

Antigiardial activity of *Zingiber officinale* in combination with honey *in vivo*

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Abstract

Giardia lamblia is a parasite that causes giardiasis in humans and other mammals. The common treatment includes different classes of drugs, which were described to produce unpleasant side effects. *Zingiber officinale* (Ginger) is a plant that is frequently used in the popular medicine to treat gastrointestinal symptoms. So, we examined the effects of watery extracts against *G. lamblia* on the basis of killed trophozoite number. The anti giardial activity of *Zingiber officinale* were demonstrated using experimental infections of *Giardia lamblia* in balb/c mice. the extract of *Zingiber officinale* was more active specially when mixed with honey, so the percentage of dead trophozoite reach to 97.7 %. This study recommend to utilization of the mixture of ginger with honey as anti giardial drugs.

الخلاصة:

يسبب طفيلي الجيارديا اللامبيلية داء الجيارديا في الإنسان وبقية الثدييات و يتضمن علاجه استخدام العديد من العقاقير الكيميائية ذات التأثيرات غير المرغوب بها. يستخدم نبات الزنجبيل لمعالجة الإصابات المعدية المعوية، لذلك تم اختبار تأثير المستخلص المائي لنبات الزنجبيل على طفيلي الجيارديا اللامبيلية بالاعتماد على أعداد الأطوار المتغذية المقتولة في الفئران البيض المختبرية. تبين ان مستخلص نبات الزنجبيل فعالا وخصوصا عندما يمزج مع العسل، حيث بلغت نسبة قتل الأطوار المتغذية للطفيلي 97.7%. من خلال نتائج هذه الدراسة نوصي باستخدام مزيج الزنجبيل مع العسل كعقار مضاد للجيارديا اللامبيلية.

Introduction:

Giardia lamblia is a common causative agent of diarrhea disease occurring in humans and various mammal species (Zeibig, 1997). This parasite has a worldwide distribution, and its prevalence varies from 15-30% in developing countries, the infection has been shown to be more prevalent in children less than promised hosts (Buret *et al.*, 1990). The pathogenesis of giardiasis is not clearly understood, but villous atrophy and reduction of the absorptive area of the small intestine have been reported, which result from a brush border enzyme deficiency responsible for malabsorption (Zeibig, 1997).

Parasitic disease remains a major public health problem affecting hundreds of millions of people, particularly in tropical developing countries. The limited availability and affordability of pharmaceutical medicines mean that the majority of the world's population depends on traditional medical remedies, and it is estimated that some 20.000 species of higher plants are use medicinally throughout the world (Akhtar *et al.*, 2000).

Zingiber officinale Roscoe (ginger, Zingiberaceae) is one of the most widely used spices and it is a common additive in large number of compounded foods and beverages due to its flavor and pungency. The rhizome of this plant is one of the most commonly used medicinal herbs as well as one of the most commonly used condiments in Chinese cuisine. Folk people have long used the soup of ginger root to warm the human body in winter. Though spicy and hot in nature, the rhizome of *Z. officinale*, has been used to treat symptoms and signs including pale feature, cold extremities (Akoachere *et al.*, 2002).

Several pharmacological effects of the Zingiber plant had been reported such as antiulcer effect (Yoshikawa *et al.* 1994), antioxidant effect, potent antibacterial activity (Mahady *et al.*, 2003), potent antifungal activity (Ficker *et al.*, 2003) and anthelmintic activity (Iqbal *et al.*, 2001) .

Honey is the most famous rediscovered remedy that is used to treat infected wounds and promote healing. Honey has been used for medical purposes by the ancient Egyptians for thousands of years. Honey has antifungal properties that can cure ringworm and other fungal conditions such as athlete's foot, jock itch and nail fungus;

also, Honey has been known to effectively treat Arthritis, Worm ,Cold & Flu and gastritis (El-Arab *et al.*, 2006).

The present study aims to evaluate the anti giardial effect of watery extract of *Z. officinale* alone ,honey alone and mixture of honey with *Z. officinale* in vivo.

Materials and Methods

1- Preparation of extracts:

A- *Zingiber officinale*

Rhizome of *Z. officinale* were purchased from the local market, the root were cut, washed with distilled water and dried in an oven at 50C° for 5-7 days until fully dried. The dried roots were ground into powder by using a grinder and stored at 4C°.

B - Honey: honey was purchased from local market and dissolved with distilled water to prepare the concentration.

2- Laboratory animals:

Mice Balb\c (6-8 weeks and weight 20-25 gm) were used in this study. Mice were infected with *G. lamblia* through intraesophageal. After that, direct smear technique was used to test the infection of mice with *G. lamblia*. Mice grouped into four groups, each groups with five mice. The first group administrated with 50% water extract of *Z. officinale*, the second group was administrated with 50% honey, third group was administrated with 50% mixture of honey with *Z. officinale* and the last group was administrated with normal saline as control group. The oral administration was achieved twice a day for all mice groups. The percentage of dead trophozoite determine according to Mirelman *et al.*(1987).

Percentage of dead trophozoite= No. of dead trophozoite \ total No. of trophozoite × 100.

3- Statistical analysis:

American statistical program (SPSSII) was used to analyzed data by using T-test, analysis were performed probability values less than 0.05 and 0.01 were considered statistically significant (Niazi, 2004).

Results and discussion:

Results of the current study showed that pretreated of infected mice with *G. lamblia* when used watery extract of *Z. officinale* , honey and mixture of *Z. officinale* with honey. As shown in figure(1) the watery extract of *Z. officinale* reduce the number of *G. lamblia* trophozoite to 21 trophozoite , also honey reduce number of trophozoite to 27 trophozoite, while reach to 96 trophozoite when used the mixture of *Z. officinale* with honey in comparison with control 96 .This reduction was considered significantly ($p < 0.05$). The percentage of dead trophozoite reach to maximum (97.7 %) when used the mixture of *Z. officinale* with honey table (2).

Several study was done to investigate the using of medical plant as anti giardiasis, Arrieta *et al.*(2001) showed that crude ethanol extract from leaves of *Zanthoxylum liebmannianum* exhibited inhibitory effect on the reproduction of trophozoites of *G. lamblia*. Barbosa *et al.*(2006) demonstrated that methanolic extract of *Helianthemum glomertatum* and *Rubus coriifolius* showed anti giardial activity and its activity is comparable to metronidazole and emetine. Also Barbosa *et al.*(2007)

used flavanoids isolated from *Geranium Mexican*, *Cuphea pinetorum* as antiangiogenic activity.

Z. officinale extracts have been extensively studied for a broad range of biological activities including antibacterial, anticonvulsant, analgesic, antiulcer, gastric antisecretory, antitumor, antifungal, antispasmodic, antiallergenic, and other activities. ability to increase digestive fluids, plus absorb and neutralize toxins and stomach acid. *Z. officinale* has been shown to increase bile secretion, as well as increase the action and tone of the bowels (Bradley, 1992).

English writer observed that a popular remedy for cough and asthma consisted of the juice of *Z. officinale* with a little juice of fresh garlic mixed with honey. *Z. officinale* contains moisture 80.9 %, protein 2.3 %, fat 0.9 %, minerals 1.2 %, fiber 2.4 % and carbohydrates 12.3 % per 100 grams. Its mineral and vitamin contents are calcium, iron, phosphorous, carotene, thiamine, riboflavin, niacin and vitamin C (Onyeagba *et al.*, 2004).

Honey is the most famous rediscovered remedy that has been used to promote wound and burn healing and also to treat infected wounds (El-Arab *et al.*, 2006). Honey showed a greater inhibitory effect to *G. lamblia*. The antiangiogenic activity of honey has been attributed to several properties of honey, including its osmotic effect, its naturally low pH, and the production of hydrogen peroxide, as also the presence of phenolic acids, lysozyme, and flavanoids. Also Honey contains more than 180 substances, including amino acids, vitamins, minerals and enzymes (El-Arab *et al.*, 2006). Honey has antifungal properties that can cure ringworm and other fungal conditions such as athlete's foot, jock itch and nail fungus; also honey has antibacterial activity due to it contain of phenolic acids, lysozyme, and flavanoids in addition to a naturally low pH, which is unsuitable for bacterial growth (Abd-El Aal *et al.*, 2007).

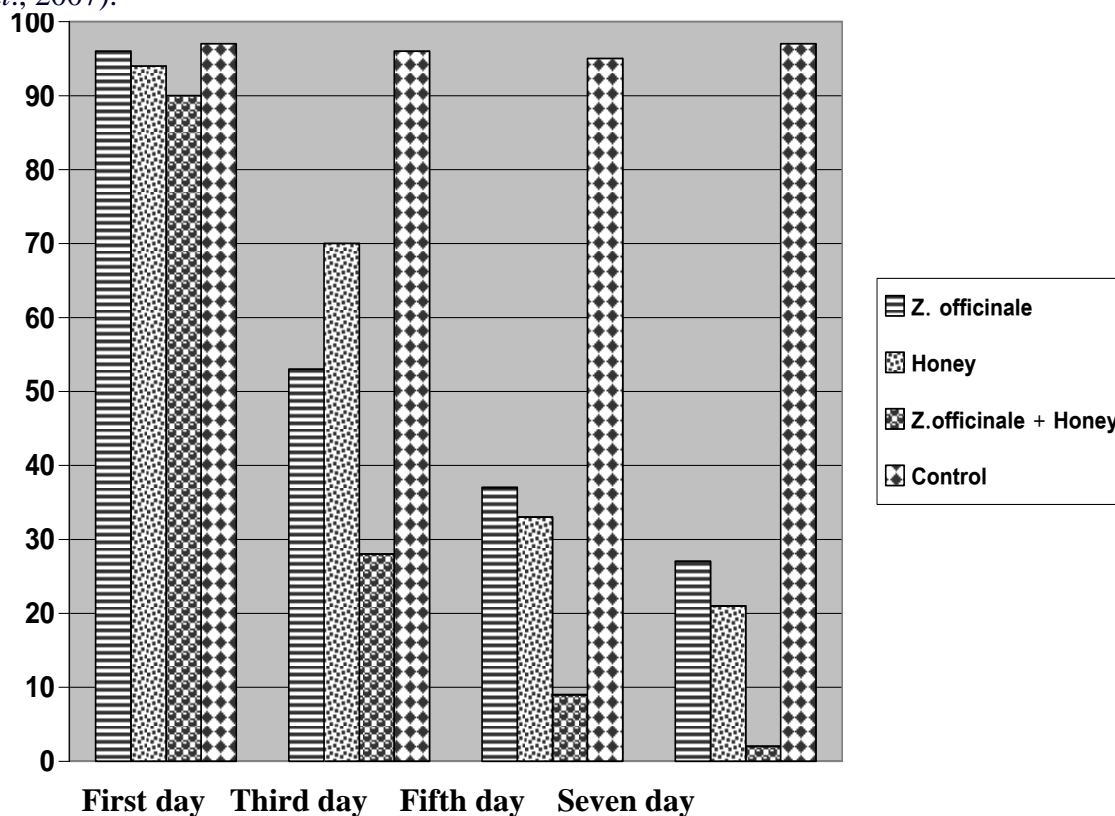


Figure (1): Effect of honey and *Z. officinale* on *G. lamblia*

treatment	Total No. of trophozoite	No. of dead trophozoite	Percentage of dead trophozoite
<i>Z. officinale</i>	96	75	78.1
honey	94	67	71.2
<i>Z. officinale</i> With honey	90	88	97.7
control	97	2	2.06

Table (2): Percentage of dead trophozoite according to treatment.

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