sarwar¹, Shaukat Hussain Munawar², Zahid Manzoor², Haseeb Anwar³

1. Faculty of Pharmacy, Bahauddin Zakariya University, Multan, Pakistan
2. Faculty of Medicine and Allied Medical sciences, Isra university, Islamabad, Pakistan
3. Faculty of Science and Technology, G.C university, Faisalabad, Pakistan

ABSTRACT

Crude aqueous bark extract of *Cinnamon loureiroi*. was evaluated for anti-emetic potential. Emesis was induced by the oral administration of copper sulphate and fresh aqueous extract of Brassica compestris to male chicks of fifteen days age. The anti-emetic activity was determined by calculating the mean decrease in number of retching in contrast with those of control. Cinnamon (3 and 6 mg / kg body weight orally) showed anti-emetic activity when compared with standard drugs Chlorpromazine , Domperidone and Metoclopramide. Both the extracts, showed the antiemetic activity, highest (79.22% inhibition) and the lowest (58.94 % inhibition) in copper sulphate induced emesis and highest (81.91%) and the lowest(59.57%) in Brassica compestris induced emesis .

Keywords: Antiemetic, *Cinnamons loureiroi*, chi-ck emesis model, Domperidone, Metoclopramide, Chlorpromazine

Corresponding Author: Imran Ahmad Khan* Faculty of Pharmacy, Baha Uddin Zakariya University, Multan, Pakistan. T.; +923143005013; E.: imranahmadkhadurrani@gmail.com

INTRODUCTION

Nausea and vomiting induced by several cancer chemotherapy agents is often the most distressing side effect of treatment. The mechanisms are quite complex. The vomiting center in the reticular formation can be stimulated by either afferent stimuli from the gastrointestinal tract or by the chemoreceptor trigger zone (CTZ). The latter is probably the primary site for emetic activity of most cancer chemotherapeutic agents and is accessible to drugs that do not cross the blood-brain barrier. It is quite possible that several agents have different receptors. The wide spectrum of antiemetics is in contrast to the often observed lack of effectiveness.

Cinnamon loureiroi use as medicine is thousand years old mentioned in several books of the Bible and in the histories of ancient Rome and Egypt as well as medieval Europe [1]. Ayurvedic and folklorik uses are, wound healing, flatulence, erectile dysfunction, conjunctivitis, leukorrhea, vaginitis, rheumatism, neuralgia, aphrodisiac, anti allergy, antifungal, insecticidal [2]. Antipyretic, analgesic, anti ulcerant, nematocidal [3]. Its historical uses were, antidiabetic [4] [5]. Anticancer [6]. Antimicrobial [7]. Anti inflammatory [8]. Blood pressure lowering [9]. Cholesterol lowering [10]. Antidarrheal, cough, sore throat, indigestion, vomiting, chest

congestion, abdominal pain, headache [11]. Tooth ache [12]. Medication resistant yeast infections [13]. Smelling of cinnamon enhances cognitive function and memory [14]. Prevention of cardiovascular diseases, carcinogenesis, atherosclerosis [15].

MATERIALS AND METHODS

Collection of Plant Material

Indigenous medicinal plant *Cinnamom loureiroi*. known by a local name of “Dal chinni”. The plant were collected from the local market of Multan, Pakistan. The plant material was authenticated by expert taxonomist, Professor Dr. Altaf Dasti at the Institute of Pure and Applied Biology, Bahauddin Zakariya University, Multan, Pakistan.

Crude extract

The plant material was made free from foreign adulterants and vegetative debris by hand picking. Special electrical herbal Grinder was used to form coarse powder. Uniform dark brown powder was obtained with characteristic smell. Powdered cinnamon dissolved in distilled water, fluid obtained was filtered through Whatman-1 Filter paper [16].

Chemicals

Copper sulfate was purchased from Scharlau Chem-ie S.A. Barcelona, Spain. Dimethyl sulfoxide (DMSO), Polyoxy-ethylene sorbitan monooleate (Tween 80) Darm-stadt, Germany. Chlorpromazine, Metoclopramide. and Domperidone were purchased from Hinoon pharmaceuticals (Pvt) Ltd. Lahore, Pakistan.

Animals and housing conditions

Young male chicks, 15 days of age, weighing from 140-168 gm were obtained from Al Manara poultry Traders Multan. After 24 hrs fasting, the antiemetic activity was evaluated. All chicks were kept under laboratory conditions at room temperature with 12 hrs light and dark cycles. All animal experiments were carried out in accordance with the acts of the Animal Ethical Committee of Baha-uddin zakariya university, Multan, Pakistan.

Antiemetic activity

The anti emetic activity was evaluated with slight modification by using chick emesis model [17]. Each chick was placed in a large beaker and left to settle for 10 minutes. Aqueous extracts of *cinnamom loureiroi*. bark was prepared as a dose of 3 and 6 mg/kg body weight in a volume of 10 ml/kg in 0.9% saline containing 5% DMSO and 1% Tween 80. The dose was administered orally. The control group received only saline 0.9%. After 10 minutes, copper sulfate was administered orally at 50 mg/kg b.w. and the number of retches was observed during the next 10 minutes. chlorpromazine, domperidone and metoclopramide were used as standard antiemetic drugs (150, 100, 50 mg/kg body weight respectively). Same procedure were adopted for aqueous extract of Brassica induced emesis. The percent inhibition was calculated by the following formula:

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

Where, A = Frequency of retching in control group; and B = Frequency of retching in test group.

Phytochemical Study

The crude plant extracts were initially screened qualitatively with different organic solvents and reagents to detect the presence of some phytochemicals classes [18].

Toxicity Study

Cinnamon is used as a spice in food material in Asia so its safety is quite obvious. Budavari *et al.* have reported acute toxicity of *Cinnamon* in the animals is very low i.e. Benzaldehyde (LD50 orally, 1300 mg/kg rat), cinnamaldehyde (LD50 orally, 2220 mg/kg rat), linalool (LD50 orally, 2790 mg/kg rat), and salicylaldehyde (LD50 orally, 520 mg/kg rat) [19].

Statistical analysis

Value for antiemetic potential was expressed as mean S.E.M. The statistical significance of the difference is determined by an unpaired Student's *t*-test. *P* values of < 0.05 were considered significant and < 0.01 were highly significant.

RESULTS

Preliminary phytochemical screening detected presence of tannins, phenols, saponins alkaloid, anthraquinones and coumarins as constituents of the crude aqueous bark extract of *Cinnamon loureiroi*. (Cl.Cr).

Table 1: Phytochemical analysis of *Cinnamon loureiroi* (bark) crude extracts (Cl.Cr).

Sr.no	Test	Observations	Result
1	Alkaloid	ppt	Positive
2	Saponins	1 cm froth	Positive
3	Tannins	Light purple	Positive
4	Anthraquinones	Pink	Positive
5	Coumarins	Yellow fluorescence	Positive
6	Phenols	Light purple	Positive
7	Flavanoid	Light yellow colour	Positive

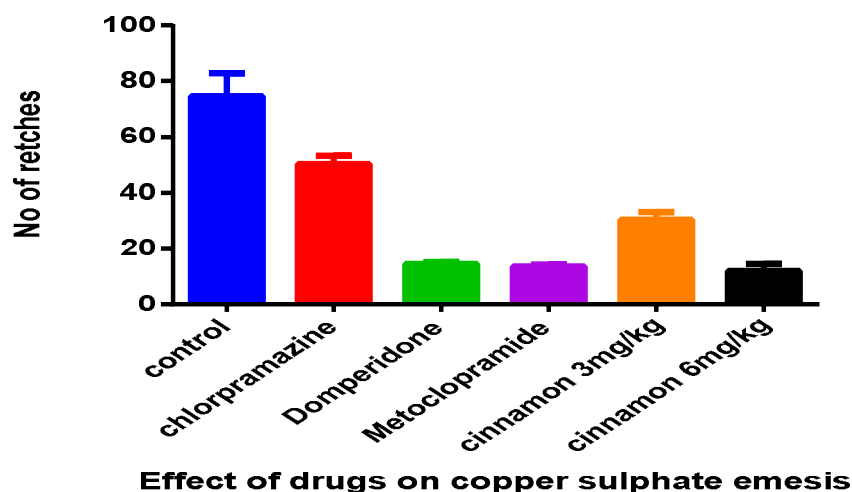


Figure 1. Antiemetic effect, Group-I: Control (Normal saline solution); Group-II: Standard drugs (Chlorpromazine, Metoclopramide and Domperidone); Group-III: Cinnamon L. (3 mg/kg and 6 mg/kg).

Table 2. Antiemetic activity of aqueous bark extracts of *Cinnamon l.* On copper sulphate induced emesis. S.E.M.= Standard Error of Mean, * $P < 0.1$ and ** $P < 0.005$ vs. control showing significant and most significant values using unpaired Student's *t*-test

Groups	Mean number of retches \pm S.E.M	Inhibition (%) of emesis
Control 10ml/kg	68 \pm 1.66	
Chlorpromazine 150mg/kg	47.11 \pm 3.12	30.88% *
Domperidone 100mg/kg	14.9 \pm 1.21	78.08% **
Metoclopramide 50mg/kg	13 \pm 1.89	80.88% **
Cinnamon 3 mg/kg	32 \pm 2.31	52.94% *
Cinnamon 6 mg/kg	14 \pm 1.09	79.41% **

Table 3. Antiemetic activity of aqueous bark extracts of *Cinnamon l.* On fresh water extract of Brassica induced emesis. S.E.M.= Standard Error of Mean, * $P < 0.1$ and ** $P < 0.005$ vs. control showing significant and most significant values using unpaired Student's *t*-test

Groups	Mean number of retches \pm S.E.M	Inhibition (%) of emesis
Control 10ml/kg	94.66 \pm 0.45	
Chlorpromazine 150mg/kg	53.33 \pm 1.12	43.61% *
Domperidone 100mg/kg	23 \pm 1.09	75.53% **
Metoclopramide 50mg/kg	16.66 \pm 1.59	86.18% **
Cinnamon 3 mg/kg	38.33 \pm 2.31	59.57% *
Cinnamon 6 mg/kg	17.23 \pm 1.09	81.91% **

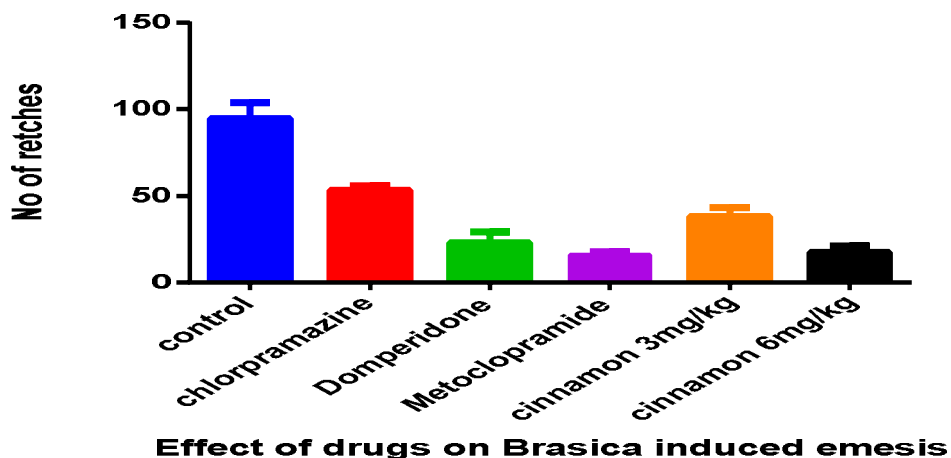


Figure 2. Antiemetic effect, Group-I: Control (Normal saline solution); Group-II: Standarder drugs (Chlorpromazine, Metoclopramide and Domperidone); Group-III: Cinnamon l. (3 mg/kg and 6 mg/kg).

Results of the antiemetic activity of aqueous extracts of *Cinnamon loureiroi* bark at various concentrations are given in Table 2. Both the extracts inhibited emesis to an extent greater than chlorpromazine at a dose of 150 mg/kg. At test dose of 3 mg/kg *Cinnamon loureiroi* showed more antiemetic activity as reference drug chlorpromazine and slightly less than metoclopramide and domperidone. At test dose of 6mg/kg *Cinnamon loureiroi* showed

almost same antiemetic activity as metoclopramid and domperidone reference drugs used. Highest antiemetic activity showed by *Cinnamon loureiroi*. (79.22 % inhibition) and the lowest antiemetic activity showed (58.94 % inhibition) in copper sulphate emesis model. From Table 3, it is clear that all tested extracts concentrations of aqueous bark extract of *Cinnamon loureiroi* having antiemetic potential which are comparable to reference drugs chlorpromazine, metoclopramide and domperidone in Brassica emesis model with highest (81.91 % inhibition) and lowest (59.57 % inhibition) somewhat similar fashion to copper sulphate emesis model.

DISCUSSION

On the basis of these results it may be concluded that both the extracts have anti-emetic potential against both ematogens and are comparable with that of chlorpromazine, metoclopramide and domperidone (the reference drugs). Ematogenic response of Brassica was more prompt than copper sulfate to positive control as well as to test material. Although the results are significant but the mode of action is not exactly known. However, proposed and claimed mechanisms are, as the oral copper sulphate induces emesis by peripheral action [20] and the extracts were able to effectively prevent its effect, it could be implied that these extracts have a peripheral anti-emetic action, *Cinnamon loureiroi*. contains flavonoids and terpenes [21]. which are reported as active principles against emesis in chick emesis model [22]. Claims of alkaloidal responsibility as antiemetic constituent [23] is may be the cause as *Cinnamon loureiroi* is rich in alkaloidal constituent [24]. Campher has been claimed as the antiemetic constituent of *Cinnamon loureiroi* bark [25]. Further studies are required regarding the exact mechanism of action responsible for antiemetic activity of *Cinnamon loureiroi*.

Brasica induces emesis by the toxic effect of its phytoconstituent isothiocyanate and betaphenylisothiocyanate [26] [27] by causing irritation in the gastrointestinal mucosa. This irritation cause release of histamine and serotonin as vomiting center rich in H1-histamine receptors [28]. While in other way input to the vomiting center are generated by vagus and spinal nerves of the gastric mucosa which are rich in 5HT3 receptors. This potentiates ematogenic stimuli in the brain by stimulating vagus afferent input to the vomiting center. *Cinnamon loureiroi* posses antiemetic activity which may be increase of peristaltic movement by its anticholinergic activity as it is anti diarrheal agent [11] as anticholinergics are good choice of antiemetic medications [29].

CONCLUSION

From the present investigation it was clear that the *Cinnamon loureiroi*. Aqueous bark extract posse's excellent antiemetic activity. Factors such as the age, sex and type of stimuli did not affected the degree of antiemetic activity.

CKNOWLEDGEMENT

Authors are thankful to Abdul Mannan and Ali Niazi Assistant pharmacists for their help throughout the experiment.

REFERENCE

1. Keith S (2008). Cinnamon: Overview of Health Benefits . Nutr Today.43: 263–266
2. Natural Standard: The Authority on Integrative Medicine.
www.naturalstandard.com

3. Manosi S, Mandal S, Mallick B and Hazra J (2013). Ethnobotany, Phytochemical and pharmacological aspect of *Cinnamomum Zeylanicum*. *int. Res. J. Pharm.* 4: 58-63
4. Qin B, Nagasaki M, Ren M, Bajotto G, Oshida Y and Sato Y (2003). Cinnamon extract (traditional herb) potentiates in vivo insulin-regulated glucose utilization via enhancing insulin signaling in rats. *Diabetes Res Clin Pract.* 62: 139-148
5. Kim S, Hyun S and Choung S (2006). Anti-diabetic effect of cinnamon extract on blood glucose in db/db mice. *J Ethnopharmacol.* 104: 119-123.
6. Schoene N, Kelly M, Polansky M and Anderson R (2005). Water-soluble polyphenols from cinnamon inhibit proliferation and alter cell cycle distribution patterns of hematologic tumor cell lines. *Cancer Lett.* 230:134-140.
7. Singh G, Maurya S, Lampasona M and Catalan C (2007). A comparison of chemical, antioxidant and antimicrobial studies of cinnamon leaf and bark volatile oils, oleoresins and their constituents. *Food Chem Toxicol.* 45:1650-1661.
8. Kim D, Kim C, Kim M, et al. (2007). Suppression of age-related inflammatory NF- κ B activation by cinnamaldehyde. *Biogerontology.* 8: 545-554
9. Preuss H, Echard B, Polansky M and Anderson R (2006). Whole cinnamon and aqueous extracts ameliorate sucrose-induced blood pressure elevations in spontaneously hypertensive rats. *J Am Coll Nutr.* 25: 144-150
10. Khan A, Safdar M, Ali Khan M, Khattak K and Anderson R (2003). Cinnamon improves glucose and lipids of people with type 2 diabetes. *Diabetes Care.* 26: 3215-3218
11. Waris Q, Salman R A, Raheem H D, Sana J, Aysha N and Ammara R (2003). Use of folk remedies among patients in Karachi Pakistan. *JAMC.* 15-21
12. Archer AW (1988). Determination of cinnamaldehyde, coumarin and cinnamyl alcohol in cinnamon and cassia by high-performance liquid chromatography. *J. Chromatogr.* 447: 272-276.
13. <http://herbwisdom.com>
14. Palmer AS, Stewart J and Fyfe L (1998). Antimicrobial properties of plant essential oils and essences against five important food borne pathogens. *Lett. Appl. Microbiol.* 26: 118 – 122.
15. Srinivasan K (2005). Role of spices beyond food flavouring: nutraceuticals with multiple health effects. *Food Rev. Int.* 21: 167-188.
16. Harborne JB (1973). *Methods of plant analysis*. In, *Phytochemical Methods*. Chapman and Hall, London, 1-7.
17. Khan IA, Aziz A, Munawar SH and Munzoor Z (2013). Antiemetic Activity of Methanolic Leaf Extract of *Rumex Vesicarius* Linn. *Int. J. of Pharm. Res. & All. Sci.* 2 : 33-37
18. Tona L, Kambu K, Ngimbi N, Cimanga K and Vlietink AJ (1998). Antiamoebic and Phytochemical Screening of Some Congolese Medicinal Plants. *Planta Med.* 61: 57-65.
19. Budavari SB, O'Neil MJ, Smith A and Heckelman PE (1989). *The Merck Index*. Merck and Co, Rahway, NJ.
20. Hossein H, Mashallah M and Akbar G (2005). Antiemetic effect of *Mentha x piperita* aerial parts extracts in young chickens. *Iranian Journal of Pharmaceutical Sciences.* 1: 21-24.
21. Jayaprakasha GK, Raom LJ and Sakariah KK (2002). Chemical composition of volatile oil from *Cinnamomum zeylanicum* buds. *Zeitschrift für Naturforschung C. Journal of Biosciences* 57: 990-993.

22. Kinoshita K, Kawai T, Imaizumi T, Akita Y, Koyama K and Takahashi K (1996). Anti emetic principles of *Inula linariaefolia* flowers and *Forsythia suspense* fruits. *Phytomedicine*. 3:51-58
23. Hassan MM, Azhar A, Salman A and Ahmad SW (2012). Antiemetic activity of some leguminous plants. *Pakj.Bot*. 44: 389-391.
24. Sandigawad AM and Patil CG (2011). Isolation and Characterization of Alkaloids from *Cinnamomum* Scha.(Lauraceae) species. *Advances in Bioresearch*. 2: 90 - 91
25. [http:// www.botanical-online.com](http://www.botanical-online.com)
26. Mishra A, Dash P, Murthy PN, Siddique HH, and Kushwaha Poonam (2012). A Classical Review on Rajika (*Brassica juncea*). *RRJBS* 1 : 18-23
27. Decker WJ (1971). In Quest of Emesis: Fact, Fable and Fancy. *Clinical Toxicology* 4: 383–387.
28. B.G. Katzung (2007). Basic and clinical Pharmacology. Lange medical Publications, 11th edi: 1084-1093
29. Richard AH (2012). Lippincott illustrated Reviews: pharmacology 5th edi Lipponcott williams &wilkins. 357-359