



EVALUATION OF LAXATIVE AND ANTIPYRETIC ACTIVITY OF VARIOUS ROOT EXTRACTS OF *Gmelina arborea* ROXB.

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ABSTRACT

Gmelina arborea an important medicinal plant is one of the most widely cultivated species of the family (Verbenaceae). It is highly valued from time immemorial because of its vast medicinal properties. The present work deals with the investigation of laxative & antipyretic activity of various extracts of *Gmelina arborea* roots. Laxative effect & antipyretic activity was checked in using Wistar strain albino rats. All the crude extracts such as ethanol, ethyl acetate, n-butanol and petroleum ether were tested for laxative (200 & 400 mg/kg) & antipyretic activity at (100 and 200 mg/kg) body weight. Whereas Agar-agar (300 mg/kg, p.o.) and paracetamol (100 mg/kg)

were used as standard drugs for laxative and antipyretic activities studies. The extract was found to produce significant laxative & antipyretic activity in dose dependent manner. The petroleum ether extract was found to possess the most effective laxative activity. Whereas ethanol & petroleum ether extract in a dose of 200 mg/Kg body weight exhibited significant antipyretic activity after 90 minutes and 120 minutes as compared to standard paracetamol.

Keywords: *Gmelina arborea*; Acute toxicity study; antipyretic activity; Laxative activity.

INTRODUCTION

In the last few decades there has been an exponential growth in the field of herbal medicine. It is getting popularized in developing and developed countries owing to its natural origin and lesser side effects. [1] Nature has provided a complete storehouse of remedies to cure all ailments of mankind. About 80% of the world population depending on herbal based

alternative system of medicine (Ayurveda, Unani medicine & Chinese traditional medicine). Herbal drugs have played a vital role in curing diseases throughout history of mankind. *Gmelina arborea* Roxb. (Verbenaceae) belongs to a genus of trees and shrubs distributed chiefly in South East Asia, tropical Australia and tropical Costa Rica. ^[2,3] *Gmelina arborea* Roxb. belonging to family Verbenaceae locally named as Gambhari (Oriya), Gambhar (Hindi), Gambhar (Bengali), Sriparni (Sanskrit) and Gummadi (Telgu). ^[4] Flowering takes place during February to April when the tree is more or less leafless whereas fruiting starts from May onwards up to June. Flowers occur in narrow branching clusters at the end of branches. The yellow flower, tinged with brown, is trumpet shaped, 3-4 cm long. The trumpets flare open into a gaping mouth with 5 distinct lobes. ^[5] The root of this plant has been used in traditional Indian systems of medicines as a demulscient, stomachic, bitter tonic, refrigerant, laxative, and galactagogue. The tender leaves are used as demulscient, in headache, fevers, gonorrhoea, cough etc. The whole plant is used in snake bite and scorpion sting throughout India. ^[6] As per the folkore medicine the root decoction is used in folk remedies for, demulcent, stomachic, and tonic, diarrhea, dropsy, dyspepsia, epilepsy, fever, gout, headache, hemorrhage, rheumatism, smallpox, snakebite, sores, sore throat, stomachic and urticaria. Ayurvedics. prescribe them for alopecia, anemia, consumption, leprosy, thirst, and vaginal discharges; the flowers for blood disorders and leprosy; the root, deemed anthelmintic, laxative and stomachic, for abdominal pains, burning sensations, fever, hallucinations, piles and urinary discharges. ^[7,8] According to scientific studies, the root decoction is used as a folk remedy for abdominal tumors. The roots are useful in hallucination, piles, abdominal pains, fevers, 'tridosha' and urinary discharge. ^[9,10] Traditional people are using to get relieve from Post delivery weakness. They are using half glass of boiled root extract. The extract is prepared by boiling roots with one glass of water till it gets reduced to half a glass. The plant has also been reported to have anti-inflammatory activity hypoglycaemic and anti-viral activities against Ranikhet disease virus. ^[11]

MATERIALS AND METHODS

Drugs and chemicals

Agar-agar and Paracetamol was procured from Bangalore Fine Chem. Bengaluru & Taj Pharmaceuticals Ltd, Mumbai, India. The ethanol AR and ethyl acetate AR 60-80°C (Emsure® ACS) were procured from Merck Pvt. Ltd., Navi Mumbai, Maharashtra, India. n-butanol GR 80°C, petroleum ether AR 40-60°C, Loba Chemie Pvt. Ltd., Mumbai, India. All other chemicals reagents used in present work were procured from authorized dealer.

Collection of Plant Material

The root of *Gmelina arborea* were collected from the tribal belts of the local area of Baipariguda of Koraput district.(India) in the month of November 2011.The plant was identified, confirmed and authenticated by the Biju Patnaik Medicinal Plants Garden and Research Centre, Dr. M. S. Swami Nathan Research Foundation, Jeypore, Koraput (District), Orissa (Letter No. MJ/SS/P-198/11,dated 16.12.2011).After authentication leaves were collected in bulk and washed under running tap water to remove adhering dirt. Then leaves were shade dried. The dried materials were made into coarse powder by grinding in mechanical grinder. and stored in a closed air tight container for further use.

Preparation of Extracts

The coarse powder was taken in Soxhlet apparatus and extracted successively with ethanol, ethyl acetate, n-butanol and petroleum ether as solvent. A total amount of 650 g coarse powder was extracted with 1200 ml of each solvent. For each solvent,10 cycles were run to obtain thick slurry. Each slurry was then concentrated under reduced pressure to obtain crude extract. All crude extracts were kept in closed air tight containers under cool and dark place for further study. ^[12,13.]

Priliminary phytochemical investigation

The crude ethanol, ethyl acetat, n-butanol and petroleum ether extracts of the root of *Gmelina arborea* were subjected to preliminary phytochemical analysis showed the presence of tannins Alkaloids,Carbohydrates,Flavonoids,glycosides,Anthraquinon glycosides,Proteins and amino acids, ,Steroids and sterols, Saponins,Triterpinoid etc by chemical analysis^[13,14 ,15]

Animals

Healthy Wister strain albino rats were used.They were housed in standard conditions of temperature (25±2 °C), 12 hours light per day cycle, relative humidity of 45-55 % in animal house of Jeypore College of Pharmacy. They were fed with standard pellets of food and water. Animals were kept and all operation on animals was done in aseptic condition.

Drugs

Agar-agar (300 mg/kg,p.o.) and a dose of 200 mg/kg and 400 mg/kg of different *Gmelina arborea* root extracts used for activity study. The doses were prepared either with vehicle (1% Tween-80 solution in normal saline or normal saline were administered orally

Experimental protocol

Animals were selected, weighed (25-30 g) and divided into ten groups (n=6), namely control, standard drug and four groups belonging to four different extracts of *C.pallida*. All the studies conducted were approved by the Institutional Animal Ethical Committee (1200/ac/08/CPCSEA), Dadhichi college of pharmacy, Vidya vihar, Cuttack, according to prescribed guide-lines of the Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA), Government of India.

Acute toxicity studies

The acute toxicity was performed according to OECD 423, 2001. The selected female albino rats were used to determine the dose. The animals were divided into twelve groups of three in each. The animals were fasted overnight prior to the acute experimental procedure. Distilled water was used as vehicle to suspend the different leaf extracts of *Gmelina arborea* and administered orally as following doses of 100, 300, 600, 1000 and 2000 mg/kg body weight. Immediately after dosing, the animals were observed continuously for first four hours for behavioral changes and for mortality at the end of 24hrs and daily for 14 days respectively ^[16]

Laxative activity

The test was performed according to Capasso *et al.* on rats of either sex weighing 200-220 g were kept in individual cages during one week. Any rat producing wet feces was rejected. The rats were fasted for 12 h before the experiment, but with water provided *ad libitum*. The animals were divided into eight groups of six in each. The animal groups were administered orally either with vehicle (1% Tween-80 solution in normal saline, 25 ml/kg), reference standard drug, agar-agar (300 mg/kg, *p.o.*) in saline or doses of extract (200 and 400 mg/kg). Immediately after dosing, the animals were separately placed in cages suitable for collection of faeces. (each cage is with a wire mesh at the bottom and a funnel to the urine; stainless-steel sieves are placed in the funnel to retain feces). After 8h of drug administration, the faeces were collected and weighed. Thereafter, food and water were given to all rats and faecal outputs were again weighed after a period of 16 h. ^[17,18]

Antipyretic activity by Yeast induced pyrexia

For studying antipyretic activity of albino rats weighing 150-200 gms were selected and divided into ten groups containing six animals in each group were used for yeast induced pyrexia models. Group I animals received 1 ml/kg body weight of normal saline orally and served as control group. Group II animals were treated with paracetamol by intraperitoneal

injection in the dose of 100 mg/kg body weight and served as standard group. The animals of group 3 two 10 received the ethanol, ethyl acetate, n-butanol and petroleum ether of root extract of *Gmelina arborea* orally (100&200mg/kg body weight) to the respective groups of animals. In the beginning of the experiment normal rectal temperatures was noted by inserting 2cms of digital thermometer, lubricated with glycerine into the rectum. Pyrexia was induced by intraperitoneal injection of 2ml/kg body weight of 15% brewer's yeast suspension in normal saline. The animals were then fasted for the duration of experiment (approximately 24 hours). After 18 hours of yeast injection, extracts (100&200 mg/kg body weight) are given to the respective test group animals then the basal temperatures were recorded for all the groups of animals by inserting 2cms of digital thermometer, lubricated with glycerin into the rectum. The rectal temperatures of all the animals were noted at 30 minutes of intervals till 3 hours. [19,20]

RESULT AND DISCUSSION

In present study four extracts (ethanol, ethyl acetate, n-butanol and petroleum ether) of root part of *Gmelina arborea* were studied for laxative & antipyretic activity (by yeast induced pyrexia method). A preliminary acute toxicity study in mice showed that all the extracts were not toxic (LD₅₀ > 1000mg/kg). The effect of various root extracts of *Gmelina arborea* shown in table no.1&2 respectively. Among all the extracts ethanol & n-butanol shows significant antipyretic activity effect than other two extract in a dose of 200 mg/kg body weight as compared to standard drug paracetamol in a dose of (100mg/kg). Similarly pet-ether extract of root of *Gmelina arborea* shows significant laxative activity than other two extract in a dose of 200 mg/kg body weight as compared to standard drug Agar-agar in a dose of (300mg/kg). Decreased body temperature of yeast induced rats. The results obtained from both standards and extracts treated groups were compared with the control group. A significant reduction in the yeast elevated rectal temp. was observed in the test drug.

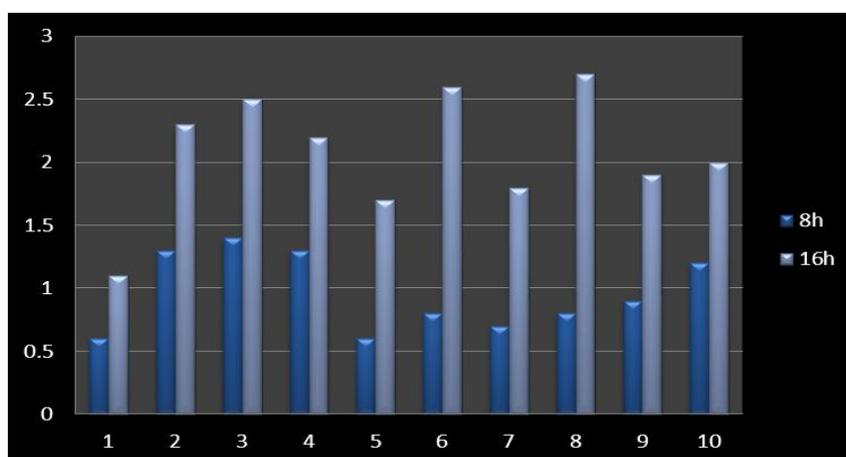
Table no 1: Laxative activity of various root extracts of *Gmelina arborea*

Treatment	Dose mg/kg	Fecal out put(g)	
		8 hours	8-16 hours
Control	-----	0.6 ± 0.1	1.1 ± 0.2
Agar-Agar (standard)	300	1.3 ± 0.1	2.3 ± 0.3
Ethanol extract	200	1.4 ± 0.1	2.5 ± 0.3
	400	1.3 ± 0.2	2.2 ± 0.1
Ethyl acetate extract	200	0.6 ± 0.2	1.7 ± 0.1
	400	0.8 ± 0.3	2.6 ± 0.3

n-butanol extract	200	0.7 ± 0.3	1.8 ± 0.1
	400	0.8 ± 0.1	2.7 ± 0.2
Pet. ether extract	200	0.9 ± 0.2	1.9 ± 0.3
	400	1.2 ± 0.1	2.0 ± 0.2

Table no 2: Effect of various root extracts of *Gmelina arborea* against yeast induced pyrexia in rats

Group	Treatment Dose (mg/Kg)	Initial Body Temperature (°C)	Basal Temperature (°C)	30min	60min	90min	120min	180min
Control	-----	38.36 ± 0.08	38.33 ± 0.6	39.47 ± 0.12	39.38 ± 0.14	39.40 ± 0.12	39.52 ± 0.19	39.02 ± 0.14
Paracetamol (standard)	100	37.65 ± 0.11	38.72 ± 0.08	38.32 ± 0.09	38.22 ± 0.16	37.52 ± 0.07	37.17 ± 0.14	37.31 ± 0.12
Ethanol extract	100	36.42 ± 0.18	37.32 ± 0.21	37.65 ± 0.25	38.22 ± 0.16	38.23 ± 0.30	39.31 ± 0.26	39.26 ± 0.23
	200	37.46 ± 0.17	38.67 ± 0.12	37.51 ± 0.16	38.25 ± 0.11	38.32 ± 0.08	37.72 ± 0.14	37.16 ± 0.12
Ethyl acetate extract	100	36.54 ± 0.20	37.38 ± 0.17	38.77 ± 0.12	38.32 ± 0.18	39.67 ± 0.22	39.42 ± 0.33	39.24 ± 0.23
	200	36.31 ± 0.23	37.27 ± 0.17	38.57 ± 0.23	38.64 ± 0.22	38.41 ± 0.33	39.40 ± 0.18	39.72 ± 0.18
n-butanol extract	100	36.40 ± 0.12	37.28 ± 0.34	38.36 ± 0.14	37.26 ± 0.11	38.84 ± 0.12	38.23 ± 0.17	38.43 ± 0.23
	200	37.27 ± 0.18	38.40 ± 0.12	37.62 ± 0.21	37.70 ± 0.25	37.31 ± 0.12	37.35 ± 0.14	38.28 ± 0.17
Pet. ether extract	100	36.65 ± 0.21	38.30 ± 0.18	39.42 ± 0.22	39.26 ± 0.11	38.71 ± 0.16	39.51 ± 0.14	39.33 ± 0.11
	200	36.15 ± 0.34	38.38 ± 0.11	38.27 ± 0.18	39.25 ± 0.14	39.34 ± 0.28	39.11 ± 0.36	39.43 ± 0.17



Graph 1: Laxative activity of various root extracts of *Gmelina arborea*

- 1: Normal control
- 2: Standard (Agar-agar)
- 3: Ethanol ext. 200mg/kg
- 4: Ethanol ext. 400mg/kg
- 5: Ethyl acetate ext. 200mg/kg
- 6: Ethyl acetate ext. 400mg/kg
- 7: n-butanol ext. 200mg/kg
- 8: n-butanol ext. 400mg/kg
- 9: Pet. ether ext. 200mg/kg , 10: Pet. ether ext. 400mg/kg

CONCLUSION

On the basis of present study, we may conclude that *Gmelina arborea* root produces Significant antipyretic and laxative activities in dose-dependent manner on animal models. By the positive activity of *Gmelina arborea* root against pyrexia, The traditional use has been pharmacologically validated. Since, *Gmelina arborea* root showed remarkable activity when compared with standard drugs. Therefore, *Gmelina arborea* root can be a substitute of synthetic laxative or antipyretic drugs having adverse effects.

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