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INVESTIGATION OF ANALGESIC AND ANTI-PYRETIC POTENTIALS OF *PHYLLANTHUS NIRURI* PLANT EXTRACTS

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ABSTRACT

Plant of *Phyllanthus niruri*, an indigenous plant of India, had been the plant of study for the current research work. Aqueous as well as ethanolic extracts of *Phyllanthus niruri* were evaluated for their analgesic as well as anti-pyretic effect using Tail Immersion Model and Brewer's Yeast Induced Pyrexia Model respectively. Aqueous as well as Ethanolic plant extracts induced better analgesia and have anti-pyretic potential when compared to standard drugs. Combination of analgesia as well as anti-pyretic effect will ascertain its significant role in infection induced fever.

KEY WORDS

Phyllanthus niruri, Anti-pyretic, Analgesia and Brewer's Yeast.

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INTRODUCTION[1-2]

Herbal Medicine also called botanical medicine or phytomedicine refers using plant's seeds, berries, roots, leaves, stems, bark or flowers for medicinal purposes. The use of natural products with therapeutic properties is as ancient as human civilization. Because medicinal plants are capable of synthesizing an overwhelming variety of low molecular weight organic compounds called secondary metabolites, usually with unique and complex structures. India has a rich heritage of traditional medicine and the traditional health care system have been flourishing for many centuries.

Phyllanthus niruri Linn is the member of the family Euphorbiacea and is closely related to other species of Phyllanthus. It is indigenous to tropical and subtropical areas in both hemi spheres. It is prevalent in the rainforests of the amazon, china, southern india, the Philippines, the Bahamas and puertorico. Making a review of ethnomedic literature, we can conclude that the two most important traditional uses are for its action on kidneystones and for its effect on liver disease (antihepatotoxic).

MATERIALS AND METHODS[3-8]

Plant material

The plant of *Phyllanthus niruri* Linn was collected from Tenkasi, Tirunelveli District, Tamilnadu, during Dec 2014. Plant was collected in fine dry weather and was dried in sunshade for a week. The shade dried plant material was coarsely powdered and used for further studies.

Preparation of Extracts

The ethanolic and aqueous extracts were prepared according to the standard procedure[1,8,9]. The filtered, extracts were dried in a vacuum evaporator and aqueous and alcoholic extracts were kept in desiccators until further use.

Physical study

Coarse powder of leaves of *Phyllanthus niruri* was performed for foaming index, swelling index, Loss on drying and Total ash value. The foaming index was found to be less than 100, the swelling index was 2%, Loss on drying was 5.5%W/W and Total ash value was 9.54%W/W.

Animals

Wistar strain albino rats of either sex weighing between 140-160g were used. The animals were obtained from the animal house attached to the pharmacology laboratory of Sri Ram Nallamani Yadava College of Pharmacy, Tenkasi. The rats were exposed to natural day and night cycles under ideal ambient laboratory conditions (temperature 22±2°C and humidity 50%–60%). They were fed with Amrut® rat pellet feed (Pranav Agro Industries) and tap water was supplied *ad libitum*.

The experiments were carried out after obtaining permission from the institutional animal ethics committee.

Evaluation of Anti-pyretic Potential using Brewer's Yeast induced Pyrexia Model

The antipyretic activities of the ethanolic and aqueous extracts were evaluated using Brewer's yeast-induced pyrexia in rates (Balamurugan *et al*., 2009; Vogel *et al*., 2002). Prior to experiments, rates were maintained in separate case for 7 days and with those rate approximately constant rectal temperatures were selected for the study. Pyrexia was induced by injecting 2 ml/kg (s.c) of 15% w/v aqueous suspension of Brewer's yeast in normal saline below the nape of the neck. Immediately after yeast administration, food was withdrawn. The rectal temperature of each rat was recorded by using a telethermometer immediately before (-18h) and 18h after (0 h) Brewer's yeast injection. The different groups were treated with the vehicle, ethanolic and aqueous extract (500mg/kg), and standard drug, paracetamol (150 mg/kg). Tween 80 (1% v/v) was used as suspending agent. The rectal temperature was then recorded again 30, 60, 120, 180 and 240 min post dosing.

Evaluation of Analgesic Potential using Tail Immersion Model

Rats (six per group) were used. Rats were administered orally with vehicle (3ml/kg), Pentazocine (30mg/kg), ethanolic, aqueous extract (500 mg/kg). The distal part of tails (3c.m) of the animals was immersed in hot water at a temperature of 55±0.5°C. The time taken to withdraw the tail was noted as reaction time with a stopwatch. A cut off time of 10 sec was maintained at55 $\pm 0.5^0$C to prevent tissue damage. The reaction time was measured at 0, 15, 30, 45 and 60 min after treatment, respectively.

Data analysis and statistics

The values were expressed as mean ± standard error mean (SEM). Statistical analysis of the data was carried out by two way ANOVA followed by bonferroni test to determine the significant between two groups $p<0.05$ was considered significant.

RESULTS AND DISCUSSION

Phytochemical Screening

The Ethanol and aqueous extracts of *Phyllanthus niruri* was screened for its various phyto constituents by standard chemical tests. The powder drug shows the presence of carbohydrates, alkaloids, glycosides, saponins, flavonoids, tannins, phenolic compounds, proteins, amino acids, mucilage and terpenoids. The results were summarized in Table No.1.

Analgesic and Anti-pyretic Activity

A significant reduction of the painful sensation due to tail immersion in warm water was observed followed oral administration of the Ethanolic and aqueous extract at dose of 500mg/kg of plant of *Phyllanthus niruri*. Results were summarized in Table No.2. And analgesic effect was found to be increasing with the dose of 500mg/kg of test compounds. Several flavonoids isolated from the medicinal plant have been discovered to possess significant analgesic effects. The analgesic activity of Ethanolic and aqueous extract of plant of *Phyllanthus niruri* may be due to the presence of flavonoids.

The subcutaneous injection of yeast suspension markedly elevated the rectal temperature after 18h of administration to rats. Treatments with Ethanolic and aqueous extract of plant at dose 500mg/kg decreased the rectal temperature in a dose dependent manner. The anti pyretic effect staretd from the first hour and maintained for 4h, after administration of Ethanolic and aqueous extract. The results were compared with standard drug, represented in Table No.3. and graphically represented in Figure No.1.

Table No.1: Qualitative Phytochemical analysis of Plant Extract of *Phyllanthus niruri*

S. No	Chemical Constituents	Powder	Ethanol	Water
1	Carbohydrates	+	+	+
2	Alkaloids	+	+	+
3	Steroids	-	-	-
4	Glycosides	+	+	+
5	Saponins	+	+	+
6	Flavanoids	+	+	+
7	Tannins	+	+	+
8	Phenolic Compounds	+	+	+
9	Proteins	+	+	+
10	Amino acids	+	+	+
11	Mucilage	+	+	+
12	Terpenoids	+	+	+

Note: $+^{ve}$ indicates presence and $-^{ve}$ indicates absence of respective constituents

Table No.2: Analgesic Activity of Ethanolic and Aqueous Extracts of *Phyllanthus Niruri*

S. No	Group	Treatment	Basal Reaction Time (sec)	Reaction Time (sec)			
				15 min	30min	45min	60min
1	I	Control	4.11± 0.20	4.25± 0.19	4.20±0.22	4.32±0.09	4.28±0.18
2	II	Pentazocine 30mg/kg	4.52± 0.20	6.66±0.28*	8.63±0.16*	8.72±0.48*	9.48±0.19*
3	VIII	EEPN 500mg/kg	4.41± 0.17	5.58±0.31*	5.92±0.24*	8.20±0.32*	8.38±0.23*
4	X	AEPN 500mg/kg	4.56± 0.18	6.10±0.36*	6.72±0.36*	8.93±0.18*	9.60±0.19*

Table No.3: Anti Pyretic Activity of Ethanol and Alcoholic Extracts of *Phyllanthus Niruri*

S. No	Treatment	Dose mg/Kg	Rectal Temperature in 0^0C at Various Times (hr)						
			-18 hr	0 min	30 min	60 min	120min	180min	240min
1	Yeast control	-	37.10± 0.03	38.03± 0.07	38.10±0.06	38.70±0.02	39.12 ± 0.01	39.32±0.06	39.50±0.07
2	Control	-	37.12± 0.05	38.03±0.02	38.70±0.05	38.60±0.03	38.52 ± 0.05	38.33±0.06	38.17±0.03
3	Paracetamol	150	37.07± 0.03	38.10±0.06	37.78±0.05*	37.40±0.03*	37.40 ± 0.05*	37.33±0.04*	37.15±0.04*
4	EEPN	500	37.15±0.04	38.08 ±0.07	37.85±0.04*	37.68±0.04*	37.56 ± 0.02*	37.36±0.03*	37.28±0.03*
5	AEPN	500	37.1 ±0.05	38.03 ±0.07	37.63±0.04*	37.35±0.04*	37.30 ± 0.07*	37.25±0.07*	37.15±0.05*

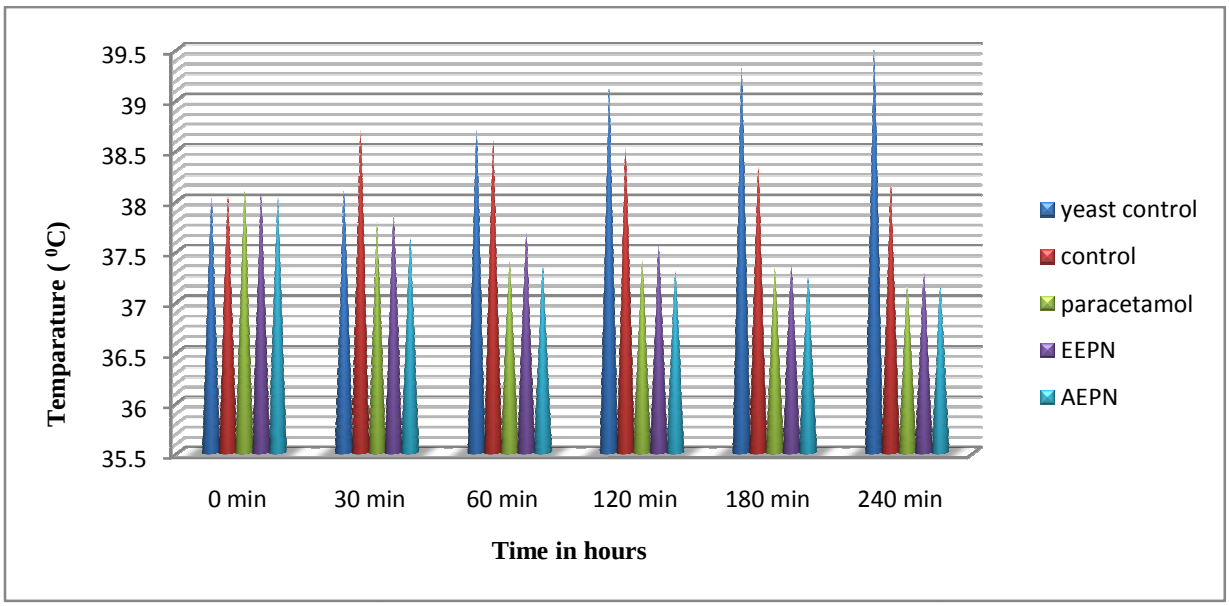

Figure No.1: Anti-pyretic Activity of Ethanolic and Aqueous Extracts of *Phyllanthus niruri*

CONCLUSION

In the present work, a medicinally useful plant in the Indian system of medicine, *Phyllanthus niruri* was selected. The Pharmacognostical study provides a set of diagnostic macroscopic characters of the plant. Determination of Physico-Chemical constants such as Ash values, Extractive values, Loss on Drying, Crude Fibre Content, Foaming index, Swelling index was carried out. Phytochemical studies were carried out. Successive solvent extraction was carried out with Petroleum ether, Chloroform and Ethanol, Water. Preliminary phytochemical analysis aided in identifying the phytoconstituents present in different extracts. Pharmacological studies were carried out to study the Analgesic and Anti-Pyretic potential of the plant *Phyllanthus niruri*. In animal studies, Water and Ethanol extract of *Phyllanthus niruri* showed significant activity. Thus the scientific evaluation employing the modern tools for the selected plant is found to prove the therapeutic potential as mentioned in the ancient texts of indigenous system of medicine and the folklore claims. Further study is required to identify the individual compounds responsible for the activities. This present study revealed the efficacy of the plant *Phyllanthus niruri* as anti-pyretic agent and thus further research can be directed towards the use of the plant in the treatment of pyrexia.

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