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The Effect of Garlic Suppository on Treatment of Enterobiasis and Comparison with other Common Medical Treatments

Abstract

Enterobius vermicularis is an intestinal parasite and a human pathogen that spreads by swallowing ova through contaminated hands, food or other articles and inhalation. It is more common in areas with low levels of public health. Common symptoms of this parasite include anal itching, anorexia, nausea, enuresis, etc. This descriptive cross-sectional study aims to examine the effect of garlic on Enterobiasis. Sampling in this study was performed by the Graham test, and its results were evaluated at intervals of three, five, and seven days. We grouped the infected people based on the results of garlic treatment into four categories: Cases recovered within three days, infected cases after three, five, and seven days. According to the results, the percentage of cured people during three days is 74.64%. Moreover, 25.35%, 0.11%, and 0.00% of people were still infected after three, five, and seven days. According to the article data, garlic has a suitable effect on the treatment of Enterobiasis..

Keywords: *Enterobiasis, Enterobius vermicularis, Home remedy, Garlic*

Farzad Shayeghi[1], Esfandiar Matini[1], Vahideh Lazemi[2], Dorsa Bahmani[1], Amirreza Shahidi Nejad Yazdi[3], Roqayeh Hakimi[4], Hossein Esmaeili[3], Seyed Ali Hosseini Zavareh[3], Alex Avakian[5], Nima Mojri[6*]

[1]*Faculty of Medicine, Islamic Azad University, Tehran Medical Sciences Branch, Tehran, Iran*
[2]*Department of Nursing and Midwifery, Islamic Azad University, Tehran Medical Sciences Branch, Tehran, Iran*
[3]*Medical Student, Department of Medicine, Islamic Azad University Tehran Medical Sciences, Iran*
[4]*Paramedicine Department, Islamic Azad University, Tehran Medical Sciences Branch, Iran*
[5]*Department of Medicine, Islamic Azad University Sari Branch, Sari, Iran*
[6]*Paramedicine Department, Islamic Azad University, Tehran Medical Sciences Branch, Tehran, Iran*

[*]*Corresponding Author: Email: nimamojri7600@gmail.com ,Tel: +989201252498*

Introduction

Due to poor health and destitute economic conditions in some parts of the world, more than one billion people are infected by a parasitic disease called Enterobiasis. This infection was higher among children, but there was no significant difference in the prevalence of infection between girls and boys.

According to the reporters, about 10 percent of the pediatric population in regions with poor hygiene is infected with Enterobiasis (1).

This infection is more common in rural areas and hot, temperate climates.

Generally, *Enterobius vermicularis* can be transmitted in two main ways, including inhalation and digestion. Contaminated hands with parasite ova can transmit the infection to the mouth. This transmission mode is especially common in young children due to poor hygiene habits. Ova-containing embryos survive in suitable conditions with low temperature and humidity for 6 to 8 weeks and die in hot and dry conditions within a few days. The development of adult worms takes about six weeks or less (2–4).

After the entrance of the ova to the small intestine, they subsequently turn into adult worms that are tiny, thread-like, and whitish along; moreover, they eventually move to the cecum, appendix, colon, and colon rectum. The migratory movements of fertile female worms, which usually occur at night, cause an uncomfortable itching in the anal area (5,6).

The released larvae from the ova around the anus migrate upwards and cause reinfection. If this status does not occur, the adult worms will die automatically due to their short life.

According to research conducted by Sebastian Wendt et al., Approximately 40% of people with the disease show low symptoms or are asymptomatic. It has also been observed that pinworms leave the rectum, migrate to the vaginal area, and cause vulvovaginitis and localized itching.

Furthermore, according to the opinion of the researchers mentioned above, the risk factors that can increase the possibility of transmission and infection among people are uncontrolled contact of the infected fingers with the mouth and habits such as chewing nails, not washing hands regularly after using the toilet, not trimming infected nails by pinworm, lack of proper personal hygiene and especially basic hand hygiene in people 4 to 11 years old (5,7).

Among the common symptoms in infected people are irritability and loss of appetite, nausea, insomnia, enuresis, nightmares, gnashing of teeth, diarrhea, anal itching, cataracts, itching of the female genital area, recurrent inflammatory cellulitis, and endometritis can be mentioned. The female worm causes severe itching in the perineal area, and if it enters the reproductive system, spawning takes place in the perineum. Also, the signs of the pinworm's existence in the reproductive system include irregular menstruation, urination, rupture of a fallopian tube abscess, pelvic inflammation, and peritonitis. If the pinworm enters the urinary tract, the patient will suffer from urinary incontinence (8,9).

Approved anti-worm drugs for *Enterobius vermicularis* are mebendazole, albendazole, benzomidazole, pyrantel ambonate and pyruvate ambinate. Only benzimidazole, mebendazole and albendazole derivatives kill adult worms and ova at the same time.

However, albendazole has not been approved for the treatment of Enterobiasis since it is expensive, and there are concerns about teratogenicity and possible hepatotoxicity (5).

One of the effective methods in the treatment of pinworms is using garlic. Although there are several different outlooks on the use of garlic in pinworm treatment, we decided to evaluate the effect of garlic in detail.

In this article, we examined the effect of garlic on the treatment of pinworms, which was common in several kindergartens throughout Tehran, Iran.

Material and Method

The samples for this article have been taken in preschools, primary schools, kindergartens, nurseries, orphanages, pediatric wards of hospitals, and clinics throughout Tehran. Participants were randomly selected from children and individuals they have connections with (parents, relatives, etc.). After sampling, participants were classified into five age groups.

The total number of people participating in this experiment was 17146, including 9531 women and 7615 men, of which respectively 1386 and 1122 were

infected with Enterobiasis. Due to the lack of adult cooperation, the number of children participating in this sampling is more than in other age groups.

The diagnostic test used in this article is the Scotch tape test. Materials used in this test include a microscope, tongue depressor (abaisse-langue), slide, and Scotch tape (10). This sampling was done by Graham's test, described as follows.

Place the slide about 1 to 1.5 cm below the edge of the tongue depressor. Then put the scotch tape from the edge of the tongue depressor to 0.5 cm from the beginning of the slide. Then take the tape with your finger and turn it over to the other side of the tongue depressor. Now tap the edge of the tongue depressor covered with the scotch tape on the anal creases until the parasite ova stick to it. In the next step, we return the tape to the slide. Since *oxyure* egg is very light, it can be transmitted through deep breathing, and contamination is possible, so gloves should be used during sampling and observing under a microscope. Deep breathing should be avoided during these steps.

The slide was placed under a microscope with the objective lens set on power x10 and then x40 to observe the parasite ova (figure 1-3).

In this study, Enterobiasis was treated by cutting a medium-sized clove of garlic and removing the enamel layer. In this way, patients have more contiguity with the effective ingredients of garlic. Since the worm is located at the end of the colon, to perform an effective suppository, garlic should be inserted about 1.5 to 2 fingertips into the anus and it is recommended to repeat this operation two to three times a day. Meanwhile, it is better to use a garlic suppository in the early morning and after each excretion. To evaluate the effectiveness of the treatment, we have selected three, five, and seven-day periods

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Figure 1: Pinworm ova

Figure 2: Male pinworm

Figure 3: Female pinworm

Results

As mentioned earlier, in this descriptive cross-sectional study, 17146 participants were examined, and among the participant population, about 44.41% and 55.59% were respectively related to male and female. Moreover, more female participants are to join due to women's higher propensity to participate in the research than men. So, the increased contamination in the females could become out of their difference number, but there is no evidence of its correlation to gender.

According to table 1, since the infection is more common among children, most of the contributors were between the ages of 0 to 9 (67.41%) and 10 to 19 (21.66%).

According to table 2 , 1386 women and 1122 men were infected out of the total samples tested. The highest and lowest rate of infection, respectively, are observed in the age group of 0-9 years (67.34%) and over 40 years (1%) in both genders.

Corresponding to the results obtained, garlic treatment was effective on people over 20 in the first five days. Still, among people under 20, including infants, children and adolescents, 0.56% were yet infected after five days (Figure 4).

According to table 3, it is clear that the maximum duration of treatment is seven days. It was observed in Girls 0 to 19 years and boys 0 to 9 years old that the duration of treatment might be up to 7 days, and it can be due to factors such as hygiene condition, nutrition and physical condition of individuals, etc.

Table 1: The absolute and relative frequency of contaminated and non-contaminated individuals relevant (dependent) to each group of age for both gender.

Age	Individuals tested		Total
	Female	Male	
0-9	6121 (35.7%)	5438 (31.72%)	11559 (67.41%)
10-19	3122 (12.38%)	1591 (9.28%)	3713 (21.66%)
20-29	812 (4.74%)	416 (2.43%)	1228 (7.16%)
30-39	353 (2.06%)	117 (0.68%)	470 (2.74%)
>40	123 (0.72%)	53 (0.31%)	176 (1.03%)
Total	9531 (55.59%)	7615 (44.41%)	17176 (100%)

Table 2: The absolute and relative frequency of males and females infected with *Enterobius vermicularis*, segregated by age groups.

Age	Infected individuals		Total
	Female	Male	
0-9	891 (35.52%)	798 (31.82%)	1689 (67.34%)
10-19	302 (12.04%)	238 (9.49%)	540 (21.53%)
20-29	119 (4.74%)	61 (2.43%)	180 (7.18%)
30-39	56 (2.23 %)	18 (0.72%)	74 (2.95%)
>40	18 (0.72%)	7 (0.31%)	25 (1%)
Total	1386 (55.26%)	1122 (44.74%)	2508 (100%)

Table 3: The absolute and relative frequency of treated people with described remedial process, according to day number.

Age	Recovered cases during 3 days		Infected cases after three days		Infected cases after five days		Infected cases after seven days	
	Female	Male	Female	Male	Female	Male	Female	Male
0-9	690 (77.44%)	603 (75.56%)	201 (22.55%)	195 (24.43 %)	1 (0.11%)	1 (0.12%)	–	–
10-19	217 (71.85%)	162 (68.06%)	85 (28.14%)	76 (31.93 %)	1 (0.33%)	–	–	–
20-29	87 (73.10%)	39 (63.93%)	32 (26.89%)	22 (36.06 %)	–	–	–	–
30-39	41 (73.21%)	13 (72.22%)	15 (26.78%)	5 (27.77 %)	–	–	–	–
>40	14 (77.77%)	6 (85.71%)	4 (22.22%)	1 (14.28 %)	–	–	–	–
Total	1049 (75.68%)	823 (73.35%)	337 (24.31%)	299 (26.64 %)	2 (0.14%)	1 (0.08%)	–	–
Sum total	1872 (74.64%)		636 (25.35%)		3 (0.11%)		0 (0%)	

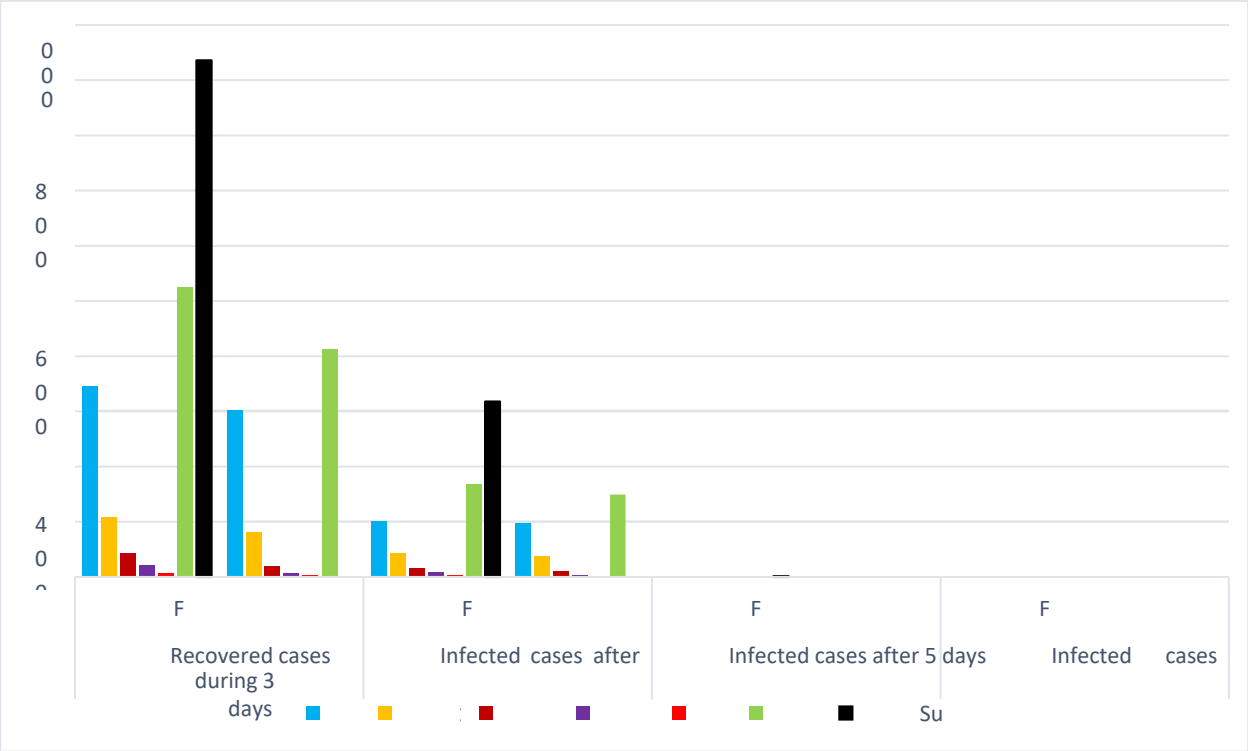

Figure 4: Comparing the effect of garlic on cases infected with *Enterobius vermicularis* categorized by day number.

Discussion

The usage of garlic in the treatment of Enterobiasis was mentioned in numerous articles; however, due to contradictions in the results and an increase in the prevalence of pinworm among children, we have decided to investigate the effect of garlic in the treatment Enterobiasis. In accordance with the results achieved in this study, the subjected population is classified into four categories: Recovered cases during three days, infected cases after three days, infected cases after five days, and infected cases after seven days. According to the results, the absolute percentage of the recovered people is 74.64%. Also, 23.35%, 0.11 %, and 0.00% of people were infected after three days, five days, and seven days, respectively.

Antiparasitic Mechanism of Garlic

Garlic consists of 17 kinds of amino acids (such as *Arginine, Glutamine, Asparagine*, …), at least 33 organosulfate compounds (like *Alliin, Allicin, Sulfate, Disulfate, Trisulfate*, …), and 8 minerals, including *Germanium, Copper, Calcium, Iron, Selenium, Magnesium, Potassium, Zinc*, and vitamins such as vitamin A, vitamin B1, vitamin B2, vitamin B3, vitamin C and more (11).

According to studies, it seems that antiparasitic features of garlic are due to the sulfur compounds in its structure. In fact, compounds such as *Allicin*, which is altered by the enzyme *Alliinase* (12), *Diallyl sulfide (DAS), Diallyl disulfide (DADS), and Diallyl trisulfide,* play an important role in the treatment of Enterobiasis. *Allicin* has variant antimicrobial effects in different ways: Inhibition of *Acetyl CoA synthetase*, enhancement of immune cells activity, induction of glutathione oxidation, induction of apoptosis, and interaction and reaction with thiol-containing enzymes (SH) (13). Moreover, sulfur-containing compounds in garlic react with free thiol groups (-SH) present in the active sites of the parasite's intracellular enzymes and inhibit enzymatic activity by making a disulfide bond (-S-S-) and destroying the parasite's vital reactions (14).

It should be noted that despite the positive effects of garlic by oral consumption, such as: Reducing blood pressure in hypertensive people, lowering cholesterol, boosting the immune system, treatment of sinusitis and colds, and being a source of antioxidants, it may have side effects including decreasing blood pressure in hypotensive individuals, eczema, allergies, heartburn, bleeding, decrease in the activity of cytochromes, bloating, abdominal pain, loss of appetite, etc., as well as its contradiction or the incumbency of few limited consumptions of garlic during pregnancy which should certainly be considered (15).

In oral consumption of garlic, *Allicin* and some of the beneficial substances of garlic are absorbed through the gastrointestinal tract and a minute amount of it reaches the large intestine. As mentioned earlier, on account of numerous issues and the uncertainty of Enterobiasis treatment via oral consumption of garlic, we investigated and tested the effect of garlic through a suppository that depicted no complications except for partial irritation in children. This method works as follows, a medium clove of garlic should be cut in half, and the enamel should be exposed and then used. As a precaution, in people with complications such as fistula, hemorrhoids, fissures, and sensitivity to garlic, it is necessary to consult a physician before use(12).

According to Prosanta Hazarika et Al., in India's Mishing and Deuri tribes, the general public is involved with agricultural and animal husbandry. Also, because of the remoteness of urban facilities, there is a lack of public health; as a result, traditional and herbal remedies are preferred to hospitals and chemical treatments. Generally, These tribes use the extract of garlic and carrot every two hours for at least 7 to 10 days to treat Enterobiasis (16).

Other Medicinal Treatments for Enterobiasis

Chemical drugs used for treating Enterobiasis in proportion to physicians include albendazole, thiabendazole, mebendazole, pyrantel pamoate, piperazine citrate, piperazine tartrate, piperazine phosphate, and pyrvinium pamoate, which are prescribed with variant doses. Ordinary doses of albendazole are 400 mg orally (200 mg in children under two years old) and should be repeated after two weeks. Doses of mebendazole are 100 mg twice daily for three periods at three-week intervals. Pyrantel pamoate, 11 my/kg body weight as a single oral dose and repeated every two weeks(2).

The use of albendazole as a broad-spectrum antiparasitic drug is common; however, it can cause many side effects such as reversible neutropenia, alopecia, and elevated liver enzyme over time(1).

Even though it is safe to use albendazole in pregnant women (17).

Thiabendazole is more toxic than other benzimidazole drugs. Consuming thiabendazole may have complications, including digestive problems, nausea, diarrhea, occasional constipation, vomiting, hypertension, hyperglycemia, drowsiness, leukopenia, hematuria, headache, and dizziness. Clinical studies have shown that thiabendazole can cause hepatic cholestasis in rare cases. It is prohibited in pregnant women and people with renal and hepatic diseases. Therefore, it should be used with caution in people with liver disorders; their liver activity should be checked regularly (1,18). Taking mebendazole in lower doses can cause gastrointestinal effects.

However, in high doses, it can cause granulocytopenia and baldness (1). Increased bacterial diversity is seen in children while treating Enterobiasis with mebendazole (19). The benzimidazole chemical family is teratogenic, and if necessary, in the case of pregnant women, they should be used in the second or third trimester (20). Pyrantel pamoate generally has gastrointestinal side effects, nausea, vomiting, diarrhea, abdominal cramps, anorexia, stomach pain, weakness, headache, sickness, and sometimes skin rashes. It is suggested to be used with caution and under the supervision of a physician in people with liver disorders (1).

Antiparasitic drugs such as piperazine citrate, piperazine tartrate, and piperazine phosphate are recommended to treat nematodes, especially *Oxyure*; nevertheless, they have complications and adverse effects. This drug is not recommended for use in patients with hepatic or renal impairments such as nephritis, patients with seizures, people who are severely allergic to the compounds present in piperazine and show a gastrointestinal reaction to these compounds and pregnant women. Possible side effects of these drugs are nausea and diarrhea, memory loss, strabismus, and paraesthesia.

Pyrvinuim pamoate has side effects such as nausea, diarrhea, vomiting, abdominal cramps, and skin allergies. This medicine causes the stool to turn red.

The larger the family is, the more the prevalence of Enterobiasis infection is seen; based on the statistics in large families, the prevalence of Enterobiasis is 83.3% more than that of small families, as mentioned by Al-Daoody et Al. (21). Regarding the fact that Enterobiasis is transmitted via infected individuals to other people, treatment of Enterobiasis must include the whole members of the family since family members have close contact with each other and use common facilities such as bedding, toilet seat, and toys. It is recommended that participants wash their hands with soap and water after each excretion to prevent the spread of parasite ova.

Conclusion

In this study, we endeavored to find an appropriate treatment for children with Enterobiasis. Considering that 75% of the infected people in our study were cured in less than 3 days and no significant complications were observed, garlic can be considered a suitable treatment for Enterobiasis. Based on the results, we realized that garlic has much fewer side effects than chemical drugs, and utilization is recommended in consultation with a physician. Acceptable results have been obtained in this study for the effectiveness of garlic on Enterobiasis and proved the efficaciousness to a large extent. Still, we hope to achieve more useful and conformation results in future research.

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Conflict of interest

none.

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