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"A comparative study on Toxicity and Antipyretic effects of Ethanol extracts of some common Indigenous plants of India, (*Phyllantus embilica, Solanum melongena Linn., Pongamia pinnata*)".

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ABSTRACT

The traditional drug consisting of leaves of *Phyllantus embilica, Solanum melongena Linn., Pongamia pinnata* were evaluated for toxicity and antipyretic study. The ethanol plant extracts at 100, 250 and 500 mg/kg dose dependently exhibited significant antipyretic properties during yeast induced pyretic test. No toxic effect was observed up to the dose of 2000 mg/kg during acute toxicity studies. These antipyretic properties of the extracts may be related to the presence of its active constituents especially alkaloid.

Key Words: Toxicity, Antipyretic, *Phyllantus embilica, Solanum melongena Linn., Pongamia pinnata*

1. Introduction

Known locally as Amla or Indian gooseberry, *Phyllanthus emblica L* (Phyllanthaceae) is an incredibly popular herb in Indian Ayurvedic system. Because of its remarkable abilities for revitalization, reconstruction, and renewal, it is commonly referred to as "The King of Rasyana."Amla is incredibly nutrient-dense and among the bestproviders of minerals, amino acids, and vitamin C. It has a variety of chemical components, including phenols, alkaloids, and tannins. Of all the hydrolyzable tannins, it has been reported that ellagic acid, gallic acid, and emblulanin A and B have biological activity. The Indian medical system makes extensive use of amla fruit, either by itself or in conjunction with other plants. It is used as a diuretic, laxative, liver tonic, refrigerant, stomachic, restorative, anti-pyretic, hair tonic, and to cure fever and common cold as well as to avoid ulcers and dyspepsia. Amla's analgesic, anti-tissue, anti-atherogenic, adaptogenic, cardio, gastro, nephro, neuro, protecting, and anticancerqualities are shown by

pharmacological study (Dasaroju & Gottumukkala, 2014).

Indian medicine has long used the culinary vegetable *Solanum melongena Linn*. (Solanaceae). The plant's parts can be used to cure a variety of ailments, including cholera, bronchitis, neuralgia, inflammatory disorders, cardiac debility, and asthma. There have been reports of its hypolipidemic, analgesic, and antioxidant properties. Additionally, the fresh juice of brinjal leaves or their dry residue is used as a fever remedy by rural people. The goal of this study is to assess the analgesic and antipyretic properties of *Solanum melonge* leaf juice residue that has been dried out. *S. melongena* flavonoids were extracted and they demonstrated strong antioxidant activity. Another naturalsource of vitamin A is *S. melongena*. It would be crucial for maintaining eye health and eyesight (Kale & Patil, 2021).

Pongamia pinnata (L.), a medium-sized evergreen tree in the Fabaceae family, is also referred to as Indian beech in English and Karanja in Hindi. Alkaloids, tannins, steroids, glycosides, demethoxy-kanugin, glabrin, kanugin, karangin, flavonoids, and fixed oils are just a few of the phytoconstituents it contains. Analgesic, anti- fungal, anti-plasmodial, anti-ulcerogenic, anti-inflammatory, anti-nonciceptive, anti-hyperglycemic, anti-lipoxidative, anti-hyperammonic, antioxidant, and anti-diarrheal properties are all present in the plant's extract. Roots are used to treat ulcers, teeth, and gums. Bark is applied internally to pile bleeding. There is a long-standing tradition of using various parts of this plant to treat conditions like gonorrhea, dyspepsia, diarrhea, rheumatism, whooping cough, and bronchitis (Rao, Jayasree, Devarakonda, & Heera, 2018).

Figure 1. *Phyllantus emblica (L)* (Amla)	*Solanum melongena*(Brinjal)	*Pongamia pinnata* (Karanj)

2. Materials and Methods

Drugs, Chemicals and Equipment

Distilled water, food, plant extracts, Pracetamol, feeder, water, yeast.

Plant materials

The dried and powdered leaves of *Phyllantus embilica* (Amla), *Solanum melongena Linn.* (Brinjal), *Pongamia pinnata* (Karanj) were successfully extracted in Soxhlet apparatus by adding 70% ethanol and later evaporated the extracts separately. Further the ethanol extracts underwent the acute toxicity test and then were evaluated for antipyretic activities by using a dose of 100, 250 and 500 mg/kg each (S, B, S, & S, 2016). The phytochemical screening showed the presence of flavonoids, alkaloids, and tannins (Subedi, Rahman, & Akbar, 2016).



Figure 2.Amla | Brinjal | Karanj

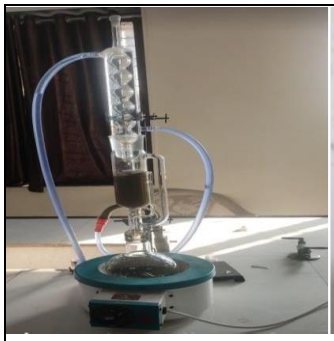



Figure 3. Soxhlet apparatus | Amla | Brinjal | Karanj

Animal preparation

Swiss Albino mice of both the sex (male and female) weighing between 20 and 30g (6 weeks) were used. Animals were kept in animal house under the supervision of veterinary doctors. Swiss albino male mice weighing 20 - 25 g were housed in group (n=6) under standard conditions of a 12-hour light/dark cycle, temperature (25±2°C), and humidity (55-65%). They were provided with standard rodent chow and water. Prior to conducting the experiments, the mice were acclimatized to the laboratory conditions for 7 days. All experiments were conducted in a noise-free room between 08:00 to 15:00 hours. Each set of experiments utilized a separate group of mice (n=6).


Figure 4. Animal preparation (Swiss Albino mice with proper feed and water)

3. Toxicity study

In compliance with Organization for Economic Co-Operation and Development (OECD) guideline 420 for chemical testing, an acute oral toxicity study was conducted. Mice of both sexes fasted for 16 hours, aged 6–8 weeksold, and were used. Animals were administered only once orally at a single dose of 2000 mg/kg at a rate of 20 ml/kg to both the sexes of mice. All animals were then allowed free access to food and water and observed for 24 hours, with special care given to first 4 hours and once daily for 14 days for any signs of acute toxicity. The visual observations of mortality, various changes in physical appearance, behavior (salivation, lethargy), and any injury or illness were conducted once daily for 14 days. All animals were given an intraperitoneal injection of ketamine to induce anesthesia on the fifteenth day. Blood samples were collected by cardiac puncture into EDTA containing tubes and non-heparinized tubes for analysis. All the tests were conducted at Super Vets Clinics & amp; Diagnostics, Mumbai, India. (Test No. 425: Acute Oral Toxicity: Up- and-Down Procedure, 2022).

Table.1: Group distribution for acute toxicity in Swiss albino mice.

Group	Product dose	Route of administration	No. of animals	
			M	F
Group I	Amla leaves extract	oral	6	6
Group II	Brinjal leaves extract	oral	6	6
Group III	Karanj leaves extract	oral	6	6

Table.2:

Group	Eyes and mucous membranes	Respiratory rate	Salivation/ excitation/ diarrhea	Motor activity	Mortality
Amla leaves extract	NAD	NAD	NAD	NAD	Nil
Brinjal leaves extract	NAD	NAD	NAD	NAD	Nil
Karanj leaves extract	NAD	NAD	NAD	NAD	Nil

NAD- No Adverse Effects Detected

Table.3:

Group	Skin andfur	Lethargy	Mucous membrane	Diarrhea	Behavioral patterns
Amla leaves extract	Ruffled hairs	NAD	NAD	NAD	NAD
Brinjal leavesextract	NAD	NAD	NAD	NAD	NAD
Karanj leavesextract	NAD	NAD	NAD	NAD	NAD

NAD- No Adverse Effects Detected

4. Antipyretic study

The way antipyretic drugs function is by reducing fever. A fever is defined as an increase in body temperaturethat is not brought on by changes in the environment. Fever is not a disease in and of itself; rather, it is only one of many symptoms.

Brewer's yeast-induced pyrexia

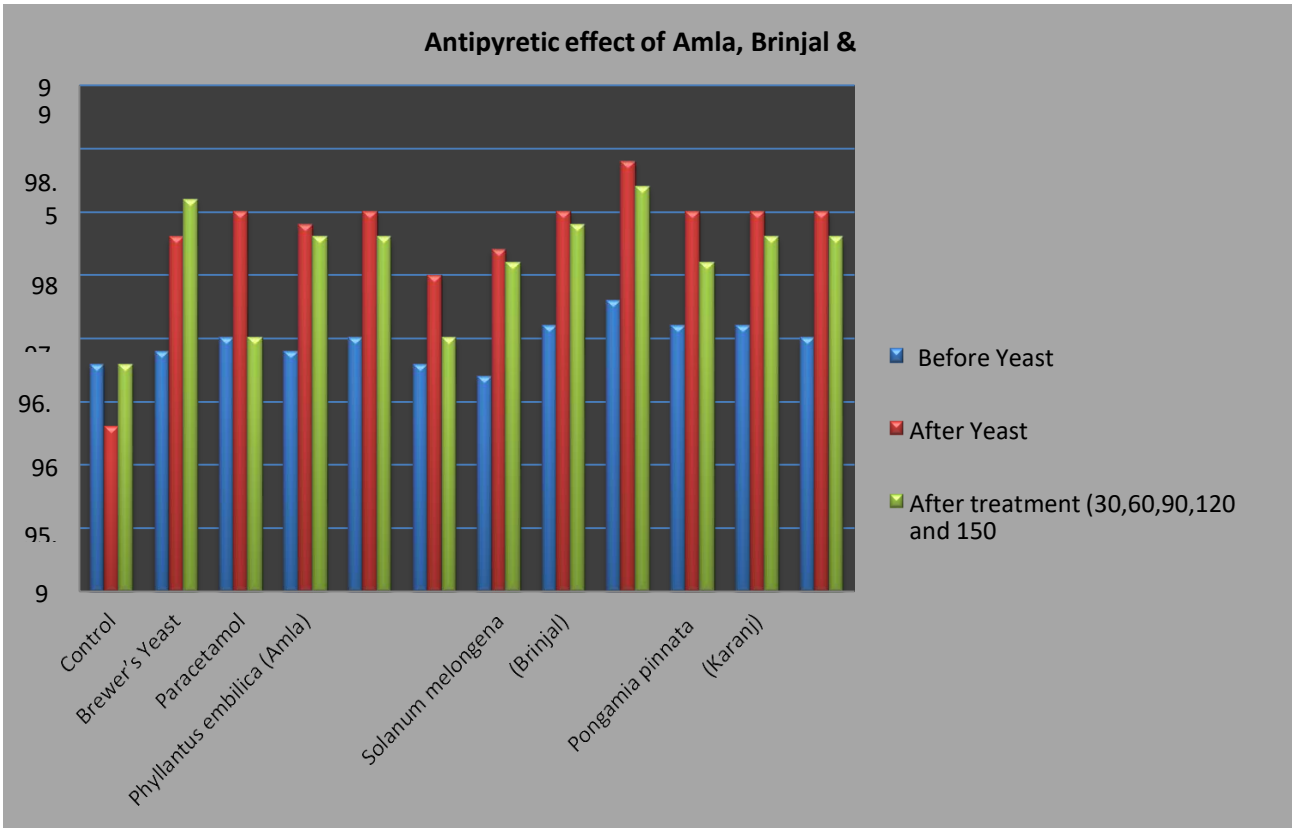
The mice's rectal temperatures were taken before the experiment by carefully putting a thermometer's lubricated bulb into their rectum. We were able to induce hyperpyrexia in the mice by injecting 10% aqueous brewer's yeast suspension subcutaneously in the area beneath the nape of the back. In order to evaluate the pyretic response induced by the yeast, pre-drug control temperatures were measured 24 hours following the yeast injection. The mice were then split up into two groups: one group was given oral doses of 100, 250 and 500 mg/kg of Amla, brinjal, and karanj extract, while the other group was given an oral dose of 33 mg/kg of paracetamol.

Table 1: Antipyretic effect of *Phyllantus embilica, Solanum mel*ongena and *Pongamia pinnata* on yeast induced pyrexia in mice.

Treatment	No. of animals	Dose mg/kg	Before Yeast inj.	After Yeast inj.	(30,60,90,120 and 150 minutes)
Control	6	1 ml saline water	96.8 ±0.186*	96.3 ±0.211*	96.8 ±0.1857*
Brewer's Yeast	6	1 ml (20%)	96.9 ±0.226*	97.8 ±0.263*	98.1 ±0.3621*
Paracetamol	6	Paracetamol	97.0 ±0.211*	98.0 ±0.234*	97.0 ±0.1857*
Phyllantus embilica (Amla)	6	100 mg/kg	96.9 ±0.211*	97.9 ±0.221*	97.8 ±0.2141*
	6	250 mg/kg	97.0 ±0.143*	98.0 ±0.122*	97.8 ±0.1088*
	6	500 mg/kg	96.8 ±0.257*	97.5 ±0.226*	97.0 ±0.2197*
Solanum melongena (Brinjal)	6	100 mg/kg	96.7 ±0.289*	97.7 ±0.309*	97.6 ±0.3095*
	6	250 mg/kg	97.1 ±0.145*	98.0 ±0.158*	97.9 ±0.1585*
	6	500 mg/kg	97.3 ±0.177*	98.4 ±0.224*	98.2 ±0.2242*
Pongamia pinnata (Karanj)	6	100 mg/kg	97.1 ±0.152*	98.0 ±0.125*	97.6 ±0.2868*

	6	250 mg/kg	97.1 ±0.108*	98.0 ±0.112*	97.8 ±0.0919*
	6	500 mg/kg	97.0 ±0.178*	98.0 ±0.170*	97.8 ±0.1939*

T-Test is applied and the data obtained is significant which is marked as*. Values are expressed as mean ± SEM (n=6). *P< 0.05 compared with control.



5. Result and discussion

Toxicity Study: -

The fact that neither of the animals receiving extracts died or became sick, as observed in the current study, implies that the ethanol extracts of amla, brinjal, and karanj were successful. orally and is a non-poisonous chemical. After a clinical trial, it was determined that Phyllantus embilica (amla), Solanum melongena (brinjal), and Pomacea pinnata (L.) (karanj) had a high safety margin and could be useful as therapeutic agents. For acute oral toxicity, 2000 mg/kg b.wt is generally regarded as an extremely high dose. Until the fourteenth day of observation, all three formulations demonstrated safety at a single exposure, and no adverse effects or mortality were observed.

Antipyretic study:

The antipyretic properties of extracts from *Phyllantus embilica* (amla), *Solanum melongena* (brinjal), and *Pongamia pinnata* (karanj) were validated by the current experimental investigations. These results suggest that the tested plant extracts have antipyretic properties similar to those of paracetamol.

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