

Cardiac Depressant Activity of *Erythrina variegata* Linn on Isolated Frog-Heart

Karthikeyan R* and Koushik OS

Department of Pharmacognosy, Vignan Pharmacy College, Vadlamudi-522213, AP, India

Abstract

Objective: *Erythrina variegata* Linn of the family leguminaceae is a medium sized deciduous small tree with prickly stems and branches, leaves with triangular leaflets and large coral red flowers and grows all over Bangladesh. Different parts of *E. variegata* have used in traditional medicine as nervine sedative, febrifuge, anti-asthmatic and antiepileptics. It is having the d-tubacurarine like activity. The present study was under taken to evaluate the cardiac depressant activity of *Erythrina variegata* in experimental animal model.

Materials and method: Aqueous extract of *E. variegata* was tested for cardiac depressant action by using frog isolated heart model. Different concentration of atropine sulphate is used along with plant water extract.

Results: The water extract shows the significant cardiac depressant activity.

Conclusion: The present study shows that *E. variegata* has significant cardiac depressant activity.

Keywords: *Erythrina variegata*; Cardiac depressant; Water extract; Atropine sulphate; Ringer solution

Introduction

The *Erythrina variegata* Linn (Leguminaceae) is a medium sized deciduous small tree with prickly stems and branches, leaves with triangular leaflets and large coral red flowers and grows all over Bangladesh [1,2]. *Erythrina variegata* Linn leaf juice given to cure whooping cough of children. The root extracts of *Erythrina variegata* Linn. possess antimicrobial activity [3]. It is also useful in ophthalmia and skin diseases. The juice of the leaves is used in earache, toothache, constipation, cough, and also known to stimulate lactation and menstruation [4]. Different parts of *Erythrina variegata* Linn have used in traditional medicine as nervine sedative, febrifuge, anti-asthmatic and antiepileptics. *Erythrina variegata* Linn showed significant anti malarial activity in vitro toward Plasmodium falciparum using the lactate dehydrogenase (LDH) method. Cardio vascular disease incurs a greater economical constraint than any other illness especially in the developing countries. It would be most common cause of death by the year 2020. The risk factors for heart disease are family history, sex, increased lipid levels, diabetes mellitus, hypertension, obesity, and cigarette smoking [5]. There is adequate evidence indicating hypercholesterolemia and other lipid abnormalities as major risk factors in the development of atherosclerosis and coronary heart disease. Therefore, cardiovascular disease is a very common problem in the affluent societies related to their life Style [6].

Materials and Method

Plant materials

The leaves of *Erythrina variegata* were collected from Pamarru, Krishna district, Andhra Pradesh, India. Plant was authenticated by Dr. M Raghu Ram Department of Botany and Microbiology, Acharya Nagarjuna University, Guntur. The leaves part was selected and washed cleanly, dried in shade were powdered and subjected to soxhalation with different solvents (Petroleum ether, n-hexane, Chloroform, Methanol, water) for 48 hours. Extracts were collected and calculated the extractive value.

Animals

The animal green frog (*Rana hexadactyla*) was used for this study.

Drugs and chemicals

The chemicals acetylcholine (10 µg/ml), adrenaline 10 µg/ml, potassium chloride (1%-4%), calcium chloride (1%-4%), propranolol (100 µg/ml), atropine sulphate (100 µg/ml), frog's ringer solution.

Physiological salt solution

Composition of physiological salt solution were: Frog ringer NaCl (18 g), KCl (0.42 g), CaCl₂ (0.36 g), NaHCO₃ (0.6 g) and Glucose (6 g) (for 3 litres of distilled water.)

Determination of cardiovascular activity

Pith the frog and pin it to the frog board. Give a middle line incision on the abdomen. Remove the pectoral girdle and expose the heart. Remove the pericardium carefully and put a few drops of frog ringer over the heart. Trace the inferior venacava, put the thread around it and give a small cut in order to insert the venous cannula which is in turn connected to a perfusion bottle containing frog ringer. Insert the cannula in the vein and tie the thread to assure the cannula in place. Give a small cut in one of the aorta for the perfusate to come out. Adjust a proper venous pressure of 2-4 cm by altering the height of perfusion bottle. The effective venous pressure is the height in cms from level of the venous cannula and the ringer level in the perfusion bottle. Start the perfusion by opening screw clamp attached to the tube. Pass a thin pin hook through the tip of the ventricle and with the help of a fine thread attach to the hook tie it to the free limb of the universal lever which is fixed to the stand. Adjust the proper tension and magnification by altering the height of the lever. Record the normal contractions of the heart on the smoked drum [7].

*Corresponding author: R Karthikeyan, Department of Pharmacognosy, Vignan Pharmacy College, Vadlamudi 522213, AP, India, Tel: 9966847127; E-mail: rkognosy@gmail.com

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Results and Discussion

In this study, different extracts of leaves of *Erythrina variegata* were evaluated for Different concentrations of extracts reveal that the activity of *Erythrina variegata* leaves on cardiovascular system via heart rate, force of contraction and tone level. Primarily normal cardiogram was recorded followed by Adrenaline (1 µg/ml), Calcium chloride (5 µg/ml), Acetyl choline (1 µg/ml) and Potassium chloride (5 µg/ml) were treated as standard drugs respectively. Then the cardiovascular activity of *Erythrina variegata* was confirmed with treatment of different extracts in different concentration (10 µg/ml, 20 µg/ml). All these extracts showed depression on the heart rate, force of contraction and tone level. Further, the study was extended to confirm the mechanism of action of *Erythrina variegata*. In presence of atropine different leaves extracts of *Erythrina variegata* have failed to produce cardiac

depressant action. The results obtained from the study was tabulated and shown in Table 1 and Figures 1 and 2. Hence, it is conformed that different extracts of *Erythrina variegata* leaves produce cardiac depressant action by acting on muscarinic receptor (M2). Hence the study confirmed that *Erythrina variegata* as like Acetylcholine has negative inotropic and chronotropic effect on cardiac muscle.

Conclusion

The study concludes water extract of *Erythrina variegata* leaves produce cardiac depressant action by acting on muscarinic receptor.

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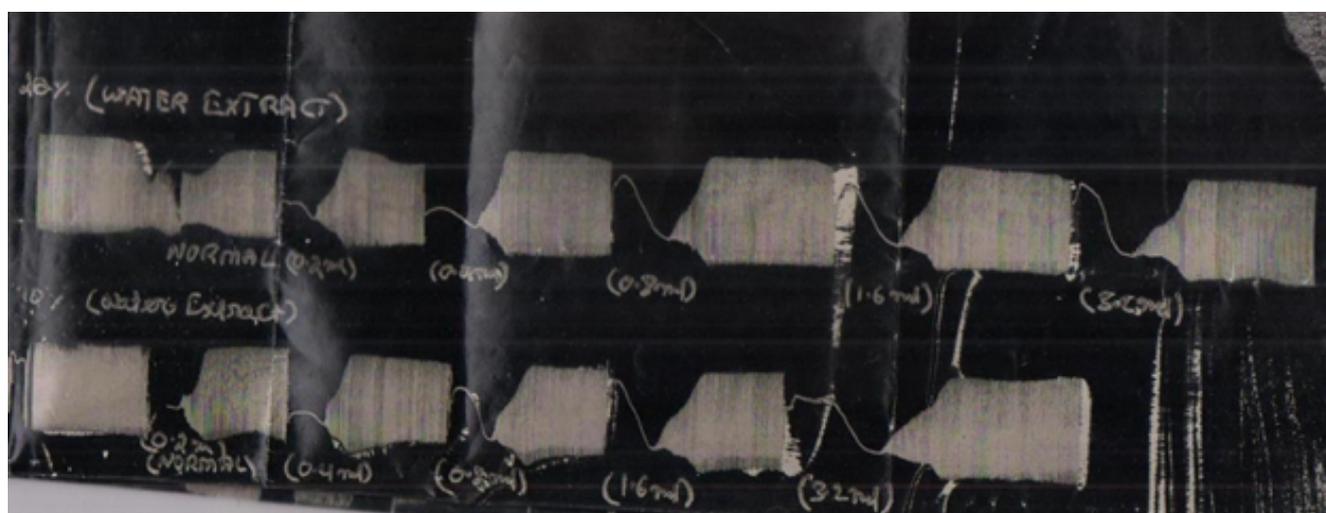


Figure 1: Cardiac depressant activity of *Erythrina variegata* leaves extracts.

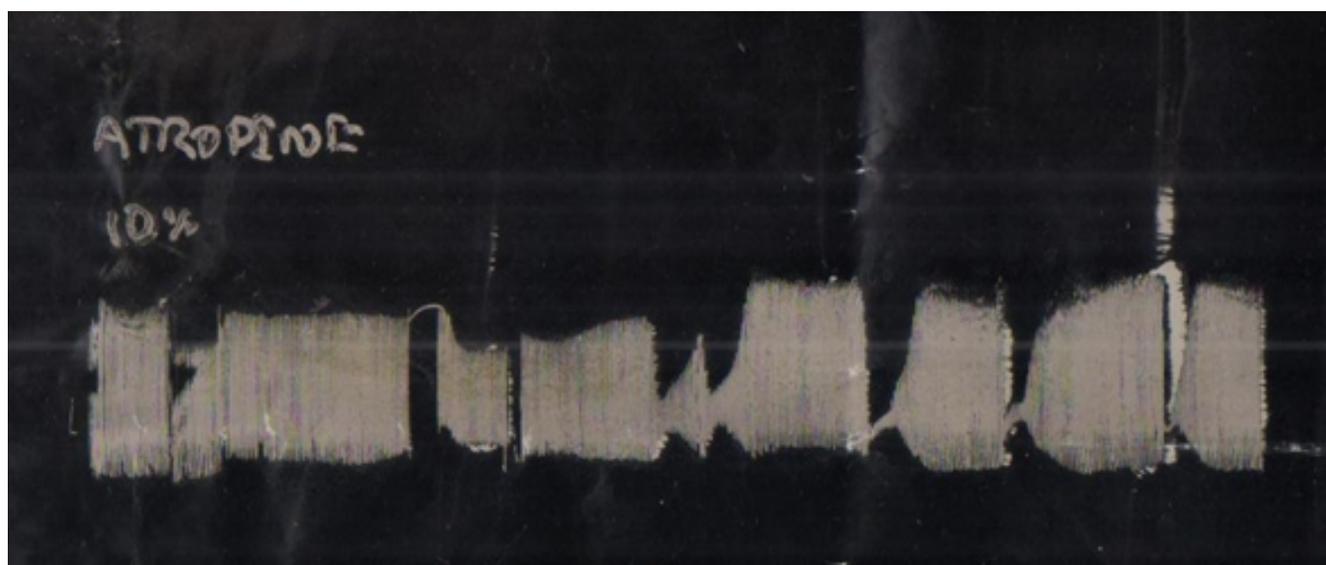


Figure 2: Cardiac depressant activity produced by *Erythrina variegata* leaves extracts against atropine.

S. No.	Drug concentration	Heart rate	Force of concentration	Tone level
1	Normal	63/min	Normal	Normal
2	Adrenaline (1 µg)	79/min	Increased	Increased
3	Calcium chloride(5 µg)	87/min	Increased	Increased
4	Acetylcholine (1 µg)	12/min	Decreased	Decreased
5	Potassium chloride (5 µg)	18/min	Decreased	Decreased
6	Water extract (10%)	Decreased	Decreased
7	Water extract (20%)	Decreased	Decreased
8	Water extract+atropine	54/min	Normal	Normal
9	Atropine (10 µg)	58/min	Normal	Normal

Table 1: Cardiac depressant activity of *Erythrina variegata* leaves extracts.

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