IAMJ

Research Article *International Ayurvedic Medical Journal* *ISSN:2320 5091*

TOXICITY STUDY OF GAMBHARI PHALA CHURNA

Ashalatha M[1], Kuber Sankh[2]

[1]Professor and HOD, Department of dravyaguna, Government Ayurveda medical college, Bangalore, Karnataka, India

[2]Ph.D Scholar, Department of dravyaguna, Government Ayurveda medical college, Bangalore, Karnataka, India

ABSTRACT

With the globalization of Ayurveda it is need of the time to prove the available data in texts on scientific basis through experiments. In ancient Ayurvedic literature many references are available regarding drug testing on animals for safety of mankind. In Charaka samhita (Chi it has been explained to test the food whether it is poisonous by testing on fire and by reaction of different birds and animals after consuming or merely seeing the poisonous substances. In Sushruth samhita kalpasthana there is similar reference dealing with observations animal experiments . Acharya vagbhata in Ashtanga hridayam sutrasthana has also explained the same with more or less congruency. *Gmelina arborea roxb.* is extensively used traditionally as anthelmintic, antimicrobial, antidiabetic, diuretic, hepatoprotective and antiepileptic agent. Nowadays along with the popularity of Ayurvedic medicines the toxicity produced by them is also reported frequently. So considering the available literature on *Gambhari* (Gmelina arborea roxb, Verbenaceae family) present study has been under taken to evaluate toxic effect on wistar albino rats.

Keywords: , Gambhari**,** Gmelina arborea, Toxicity, Verbenaceae

INTRODUCTION

Indigenous system of medicine namely Ayurveda, has been existing since centuries. In recent years Ayurvedic drugs have kindled interest, on account of their efficacy for curing several human ailments with little or no adverse effects if properly administered. It is estimated that around 70,000 plant species from lichens to tall trees, have been used for medicinal purposes, but still there is lack of data on efficacy , safety and toxicity of herbal drugs . Hence there is need to find herbal drugs which are effective, freely available , economical, producing minimum ADR's and no toxic effects.

The fruits of the plant *Gmelina arborea roxb.* are oval in shape, ¾ inches in length and are yellow in color. The fruits are sweet in taste and sometimes astringent[1,2]. The plant, *G. arborea* was reported to have several medicinal properties such as aphrodisiac, astringent, analgesic, antipyretic, antidiabetic, diuretic, anti-inflammatory and tonic characteristics[3]. The literature survey reveals that fruits of *G. arborea* contain cardiac glycosides and steroids. The ethanol extract contains alkaloids, carbohydrates, anthraquinone glycosides, gums, mucilages, tannins, phenolic compounds and flavonoids. The ethyl acetate extract contains gums, mucilages, proteins and amino acids. The n-butanol extract contains alkaloids, anthraquinone glycosides, gums, mucilages, tannins, phenolic compounds, triterpenoids,

saponins and flavonoids. The petroleum ether extract contains alkaloids, carbohydrates, anthraquinone glycosides, proteins, amino acids, triterpenoids and saponins.

AIMS AND OBJECTIVES OF THE STUDY

1. To study the acute and sub- acute toxicity implications of *Gambhari phala* powder.

MATERIALS AND METHODS

The Fruits of *Gambhari* (Gmelina arborea) were collected from natural habitat. Fruits were carefully checked for the presence of infested ones and after removing them, washed with water to remove dust. Sample was then dried under shade. Completely dried Gambhari fruits were then pounded to convert them in to fine powder and filtered using cloth and preserved in air-tight food grade plastic containers. Powder thus obtained was used for preliminary phyto-chemical analysis and toxicological studies.

Healthy male and female Wistar albino rats of 4-8 weeks old were selected for the study. Rats were maintained under standard laboratory conditions and acclimatized for 14 days before commencing study.

Gambhari fruit powder was administered at different dosages by using distilled water as media and through oral gavazing. Since available LD_{50} study report revealed acute toxicity of *Gmelina arborea* methanolic extract to be up to 3g/kg body weight[5], 2g/kg dose was taken as maximum dose for acute and 1g/kg sub-acute toxicity studies respectively. Control group animals were administered with only distilled water.

Toxicity studies:

Organization of Economic Co-operation and Development guidelines (OECD 425[6] and 407[7]) were followed for acute and sub-acute toxicity tests respectively. The study was conducted in two schedules. First schedule comprised with the pilot study to estimate acute toxicity and dose selection for sub-acute (28 days repeated dose) toxicity studies.

1st schedule (Acute toxicity test):

Limit test was carried out to assess acute oral toxicity. Two groups of rats comprising of six animas in each group were used for the study. First group served as control. To the overnight starved animals, Gambhari phala powder was administered (second group) in the dose of 3g/kg body weight through gavazing as single dose. Distilled water was used as media of drug administration. The animals were observed for general behavioural changes, signs of toxicity and mortality continuously for 1h after administration, then intermittently for 4h, and there after over a period of 24 h. The Rats were further observed for up to 14 days following treatment for behavioral changes and signs of toxicity/death and the latency of death. Throughout the study period, food and water was provided to the experimental animals *ad libitum*.

2nd schedule: (Sub-acute toxicity or repeated dose 28 days study)

For the sub-acute study, Wister albino rats of either sex, weighing 150-200 g, were divided into 4 groups of 6 rats in each group (3females and 3 males were maintained in separate cages) after recording their body weight. The Group I was maintained as control, groups II, III and IV were administered with 300mg, 500mg and 1g/kg of Gambhari phala powder for 28 days respectively. Distilled water was used as media for oral gavazing.

Experimental animals were observed for mortality, manifestation of toxic signs, behavioural changes, food and water intake,

nature of excreta and gain/loss of body weight. Weight of individual animal was measured every day with the help of electronic weighing machine.

On 29th day, blood was collected from all experimental animals through retro-orbital plexus with capillary tube in separate blood collecting tubes with and without EDTA (for haematological and bio-chemical parameters respectively). Haematological parameters like, total erythrocytes, leucocytes (TC), differential count of leucocytes (DC), Platelet count and haemoglobin were considered for analysis. Bio-chemical parameters like serum glucose, total proteins, blood urea nitrogen, serum creatinine, AST, ALT, total bilirubin and direct bilirubin were estimated.

After collecting blood from experimental animals, all the animals were sacrificed and sample of vital organs like brain, liver, kidney, heart, lungs, spleen and intestines were collected in labelled containers filled with 10% NBF (Neutral buffered formalin) solution and were subjected for histological studies.

RESULTS

None of the experimental animals died during study period (both schedule 1 and 2). Food and water consumption, nature of excreta and behavior remained un-altered throughout study period of 28 days. Loss of body weight was not observed in any experimental animals. Gain in body weight at the end of 28th day was about 20% among *Gambhari phala churna* administered groups.

Throughout the study period, experimental animals showed normal behavior. No abnormal signs like drowsiness, irritability and aggressiveness were observed among experimental animals.

There was no change in hematological parameters like total count and differential counts of leucocytes. Hematological parameters remained within normal ranges at the end of 28 days. No variations in the parameters were observed in different groups (Table 1).

There was no change in serum bio-chemical parameters like serum glucose, total proteins, bilirubin, Creatinine and Blood urea nitrogen (BUN). Bio-chemical parameters remained under normal ranges at the end of 28 days among all groups (Table 2). Histology of vital organs remained normal compared to control group animals. No signs of inflammation, aggression, hemorrhage, necrosis and deposition of protein matter were observed in any vital organ samples during histological studies. There was normal architecture of cells and tissues noticed among all vital organs of all groups.

DISCUSSION

Since repeated drug intake is needed to ascertain activities such as Medhya, 28 days repeated dose study (sub-acute toxicity study) was undertaken to ascertain safety of *Gmelina arborea fruits*. Purpose of choosing higher dosage of churna was to establish the safety of the test drug with respect to vital organs especially on the brain. Dose fixation was in accordance with OECD Guidelines and earlier works done on methanolic extract of *Gmelina arborea roxb*[8].

Though none of the animals died during study period, changes pertaining to their behavior patterns were very vital to prove non-toxic nature of test drug as it has to be used as memory promoter. Absence of any abnormal behavior thus proves the safety of test drug for clinical usage. No varia-

tion in TC and DC of leucocytes indicated that, during the study period, test drug did not alter the immune system. Weight gain among experimental animal was the positive sign as Gmelina arborea fruits also have very good nutritional value.

Normal bio-chemical parameters signify the safety of test drug on body physiology. Vital organ histology also remained un-affected at the end of the study period signifying safety of the test drug (*Gambhari phala churna)*.

CONCLUSION

Gmelina arborea. is practically non toxic drug and its safety is thus established with the present study. *Gambhari phala chunrna* in the dose up to 2g/kg does not cause any kind of variations among behavior, hematology, bio-chemistry and histology of vital organs. Crude powder of the Gambhari fruit can be conveniently used for further therapeutic applications for longer durations.

ACKNOWLEDGEMENT

Author wish to thank JSS college of Pharmacy, Shivaratreeshwara nagar, Mysore, for providing laboratory facility to carry out animal study

REFERENCES

1. Smith AC. Flora of vitiences nova; a new flora of Fiji. Hawaii: National trophical garden; 1991
2. Adegbehim JO, Abayomi JO, Nwaigbo LB. Gmelina arborea in Nigeria. Forestry review 1998;67920:159-166
3. Nayak B S, Jena P K, Dinda S C ,Ellaiah P . A overview on silvi culture and traditional therapeutic uses of Gmelina arborea Roxb. J Pharmacy Res 2011;(5):1-2.
4. Nayak B S, Jena P K, Dinda S C ,Ellaiah P . Phytochemical investigations and in viytro evaluation of anthelmintic activity of Gmelina arborea Roxb. Fruit extracts . Asian J chem. 2012; 24(8): 3445-3448.
5. Bhabani shankar nayak etal‘ Evaluation of diuretic activity of *gmelina arborea* roxb. Fruit extracts : Asian Journal of Pharmaceutical and Clinical Research; Vol 6, Suppl 1, 2013.P. 111-113
6. OECD 425 guideline for the testing of chemicals; adopted on 03rd October 2008- Acute Oral Toxicity – Up-and-Down-Procedure (UDP)
7. OECD 407 guideline for the testing of chemicals; adopted on 03rd) October 2008-Repeated dose 28-day oral toxicity study in rodentsDinda S C, Mukharjee B,Gum caordia- A new tablet binder and emulsifier ,Acta pharm sci 2009: 51:189-198
8. Bhabani shankar nayak etal, Evaluation of diuretic activity of *Gmelina arborea* roxb. Fruit extracts : Asian Journal of Pharmaceutical and Clinical Research; Vol 6, Suppl 1, 2013.P. 111-113

Table 1: Hematological study report*: (Mean values)

Sl	Test	Normal range	300mg/kg Mean value	500mg/kg Mean value	1g/kg Mean value
1	RBC Count	7 – 10×10v/mm^3	7.56	7.3	**7.84**
2	WBC (TC)	6 – 17×10^3/mm^3	6.3	10	**7.6**
3	Polymorphs	9 – 34%	30	20	**37**
4	Lymphocyte	65 – 85%	66	75	**62**
5	Monocytes	0 – 5%	2	2	**1**

6	Eosinophil	0 – 6%	2	3	**3**
7	Platelets	500– 1300×10^3/mm^3	760	800	**770**
8	**Hb**	**11 – 18g/dl**	**11.2**	**13**	**12.8**

Table 2: Biochemical study report*: (mean values)

	Test	Normal range	300mg/kg Mean value	500mg/kg Mean value	1g/kg Mean value
1	Glucose	50 – 135mg/dl	100	88	**76**
2	Creatinine	0.2 – 0.8mg/dl	0.56	0.61	**0.43**
3	ALT	20 – 40 U/L	36	28	**30**
4	AST	30 – 50 U/L	41	38	**44**
5	Proteins	5.6 – 7.6g/dl	6.02	5.78	**6.0**
6	Blood Urea	15 – 21mg/dl	15.4	20	**16.5**
7	Bilirubin Total	0.2 – 0.55mg/dl	0.40	0.38	**0.42**
8	**Bilirubin Direct**	**0.1 – 0.3 mg/dl**	**0.2**	**0.21**	**0.14**

CORRESPONDING AUTHOR

Dr. Kuber Sankh

Ph.D Scholar Department of Dravyaguna,
Government Ayurveda medical college,
Bangalore, Karnataka, India

Email:kuberss@live.com