Pak J Sci Ind Res 2001 44(3) 168-170

HYPOTENSIVE ACTION OF AN EXTRACT OF *HIBISCUS ROSA SINENSIS*, LINN

Shahnaz Ahmed, Shamim Qureshi, Maryam Mirza, Naseem M Qadri and A Q S Bukhari

Pharmaceutical and Fine Chemical Research Centre, PCSIR Laboratories Complex, Karachi-75280, Pakistan

(Received 11 February 1999; accepted 28 August 2000)

Hypotensive action of extract of pink flowers of *Hibiscus rosa sinensis*, Linn. was investigated in rats and dogs. It was found that 45 mg kg^{-1} of an aqueous extract of pink flowers lowered the blood pressure of rats from 80 mmHg to 40 mmHg while a dose of 60 mg kg^{-1} of same extract produced a fall in blood pressure of dogs from 120 mmHg to 40 mmHg, but the duration of hypotensive action was more than 3-4 h in both the cases i.e. rats and dogs. Also the biphasic response of the drug and its possible mode of action is discussed.

Key words: *Hibiscus rosa sinensis*, Aqueous extract, Hypotensive action.

Introduction

Hibiscus rosa sinensis, Linn. (Family Malvaceae) commonly known as shoe flower is an ornamental plant and grows in many colours as single or in double petals. It is a native plant of China but grows abundantly in Pakistan and India (Watt 1890; Kirtikar *et al* 1933; Nadkarni 1954; Chopra *et al* 1958). It is well known in folk-lore medicine for curing different ailments. Flowers are considered as emollient, refrigerant and demulcent (Watt 1890; Dymock 1890; Kirtikar *et al* 1933; Nadkarni 1954; Chopra *et al* 1958). Flowers are also used in strangury, cystitis and other irritable conditions of genito-urinary tract (Dymock 1890; Nadkarni 1954). Flowers of *H. rosa sinensis* also have a reputation in modern cosmetic industry i.e. hair dyes or eye brow dyes (Rosenbaum *et al* 1985) and also in polishes (Watt 1890; Nadkarni 1954; Chopra *et al* 1958).

Recently the flowers are reported to possess antifertility properties (Kholkute *et al* 1976; Kholkute and Udupa 1976; Singh *et al* 1982; Gupta *et al* 1985; Nath *et al* 1992; Jiang Yan *et al* 1998). Roots are used and marketed as a substitute for Althaea (Dymock 1890). Roots, flowers and leaves of *H. rosa sinensis* are used in cough and as an external remedy for all kinds of inflammations (Kirtikar *et al* 1933), as poultice on boils and cancerous swellings (Nadkarni 1954).

Literature survey indicates that *H. rosa sinensis* is very rich in chemical constituents. It reveals the presence of tannins (Dymock 1890); hibiscetin (Watt 1890), wax, hydrocarbons, fatty acids (Srivastava *et al* 1976); sterculic, malvalic acid and sterols (Chaukans 1984). Presence of pigments (Chuan 1975); anthocyanins, quercetin (Srivastava 1974) kaempferol, cyanin chloride, cyanidine chloride, and hentriacontane (Ishikura and Kimamoto 1973) has been confirmed. It also contains pigments, citric, tartaric and oxalic acids and some sugars (fructose, glucose and sucrose) (Chuan 1975).

It is a well known fact that all these compounds exert some pharmacological action of their own (Harada 1997). In this context, it was considered worthwhile to investigate the pharmacological properties of the crude aqueous extract of *H. rosa sinensis* flowers first and then to proceed on to its fractions. The present study aims at evaluating *H. rosa sinensis* for its toxicity and its action on blood pressure in normotensive albino rats and dogs of either sex.

Materials and Methods

Preparation of aqueous extract. The flowers of the *H. rosa sinensis* were collected from a local garden and washed thoroughly, first with tap water and then with distilled water. Flowers were dried in open air at room temperature on filter paper sheets. 5 kg of flowers were chopped into small pieces and soaked in 70% ethyl alcohol. Stirring was done by means of a mechanical shaker for 8 h daily for a period of 5 days. Contents were then filtered and filtrate was evaporated under reduced pressure at room temperature. 1.35 kg extract thus obtained was then partitioned with 2:1 ratio of water and pet-ether with vigorous shaking in separating funnel. The aqueous layer thus formed was decanted and evaporated at 60°C. The semi solid mass (0.533 kg) thus obtained as aqueous part/portion (Herrera *et al* 1986) was used for pharmacological screening.

Oral toxicity test. The oral toxicity of *H. rosa sinensis* was carried out on healthy adult albino rats of either sex weighing 200-250g reared at our animal house. The drug as doses of 250, 500 and 1000 mg kg^{-1} (Loomis 1978; Clarke

*Author for correspondence

and Clarke 1975) was administered by means of a bent cannula and syrings (Griffith and Farris 1942) for a period of 21 days, taking care not to injure the animals during this process. Normal saline as placebo was administered to the control group of animals.

The animals were placed in groups of six animals in plastic cages. After administering the drug, normal ration was provided to the animals and water was supplied through inverted bottles. To facilitate the housing of the animals, a layer of sand dust was laid at the bottom of cages, which was replaced on alternate days. The cages were labelled according to their respective doses.

Intravenous toxicity test. Intravenous toxicity was performed on healthy adult albino mice (male and female) weighing 25-30g reared at our animal house. The aqueous extract of *H. rosa sinensis* was injected through the tail vein in doses of 25, 50, 100, 200, 400 and 800 mg kg^{-1}, respectively. A placebo with normal saline in equal volume was administered to the control group of animals. In either case, care was taken to maintain the 0.4ml volume of the injectable materials.

Hypotensive activity. (a) In rats: Adult Sprague Dawley strain of rats of either sex weighing 250 to 300g were used, Rats were anaesthetized intraperitoneally by means of 25% urethane solution in the dose of 0.7 mg $100g^{-1}$. Blood pressure of animal was recorded through carotid artery while drug was injected through jugular vein (Rubeena *et al* 1998). Readings were recorded on a kymograph.

(b) In dogs: adult normotensive dogs of either sex weighing 18-22 kg were anaesthetized by intravenous injection of pentothal sodium in the dose of 15 mg kg^{-1} followed by an intraperitoneal injection of gardinal sodium in the dose of 35 mg kg^{-1}. Blood pressure was recorded through femoral artery while the drug was injected through the contralateral femoral vein (Pantoja *et al* 2000). Readings were recorded on a kymograph (Sarfaraz and Bari 1965).

Results and Discussion

The animals were continuously observed upto 15 days but no mortality was observed in the oral toxicity test in the given doses (Loomis 1978; Clarke and Clarke 1975).

No mortality was observed in doses administered through the I.V. route. The dose of 400 mg kg^{-1} increased the respiratory rate. This condition persisted for for a few minutes i.e. 10-20 min and then the animals regained normal respiratory pattern (Loomis 1978).

An aqueous extract of *H. rosa sinensis* (Pink colour flowers) showed a marked fall in blood pressure in both rats and

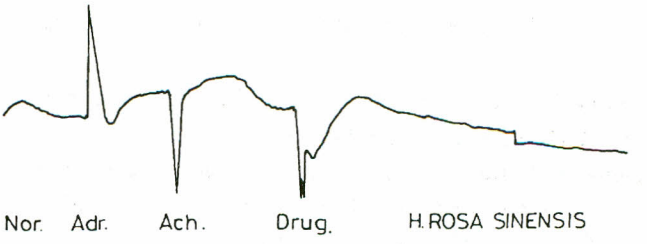

Fig 1. Hypotensive effect of *Hibiscus rosa sinensis* in rat at the dose of 45mg kg^{-1}.

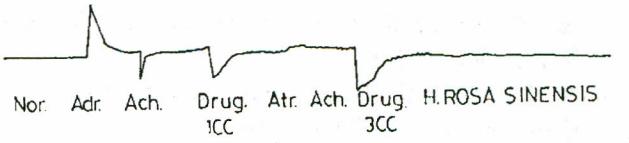

Fig 2. Hypotensive effect of *Hibiscus rosa sinensis* in dog at the dose of 60mg kg^{-1}.

dogs as shown in Fig 1 and 2. The dose of 45mg kg^{-1} of this extract, produced marked hypotension in rats and the blood pressure was reduced from 80 mmHg to 40 mmHg. This response was biphasic; initiated by a marked transient fall followed by slight rise and depression which continued to rise to near normal level of 80 mmHg and followed by a marked and prolonged fall which persisted for above 3 h (Fig 1). The dose of 60 mg kg^{-1} in dogs produced a substantial fall in the blood pressure from 120 mmHg to 40 mmHg which gradually increased to about 80/90 mmHg and persisted for 4 h (Fig 2).

Atropinization failed to block the hypotensive activity produced by this extract. The rate and depth of respiration was greatly enhanced and was concomitent to the fall in the blood pressure in the dogs which could be attributed to the baro-receptors. The prolonged fall in the normal blood pressure of these dogs and rats indicates that this hypoten-sion may be central in origin or through the blockade of the ganglia (Mary *et al* 1997; Katzung 1998) which warrants further investigation and is in consonance with the findings of the other workers. (Agarwal and Shinde 1967).

References

Agarwal S L, Shinde S 1967 Studies of *Hibiscus rosa sinensis*. (II) Preliminary pharmacological investigations. *Indian J Med Res* **55**(9) 1007-1010.

Chaukan V K 1984 Sterol of some Malvaceaus plants with particular emphasis on cholesterol occurrence. *Proc Natl Acad Sci* **54**(3) 236-239.

Chopra I C, Handa K L, Kapur L D 1958 *Indigenous Drugs*

of India. U N Dhur and Sons, Private Ltd. Calcutta pp 510-511.

Clarke E G G, Clarke M L 1975 *Veterinary Toxicology*. Bailliere Tindall, London pp 10.

Dymock W 1890 *Pharmacographic Indica. A history of the Principals of Drugs*. The Institute of Health and Tibbi Research, Pakistan Vol I pp 204.

Griffith J, Farris E J 1942 *The Rat in Laboratory Investigation.* J B Lippincott pp 164.

Gupta I, Tank R, Dixit U P 1985 Fertility regulation in males; Effect of *H. rosa sinensis* and *Malva viscus* flowers extract on male albino rats. *Proc Natl Acad Sci India* Sect-B **55**(4) 262-267.

Harada H 1997 Health/beauty beverage composition. *Jpn Kokai Tokkyo Koho* JP09 **19** 276.

Herrera C L, Cuasay P M, Ramos E V, Chaves E P, Dayap L A, Rafang B C 1986 Preliminary studies on the antifertility activity of *Averrhoa bilimbi L. Philippine J Science* **115**(4) 307-316.

Ishikura N, Kimamoto 1973 Anthocyanins and flavanols in the flowers of *H. mutobilis* and *F. versicolor. J Sci Biol* **11**(2) 51-59.

Jiang Y, Zhao C, Li K, Zhou M 1998 Effect of Petroleum ether extract of *H. rosa sinensis* flowers on early pregnancy and some reproductive hormones in rats. Yunan Daxue Xuebao, Ziran Kexueban **20**(3) 162-165.

Katzung B G 1998 Basic and clinical pharmacology. In: *Cholinoceptor - Blocking Drugs*. Appleton and Lange, 7th ed pp 108-109.

Kholkute S D, Chutterjee S, Udupa K N 1976 Effect of *H. rosa sinesis* Linn, on oestrus cycle and reproductive organs in rats. *Indian J Exptl Biol* **14**(6) 703-704.

Kholkute S D, Udupa K N 1976 Effect of *H. rosa sinensis* on pregnancy of rats. *Planta Medica* **29**(4) 305-400.

Kirtikar K R, Basu B D, I C S 1933 *Indian Medicinal Plants*. Lalit Mohan Basu. 49-Leakers Road, Allahabad, India. Vol I, 2nd ed pp 335.

Chuan Lin Yuan 1975 Study of red pigment in Taiwan plants. *Proc Natl Sci Counc part* 1, **8** 133-137.

Loomis T A 1978 Essentials of Toxicology. Lea and Febiger. Philadelphia 3rd ed pp 18, 203.

Mary J M, Richard A H, Pamela C C, Bruce D F, Michael C 1997 Lippincotts Illustrated Reviews Pharmacology. In: *Cholinoceptor-Blocking Drugs*. Lippincott - Raven 2nd ed pp 45-49.

Nadkarni A K 1954 *Indian Materia Medica*. Popular Book Depot, Bombay, Vol I, 3rd ed pp 630-631.

Nath D, Sethi N, Singh R K, Jain A K 1992 Commonly used Indian abortifacient plants with special reference to their teratologic effects in rats. *J Ethanopharmacology* **36**(2) 147-154.

Pantoja C V, Martin N T, Norris B C, Contreras C M 2000 Purification and bioassays of a diuretic and natriuretic fraction from garlic (*Allium sativum*). *J Ethanopharmacology* **70** 35-40.

Rosenbaum G, Cotteret J, Grolier J F 1985 Hair dye composition containing a mixture of non exhausted vegetable powder, a direct-dye of a natural origin and a diluent. *Can C A* **1** 179, 269..

Rubeena S, Mohammad A, Syed A H, Ahsana D, Aftab S, Syed I A 1998 Preliminary pharmacological studies on some traditional herbal medicines. *Pak J of Pharma* **15**(2) 45-55.

Sarfaraz S, Bari M A 1965 Synergistic action of Isochaksine and Serpajmaline. *Pak J Sci Ind Res* **8** 260-264.

Singh M P, Singh R H, Udupa K N 1982 Antifertility activity of Benzene extract of *H. rosa sinensis* flowers on female albino rats. *Planta Medica* **44** 171-74.

Srivastava D N 1974 Phytochemical analysis of *Japa kusum. J Res Indian Med* **9**(4) 103-4.

Srivastava D N, Bhatt S K, Udupa K N 1976 Gas chromatographic identification of fatty acid, fatty alcohol, hydrocarbons of *H. rosa sinensis* leaves. *J Am Oil Chem Soc* **53**(10) 607-8.

Watt G 1890 Dictionary of the Economic Products of India. Vol.IV, Government of India Central Printing Office, 8-Hastings Street, Calcutta pp 242-243.