

PRELIMINARY PHARMACOLOGICAL STUDIES ON CONVOLVULUS PLURICAULIS CHOIS-AN INDIAN INDIGENOUS HERB

PART I

By

F.S.K. BARAR and V.N. SHARMA

Department of Pharmacology and Experimental Therapeutics, S.M.S. Medical College, Jaipur

The indigenous plant *Convolvulus pluricaulis Chois* is a hairy perennial herb belonging to the natural order *Convolvulaceae*. It is distributed throughout the plains of India and flowers during the months of September and October. The flowers are white to light pink in colour. Its common Indian name is *Sankhpuspi* (Sanskrit) and is also known as *Poprang*, *Gorakhpinaw*, *Bephuli* and *Dodak*. In the Ayurvedic system of medicine the drug is used as a brain tonic, in the treatment of some forms of insanity and neurasthenia.

No systematic pharmacological investigation of this commonly growing indigenous remedy has been carried out so far. The present communication embodies the results of a study undertaken with the extract of the entire plant.

MATERIAL AND METHODS

The entire plant was collected from its habitat in its flowering phase during the months of September and October and identified. Fig. 1 shows the plant in its flowering phase. Air dried in shade and reduced to a powder in a disintegrator. 50 Gm of the dried powder (entire plant) was soaked in 100 ml of 95 percent ethanol for 24 hours. Then the powder was subjected to extraction with 500 ml of 80 percent ethanol in a Soxhlet extraction apparatus. After complete extraction, the material was filtered to remove chlorophyll and other insoluble substances. The alcohol was then distilled off. A 40 percent solution of the thus obtained de-alcoholized fraction was prepared in distilled water. It gave a positive test for the presence of an alkaloid using the Mayer's Regent. This was the extract used throughout the investigations. Hereafter the material will be referred to as 'extract'.

METHODS

Cardiac Muscle :

(i) *Frog heart perfusion* :—The frog's heart was perfused according to the method of Bulbring described by Burn (1). The 'extract' was administered in doses ranging from 0.1 to 1.0 ml. Five experiments were performed.

(ii) *Straub heart preparation* :—The excised frog heart was set up according to the Straub's method as described by Gaddum (2). The capacity of the cannula used was 3 ml. Two doses of 0.2 ml and 0.5 ml of the 'extract' were added in five experiments.

(iii) *Rabbit heart perfusion* :—This was performed according to the modified Langendorff's method as described by Burn (1) The 'extract' was injected in doses ranging from 0.1 to 1.0 ml. Five experiments were carried out.

(iv) *Dog's heart 'in situ'* :—Auricular and ventricular contractions were registered in five anaesthetised dogs by the suspension method of Jackson (3). The 'mean' arterial blood pressure was recorded through the left common carotid artery. Doses ranging from 0.1 to 0.5 ml/kg were injected through the cannulated femoral vein.

(v) *Blood pressure and respiration of anaesthetised dog* :—Five dogs of both sexes, weighing between 8 and 14 kg were anaesthetised with morphine (5 mg/kg I.M.) and urethane (1.4 gm/kg I.M.). The left common carotid artery and the trachea were cannulated. Responses were recorded in the usual manner. The 'extract' was administered through the cannulated femoral vein in doses ranging from 0.1 to 0.5 ml/kg.

Smooth Muscle :

(i) *Isolated rabbit ileum* :—The piece of the ileum was put up according to the method of Burn (1). A 50 ml bath containing oxygenated modified Kreb's Ringer solution was used. The 'extract' was added in doses of 0.1 to 2 ml and allowed contact for two minutes. Five experiments were performed.

(ii) *Isolated rat uterus* :—Five experiments were performed utilising one horn of the uterus of non-pregnant rats, set up according to the method of Burn (1). The rhythmic movements were recorded. A 15 ml bath was used. The 'extract' was added in 0.2 and 0.4 ml quantities.

(iii) *Intact intestine of dog* :—In five Morphine-Urethane anaesthetised dogs a loop of the ileum was exteriorised through a right paramedian incision. The movements were registered by the Jackson's enterograph. The 'extract' was injected in 1 ml and 4 ml (total dose) dose through the cannulated femoral vein.

(iv) *Dog's tracheal muscle preparation* :—The method as described by Sharma (4) was employed. 'Control' acetylcholine contractions were obtained by offering it in a strength of 1:1 million. The 'extract' was offered in a dose of 0.1 ml for 2 minutes to the strip, followed by the addition of acetylcholine.

Skeletal Muscle :

Frog rectus abdominis muscle preparation :—The preparation was set up in a 10 ml bath according to the method described by Burn (1). Acetylcholine responses were obtained by offering it in a strength of 1:2 million for 90 seconds. The extract was added in a dose of 1.0 ml, contact allowed for 2 minutes, followed by the addition of the 'control' dose of acetylcholine.

EXPERIMENTAL OBSERVATIONS

Cardiac Muscle :

(i) *Frog heart perfusion* : The 'extract' in all the doses tried, resulted in an almost immediate diminution in the force of contraction. In one out of the five experiments a 1.0 ml dose of the 'extract' caused a cardiac arrest in diastole. The effect on the



Fig. 1. The plant *Convolvulus pluricaulis-chois* in its flowering phase.

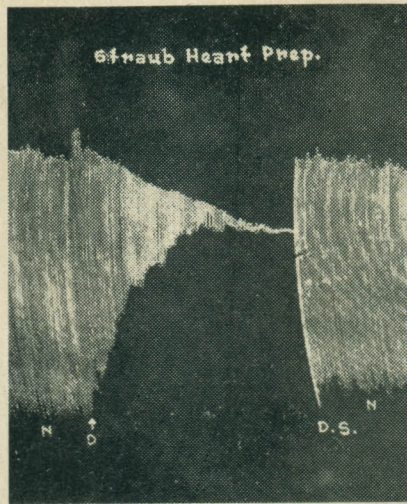


Fig. 2. Shows the effect of the 'extract' on the Straub heart preparation. At D a 0.5 ml dose was offered to the heart resulting in a gradual negative inotropic effect with ultimate mid-diastolic arrest. D.S. — Drum stopped for 10 minutes. N—denotes normal contractions.

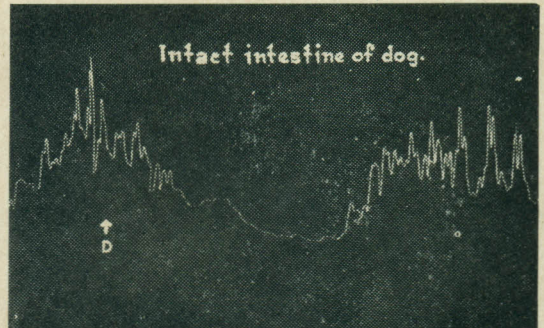


Fig. 3. Illustrates the effect of the 'extract' on the intact intestine of dog. At D a 4 ml dose (total dose) of the drug was injected intravenously which caused a relaxation of the intestine.

heart rate was not marked, except in 1.0 ml doses which resulted in an appreciable slowing. Recovery was complete.

(ii) *Straub heart preparation* :—The 'extract' elicited a gradual negative inotropic effect in this preparation. The effect on the heart rate was not marked. With 0.5 ml doses in all the experiments a mid-diastolic arrest was observed. On subsequent repeated washings the heart recovered completely. A typical response is shown in Fig. 2.

(iii) *Rabbit heart perfusion* :—As in experimentation on the frog's heart the 'extract' exhibited a decrease in the force of ventricular contraction and also in the coronary flow in higher doses. The effect was short-lived. In two out of the five experiments a 1.0 ml dose caused a diastolic standstill.

(iv) *Dog's heart 'in situ'* :—This study also revealed a negative inotropic effect, which was transient. There was an associated fall in the 'mean' arterial blood pressure with gradual return to normal.

(v) *Blood pressure and respiration of anaesthetised dog* :—There was an immediate fall in blood pressure in all the doses of the 'extract', with a reflex stimulation of respiration. The recovery of the blood pressure to normal was gradual.

On the amphibian and the mammalian cardiac muscle the 'extract' exhibited a negative inotropic effect. No visible irregularity in rhythm was observed during the study. In higher doses in some of the preparations as mentioned above it had a negative chronotropic effect. The coronary flow as studied on the isolated perfused rabbit heart showed a diminution in higher doses.

Smooth Muscle :

On the isolated rabbit ileum the 'extract' in all the doses tried exhibited a spasmolytic activity. In 2.0 ml doses this was quite marked in magnitude. Experiments designed to study the effect of the 'extract' on the rhythmic movement of the rat uterus, and the motility of the intact intestine of dog also yielded similar results, in the form of inhibition of the uterine rhythm and relaxation of the intestinal tone. The typical effect on the intact intestine is shown in Fig. 3.

The tracheal muscle preparation of dog exhibited a potentiation of the acetylcholine responses with 0.1 ml doses of the 'extract'.

On the isolated rabbit ileum and intact intestine of dog the 'extract' exhibited a potent spasmolytic effect, which is quite sustained in nature. The uterine motility is also inhibited. The response of the tracheal muscle to acetylcholine is potentiated (Mean 45 per cent).

Skeletal Muscle :

The frog rectus abdominis muscle preparation also registered a potentiation of acetylcholine response (Mean 30 percent) subsequent to the addition of the 'extract' in the dose mentioned.

The preliminary study of the herb is being currently continued towards details, and attempts to isolate the active material in the plant are also in progress.

SUMMARY

(1) The 'extract' obtained from an Indian indigenous herb *Convolvulus pluri-caulis chois*, variously employed in the Ayurvedic system of medicine, has been subjected to a pilot pharmacological investigation.

(2) A depression of the amphibian and the mammalian myocardium has been revealed. This negative inotropic action is not a sustained one.

(3) The study on the smooth muscles has revealed its spasmolytic activity, except the tracheal muscle which behaved differently and exhibited a potentiation of acetylcholine response.

(4) The skeletal muscle also exhibited a potentiation of acetylcholine response.

ACKNOWLEDGEMENT

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REFERENCES

1. Burn, J.H. "*Practical Pharmacology*". Blackwell Scientific Publications Ltd. 1952 Oxford.
2. Gaddum J.H. "*Pharmacology*", Oxford University Press, New York, London. 5th Edition., PP. 296. 1959.
3. Jackson, D.E. "*Experimental Pharmacology and Materia Medica*". C.V. Mosby & Co. London. 2nd Edition., PP. 285. 1939.
4. Sharma, V.N. *Arch. int. Pharmacodyn.*, 125, 304. 1960.

Book Review

Lung Function: Assessment and application in Medicine BY J. E. COTES 1965
Blackwell Scientific Publication Oxford.

The functions of the lung has attracted the attention of Physiologists for a long time. Much useful work has been done and data collected on the subject in laboratories and clinics all over the world. J. E. Cotes has very ably sieved through this information and has critically analysed it in this book, which gives a good account of basic information and its application in disease.

This book would be as useful for the postgraduate students and research workers in the field of respiratory physiology as it would serve to be a good addition to the bookshelves of Physiologists, Physician, and Surgeons alike.

V.D.M.