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 antigiardial 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 antigiardial drugs.

**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 antigiardial 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 50°C for 5-7 days until fully dried. The dried roots were ground into powder by using a grinder and stored at 4°C.

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 (SPSSll) 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 2 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 antigiardiasis, 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 antigiardial activity and its activity is comparable to metronidazole and emetine. Also Barbosa et al.(2007)
used flavanoids isolated from *Geranium Mexican, Cuphea pinetorum* as antiGiardial 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).

An 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 antiGiardial 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*](image-url)
<table>
<thead>
<tr>
<th>treatment</th>
<th>Total No. of trophozoite</th>
<th>No. of dead trophozoite</th>
<th>Percentage of dead trophozoite</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z. officinale</td>
<td>96</td>
<td>75</td>
<td>78.1</td>
</tr>
<tr>
<td>honey</td>
<td>94</td>
<td>67</td>
<td>71.2</td>
</tr>
<tr>
<td>Z. officinale With honey</td>
<td>90</td>
<td>88</td>
<td>97.7</td>
</tr>
<tr>
<td>control</td>
<td>97</td>
<td>2</td>
<td>2.06</td>
</tr>
</tbody>
</table>

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

References


