

HELMINTHOLYTIC ACTIVITY OF LEAVES OF FENUGREEK PLANT (*TRIGONELLA FOENUM-GRAECUM*)

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ABSTRACT

The aim of the present study was to evaluate helmintholytic activity of crude methanolic and aqueous extract of leaves of *Trigonella Foenum-graecum* using *Pheretima posthuma* as test worm. Various concentrations of (25, 50, 100 mg/ml) of methanolic and aqueous extracts were tested in the bioassay, which involved the determination of time of paralysis (P) and time of death (D) of the worms. Albendazole was included as standard reference and distilled water as control. Aqueous and methanolic extracts displayed significant Helmintholytic activity at highest concentration of 100 mg/ml. The extracts of leaves of *Trigonella Foenum-graecum* had shown a dose dependant inhibition of spontaneous motility (Paralysis) of earthworms. The gradual increased in a dose exhibited a gradual

increase in the activity. The results of present study indicated that the crude aqueous extract significantly paralysis and also caused death of worm in short time, as compared to methanolic extract. In conclusion, the traditional use of leaves of the plant *Trigonella Foenum-graecum* as an helmintholytic activity have been confirmed and further studies are suggested to isolate the active principles responsible for activity.

KEYWORDS: Albendazole, Helmintholytic, *Pheretima posthuma*, *Trigonella Foenum-graecum*.

INTRODUCTION

The world population use herbal medicine for health care because of safety, efficacy, easily and abundantly available without side effects. The conditions appear to be worsening with

respect to the number of persons affected. Helminthiasis infections are particularly in patients residing in tribal areas lack of knowledge of sanitation. Plant *Trigonella Foenum-graecum* belongs to the family *Fabaceae* and it is popularly known as Fenugreek used for the treatment of and helminthiasis.^[1] The present study was aimed to evaluate the *in vitro* Helmintholytic activity of crude methanolic and aqueous leaves extract of *Trigonella Foenum-graecum* against *Pheretima posthuma*. Albendazole was included as standard reference and distilled water as control. Scientific literature survey revealed that the helmintholytic activity of *Trigonella Foenum-graecum* has not been reported.

Causative Agents

Antihelminthic drugs are used in the treatment of helminthiasis (vomiting of worms).

The different types of worms include

- i) **Round worms:** They are of two types, Adult Intestinal Nematodes and Larval Tissue Nematodes.
- ii) **Tape worms:** They are found in the intestine or larva in the tissues.
- iii) **Flukes:** These are hermaphrodites with an exception of blood flukes. They are found in blood vessels, the intestine, biliary tract, lungs.

Symptoms

Symptoms of Helminthiasis are as follows

- 1) Abdominal pain
- 2) Diarrhea
- 3) Fever
- 4) Fatigue
- 5) Enlarged liver
- 6) Gastrointestinal inflammation
- 7) Eosinophilia
- 8) Dehydration.

Mode of Transmission

The disease is transmitted through

- 1) Fecal - oral route for ascaris, trichuris and hookworm
- 2) Skin penetration for hookworms

Prevention and Control

Following measures can be taken for prevention and control of the disease

- Personal hygiene
- Environmental sanitation
- Clean food and drinking water.
- Use of slippers or shoes
- The drugs used are Albendazole, Mebendazole and Levamisole Helminthiasis.^[2]

Description of plant

Trigonella foenum-graecum commonly known as Fenugreek (English), Helba (Arabic), Methi (Urdu, Hindi), Alholva, Feno-greco (Spanish) belongs to Family *Fabaceae*, with leaves consisting of three small obovate to oblong leaflets.^[3]

Characteristics of *Trigonella foenum-graecum*.



Figure 1: Diagram of *Trigonella Foenum-graecum* plant.

Traditional and other medicinal uses

Fenugreek is taken by mouth for digestive problems such as loss of appetite, upset stomach, constipation, inflammation of the stomach (gastritis). Fenugreek is also used for diabetes, painful menstruation, polycystic ovary syndrome, and obesity. It is also used for conditions that affect heart health such as "hardening of the arteries" (atherosclerosis) and for high blood levels of certain fats including cholesterol and triglycerides.^[4] Fenugreek is used for kidney ailments, a vitamin deficiency disease called beriberi, mouth ulcers, boils, bronchitis, infection of the tissues beneath the surface of the skin (cellulitis), tuberculosis, chronic coughs, chapped lips, baldness, cancer, Parkinson's disease, and exercise performance. Some

men use fenugreek for hernia, erectile dysfunction (ED), male infertility, and other male problems. Women who are breast-feeding sometimes use fenugreek to promote milk flow. Fenugreek is sometimes used as a poultice.^[5] That means it is wrapped in cloth, warmed, and applied directly to the skin to treat local pain and swelling (inflammation), muscle pain, pain and swelling of lymph nodes (lymphadenitis), pain in the toes (gout), wounds, leg ulcers, and eczema. In foods, fenugreek is included as an ingredient in spice blends.^[6] It is also used as a flavoring agent in imitation maple syrup, foods, beverages, and tobacco. In manufacturing, fenugreek extracts are used in soaps and cosmetics.^[7] Fenugreek appears to slow absorption of sugars in the stomach and stimulate insulin. Both of these effects lower blood sugar in people with diabetes.^[8]

Phytochemistry

Fenugreek seed is a good source of calcium, minerals, iron, β -carotene and several vitamins like vitamins A and D. It is rich source of available carbohydrates and dietary fiber.^[9] It is a source of free amino acids; 4-hydroxyisoleucine, lysine, histidine and arginine (25.8%), protein (20-30%), moisture (11.76%), fat (6.53%), crude fibre (6.28%), ash content (3.26%) and energy (394.46 Kcal/100 g seed).^[10] It contains lecithin, choline, minerals, B. Complex, Phosphates, and Para-Amino Benzoic acid (PABA).^[11] In addition, the main chemical compounds in fenugreek are saponins, fenugreekine, trigonelline, coumarin, scopoletin, phytic acid and nicotinic acid.^[12]

MATERIALS AND METHODS

Collection of plant

T. foenum-graecum (leaves) were collected from Vangapally, Yadagirigutta and were identified by Prof. Dr. S. Srinivas Rao.

Preparation of plant extract

Leaves of *T. foenum-graecum* were hewed and then shade dried. Then plant material was powdered finely and the net weight of the powdered plant material was (1.2 kg).^[13] The methanol extract was carried out by soxhlation for 72 hrs and aqueous extraction was carried out by maceration method for 7 days.^[14] Then the methanol soluble materials were filtered off using Whatman filter paper No.1. Filtrate were intermingled and decoctured under vacuum at 40° C using rotary evaporator. Finally blackish green crude methanolic leaves extract was obtained having 140 g.^[15] the solvents were removed under reduced pressure to yield 9.0 % and 7.5 % for methanol and aqueous extracts respectively.^[16]

Collection of worm and authentication

Indian earthworm *Pheretima posthuma* (annelida) were collected from the water logged areas of soil and authenticated Prof. Dr. T. Ramesh.

Helmintholytic activity

- The activity was performed on Indian earth worms due to its anatomical and physiological resemblance with the intestinal round worm parasite of human intestine.
- Indian adult earth worm (*Pheretima posthuma*) of 5-8 cm in length and 0.2-0.3 cm in width were used.^[17]
- Eight groups of approximately equal sized earth worms each containing six earth worms were selected.^[18]
- All the earth worms were washed in normal saline solution before they were used.
- The control group was treated with distilled water.
- The earth worms were placed in a standard and extracts and time of paralysis (P) and time of death (D) were calculated.^[19]
- The time of paralysis was noted when no movement of any sort could be observed except when the worms were shaken vigorously.^[20]
- The time of death were recorded after ascertaining that the worms neither moved when shaken vigorously nor when dipped in warm water (50⁰ C).^[21]

RESULTS AND DISCUSSION

Primary phytochemical screening of crude alcoholic extract detect some secondary plant metabolites like steroids, Diosgenin, Trigonelline, Gitogenin, Vicenins-I & II, Vitexin, Quercetin, Luteolin, Kaempferol, β -Sitosterol etc. Some of the traditionally used herbs have scientifically proved a potent Helmintholytic activity by using suitable experimental models. Methanolic and aqueous extracts from the leaves of the plant *Trigonella Foenum-graecum* had shown significant Helmintholytic activity at concentration of 100 mg/ml with reference to Albendazole (100 mg/ml) as a standard drug by using adult earthworms' *P. posthuma* as experimental model. The present study reveals that leaves of aqueous extract of *Trigonella Foenum-graecum* showed mark and potent Helmintholytic activity than the standard reference drug of albendazole. Aqueous extract had shown promising result (time of paralysis was found to be 1.20 ± 0.38 min, and time of complete death of worm was found to be 11.16 ± 0.30 min) as Helmintholytic activity and methanolic extracts has also shown (time of paralysis was found to be 20.00 ± 0.45 min, and time of complete death of worm was found

to be 34.17 ± 0.16 min) activity up to lesser extent. As leaves are cheap, easily available in the local market, therefore leaves of this plant could be categorized under Helmintholytic herbal drugs and could become a key ingredient of Helmintholytic herbal formulation.

Table 1: Helmintholytic activity of methanolic and aqueous extract of leaves of *Trigonella Foenum-graecum*.

Test substance	Concentration (mg/ml)	Time taken for paralysis (P) Death (D) of earth worms (min)	
		P	D
Albendazole	25	2.15 ± 0.78	36.10 ± 0.57
	50	2.06 ± 0.65	25.04 ± 0.42
	100	1.30 ± 0.32	13.38 ± 0.29
Methanolic extract	25	25.00 ± 0.09	46.26 ± 0.36
	50	22.00 ± 0.23	38.84 ± 0.29
	100	20.00 ± 0.45	34.17 ± 0.16
Aqueous extract	25	1.62 ± 0.87	32.31 ± 0.46
	50	1.55 ± 0.62	28.24 ± 0.77
	100	1.20 ± 0.38	11.16 ± 0.30
Control	-	-	-

Values are mean \pm S.E.M. from six observations. P: Time for Paralysis (min),

D: Time for Death of worms (min) Control worms were alive for up to 24 hrs of the experimentation.

CONCLUSION

This study has revealed that this plant *Trigonella Foenum-graecum* has many secondary metabolites (Phytoconstituents) and shows dose dependent Helmintholytic activity and Albendazole shows less paralysis and death time as compared to others. Various concentrations of (25, 50, 100 mg/ml) of methanolic and aqueous extracts were tested in the bioassay, which involved the determination of time of paralysis (P) and time of death (D) of the worms. Aqueous extract shows less time (1.20 ± 0.38 min for paralysis and 11.16 ± 0.30 min for death of worm with 100 mg/ml of aqueous extract of *Trigonella Foenum-graecum*) for paralysis and death of the worms as compared to the methanolic extract in the study. Further, it would be interesting to isolate the phytoconstituents responsible for Helmintholytic potential. The present research work was providing a basis for further detailed investigations in the direction of isolation of other active compounds.

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