

## SOME PHARMACOLOGICAL ACTIONS OF PONGAMIA PINNATA LINN (KARANJA)

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*ABSTRACT* : Ste, bark of pongamia pinnata, a medicinal tree of importance in Ayurveda has been subjected to various pharmacological studies using the aqueous extract in different dose levels. The aqueous extract of bark exhibited significant CNS sedative and antipyretic effects in experimental animals. But there was no effect on cardiovascular system, through it showed antispasmodic effects on smooth muscle (invitro). These observations are presented here.

### Introduction

P.Pinnata (p. glabra ) belong to the family of Papilionaceae, is a common tree seen all over India and Ceylon. Six varieties of this tree is available and the seeds, stem bark, root, leaves, flowers, fruits and oil from the seeds are being used in Ayurveda in the treatment of piles, intestinal worm, infections, leprosy, gonorrhoea, fever, malaria, skin diseases, bronchitis, diabetes and in liver affections<sup>1</sup>. Bark contains a bitter alkaloid, resin, mucilage, sugar but no tannin. Four furoflavones viz. keranjin, pongapin, pinnatin and pongapin from seeds and waxes from stem bark<sup>2</sup>.

In the present study an attempt has been made to investigate the medicinal value of the bark of the tree using aqueous extract. In various experimental models.

### Materials and Methods

Pharmacognostically identified, shade dried fresh bark of the tree was supplied by the SMP unit attached to the Regional Research

Institute (DR), Trivandrum -12 and the decoction was prepared as described by Nadkarni (1954)<sup>3</sup>.

Albino rats, mice, g.pigs, rabbits and dogs were used in various experiments and the decoction in various dose levels were given orally or parenterally as indicated. Dosage level of drug was calculated in terms of crude drug per kg body weight.

#### i) Acute toxicity and general behavior

Drug decoction was administered orally in groups of over-night fasted male mice (20–30g) in dose levels of 0.5, 1,2 and 4g per 100g body wt. Control group received equivalent quantity of dist. Water and they were observed very closely for the first 3 hours and thereafter every 24 hours for 2 days. Toxic effects and mortality if any, were recorded<sup>4</sup>.

#### ii) On pentobarbitone hypnosis

Karanja bark decoction was given to overnight fasted groups of male mice in dose levels of 1,5,10 and 20g per kg body wt. and 30 min later all of them received pentobarbitone Sodium (50mg/kg i.p.). Control group received dist. Water instead of decoction. The Period between the loss and the gain of righting reflex was taken as the sleeping time and Compared with that of the control group<sup>5</sup>.

### iii)Anticonvulsant activity

The effect of aqueous extract was studied against the maximal electroshock seizures (MES) in male rats according to the method of Holland et al (1961)<sup>6</sup>. Decoction in 5, 10 and 20g/kg and Dilantin sodium (100 mg/kg ) were given orally 30 min prior to convulsions. Percentage protection afforded by drugs was noted in each group.

### iv)Analgesic activity

Analgesic activity of the drug was studied by the tail flick method using a hot wire analgesiometer<sup>7</sup>. Decoction in 5,10 and 20g/kg and acetyl salicylic acid 500 mg/kg were given orally before the heat challenge.

### v)Antipyretic activity

Effect of graded doses (2,5 & 10g/kg) of decoction in albino rats made febrile according to the method of Gujral et al (1955)<sup>8</sup> was studied with the acetyl salicylic acid (500mg/kg) as the standard drug for comparison. Groups of 8 or more rats were used for each dose level.

### Vi)Hypothermic Activity

Effect of the test drug on normal body temperature in albino rats was also evaluated using the decoction in doses of 5, 10 and 20g/kg orally. Control group received

dist. Water and the temperature changes were recorded for 2 hours after treatment.

### Vii) Effect on frog heart (in – situ)

Effect of decoction was studied on perfused frog heart according to the method of Burn (1952)<sup>9</sup>.

### Viii) Effect on arterial blood pressure and respiration in anesthetized dog

Test drug decoction was given parenterally (iv) in doses of 10, 20 40, 100, 200 and 500mg/kg in anesthetized mongrel dogs of either sex (10–15kg) to detect its effect on B.P. and respiration in all doses, no further studies were carried out.

ix) Decoction of the drug was investigated in five doses levels (1, 2, 4, 5 and 10kg/kg) to detect its probable anti – implantation effect in mated fertile female rats from D1 – D7. On Day 10, they were laparatomised and uterus examined for implants and Implantation sites<sup>10</sup>. Control group was also maintained for comparison.

### x) Invitro tests

#### a) **on isolated items of guinea pig**

Effect of pongamia decoction was studied in different doses (10 mg to 200mg/ml) on Isolated ileum of the G. Pig<sup>9</sup>. Decoction alone did not exhibit any spasms on the ileum. But in dose levels of 100 and 200 mg/ml bath concentration, there was dose dependent Inhibition of spasmogenic effect of acetylcholine (Ach) and histamine (05/u/ml bath).

#### b) On rectus abdominis muscle of frog

Recuts abdominis muscle of the frog was mounted according to the method of Burn (1952)<sup>9</sup>. Effect of graded doses of decoction

was recorded separately and also on Ach induced spasms (1/ug/ml bath). Decoction in doses of 20 to 200 mg/ml bath was assayed to detect its effect on skeletal muscles. At 200mg/ml there was a slight spasmogenic effect. Effect of atropine Pretreatment on this spasms was also studied.

## **Results and Discussion**

### **Acute toxicity and general behavior**

Pongamia bark decoction did not elicit any toxic effects or mortality in mice upto 40g per kg dose level. There was no change in normal behavioural pattern in mice.

### **Effect on pentobarbitone hypnosis**

In dose levels of 5, 10 and 20g/kg there was significant prolongation of pentobarbitone sleeping Time in mice ( $p < 0.01$ ) which is suggestive of its CNS sedative effect.

### **Anticonvulsant activity**

The drug upto 20g/kg orally could not prevent convulsive seizures due to electroshock in rats.

### **Antipyretic activity**

Test drug decoction showed very significant antipyretic action ( $p < 0.01$ ) in dose

levels of 2g/kg and above, which was found to be comparable to that of acetylsalicylic and (500 mg/kg). More activity was seen with the lower dose level (Table 1).

### **Hypothermic activity**

Drug decoction did not show any significant changes in body temperature of normal albino rats when fed in different dose levels.

### **On frog heart (in-situ)**

From 200mg onwards there was an increase in the rate and force of contraction suggestive of a dose dependent positive chronotropic and inotropic effects with a transient myocardial depressant effect or heart block which is not blocked by atropine.

### **On anesthetized dog heart**

Decoction upto 100mg/kg did not show any influence on blood pressure and respiration. But in 200mg and above dose there was an insignificant rise in B.P., which is not influenced by alpha and beta adrenergic blockers.

Table 1.: Antipyretic action of p. pinnata in febrile rats

| Drug                                    | Dose<br>Mg/kg<br>(p.o) | Mean<br>Normal<br>temp.Of<br>Rats ± S.E | Mean<br>temp.<br>of pyretic<br>rats±<br>Mean | Temp. hours after treatment<br>(mean ± S.E.) |                 |                  |                  |
|---|------------------------|---|--|--|-----------------|------------------|------------------|
|   |                        |   |  | 1h   | 2h              | 3h               | 4h               |
| i) p.pinnata<br>decoction<br>(8)        | 2g                     | 37.50±<br>0.3                           | 39.10±<br>0.13                               | 38.72±<br>0.21                               | 38.30±*<br>0.26 | 38.68±*<br>0.13  | 37.95±**<br>0.20 |
| ii) P.Pinnata<br>Decoction<br>(8)       | 5g                     | 38.19±<br>0.21                          | 39.08±<br>0.28                               | 38.77±<br>0.36                               | 39.30±<br>0.20  | 39.01±<br>0.30   | 38.06±*<br>0.37  |
| iii) P.Pinnata<br>Decoction<br>(8)      | 10g                    | 38.51±<br>0.15                          | 39.92±<br>0.07                               | 39.75±<br>0.16                               | 39.83±<br>0.17  | 39.52±<br>0.19   | 38.75±**<br>0.19 |
| iv) Acetylsalicylic<br>acid<br>(8)      | 500<br>mg              | 35.20±<br>0.15                          | 37.20±<br>0.13                               | 37.60±<br>0.15                               | 36.20±*<br>0.14 | 35.40±**<br>0.17 | 35.00±**<br>0.12 |
| v) Vehicle control<br>(8) (Dist. Water) | 10<br>ml               | 37.06±<br>0.32                          | 39.01±<br>0.35                               | 39.17±<br>0.21                               | 38.95±<br>0.25  | 38.68±<br>0.13   | 38.81±<br>0.10   |

P --- Values \*\* < 0.01, \* < 0.05

Figures in the parenthesis indicate number of rats in the group.

#### Antifertility activity

No Significant anti – implantation effect in female rats.

#### On isolated G. pig ileum

Decoction in 20 to 200mg per ml bath showed slight relaxation of ileal muscles. But in 200 mg per ml bath it had completely blocked the spasmogenic effects of both acetyl choline and histamine (0.5 g/ml/bath).

#### On Frog rectus abdominis

Pongamia decoction produced spasms in 100 and 200 mg/ml. But it did not potentiate the acetylcholine induced spasms. However atropine pretreatment abolished this spasms completely. Hence the activity was found to be more or less similar to Acetyl choline.

In this preliminary study an attempt has been made to screen the aqueous extract of stem bark of this tree and found that it possessed significant CNS sedative effect and antipyretic activity in febrile rats. But it was devoid of analgesic and anticonvulsant

effects. Drug decoction also did not exhibit any significant effects on skeletal muscles.

From these preliminary observations it is justified the use of pongamia pinnata (bark) in malarial fevers in Ayurvedic system of Medicine.

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