

Anthelmintic Activity of *Urtica dioica* L. in Mice Naturally Infected with *Aspiculuris tetraptera*

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Abstract: The aim of present study was to investigate the anthelmintic activity of *Urtica dioica* L. (nettle) in Swiss albino mice naturally infected with *Aspiculuris tetraptera*. Methanolic extracts obtained from leaves and seeds of *U. dioica* were evaluated for their *in vivo* anthelmintic activity. The 250 µL (175 mg mL⁻¹) extracts were administered orally on daily basis. Results showed that methanolic extract of *U. dioica* seeds possessed only a slight anthelmintic activity. In contrast, methanolic extract of leaves exhibited potent anthelmintic activity.

Key words: *Urtica dioica* L. nettle, antelmintic activity, *Aspiculuris tetraptera*, mouse

INTRODUCTION

Several medicinal plants have long been traditionally used as remedies against different diseases. The use of herbal medicines has increased in recent years. *Urtica dioica* L. (nettle) belongs to the plant family *Urticaceae*, with a height of 50-150 cm. The seeds and leaves of *U. dioica* have been used for a long time in the Middle East, as a traditional medicine for a variety of complaints such as eczema, abscess, wound, pile, liver insufficiency, rheumatic pain, internal diseases, diabetes, dermatophytic infections, cancer and rhinorrhagie (Sezik *et al.*, 2001).

Aspiculuris tetraptera classified under *Oxyuroidei* group is a natural and common intestinal parasite of mice and other rodents (Soulsby, 1982; Moulia *et al.*, 1993; Kozan *et al.*, 2006). This parasite is important since, it has been extensively used in determination of efficacy of several chemotherapeutic agents (Theodorides, 1976). Therefore, this parasite was chosen to detect the anthelmintic activity of the leaves and seeds of *U. dioica*.

The present study was performed to investigate the anthelmintic activity of leaves and seeds of *Urtica dioica* in Swiss albino mice naturally infected with *A. tetraptera*.

MATERIALS AND METHODS

Plant materials: *U. dioica* leaves were collected from Van Province, East of Turkey. Its seeds were purchased from the local herb market in Van. The voucher specimen was authenticated by Asst. Prof. Dr. Fevzi Oztokce from Department of Biology, Faculty of Science and Art, Yuzuncu Yil University. The samples of *U. dioica* leaves were deposited in the herbarium unit. The herbarium number of *U. dioica* L. leaves is S12941.

Preparation of plant extracts: The plant material was dried in the shade, ground finely to a powder in an electric mill and stored in dark bottles. The extracts were prepared as described below.

Methanol extract preparation: Twenty gram powdered plant material was extracted with methanol (99.5%) at 50°C in a Soxhlet apparatus for 12 h. The methanol extract was evaporated to dryness in vacuum to give Crude Methanolic Extract (CME). The same extraction procedure was also applied for the *Urtica dioica* seeds. The yield of extracts was approximately 12.5%. The CMEs were freshly suspended in 5% Tween-80 in distilled water to obtain a suspension with a final concentration of 175 mg mL⁻¹.

Pharmacological procedures: Swiss albino mice (22-25 g) were obtained from the animal house facility of the Faculty of Medicine, Yuzuncu Yil University, Van, Turkey. The animals were housed in standart cages with food (Van Animal Feed Factory, Van-Turkey) and water ad libitum, at room temperature ($20\pm 2^{\circ}\text{C}$) with artificial light from 7:00 am to 7:00 pm. The approval of Animal Ethics Committee was obtained. The stool samples of 100 mice were examined for detecting naturally infected animals. Infected animals were identified by the technique of centrifugal flotation in saturated zinc sulphate solution. Thirty five infected mice (both sexes) were divided into four groups by random selection. The animals were fasted for 4 h before treatment. The mice received 250 μL leaf extract orally daily for a period of 7 days in Group I and seed extract by same manner in Group II. Ivermectin as reference drug, was administered by intramuscular injection at a dose rate of 0.2 mg kg^{-1} to each animal in Group III. The mice in Group IV (control group) were given tap water only. The fecal samples from the mice were examined on 1 day pre-treatment, on the day of the treatment and for 7 days post-treatment on a daily basis using centrifugal flotation technique in saturated zinc sulphate. The mice were euthanised on the 8th day pos-treatment. Gastrointestinal tract was removed and washed with sterile saline solution. The contents were examined under a stereomicroscope to count and identify *A. tetraptera*. The efficacies of the drugs were calculated by the formula given below (Jacobs *et al.*, 1994; Wood *et al.*, 1995; Gicik, 1997):

$$\text{Efficacy}(\%) = \frac{\left(\frac{\text{Geometric mean no. of a tetraptera in control group}}{\text{Geometric mean no. of a tetraptera in control group}} - \frac{\text{Geometric mean no. of a tetraptera in treated group}}{\text{Geometric mean no. of a tetraptera in control group}} \right) \times 100}{1}$$

The data were statistically analyzed in order to evaluate its significance, through analysis of variance test.

RESULTS AND DISCUSSION

Table 1 shows the results. The number of parasite in Group I-III tended to decrease on the 2nd day of the treatment. At the necropsy, severe parasite invasion (total 734 *A. tetraptera*) was detected in Group IV (control group). Two mice had no parasite, but 143 parasites were detected in 6 mice in Group III and efficacy of ivermectin was calculated as 92.6%. The numbers of *A. tetraptera* were counted as 100 in Group I and as 703 in Group II. Although, the efficacy of *U. dioica* leaves was 88%, the efficacy of *U. dioica* L. seeds was found lower (38.5%). The results showed that anthelmintic activity of *U. dioica* L. leaves was similar to ivermectin.

When the results compared with control, differences among efficacies of the drugs were statistically significant ($p < 0.001$). In addition, no side effects were observed in the animals in Group I and II.

The anthelmintics are widely used against different parasitic infections. Their low therapeutic indices and increasing problems of development of resistance in helminthes against anthelmintics have led to the proposal of screening medicinal plants for their anthelmintic activity (Iqbal *et al.*, 2004; Coles, 1997). There is a need for potent and less toxic anthelmintic. Anthelmintic plants offer a traditional alternative to manufactured anthelmintics that is both sustainable and environmentally acceptable. Such plants could have a more important role in the future control of helminth infections (Hammond *et al.*, 1997). A number of medicinal plants have been used to treat parasitic infections in man and animal in Turkey (Sezik *et al.*, 2001; Kozan *et al.*, 2006).

U. dioica is widely used as remedies against different diseases in Turkish Folk Medicine (Sezik *et al.*, 2001). But we could not find any knowledge about anthelmintic activity of *U. dioica* to discuss. Anthelmintic activity of the leaves and seeds of *U. dioica* were investigated in this experimental study. This present study revealed that methanol extract of *U. dioica* leaves had a significant anthelmintic activity, but MeOH-extract of *U. dioica* seeds was weak (Table 1).

Table 1: The efficacies of the leaves and seeds *U. dioica* and ivermectin against naturally infected mice with *A. tetraptera*

Groups	N. of mice with parasite at necropsy	Parasite counts recovered at necropsy (8th day)					Efficacy (%)
		Total	Min-max	Geo-mean	S.E	S.E.M	
Group I leaves (n = 9)	9/9	100	4-27	09.21	07.390	02.463	88.08
Group II seeds (n = 9)	9/9	703	7-192	47.51	64.404	21.468	38.51
Group III ivermectin (n = 8)	6/8	143	0-98	05.78	32.887	11.627	92.56
Group IV Control (n = 9)	9/9	734	45-122	77.26	28.04	9.347	

S.E: Standard Deviation; S.E.M: Standard Error of Mean

CONCLUSION

It is concluded that *U. dioica* leaves considerably possess anthelmintic activity. It is suggested that further research on a large scale be carried out on live-stocks.

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