TOXICITY OF SEMECARPUS ANACARDIUM EXTRACT

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Received: 4 August 1987    Accepted revised manuscript: 30 July 1988

ABSTRACT: Toxicity by oral route administration of S. anacardium extract with peanut oil was compared against the same extract emulsified with Tween-80 saline. The traditional way of administration with peanut oil was found to be safe and up to 25 mg/kg/day x 9 days, increase in weight, RBCs & haemoglobin % was observed without mortality. Same dose with Tween-80 saline was found to have adverse effects regarding all the parameters with 16.5% mortality. This study supports Ayurvedic method of administration for efficacy without toxicity.

Introduction

Semecarpus anacardium Linn (Bibba, Bhilwa, Bhallataka, Black nut, Marking nut) is well known for its corrosive juice and vesicant nature. The pharmacological studies were carried out by Bose et al. (1) in which it was reported that the extracts have direct depressant effects on the isolated frog heart and rabbit intestine. It was found to be a nonspecific smooth muscle relaxant. It produced delayed hypotension in dogs and the petroleum ether extract was found to cause significant reduction in skin histamine.

Ayurveda describes S. anacardium to be a potent drug against variety of ailments and is popularly known as ‘Ardha Vaidya’ (2). Its anthelmintic activity was found to be comparable with that of piperazine citrate (3). Usefulness of nut extracts in the treatment of rheumatic pains was also studied (4). Its clinical applications in the treatment of rheumatoid arthritis have given a lot of encouragement (5, 6). The mechanism of antiarthritic activity was studied and was found to be because of immunosupression (7). The use of this nut is restricted only for the reason of its dermal toxicity which can affect sensitive individuals very seriously. Monoene and diene bhilawanols were isolated from the nuts and have been shown to have potent antibacterial activity specifically towards Gram positive anaerobes (8, 9, 10). Various reports on trials by Ayurvedic Practitioners indicate that bibba can be given orally with milk, Ghee, peanut oil etc. and with such type of administration toxic effects are not observed but on the contrary anabolic effects are obtained (11).

Indap et al (12) carried out antitumor and pharmacological effects of bibba oil. These workers used Peanut oil as a vehicle and tween saline suspensions were found to be devoid of anticancer activity. With peanut
oil as vehicle, anticancer activity. With peanut oil as vehicle, anticancer activity was obtained but no significant pharmacological activity was observed.

With these observations, present studies were initiated for studying comparative toxicity of bibba extract, with peanut oil and with tween-80 saline.

Methods

For comparative toxicity, chloroform extract was administered orally in two forms:

1) Extract dissolved in peanut oil.
2) Extract emulsified with tween 80 saline.

From stock solutions of 1g/ml. various dose levels ranging from 25 to 200 mg/kg were administered to experimental animals.

Study model: six groups of six mice each (3 male & 3 female).

Period of observation: Nine days.

Each animal in every group received specified quantity of extract either in the form of emulsified with tween-80 or dissolved in peanut oil. Separate controls were maintained throughout the period of observation. On ninth day animals were sacrificed and following parameters were studied. The doses were selected on the basis of previous pharmacological studies (13).

1) Moratlity pattern
2) Effect on body weight
3) R.B.C. count
4) Hemoglobin percentage

Results

1) Moratlity pattern

All the parameters studied indicated a vast difference between extracts wit peanut oil and that with tween-80 saline. The mortality pattern clearly shows that the extract-peanut oil combination was safe upto 100 mg/kg/day dose, while at 200/mg/kg/day dose 16.5% mortality was observed. In case of same extract emulsified with Tween-80 saline, even with 25mg/kg/day dose 16.5% mortality was observed and at 200 mg/kg/day does 100% mortality was observed (Table 1).

Table 1.: Mortality pattern of Crude Chloroform Extract Using pea nut oil and Tween-80 as vehicles in mice*

| Dose (mg/kg/day × 9) | % Mortality Pea nut oil Tween 80 ** |
|---------------------|-------------------------------------|
| 20                  | 0.00                                |
| 50                  | 0.00                                |
| 100                 | 0.00                                |
| 200                 | 16.6                                |
|                     | 100.00                              |

*Six mice in each group
***Suspension in normal saline.

2 Effect on body weight

Extract with peanut oil showed increase in weight of animals at 25 mg/kg/day dose while with increased concentration there was weight loss (Table 2). Regarding extract with Tween -80 saline, 16.5% mortality was observed.
Table 2. Effect of Crude Chloroform Extract on Body weight.*

| Dose (mg/kg/day × 9) | 0 day  | 5th day | 9th day |
|----------------------|--------|---------|---------|
| Control (peanut oil) | 18.83  | 20.00   | 20.16   |
| 25                   | 18.00  | 18.00   | 21.16   |
| 50                   | 18.33  | 16.00   | 17.75   |
| 100                  | 18.00  | 15.60   | 15.00   |
| 200                  | 18.50  | 15.70   | 14.90   |

*Six mice in each group

3) Effect on R.B.C

Extract with peanut oil showed slight increase in RBC count at 25 mg/kg/day dose while the count was gradually reduced in higher concentration. Extract emulsified with Tween-80 saline showed marked reduction of R.B.C. from the dose of 25 mg/kg/day, and was much higher in higher concentrations (Table 3).

Table 3. Effect of Crude Chloroform Extract on RBC Count*

| Dose (mg/kg/day × 9) | RBC × 10^6 cm | Extract in Pea Nut oil | Extract in Tween 80** |
|----------------------|---------------|------------------------|-----------------------|
| Control (Tween 80 saline) | 7.02          | 7.02                   |                       |
| 25                   | 7.1           | 6.37                   |                       |
| 50                   | 6.9           | 5.23                   |                       |
| 100                  | 7.2           | 5.09                   |                       |
| 200                  | 6.5           | No survival            |                       |

*Six mice in each group
**Suspension in normal saline.

4) Hemoglobin percentage

The hemoglobin percentage was increased to the level of 17.05 from 14.46 at 25 mg/kg/day dose and then with highest doses it was gradually reduced. Extracts with Tween 80 saline showed significant reduction in hemoglobin percentage from 25 mg/kg/day dose and this was further reduced in higher doses (Table 4).

Table 4. Effect of Crude Chloroform Extract on Hemoglobin percent*

| Dose (mg/kg/day × 9) | HB (gm %) | Extract in pea Nut oil | Extract in Tween 80** |
|----------------------|-----------|------------------------|-----------------------|
| Control (Tween -80 saline) | 14.46     | 14.3                   |                       |
| 25                   | 17.05     | 10.46                  |                       |
| 50                   | 14.64     | 10.2                   |                       |
| 100                  | 13.96     | 10.1                   |                       |
| 200                  | 12.15     | No survival            |                       |

*Six mice in each group

**Suspension in normal saline.

Discussions

The crude extracts of bibba have been reported to have antibacterial as well as antitumor activities. The crude extracts were found to be very toxic and after purification the toxicity was found to increase as evident from LD50 values (12, 13). It is interesting that such toxic effects are not observed when bibba is used by Ayurveda physicians, hence it was decided to follow traditional route of administration i.e. with peanut oil and to compare it with modern Route of administration i.e. emulsification with Tween 80 saline.

It was observed that the extracts given with peanut oil did not show serious toxicity while Extracts emulsified with Tween -80 saline were extremely toxic. It would be interesting to
Note that up to the dose of 25 mg/kg/day extracts with peanut oil showed good anabolic properties. Weight of experimental animals was increased, R.B.C. count was increased with increased hemoglobin percent.

The present study gives a scientific rational to the Ayurvedic therapy using Bhallataka and suggests that the traditional methods mentioned in Ayurveda should be sincerely followed so as to get therapeutic effects without toxicity. Further studies on effect of extracts on WBC Count and platelet count are required for the mechanism of toxic action.

Conclusion
1) The toxicity of bibba can be controlled by administration with peanut oil or similar vehicles.
2) Up to 25 mg/kg/day dose bibba can be given safely for therapeutic uses. It can act as a good hematinic agent and as a general tonic.
3) Ayurvedic method of administration has shown reduction in toxicity with maintained efficacy.

Acknowledgements
We are thankful to the Director, Haffkine Institute, Bombay for facilities. Financial assistance from D.S.T. is also gratefully acknowledged.

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