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PHARMACOGNOSTICAL, PHYTOCHEMICAL AND ANTHELMINTIC ACTIVITY ON LEAVES OF *SOLANUM NIGRUM* LINN

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ABSTRACT

The Petroleum ether, Chloroform, Ethanol and aqueous extracts of *Solanum nigrum* were tested for anthelmintic activity using Indian earth worms (*Pheretima posthuma*). In this study, the time taken for paralysis and death was observed in all experimental groups and albendazole is used as standard drug, the result showed that, ethanol and water extracts exhibit significant anthelmintic activity comparable to the standard drug where as Petroleum ether and Chloroform extracts shows less significant activity when compared with standard drug. Pharmacognostical and Phytochemical investigations were also performed on the leaves of *Solanum nigrum*.

KEY WORDS

Solanum nigrum, Anthelmintic activity and *Pheretima posthuma*.

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INTRODUCTION¹⁻²

Solanum nigrum commonly called Black night shade, grows as a weed, found in the dry parts of India and other parts of the world. Black nightshade is a fairly common herb or short-lived perennial shrub sometimes purple-green, hairy with glandular and simple, non-glandular hairs; prickles absent. It has a height of 30-120 cm. leaves 4-7.5 cm (1 1/2-3") long and 2-5 cm wide (1-2 1/2"); ovate to heart shaped, with wavy or large-toothed edges; both surfaces hairy or hairless; petiole 1-3 cm (1/2-1") long with a winged upper portion. The flowers have petals greenish to whitish, recurved when aged and

surround prominent bright yellow anthers. The berry is mostly 6-8 mm (1/4-3/4") diam., dull black or purple black. It is widely used most effective anti-ulcer agent, treatment of skin diseases. It is also used as anti-pyretic and anti-tumorogenic agent.

MATERIALS AND METHODS³⁻⁸

Plant material

The leaves of plant of *Solanum nigrum* Linn were collected from Tenkasi, Tirunelveli District, Tamilnadu, during Dec 2013. Leaves were collected in fine dry weather and were dried in sunshade for a week. The shade dried plant material was coarsely powdered and used for further studies.

Extraction

The leaves were dried under shade and made into coarse powder by hand operated mill. The Pet.ether, Chloroform, Ethanol extracts are prepared by hot continuous extraction process and aqueous extract is prepared by maceration process. The pet.ether extract was yellowish brown in colour, chloroform extract was greenish black, ethanol extract was dark green and aqueous extract was brown in colour and these extracts were tested for the presence of phytochemical constituents and anthelmintic activity.

Physical study

Coarse powder of leaves of *Solanum nigrum* 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%W/W and Total ash value was 10.4%W/W.

RESULTS AND DISCUSSION

Phytochemical Screening

The pet.ether, chloroform, ethanol and aqueous extracts of *Solanum nigrum* was screened for its various phytoconstituents by standard chemical tests. The powder drug shows the presence of carbohydrates, alkaloids, steroids, glycosides, saponins, flavonoids, tannins, phenolic compounds,

proteins, amino acids, mucilage and terpenoids. The results were summarized in Table No.1.

Anthelmintic Activity

The various extracts of leaves of *Solanum nigrum* were tested for anthelmintic activity by in-vitro bioassay method. The south Indian adult earth worms *Pheretima posthuma* of 7-9cm in length and 0.2-0.3cm in width were selected for the invitro anthelmintic activity due to its anatomical and physiological resemblance with the gastro intestinal worm parasites of human beings. The earth worms of nearly equal size (8 ± 1 cm) were taken and then washed thoroughly with distilled water to remove all fecal and adhering soil materials before they were released into petri dishes which containing only the distilled water with various drug concentrations. The earth worms were separated into the control, standard and tested groups of five earthworms in each group. The earth worms were placed in petri dishes containing 2mL of various drug concentrations, 12.5mg/mL, 25mg/mL, 50mg/mL, 100mg/L, 200mg/mL, of solutions. Albendazole solution was used as reference standard drug and distilled water as control. The five earth worms were taken in each petri dishes at room temperature. Then observe, the time taken for the induction of complete paralysis and time taken for death of individual earthworms were noted. The control group observed that the worms were still alive upto 48 hours. The time taken for individual worm to become motionless and donot revive reflex even in distilled water was noted as paralysis time. The death time was ascertained by inducing external stimuli if not placing the individual worms in warm water at 50°C which stimulate and induce movement of worms, if alive. The mean paralysis time and mean average death time were calculated for each tested concentrations of the *Solanum nigrum*. The results were summarized in Table No.2, 3, 4, 5, 6 and Figure No.1, 2, 3, 4 and 5.

Table No.1: Qualitative Phytochemical Analysis of Leaf Extract of Solanum Nigrum

S.No	Chemical Constituents	Powder	PE	CHCl ₃	Et.OH	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: In Vitro Anthelmintic Activity of Standard Albendazole

S.No	Plant Extract	Conc. mg/ml	Time taken for paralysis(P)	Time taken for death (D)
1	Std. drug Albendazole	12.5	16min, 26 sec	21min,32sec
		25	15min, 28 sec	19min,02sec
		50	12min, 34 sec	16min,38sec
		100	10min, 42 sec	12min,54sec
		200	09min, 12 sec	32min,34sec

Table No.3: In Vitro Anthelmintic Activity of Pet.Ether Extract of *Solanum nigrum*

S.No	Plant Extract	Conc. mg/ml	Time taken for paralysis(P)	Time taken for death (D)
1	Pet.Ether extract of <i>Solanum nigrum</i>	12.5	23min, 43 sec	29min,23sec
		25	22min, 18 sec	25min,52sec
		50	19min, 12 sec	23min,08sec
		100	16min, 57 sec	19min,02sec
		200	15min, 43 sec	17min,50sec

Table No.4: In Vitro Anthelmintic Activity of Chloroform Extract of *Solanum nigrum*

S.No	Plant Extract	Conc. mg/ml	Time taken for paralysis(P)	Time taken for death (D)
1	Chloroform Extract of <i>Solanum nigrum</i>	12.5	22min, 36 sec	27min, 23sec
		25	19min, 13 sec	24min, 57sec
		50	15min, 43 sec	22min, 57sec
		100	14min, 22 sec	18min, 22sec
		200	12min, 18 sec	16min, 40sec

Table No.5: In Vitro Anthelmintic Activity of Ethanol Extract of *Solanum nigrum*

S.No	Plant Extract	Conc. mg/ml	Time taken for paralysis(P)	Time taken for death (D)
1	Ethanol Extract of <i>Solanum nigrum</i>	12.5	16min, 40 sec	22min, 23sec
		25	15min, 52 sec	19min, 50sec
		50	12min, 31 sec	16min, 42sec
		100	10min, 54 sec	12min, 20sec
		200	10min, 05 sec	11min, 50sec

Table No.6: In Vitro Anthelmintic Activity of Water Extract of *Solanum nigrum*

S.No	Plant Extract	Conc. mg/ml	Time taken for paralysis (P)	Time taken for death (D)
1	Water Extract of <i>Solanum nigrum</i>	12.5	17min, 32 sec	21min, 40sec
		25	16min, 24 sec	20min, 40sec
		50	13min, 46 sec	16min, 55sec
		100	11min, 24 sec	13min, 04sec
		200	10min, 32 sec	12min, 55sec

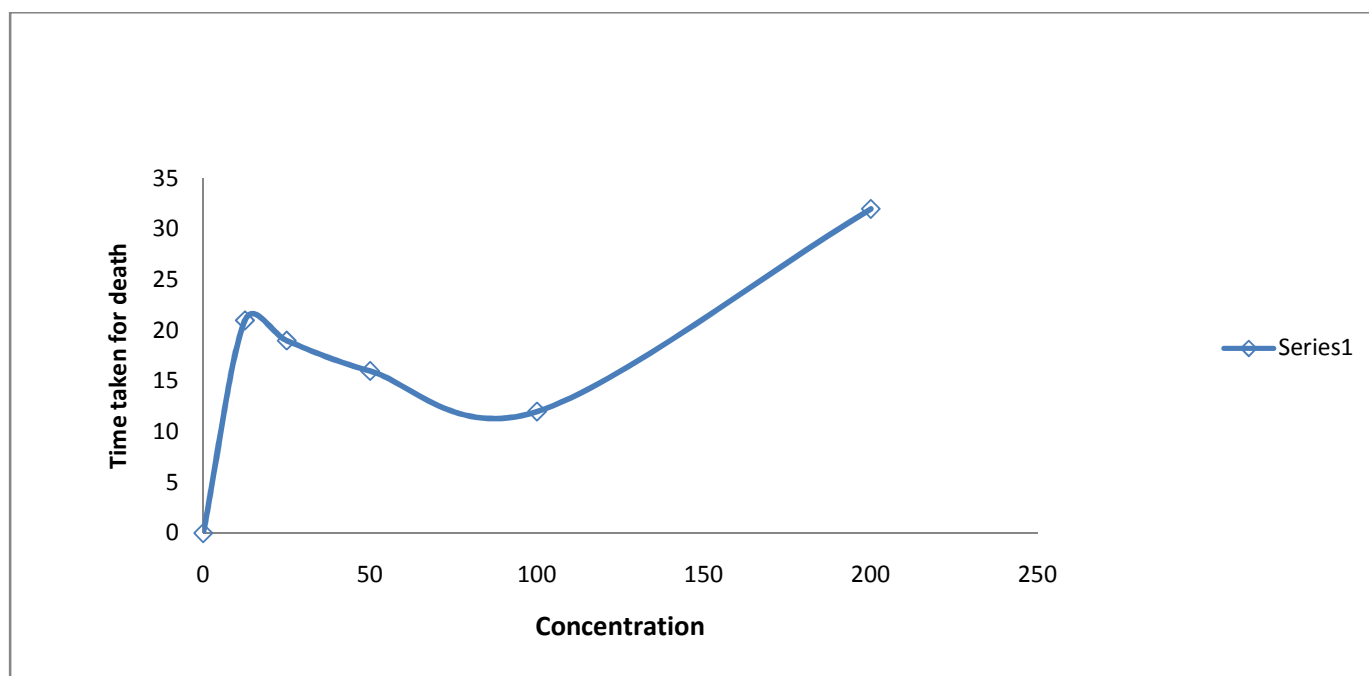


Figure No.1: DRC of Albendazole for Anthelmintic Activity

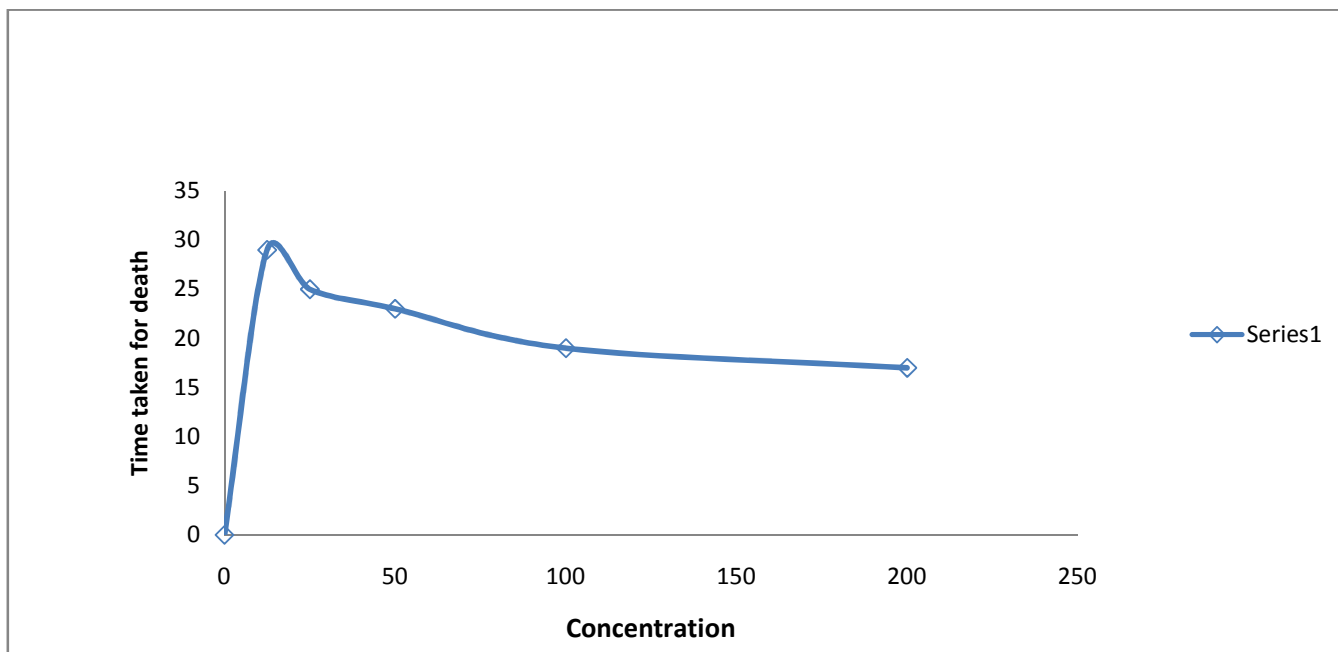


Figure No.2: DRC of Pet.Ether Extract of *Solanum nigrum* for Anthelmintic Activity

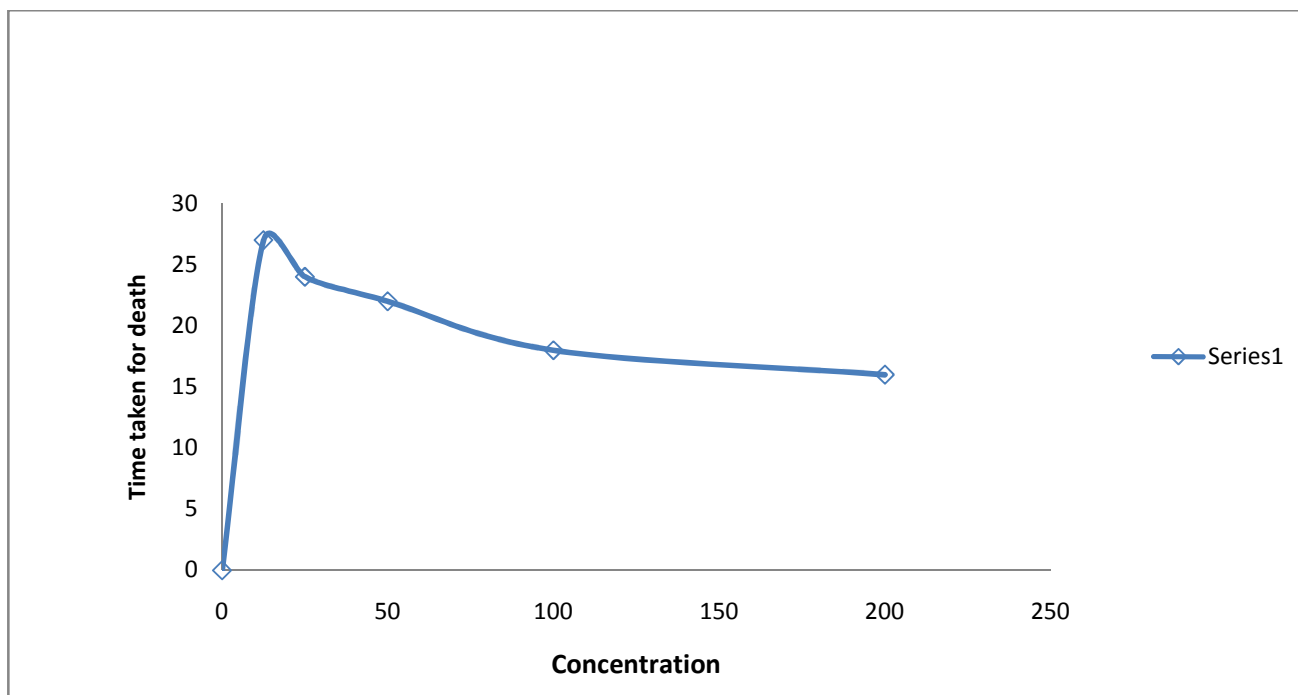


Figure No.3: DRC of Chloroform Extract of *Solanum nigrum* for Anthelmintic Activity

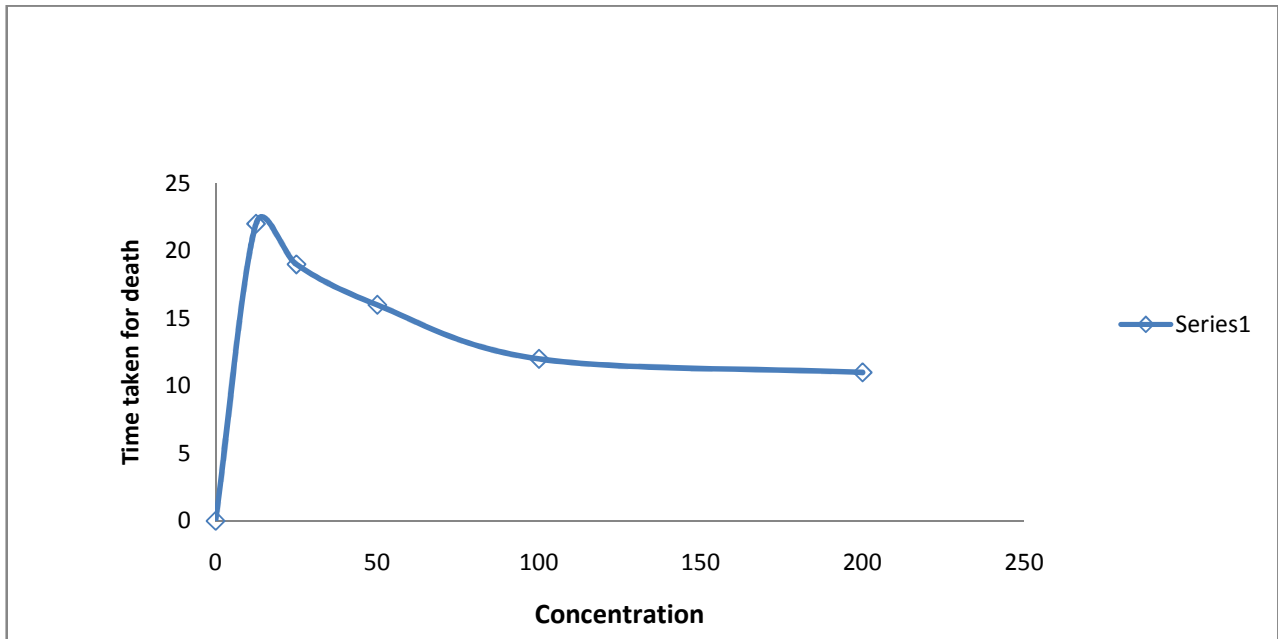


Figure No.4: DRC of Ethanol Extract of *Solanum nigrum* for Anthelmintic Activity

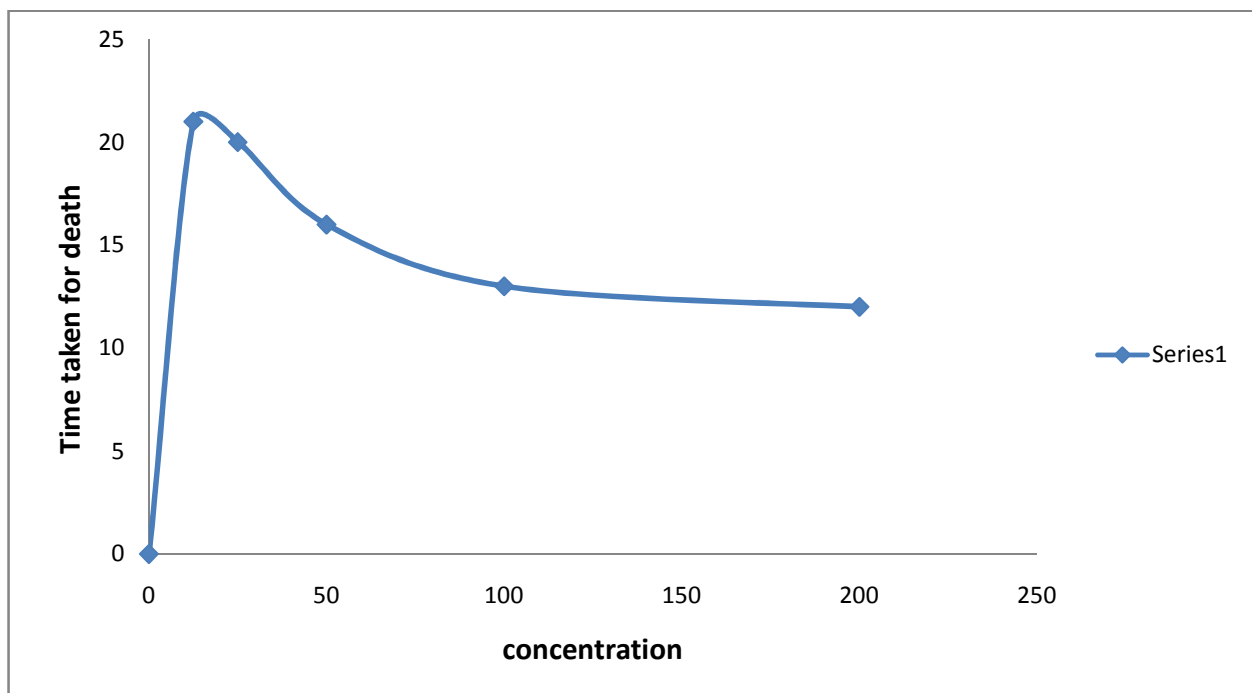


Figure No.5: DRC of Water Extract of *Solanum nigrum* for Anthelmintic Activity

CONCLUSION

In the present work, a medicinally useful plant in the Indian system of medicine, *Solanum nigrum* was selected. The Pharmacognostical study provides a set of diagnostic macroscopic characters of the leaves. 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 Anthelmintic potential of the plant *Solanum nigrum*. In *in vitro* studies, Water and Ethanol extract of *Solanum nigrum* showed significant anthelmintic activity against indian earthworm *Pherethima posthuma*. 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 *Solanum nigrum* as anthelmintic agent and thus further research can be directed towards the use of the plant in the the treatment of helminths.

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