

FISH TOXICITY STUDY OF AQUEOUS EXTRACT OF *SIDA CORDIFOLIA* IN *POECILIA RETICULATA* (GUPPY)

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ABSTRACT

Sida cordifolia L. (Malvaceae) is folk medicine known as "malva-branca" which consists of ephedrine and pseudoephedrine, vasocinone and vasicine as major alkaloids along with fatty oils, steroids, resin, resin acids, mucin and potassium nitrate in minor quantities. *Sida cordifolia* has been investigated for its analgesic, anti-inflammatory and antipyretic, antimicrobial, weight loss, antioxidant, anticancer, liver regeneration, immunomodulatory and hepatoprotective activities. *Sida cordifolia* had been tested for fish toxicity study preferably for a period of 96 hours to determine toxic dose and save life of aquatic animals. Mortalities are recorded at 24, 48, 72 and 96 hours and the concentrations which kill 50 per cent of the fish (LC50) are determined. For Fish Toxicity Study of *Sida cordifolia* showed no toxicity and mortality effects during 96 hrs observations and hence the 96 hrs LC 50 of *Sida cordifolia* was found to be greater 2000 ppm. This indicates *Sida cordifolia* is safe at 2000 ppm dose.

Keywords: Fish toxicity, *Sida cordifolia*, *Poecilia reticulata*, Fish Toxicity of *Sida cordifolia*.

INTRODUCTION

Sida cordifolia Linn (Hindi – Kungyi; Sanskrit – Bala) an under shrub belonging to family- Malvaceae, is grows in the tropical and sub-tropical regions of the world and all over India¹. *Sida cordifolia* L. (Malvaceae) is popularly known as "malva-branca" (white mallow) or "malva-branca-sedosa" (silky white mallow) in Brazil. It grows as a bush of up to 2 m in height. The leaves are light green, cordiform, serrated and oval-elongated, and the pedunculated flowers are arranged in axillary or terminal racemes. In traditional medicine, the plant is used for the treatment of stomatitis, blenorrhea, asthmatic bronchitis and nasal congestion². In Brazil, it is also used due to its anti-inflammatory properties. Some studies have demonstrated the presence in the leaves of sympathomimetic amines, ephedrine and pseudoephedrine, vasocinone³ and vasicine as major alkaloids⁴. Other studies also showed the presence of fatty oils, steroids, resin, resin acids, mucin and potassium nitrate in the plant. *Sida cordifolia* has been used extensively in the folklore medicine for the treatment of a variety of diseases⁵. Pharmacologically the plant has been investigated for its analgesic, anti-inflammatory and antipyretic activities^{2-3,6-8}, antimicrobial⁹⁻¹², weight loss^{1,13,15}, antioxidant¹⁶⁻¹⁷, anticancer¹¹⁻¹², liver regeneration¹⁸, Immunomodulatory¹⁹ and hepatoprotective²⁰.

MATERIALS AND METHODS

Plant material and extraction

Sida cordifolia were collected during the season and were thoroughly dried in the shade. The plant was authenticated at Department of Pharmacognosy, SPTM, NMIMS University, Shirpur (India). All parts of plant were ground to coarse powder and were subjected to maceration with distilled water. The crude extract thus obtained was then utilized for evaluating fish toxicity.

Animals

Poecilia reticulata fish were obtained from National Toxicology Centre, Pune.

Fish toxicity study

Poecilia reticulata (Guppy) fish of length 2.0 + 1.0 were housed into 2 litre water aquaria at 22-25 °c. Fish were divided into following groups of control, 125, 250, 500, 1000 and 2000 mg/L and each water aquarium contains ten fish. Fish were observed before drug administration mixing in water from each aquarium for gill movement, swimming behaviour, pigmentation etc. Extracts of 125, 250, 500, 1000 and 2000 mg/L concentration were added in respective aquarium and fish were inspected after 24, 48, 72 and 96 hrs. Fish were considered dead if there was no visible movement (i.e. gill movement) and if touching of caudal peduncle produced no reaction. Dead fish were removed when observed. Records were kept of visible abnormalities (e.g. each aquarium for gill movement, swimming behaviour, pigmentation etc.)²¹

RESULTS

96 hrs LC50 value of "*Sida cordifolia*" to fresh water of fish Guppy was done. Test drug extract was administered at 0 mg/L for control and limit dose level 2000mg/L for test group. It caused no mortality and no clinical signs of intoxication after dosing till end of study. The 96 hrs LC50 value was found to be greater than 2000 ppm. Preliminary range findings study, Final study and LC 50 Studies were observed for toxic symptoms (Table 1,2,3). No mortality was found after 96 hrs of "*Sida cordifolia*".

DISCUSSION

For Fish Toxicity Study, guppy fish were selected. Fish were divided into following groups of two treated and one control group. Fish were housed into 2 litre water into aquaria. Drug extract of different concentrations were added properly into different aquaria. 24, 48, 72 and 96 hrs observations were made and recorded systematically.

Toxicity and mortality were not observed for any group during 24, 48, 72 and 96 hrs observations. Hence, the 96 hrs LC 50 of *Sida cordifolia* was found to be greater 2000 mg/L. This indicates *Sida cordifolia* is safe at 2000 mg/L dose.

Table 1: Preliminary Range Findings Study Results

S. No.	Groups	No. of fish	Dose (mg/L)	% Mortality
1.	Control	2	0	0
2.	125 mg/L	2	125	0
3.	250 mg/L	2	250	0
4.	500 mg/L	2	500	0
5.	1000 mg/L	2	1000	0
6.	2000 mg/L	2	2000	0

Table 2: Result of Final study

S. No.	Groups	No. of fish	No. of died No. of treated	% Mortality
1.	Control	10	0/10	0
2.	125 mg/L	10	0/10	0
3.	250 mg/L	10	0/10	0
4.	500 mg/L	10	0/10	0
5.	1000 mg/L	10	0/10	0
6.	2000 mg/L	10	0/10	0

Table 3: Result of LC 50 Studies

S. No.	Group	Dose (mg/L)	No. of died in time (hrs)									% Mortality	
			No. of treated										
			½	1	2	4	6	12	24	48	72	96	
1.	Control	0	-	-	-	-	-	-	-	-	-	-	0
2.	125 mg/L	125	-	-	-	-	-	-	-	-	-	-	0
3.	250 mg/L	250	-	-	-	-	-	-	-	-	-	-	0
4.	500 mg/L	500	-	-	-	-	-	-	-	-	-	-	0
5.	1000 mg/L	1000	-	-	-	-	-	-	-	-	-	-	0
6.	2000 mg/L	2000	-	-	-	-	-	-	-	-	-	-	0

CONCLUSION

For Fish Toxicity Study of *Sida cordifolia* showed no toxicity and mortality effects during 96hrs observations and hence the 96 hrs LC 50 of *Sida cordifolia* was found to be greater 2000 ppm. This indicates *Sida cordifolia* is safe at 2000 ppm dose.

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REFERENCES

- Pal, D.C., and Jain, S.K. In: Tribal Medicine, 1998:238
- Franzotti, E.M., Santos C.V.F., Rodrigues. H.N.L.S., Mourão R.H.V., Andrade, M.R., and Antonioli AR. Anti-inflammatory, analgesic activity and acute toxicity of *Sida cordifolia* L. Journal of Ethnopharmacology. 2000; 72(1-2) : 273-277
- Ghosal, S., Chuahan R.R.P.S., and Mehta, R. Alkaloids of *Sida cordifolia*. Phytotherapy Resource. 1975;14:830-832
- Gunatilaka, A.A.L., Sotheeswaran, S., Balasubramanian, S., Chandrasekara, A.I., and Sriyani H.T.B. Studies on medicinal plants of Sri Lanka. Planta Medica. 1980;39:66-72
- Prajapati, Purohit, Sharma and Kumar. A HANDBOOK OF MEDICINAL PLANTS, A COMPLETE SOURCE BOOK. 2006;475
- Kanth, V.R., and Diwan, P. V. Analgesic, antiinflammatory and hypoglycaemic activities of *Sida cordifolia*. Phytotherapy Resource. 1999;13 (1):75-7
- Sutradhar, R.K., Mator Rahman, A.K.M., Ahmad, M.U., Datta, B.K., Bachar, S.C. and Saha, A. Analgesic and Antiinflammatory activities of *Sida cordifolia* Linn. Indian Journal of Pharmacology. 2006;38: 207-208
- Binu, K.P., Muralidharan, A., Natarajan, B., Varadamurthy, S. and Venkataraman, S. Preliminary evaluation of anti-pyretic and anti-ulcerogenic activities of *Sida cordifolia* methanolic extract. Fitoterapia. 2008;79(3):229-231
- Xirley, P.N., Gabriela, L.A.M., Jackson, R.G.S.A., Fillipe, O.P., and Edeltrudes, O.L. Antimicrobial activity of the essential oil of *Sida cordifolia* L. Revista Brasileira de Farmacognosia. 2006;16
- Balakrishnan, N., Bhaskar, V.H., Jayakar, B. and Sangameswaran, B. Short communication Antibacterial activity of *Mimosa pudica*, *Aegle marmelos* and *Sida cordifolia*, "Pharmacognosy Magazine. 2006;2(7):198-199
- Dr. Nadkarni, K.M. The Indian Materia Medica, Vol.I: 1137
- Prof Sharma, P.V. Dravya Guna Vigyana, Vol II: 735
- Gower Power Sports Nutrition, *Sida cordifolia* description (14 Feb. 2009)
- Dr. Amrit, P.S. Bala (*Sida cordifolia* L.) –Is It Safe Herbal Drug?. Ethnobotanical Leaflets .2006;10:324-329
- Carole, A.C. and Len, K. The remarkable calorie. *IDEA Personal Trainer*. 2003:30
- Auddy, B., Ferreira, M., Blasina, F., Lafon, L., Arredondo, F., Dajas, F., Tripathi, P.C., Sea, T. and Mukherjee, B. Screening of antioxidant activity of three Indian medicinal plants, traditionally used for the management of neurodegenerative diseases. Journal of Ethnopharmacology. 2003; 84:131-138
- Dhalwal, K., Deshpande, Y.S., Purohit, A.P., and Kadam, S.S. Evaluation of the Antioxidant Activity of *Sida cordifolia*. International Journal of Pharmacognosy. 2005; 43: 754- 761
- Orlando, C.S., Renata, L.S., Gustavo, B.M., Valdinaldo, A.M., Sônia, O.L., Ângelo, R.A., and Vanderlei, S.B. Proliferative effect of medicinal plants and laser on liver regeneration. A considerable experimental model: from an experimental model to clinical applications. *Acta Cirurgica Brasileira*. 2003;18:7
- Triphala A Reputed Herbal Formulation. *Pharmaceutical Reviews*. (ISSN 1918-5561). www.pharmainfo.net . 2005;3
- Silva, R.S. Effect of the aqueous extract of *Sida cordifolia* on live regeneration after partial hepatectomy. *Acta Cir*. 2006; 21(1):77-79.
- Oecd guideline for testing of chemicals, 203 adopted by the council on 17th July 1992. Fish, acute toxicity test. Page 1-6.