

## ANTI-EMETIC ACTIVITY OF SOME LEGUMINOUS PLANTS

MUHAMMAD MOHTASHEEM UL HASAN\*, IQBAL AZHAR, S. MUZAMMIL,  
SALMAN AHMED AND SYED WASEEMUDDIN AHMED

Department of Pharmacognosy,  
Faculty of Pharmacy, University of Karachi, Karachi-75270, Pakistan.

### Abstract

Crude methanol extracts of the leaves of *Adenanthera pavonina* L., *Peltophorum roxburghii* L., *Prosopis cineraria* L., and *Prosopis juliflora* DC., were evaluated for anti-emetic activity. Emesis was induced by the oral administration of copper sulphate 50mg/kg body weight to male chicks of four days age. The anti-emetic activity was determined by calculating the mean decrease in number of retching in contrast with those of control. All extracts (150 mg / kg body weight orally) showed anti-emetic activity when compared with standard drug Chlorpromazine at the same dose. Among all the extracts, *Prosopis juliflora* showed the highest (73.64%) and *Adenanthera pavonina* showed the lowest (50.17%) anti-emetic activity.

### Introduction

*Adenanthera pavonina* L., *Peltophorum roxburghii* L., *Prosopis cineraria* L., and *Prosopis juliflora* L., belong to the family Leguminosae. *Adenanthera pavonina* is widely used in various Ayurvedic herbal preparations for treating diseases such as boils, inflammations and gout (Jayasinghe *et al.*, 2006). A decoction of the leaves is used for gastric complaints such as diarrhoea and dysentery (Holdsworth, 1977). Chemical literature survey of *Adenanthera pavonina* revealed the presence of triterpenes (Yadav *et al.*, 1976), flavonoids (Gennaro & Nasini 1972) and fatty acids (Kabele-Ngiefu *et al.*, 1975; Balogum & Fetuga, 1985; Sotheeswaran *et al.*, 1994).

The hexane and methanol extracts of *Peltophorum roxburghii* (G. Don) Degener (syn. *Peltophorum pterocarpum* (DC.) K. Heyne) showed anti microbial activity (Veeramuthu *et al.*, 2006). The bark of plant is used in dysentery, toothache, pains and sores (Jagessar *et al.*, 2007).

*Prosopis cineraria* (L.) Druce is beneficial in cough, vertigo, dyspnoea, skin diseases, piles and worms (Bhattacharjee, 2001). Literature survey of *P. cineraria* revealed the presence of proteins, alkaloids (Rastogi & Mehrotra, 1995), sterols, flavonones, glycosides (Akhtar & Virmani, 1992) and fatty acids (Gangal *et al.*, 2009).

Leaf preparations of *Prosopis juliflora* (Sw.) DC., are used to mend broken bones, dyspepsia and venereal disease (Pasicznik *et al.*, 2001). The flavonol glycosides and hydroxycinnamic acid from *Prosopis juliflora* pollen were reported to possess antioxidant with high free radical scavenging activity (Wierman & Vieth, 1983; Campos *et al.*, 1997). 3-Oxo-juliprosopine and Secojuliprosopinal (SivaKumar *et al.*, 2009) were isolated from *Prosopis juliflora*.

In present study, we determined the potential of anti-emetic activity in the methanol extracts of *Adenanthera pavonina* Linn., *Peltophorum roxburghii* Linn., *Prosopis cineraria* Linn., and *Prosopis juliflora* DC. Effect produced by these plant extracts were determined by the decrease in the number of retching after oral administration of copper sulphate.

### Materials and Method

**Plant material:** The leaves of *Adenanthera pavonina* L., *Peltophorum roxburghii* L., *Prosopis cineraria* L., and *Prosopis juliflora* DC., were collected from Karachi and soaked in methanol for seven days at room temperature, then methanol was evaporated by a rotary evaporator which afforded thick crude extracts.

**Animals:** Young male chicks 4 days of age, weighing from 32-52 g were taken from the local market.

**Anti-emetic activity:** The anti-emetic activity was determined by calculating the mean decrease in number of retching in contrast with those of control (Yang *et al.*, 1999). Each chick was set aside for 10 minutes to stabilize in a large beaker. The extracts of *Adenanthera pavonina*, *Peltophorum roxburghii*, *Prosopis cineraria* and *Prosopis juliflora* were dissolved in 0.9% saline containing 5% DMSO and 1% Tween 80 and administered at a dose of 150 mg / kg abdominally and volume of 10 ml / kg to the test animal on the basis of their body weights.

Control group received only saline 0.9%. After 10 minutes copper sulphate was administered orally at 50 mg / kg, then the number of retching (an emetic action without emitting gastric material) was observed during next ten minutes. Chlorpromazine was used as a standard drug (150 mg/kg.b.w).

The percent inhibition was calculated by the following formula:

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

where,

A = Frequency of retching in control group

B = Frequency of retching in test group

**Statistical analysis:** Anti-emetic activity is expressed as mean  $\pm$  S.E.M (Table). The statistical significance of the difference was determined by an unpaired Student's *t*-test.

\*Corresponding author: phm.hasan@gmail.com

**Table . Anti-emetic effect of some Leguminous plants.**

Drug	Mean no. of retches $\pm$ S.E.M	Inhibition (%)
Control	69.28 $\pm$ 4.28	-
Chlorpromazine	46.62 $\pm$ 3.84*	32.71
<i>A. pavonina</i>	34.52 $\pm$ 3.12*	50.17
<i>P. roxburghii</i>	31.25 $\pm$ 3.02*	54.89
<i>P. cineraria</i>	21.14 $\pm$ 3.12*	69.49
<i>P. juliflora</i>	18.26 $\pm$ 2.12*	73.64

\*Significantly different from the control values  $p < 0.05$

Dose: 150 mg/kg, N= 6

### Results and Discussion

The anti-emetic activity of *Adenanthera pavonina*, *Peltophorum roxburghii*, *Prosopis cineraria* and *Prosopis juliflora* on young chicks revealed that these extracts have anti-emetic effect. After administration of a dose of 150 mg/kg BW chlorpromazine and the extracts of tested four plants, the numbers of retches were reduced. The group of chicks treated with chlorpromazine was found to have 46 retches as compared to the 69 retches of control group, thus chlorpromazine reduced the retches by 32.71%. The chicks treated with *Adenanthera pavonina* inhibited the

retches up to 50.17%. The extract of *Peltophorum roxburghii* showed 54.89% inhibition, *Prosopis cineraria* inhibited retches by 69.49% whereas, *Prosopis juliflora* showed 73.64% inhibition. Therefore, the extracts of *Adenanthera pavonina*, *Peltophorum roxburghii*, *Prosopis cineraria* and *Prosopis juliflora* inhibited emesis to an extent greater than chlorpromazine at 150 mg/kg (Table and Fig. 1).

On the basis of these results it may be concluded that all the extracts have anti-emetic potential and are comparable with that of chlorpromazine (the reference drug). Although the results are significant but the mode of action is not known. However, as the oral copper sulphate induces emesis by peripheral action (Hossein *et al.*, 2005), and the extracts were able to effectively prevent its effect, it could be implied that these extracts have a peripheral anti-emetic action. This study also justifies the traditional use of *Adenanthera pavonina* and *Prosopis juliflora* in G.I.T complaints. From chemical point of view, both species of *Prosopis* contain alkaloids and showed highest activity as compared to *Adenanthera pavonina* and *Peltophorum roxburghii*. Therefore, it may be said that alkaloidal contents may play some role in anti-emetic effect. Further studies are required to determine the exact mode of action and the active compounds responsible for this effect.

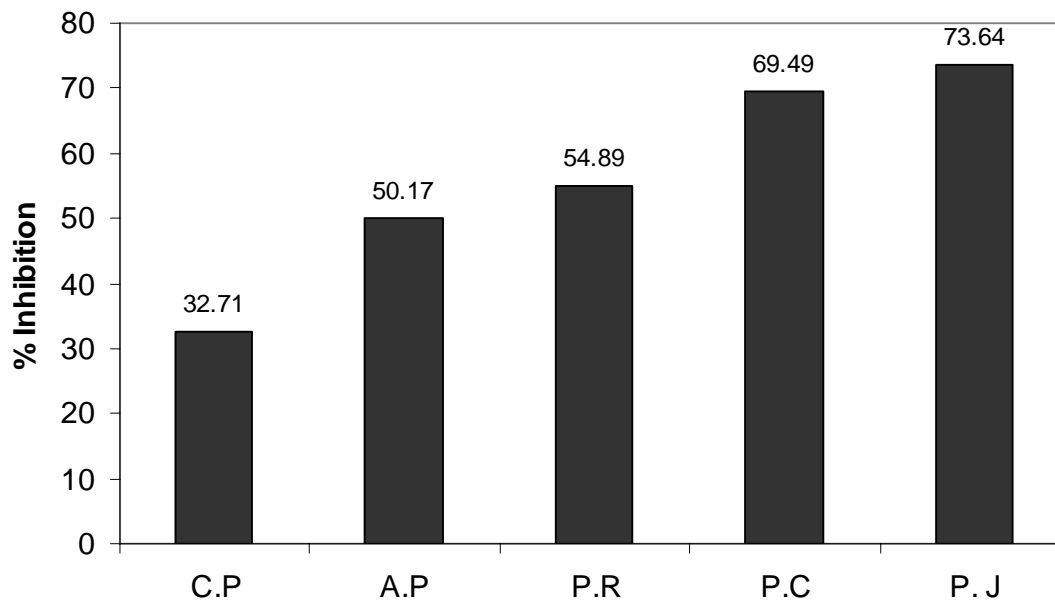


Fig. 1. Percent inhibition of some Leguminous plants studied for antiemetic effect.

C.P= Chlorpromazine, A.P= *Adenanthera pavonina*, P.R= *Peltophorum roxburghii*, P.C= *Prosopis cineraria*, P.J= *Prosopis juliflora*

### References

- Akhtar, H. and O.P. Virmani. 1992. *Dictionary of Indian Medicinal Plants*. (1<sup>st</sup> Ed) Central Institute of Medicinal and Aromatic Plants, Lucknow.
- Balogum, A.M. and B.L. Fetuga. 1985. Fatty acid composition of seed oils of some members of the Leguminosae family. *Food Chem.*, 17: 175-182.
- Bhattacharjee, S.K. 2001. *Handbook of Medicinal Plants*. (3<sup>rd</sup> Ed) Pointer publication, Jaipur.
- Campos, M.G., K.R. Markham and A. Proença da Cunha. 1997. Quality assessment of Bee- pollens using flavonoid/phenolic profiles. *Polyphenol Commun.*, 96: 53-54.
- Gangal, S., S. Sharma and A. Rauf. 2009. Fatty Acid Composition of *Prosopis cineraria* Seeds. *Chem., Nat., Compds.*, 45(5): 705-707.
- Gennaro, A.M. and G. Nasini. 1972. Flavonoids from *Adenanthera pavonina*. *Phytochem.*, 11(4):1515.

- Holdsworth, D.K. 1977. *Medicinal Plants of Papua New Guinea*, South Pacific Commission Technical paper No.175, Noumea, New Caledonia.
- Hossein, H., M. Mashallah and G. Akbar. 2005. Antiemetic effect of *Mentha xpiiperita* aerial parts extracts in young chickens. *Irr. J. Pharm. Sci.*, 1(1): 21-24.
- Jagessar, R.C., A. Mohamed and G. Gomes. 2007. Antibacterial and antifungal activity of leaf extracts of *Luffa operculata*, vs *Peltophorum pterocarpum*, against *Candida albicans*, *Staphylococcus aureus* and *Escherichia coli*. *Nature and Science*, 5(4): 81-93.
- Jayasinghe, P.K.I.D.E., B.M.R. Bandara, E.W.M.A. Ekanayaka and V. Thevanesam. 2006. Screening for antimicrobial activity of *Acronychia pedunculata* (Ankenda) and *Adenathera pavonina* (Madatiya) against bacteria causing skin and wound infections in humans. *Proceedings of the Peradeniya University Research Sessions*, Sri Lanka, 11:105.
- Kabele-Ngiefu, A. Viex and C. Paquot. 1975. An oil rich in lignoceric and ceratic acids. The oil of *Adenathera pavonina* L., seeds. *Oleagineux*, 30(3):119-120.
- Pasiecznik, N.M., P. Felker, P.J.C. Harris, L.N. Harsh, G. Cruz, J.C. Tewari, K. Cadoret and L.J. Maldonado. 2001. The *Prosopis juliflora* - *Prosopis pallida* Complex: A Monograph. HDRA, Coventry, UK. pp. 172.
- Rastogi, R.P. and B.N. Mehrotra. 1995. *Compendium of Indian Medicinal Plants: A CDRI Series*. (Vol. IV) Lucknow, Publication and Information Directorate, New Delhi.
- SivaKumar, T., K. Srinivasan, R. Rajavel, M. Vasudevan, M. Ganesh, K. Kamalakannan and P. Mallika. 2009. Isolation of Chemical Constituents from *Prosopis juliflora* bark and Anti-inflammatory activity of Its Methanolic Extracts. *J. Pharmac. Res.*, 2(3): 551-556.
- Sotheeswaran, S., M.R. Sharif, R.A. Mureau and G.J. Piazza. 1994. Lipids from the seven Fijian plant species. *Food Chem.*, 49:11-13.
- Veeramuthu, D., A. Muniappan and I. Savarimuthu. 2006. Antimicrobial activity of some ethnomedicinal plants used by Paliyar tribe from Tamil Nadu, India. Entomology Research Institute, Loyola College, India. *BMC Comple. Alt. Med.*, 6: 35.
- Wierman, R and K. Vieth. 1983. Outer pollen wall, an important accumulator site for Flavonoids. *Protoplasma*, 118(3): 230-233.
- Yadav, N., G. Misra and S.K. Nigam. 1976. Triterpenoids of *Adenathera pavonina* bark. *Planta Med.*, 29(2): 176-178.
- Yang, Y., K. Kinoshita, K. Koyania, K. Takahashi, T. Tai, Y. Nuroura and K. Watanabe. 1999. Anti-emetic principles of *Pogostemon cablin* (Blanco) Benth. *Phytomed.*, 6(2): 89-93.

(Received for publication 15 July 2010)