Evaluation of Analgesic Activity of Lotus seeds (Nelumbo nucifera) in Albino Rats

Vikrama Chakravarthi.P. and Gopakumar.N*

Department of Pharmacology and Toxicology,
College of Veterinary and Animal Sciences, Mannuthy, Thrissur, Kerala
* Correspondinga author

Abstract

The present study was undertaken to assess the analgesic effect of red and white lotus (*Nelumbo nucifera)* seeds in albino rats. The analgesic action in acute pain model was studied by tail flick method. The methanolic extracts of lotus seeds were screened for phytochemical analysis and it's revealed the presence of all components excluding tannins. The Forty eight adult Sprague-Dawley rats were divided into six groups of eight each and maintained under ideal laboratory conditions. Group I was taken as control and group II treated with the standard drug diclofenac potassium @ 3mg/kg on 7th day of study. The methanolic extract of *Nelumbo nucifera* seeds of red and white varieties @ 400mg/kg and 600mg/kg were fed to group III, IV, V and VI respectively, for 7 days. It is observed that the both lotus seed extracts shows considerable analgesic effect in acute pain model which is less than the effect of Diclofenac group. The higher dose groups of lotus seed extracts (600mg/kg) were revealed more activity than their corresponding lower dose. While evaluating all groups, the higher dose group of white lotus seed (600mg/kg), exhibited more pronounced activity than other extracts.

Keywords: Analgesic activity, Lotus seeds, Tail Flick method, Pain.

Introduction

The herbal medicine consists of natural plant substances which are used for prevention and treatment of ailments. This practice has existed since prehistoric times and flourishes today as the primary form of medicine. The nature has bestowed upon us a very rich botanical wealth and over 80,000 species of plants are in use throughout the world. The World Health Organization (WHO) estimated that, 80% of the populations of developing countries rely on traditional medicines mostly plant drugs, for their primary health care. Since the use of herbal drugs remains a good alternative to allopathic agents, with fewer side effects. *Nelumbo nucifera* (lotus) is one of the plants that have been used for its medicinal properties since ancient times. This plant is often cultivated in India, for their elegant flower, which is the national flower of India. The rhizomes, flowers, stalk and leaves of lotus are used in the form of infusion in fever as refrigerant and diuretic (Mitra *et al*., 1973). Mukherjee *et al.* (1996) reported that the methanolic extract of rhizomes of *Nelumbo nucifera* in doses of 200mg/kg, 300mg/kg and 400mg/kg, I/P. had shown reduction in spontaneous activity, reduction in muscle relaxant activity and depression of pain response in mice. Hence, the present study is aimed to prove scientifically the analgesic property of lotus seeds as well as to compare the activity of red and white lotus seeds.

Materials and Methods

Phytochemical Screening: The methanolic extracts of red and white lotus seeds were tested for the presence of various active principles namely steroids, alkaloids, tannins, phenolic compounds, flavonoids, glycosides, diterpenes, triterpenes and saponins as per the procedure quoted by Harborne (1991).

Experimental Animals: The study was carried out on 48 adult Sprague-Dawley rats (150-200 g) of either sex, maintained under ideal feeding and management practices in the laboratory.

Study Design: The Sprague-Dawley Rats were divided into six groups of eight each and maintained for the analgesic activity. Five % Gum acacia were fed to Group I and II, in which the Group II received the standard drug diclofenac potassium @ 3mg/kg on the 7th day before subjected to tail flick reaction. The methanolic extract of *N.nucifera* seeds of red and white varieties @ 400mg/kg and 600mg/kg were fed to group III, IV, V and VI respectively, for 7 days.

Analgesic Screening-Tail flick model : Analgesic effect in rats was assessed by tail flick model (Dandiya and Menon, 1963) using analgesiometer (Davies *et al.*, 1946). The tail flick latency was obtained thrice before drug administration, and mean was used as pre drug latency. A cut off time of 10 sec was planned to avoid any tissue damage in the animal. The instrument has a nichrome wire, which would be heated to the required temperature and maintained by means of heat regulators. The strength of the current passing through the naked nichrome wire was kept constant at 4 Amps. The rat was kept in a rat holder with only the tail portion protruding out. The tail was placed on the platform in such a way that the middle portion of the tail remained just above the hot wire but without touching it. The latency period (reaction time) was noted when the animal responded with a sudden and characteristic flick or tail lifting. The reaction time for each group was measured at 30, 60, 90 and 120 minutes using analgesiometer on the 7th day after drug/extract administration. The blood was collected after 120 minutes and the serum and hematological parameters were assessed.

Statistical Analysis of Data: Results were analyzed by using one-way ANOVA test as described by Snedecor and Cochran (1985). Significance in the difference of the means was tested using Least Significant Difference (LSD). Results were expressed as mean ± standard error.

Results and Discussion

The phytochemical analysis of lotus seeds revealed the presence of alkaloids, flavonoids, glycosides, steroids, phenolic compounds, diterpenes and triterpenes in them. Rai *et al.* (2006) investigated the active principles of *N.nucifera* seeds and find the seeds contain alkaloids, saponins, phenolics and carbohydrates.

In the present study, the diclofenac (Group-II) and red and white lotus seed extract treated groups (Groups III, IV, V and VI) showed a significant analgesic effect compared to that of control group (Group I), but the activity shown by the red and white lotus seed extracts were less than to that of diclofenac treated group (Table.1). The methanolic extract of red and white lotus seed at both dose levels exerts a similar reaction time suggesting an increase in the dose from 400mg/kg to 600mg/kg body weight will not have significant influence in the analgesic activity.

A significant increase in the reaction time for tail flick method indicated the analgesic effect by red and white lotus seed and also elucidates the involvement of central mechanism in analgesic action. Analgesic effect mediated through central mechanism indicates the involvement of endogenous opioid peptides and biogenic amines like 5HT (Bensemana and Gascon, 1978; Glazer *et al.*, 1981).

The flavonoids were reported to have analgesic activity (Hossinzadeh *et al.*, 2002) by reduced availability of prostaglandins. Hence, the presence of flavonoids in the methanolic extract of red and white lotus seed may also contribute for the analgesic activity. The serum AST, ALT, Total leukocyte count and Differential leukocyte counts were found within the normal range.

From the results of the present study it can be inferred that methanolic extract of red and white lotus seeds is an effective analgesic agents. While comparing the lotus seed extracts, the white lotus seed @ 600 mg/kg body weight revealed higher effect than others.

Acknowlegement

Authors are sincerely thank to Kerala State Council for Science, Technology and Environment for providing financial assistance to the project entitled "Comparative evaluation of red and white flowered ecotypes of sacred lotus (Nelumbo nucifera Gaertn)".

References

1. Bensemana, D. and Gascon, A.L. (1978).

Table-1.Effect of treatments on analgesic activity by tail flick model in rats.

Time interval (Minutes)	Reaction time in seconds (mean ± SE)					
	Control (3mg/kg)	Diclofenac	Red lotus Seed Extract @400mg/kg	Red lotus Seed Extract @600mg/kg	White Lotus Seed Extract @400mg/kg	White Lotus Seed Extract @600mg/kg
0	3.00±0.15	3.24±0.04	3.13±0.07	3.04± 0.19	3.10±0.12	3.20±0.09
30	3.66±0.07	3.68±0.07*	3.49±0.08*	3.71±0.05*	3.71±0.07*	3.70±0.07*
60	3.76±0.11	5.03±0.20*	3.88±0.20*	4.19±0.20*	4.18±0.05*	4.21±0.03*
90	4.05±0.15	5.95±0.08*	6.14±0.03*	6.25±0.03*	5.60±0.29*	6.39±0.12*
120	3.75±0.12	6.31±0.08*	5.16±0.05*	5.26±0.07*	5.30±0.07*	5.39±0.11*

* Significant at P<0.01, Means bearing same superscript do not differ significantly at P<0.05

Relationship between analgesia and turnover of brain biogenic amines. *Can. J. Physiol. Pharmacol*. 56: 721-730.

2. Dandiya, P.C. and Menon, M.K. (1963). Studies on central nervous system depressants (iii). *Arch. Intern. Pharmacodynamic.* 141: 223-227.
3. Davies,O.L., Raventos, J. and Walpole, A.L.(1946). A method for evaluation of analgesic Activity using rats. *Br. J. Pharmacol.* 1: 255-260.
4. Glazer, E.J., et.al.(1981).Serotonin neurons in nucleus raphe dorsalis and paragigantocellularis of the cat contain enkephalin. *J. Physiol*. 77: 241-245.
5. Harborne, J.B.(1991). Phytochemical methods. Guide to modern techniques of plant analysis. Second edition. Chapman and Hall, India. 653 p.
6. Hossinzadeh, H., Ramezani, M., Fadishei, M. and Mahmoudi, M. (2002). Anti-inflammatory and acute toxicity effects of *Zhumeria majdae* extracts in mice and rats. *Phytomedicine* 9: 135-141.
7. Mitra, R., Mehrotra, S., Kapoor, L.D. (1973). Medicinal Plants. *Indian J.Pharm.* 35:207.
8. Mukherjee, P.K., Balasubramanian, R., Pal, M. and Saha, B.P. (1996). Studies on psycho pharmacological effects of *N.nucifera* rhizome extract. *J. Ethnopharmacol.* 54: 63-67.
9. Rai, S., Wahile, A., Mukherjee, K., Saha, B.P. and Mukherjee, P.K. (2006). Antioxidant activity of *Nelumbo nucifera* (sacred lotus) seeds. *J. Ethnopharmacol.* 104 (3): 322-327.
10. Rajnarayana, K., Reddy, M.S., Chaluvadi, M.R. and Krishna, D.R. (2001). Bioflavonoids classification, pharmacological, biochemical effects and therapeutic potential. *Indian J. Pharmacol.* 33: 2-16
11. Snedecor, G.W. and Cochran, W.G. (1985). *Statistical Methods*. Eighth edition. Oxford and IBM publishing Company, Calcutta, p. 584.

* * * * * * * *