



COMPARATIVE CARDIOTONIC ACTIVITY OF *HELICTERES ISORA* WITH DIGOXIN ON ISOLATED FROG HEART

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ABSTRACT

Helicteres isora Linn (Sterculiaceae) commonly known as Screw nut. Phytochemical studies had revealed the presence of glycosides, saponins, tannins. Present study was carried out to determine the cardiac stimulant effect by using infusion of fruits with different dilutions & compared with cardiotonic activity of digoxin-the life saving cardiotonic. The activity was tested by using isolated frog heart assembly. The present preliminary studies confirm the better cardiotonic activity of *Helicteres isora* as compared to digoxin. Further studies can confirm the reduced toxicity & this will be the advantage of *Helicteres isora* over digitalis. Thus, in future it will be interesting to isolate the active chemical constituents which are responsible for the cardiotonic activity.

Key-words: Cardiotonic activity, digoxin, *Helicteres isora*, isolated frog heart.

INTRODUCTION

Herbs and preparations thereof have been used to treat ailments since medicine began. The treatment of diseases with medicines of plant origin is an integral part of many cultures throughout the world. Nowadays 80% of the world's population uses medicines, which are directly or indirectly derived from plants. Worldwide, such medicines make up a 25% share of the pharmaceutical arsenal. Based on the strong traditional knowledge on the use of plants as therapeutic agents, a rational approach is being developed to use the medicinal plants as lead for the discovery of active molecules. The essential organ of the human body i.e. heart when fails to work leads to sudden death. Since the potent cardiotonic drug i.e. the digoxin which is of the plant origin has a long list of ADR and toxicity, it is a need of hour to develop and standardise cardiotonic drugs of herbal origin [1-9].

Helicteres isora Linn (Family – Sterculiaceae) is a large shrub or small tree occurs often gregariously, throughout India and in dry deciduous forests up to 1500 m on the hill slopes. In traditional medicine the root juice is claimed to be useful in cough, asthma, stomach affections, intestinal infections, diabetes and a cure for scabies when applied topically. Fruits

are demulcent, mildly astringent and useful in griping and flatulence. The decoction of the root used to be mixed with turmeric powder and applied externally to treat cuts and wounds by the ethnic people of Rayalseema region of Andhra Pradesh, India. The presence of cucurbitacin B and isocucurbitacin B were reported in roots. Aqueous ethanol and butanol extracts of *H. isora* root has been reported to possess significant antihyperglycemic activity in both Alloxan and glucose induced hyperglycemic rats at a dose of 250 mg/kg. The literature further revealed that, ethanol extract of root caused significant reduction in plasma glucose, triglycerides and insulin levels at 300 mg/kg dose after nine days of administration to insulin resistant and diabetic db/db mice. The potent inhibitory activity of aqueous extract of *H. isora* fruits was reported against avian myeloblastosis virus and human immunodeficiency virus . Bengal to Ceylon. From the roots betulinic acid, daucosterol, sitosterol, isorin were isolated. Cucurbitacin B and isocucurbitacin B were isolated and reported to possess cytotoxic activity. No significant studies were carried out for cardiac stimulant activity of *Helicteres isora* and hence, we decided to evaluate the general cardiotonic activity of *Helicteres isora* by using isolated frog heart assembly [10-11].

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EXPERIMENTAL WORKDONE:-**Materials and methods**

Drug : Infusion of *Helicteres isora* Linn (Family – Sterculiaceae)

Chemical : Digoxin, Ringer Solution

Animal : Frog

Instruments : Sherington Rotating Drum, Sterling's heart lever

Preparation of infusion

The fruits of *Helicteres isora* Linn of Family Rubiaceae were collected from Manchar (Awasari Ghat) Dist. Pune and authenticated at Botanical Survey of India, Koregaon Park, Pune. One specimen was preserved in Department of Pharmacognosy of our institute for the reference. The fruits were washed thoroughly to remove adhered material and fine powder was made by using hand grinder. 1gm of powder was mixed with 100ml distilled water with the help of magnetic stirrer for half an hour. The material was filtered through Whatman filter paper no.40 and filtrate was collected. The prepared infusion was diluted with the help of distilled water in varying proportion and labeled as follows [12],

A1-Undiluted filtrate

A2-1:1 (filtrate: distilled water)

A3-1:2 (filtrate: distilled water)

A4-1:4 (filtrate: distilled water)

All the preparations were evaluated for their cardiotoxic activity by using isolated frog heart assembly. The rate and force of heart contraction was determined.

Preparation of digoxin solution

The marketed digoxin ampoules (Sunpharma Ltd.)

were obtained from local market. Various different dilutions were made with distilled water and labeled as follows, B1- 25 µg/ml, B2- 50 µg/ml. Above prepared samples were evaluated for their cardiotoxic activity and treated as standard.

Preparation of hypodynamic ringer solution

Hypodynamic ringer solution was prepared by using standard method [13,14]. (Table-1)

Evaluation of cardiotoxic activity

The frog of species *Rana tigrina* was pithed and pinned it to the frog board. A midline incision was given on the abdomen, the pectoral girdle was removed and the heart was exposed. The pericardium was carefully removed and put a few drops of hypodynamic frog ringer over the heart. The inferior vena cava was traced, put a thread around it and given a small cut in order to insert the venous cannula. The cannula was inserted in the vein and the thread was tied to assure the cannula in place which is in turn connected to a saline bottle containing hypodynamic frog ringer solution. A small cut in one of the aorta was given for the ringer to come out. Heart was isolated and attached to the stand with moderate flow of ringer. A thin pin hook was passed through the tip of the ventricle and with the help of a fine thread attached to the hook; it was tied to the free limb of the Sterling's heart lever which was fixed to a stand. A proper tension was adjusted by altering the height of the lever [13,14]. The normal heart rate was noted. All test samples that is A1, A2, A3, A4, B1 and B2 were administered in different doses viz. 0.1ml, 0.2ml, 0.3ml respectively. The rate and force of heart contraction were noted as given in (Table 2-7, Figure 1-7).

Table-1 Composition of Hypodynamic ringer solution

Sr. No.	Ingredients	Quantity
1.	Sodium chloride (NaCl)	6.5 gm
2	Potassium chloride (KCl)	0.14 gm
3	Calcium Chloride (CaCl ₂)	0.03 gm
4	Sodium bicarbonate (NaHCO ₃)	0.2 gm
5	Glucose	2 gm
6	Distilled Water	1000 ml

Table-2

Sr. No.	Drug	Dose(in ml)	Beats/min.	Change in Force
1	.....	Normal	34	Normal
2	A1	0.1	30	Increase
3	A1	0.2	27	No Change
4	A1	0.3	25	No Change

Table-3

Sr. No.	Drug	Dose(in ml)	Beats/min.	Change in Force
1	.....	Normal	36	Normal
2	A2	0.1	32	Increase
3	A2	0.2	29	Decrease
4	A2	0.3	24	No Change

Table-4

Sr. No.	Drug	Dose(in ml)	Beats/min.	Change in Force
1	.....	Normal	37	Normal
2	A3	0.1	32	No Change
3	A3	0.2	27	Slight Increase
4	A3	0.3	22	Rapid Increase

Table-5

Sr. No.	Drug	Dose(in ml)	Beats/min.	Change in Force
1	.....	Normal	36	Normal
2	A4	0.1	32	Rapid Increases
3	A4	0.2	28	Rapid Increases
4	A4	0.3	23	Rapid Increases

Table-6

Sr. No.	Drug	Dose(in ml)	Beats/min.	Change in Force
1	.....	Normal	28	Normal
2	B1	0.1	23	Increase
3	B1	0.2	22	Slight decrease
4	B1	0.3	24	Increase

Table-7

Sr. No.	Drug	Dose(in ml)	Beats/min.	Change in Force
1	.....	Normal	30	Normal
2	B2	0.1	27	Increase
3	B2	0.2	26	Slight Increase
4	B2	0.3	20	Sudden Cardiac Block

OBSERVATIONS:

Figure 1

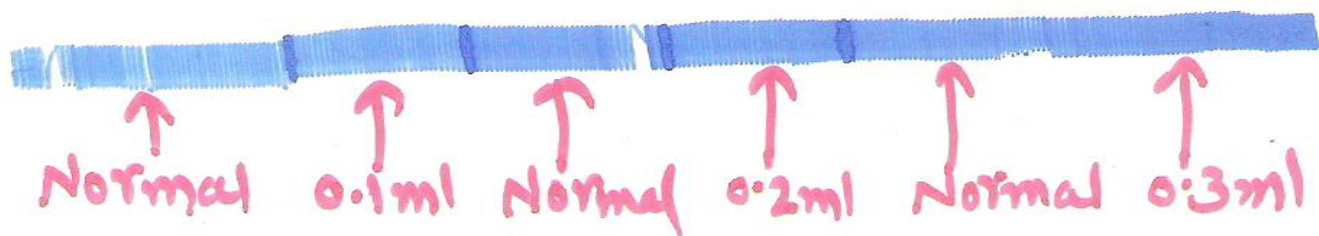


Figure-2

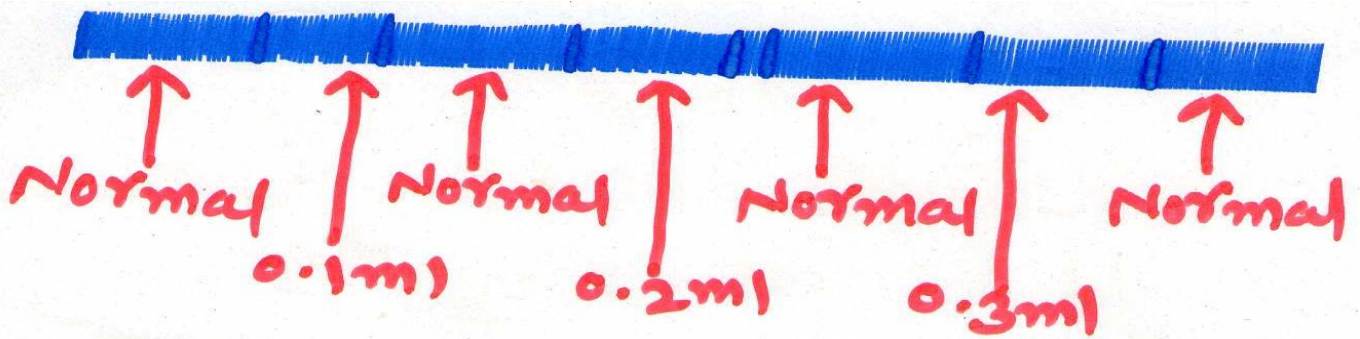


Figure-3

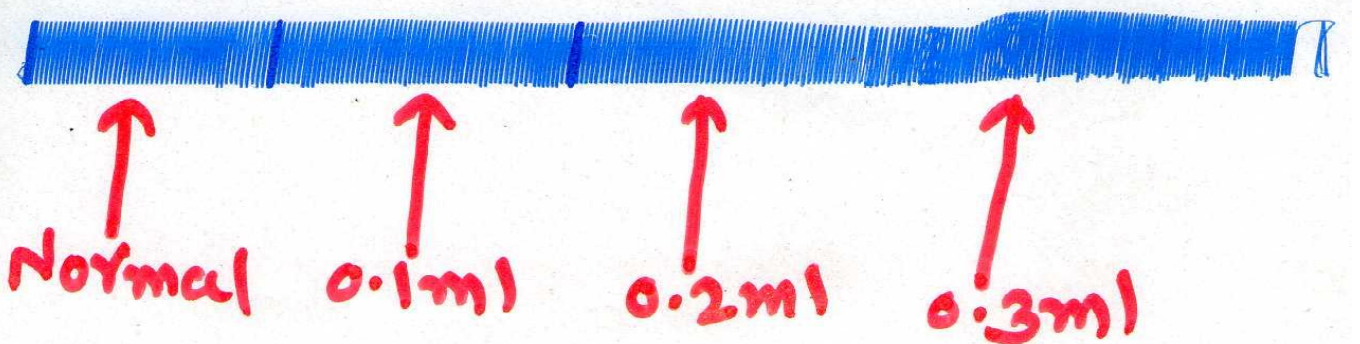


Figure-4

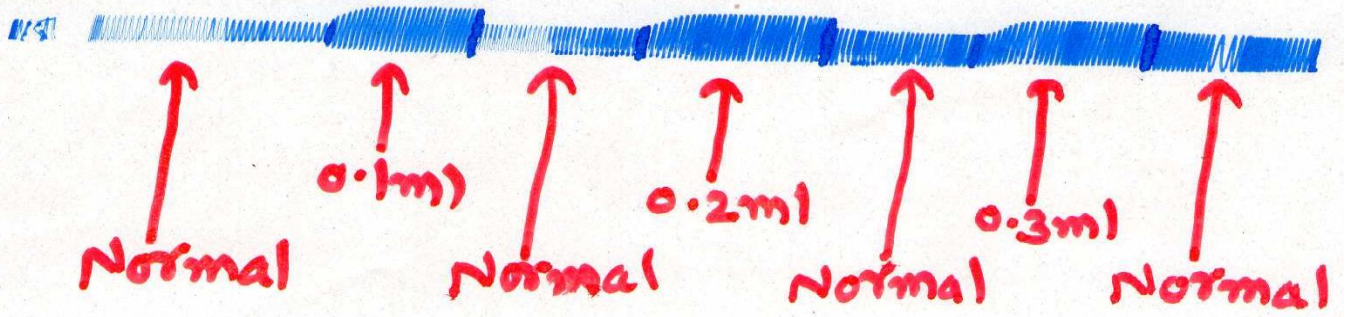


Figure-5

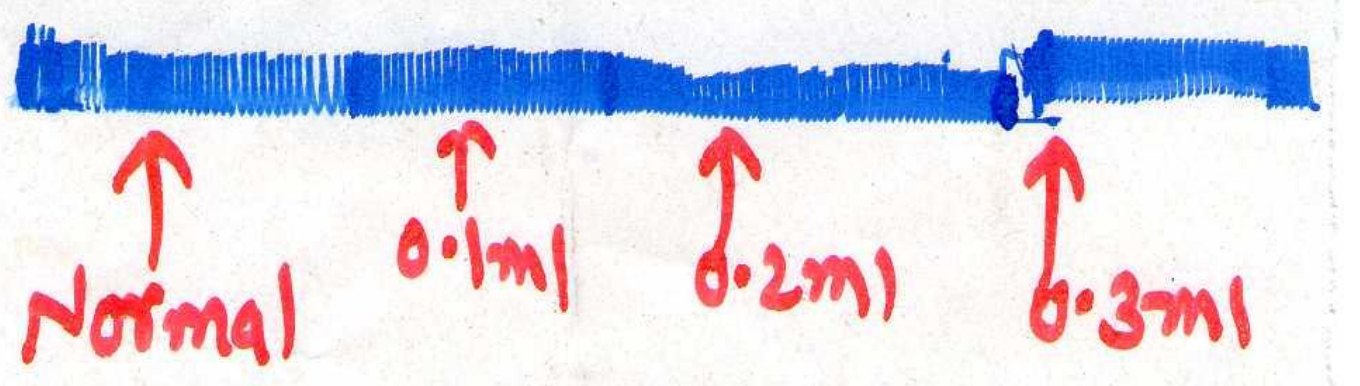


Figure -6

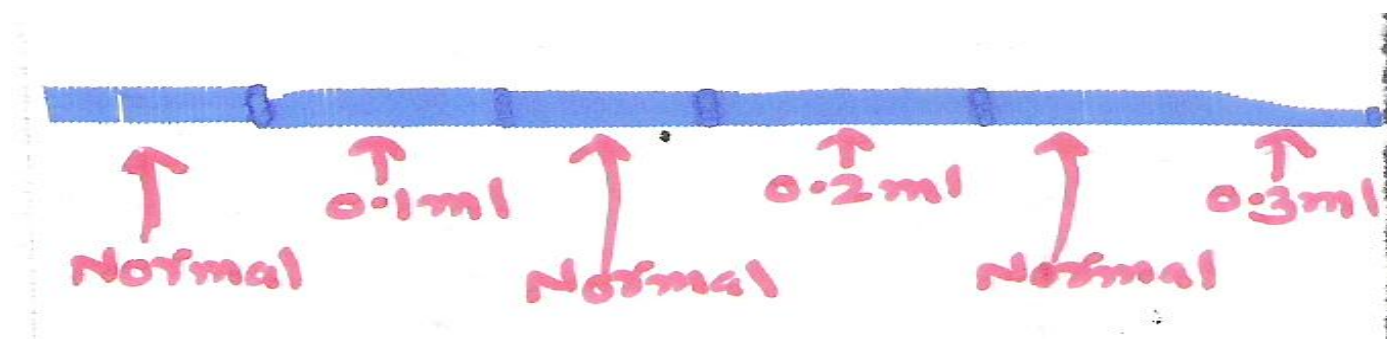
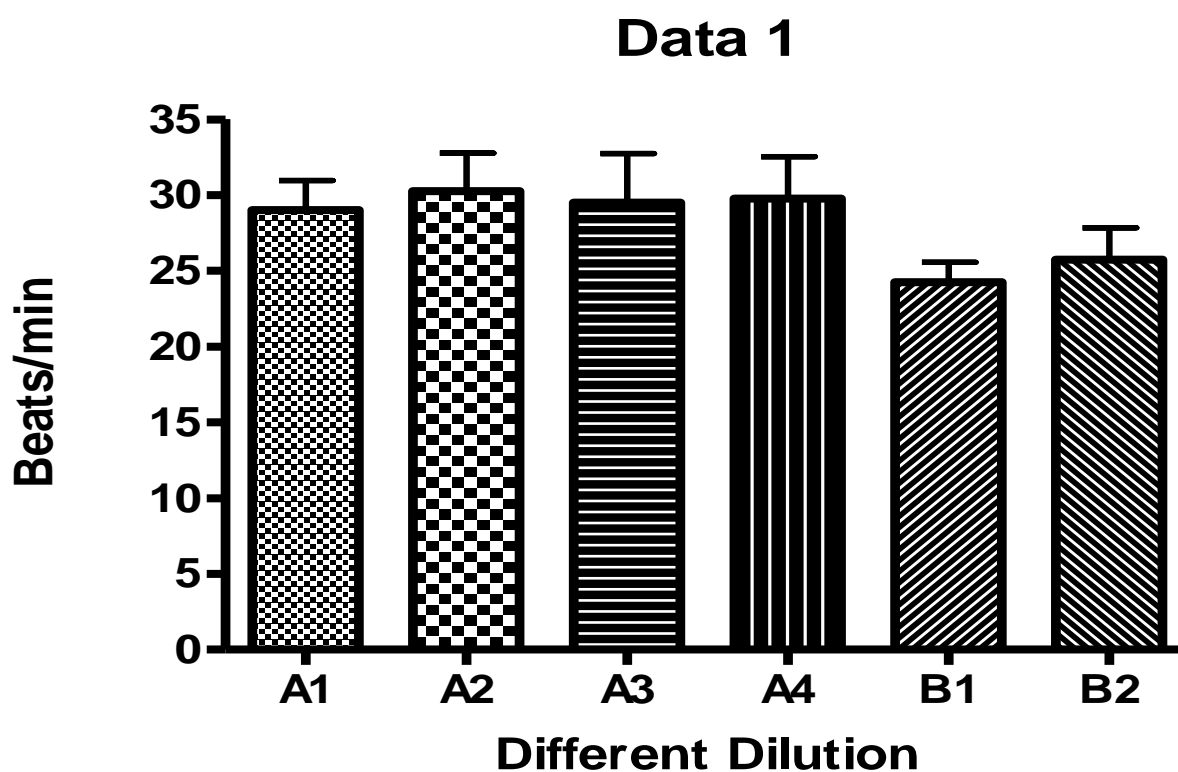


Figure -7



RESULTS AND DISCUSSION

All the dilutions of *Helicteres Isora* restore cardiac activity of Hypodynamic frog heart i.e. it increases rapidity and force of contraction [15]. It was found that undiluted sample showed better response as compared to other samples. It is interesting to know that *Helicteres Isora* has rapid onset of action compared to Digoxin. These preliminary studies confirm the better cardiotoxic activity

of *Helicteres Isora* and it can stand as better option for digitalis. Further studies can confirm the reduced toxicity & this will be the advantage of *Helicteres Isora* over digitalis. Thus, in future it will be interesting to isolate the active chemical constituents which are responsible for the cardiotoxic activity as well as to determine the possible mechanism of action.

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