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A Comparative Study on Phytochemical and *In Vitro* Antioxidant Activity of *Trigonella foenum graecum* L.

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ABSTRACT

Trigonella foenum graecum commonly known as fenugreek (Menthikura) is a traditional Indian medicinal plant of the Fabiaceae family. It is commonly used as traditional food and medicine. The plant has been found to be possessing pharmacological activities such as antioxidants and antidiabetic. The present investigation undertaken to perform phytochemical screening and antioxidant activity of leaf, stem and seeds of various extract of T. foenum graecum by using ethanol as solvent. The antioxidant activity of ethanolic extracts was performed by using Hydrogen Peroxide (H_2O_2) scavenging method. All the extracts showed significant results compared with standard drug ascorbic acid. The preliminary phytochemical screening of ethanolic extracts of T. foenum graecum showed the presence of primary and secondary metabolites. This study describes the phytochemical investigation and antioxidant activity of T. foenum graecum. The results obtained in the present study clearly indicate that the ethanolic seed extract of T. foenum graecum having potent phytochemicals, antioxidant action than leaf and stem.

Keywords: *Trigonella foenum graecum*, Antioxidant, Phytochemical screening

INTRODUCTION

Fenugreek (*Trigonella foenum-graecum*) is an annual plant in the family Fabiaceae, with leaves consisting of three small obovate to oblong leaflets. It is cultivated worldwide as a semiarid crop and its seeds are a common ingredient in dishes from the Indian subcontinent [1]. Per 100 g, fenugreek leaves provide 210 Kj (49 kcal) and contain 89% water, 6% carbohydrates, 4% protein and less than 1% fat, with calcium at 40% of the Daily Value (DV, table) [2]. Fenugreek seeds (Per 100 g) are rich sources of protein (46% of DV), dietary fiber (98% DV), B vitamins, iron (186% DV) and several other dietary minerals [3]. The seeds and green leaves of fenugreek are used in food as well as in medicinal application that is the old practice of human history. It has been used to increase the flavouring and color and also modifies the texture of food materials. This plant has promising nutraceutical value [4]. Seeds of fenugreek spice have medicinal properties such as hypocholesterolemic, lactation aid, antibacterial, gastric stimulant, for anorexia, antidiabetic agent, galactogogue, hepatoprotective effect and anticancer [5-8].

MATERIALS AND METHODS

Plant materials collected and authentication

The plant material was collected from Nalgonda at Madulgullapally region was authenticated by Mr. Siddu, Head of the department of botany, Nagarjuna Government Degree College, Nalgonda.

Extraction of plant materials

The powdered plant material was subjected to successive solvent extraction of ethanol. The powdered plant material was subjected to hot soxhlet extraction for 10 h with 250 ml of ethanol solvent. The extracts obtained were later kept for distillation to remove the excessive solvent. These extracts were stored in a cool dry place for the analysis for the presence of preliminary phytochemicals and pharmacological activity.

Phytochemical screening

The methanol extract of *T. foenum graecum* were subjected to preliminary quantitative phytochemical investigation for detection of phytochemicals such as alkaloids, glycosides, steroids, tannins, flavonoids and saponins using the standard methods [9,10]. The obtained results are represents in Table 1.

***In vitro* antioxidant activity**

Free radical scavenging activity using hydrogen peroxide

The scavenging activity of H_2O_2 by the plant extraction was determined by the method of Ruch et al. [11]. A solution of hydrogen peroxide (40 mM) is prepared in phosphate buffer (50 mM, pH 7.4). The concentration of hydrogen peroxide is determined by absorption at 230 nm using a spectrophotometer. Extract (200-400 µg/ml) in distilled water is added to hydrogen peroxide and absorbance at 230 nm is determined after 10 min against a blank solution containing phosphate buffer without hydrogen peroxide. The obtained results are representing in Table 2. The percentage of hydrogen peroxide scavenging is calculated as follows:

$$\text{Scavenging activity} = (A_0\text{-}A_s)/A_0 \times 100$$

Where, A_0 is the absorbance of the control and A_s is the absorbance of the sample.

RESULTS AND DISCUSSION

Preliminary phytochemical screening

T. foenum graecum shows that plant have abundant amount of secondary metabolites in it. The following Table 1 shows the result of the test performed.

Table 1: Phytochemical screening of *Trigonella foenum graecum* extract

S. No.	Phytochemical test	Ethanolic extract of leaf and stem	Ethanolic extract of seeds
1	Carbohydrates	+	+
2	Proteins	-	-
3	Amino acids	-	-
4	Fats and oils	+	+
5	Steroids	+	+
6	Glycosides	+	+
7	Saponins	-	+
8	Flavanoids	+	+
9	Alkaloids	+	+
10	Tannins and phenolic compounds	+	+

"+" Indicates present; "–" Indicate absent

Free radical scavenging activity using hydrogen peroxide

The antioxidant activity of aerial parts and seed of *T. foenum graecum* represented in the following Table 2. The seed extract was found to have significant scavenging activity 48.34% at 400 µg/ml by Hydrogen peroxide method as compared to standard (Figure 1).

Table 2: ***In vitro* antioxidant activity of *Trigonella foenum graecum* extract**

S. No.	Concentration	Percentage (%) scavenging of hydrogen peroxide		
		Ascorbic acid (std.)	Seeds	Leaf and stem
1	200	0.4924	0.2812	0.2025
2	250	0.5117	0.3453	0.2416
3	300	0.5328	0.4192	0.2784
4	350	0.5816	0.4521	0.2943
5	400	0.6125	0.4834	0.3356

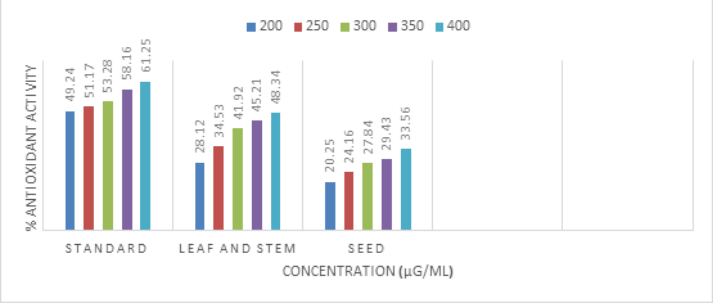

Figure 1: Hydrogen peroxide scavenging activity of *Trigonella foenum graecum*

CONCULSION

Trigonella foenum graecum is a plant that has shown potential as a source of chemotherapeutic compounds. The present study, therefore investigate the phytochemical constituents of ethanolic extracts of leaf and stem of *T. foenum graecum* by hot extraction. The results obtained in the present study clearly indicate that the ethanolic seed extract of *T. foenum graecum* having potent phytochemicals than leaf and stem. From the investigational reports antioxidant action of *T. foenum graecum* seed, leaf and stem showed significant action towards free radicals due to the presence of constituents like tannins, phenols and, flavonoids.

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