



## ORIGINAL: Trichostrongyliasis Outbreak in North of Iran

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### ABSTRACT

**Introduction:** Nematodes of *Trichostrongylus* genus are mainly parasites of herbivores, although human infections in sporadic form have been reported worldwide. Herein we reported an outbreak of trichostrongyliasis in Qaemshahr city in Mazandaran province, north of Iran during May to June 2020.**Material and Methods:** The investigation was designed as a retrospective cross-sectional study on an outbreak occurred in Qaemshahr city in north of Iran. The diagnosis of trichostrongyliasis cases was confirmed by hypereosinophilia and existence of *Trichostrongylus* eggs in the stool.**Results:** Trichostrongyliasis diagnosed in twelve patients. The age range of patients was 10-78 years old. 83.5% of the patients were female and 75% of them lived in the rural area. The most common signs and symptoms of patients were abdominal pain 91.6%, diarrhea 83.3%, vomiting 41.6%, nausea 50%, anemia 8.3% and chill 16.6% respectively. These patients undertook a course of treatment consisting antihelminth drug for adult and albendazole for children. Symptoms of trichostrongyliasis improved completely after therapy.**Conclusion:** Our study indicated that trichostrongyliasis may be a major parasitic etiology for gastrointestinal symptoms such as abdominal pain among rural residents in endemic areas with outbreak presentations.

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## Introduction

**T**richostrongyliasis is a relatively common nematodes infection between humans and herbivorous animals which affects gastrointestinal system (1-4). However, the prevalence of Trichostrongyliasis is not the same in all parts of the world, this disease has been frequently reported from humans in Middle East particularly in rural communities with poor personal hygiene and close cohabitation with herbivorous

animals. North of Iran is one of the endemic areas of Trichostrongyliasis. Most rural residents in this area are farmers, and domestic animal husbandry can expose them to zoonotic parasites, such as *Trichostrongylus* (4, 6). There are more than 30 species of *Trichostrongylus* exist, most of them are parasites of herbivores. At least 10 species have been reported from humans infections. Human infections occur mainly

via ingestion of filariform larvae from contaminated vegetables or water or rarely by penetrating through the skin. Infection with this parasite is often accidental, while in some patients, it causes significant clinical symptoms and reduced quality of life (1). Most patients are asymptomatic but some studies reported symptoms like abdominal pain, bloating, flatulence, skin rash, nausea, vomiting, diarrhea, fatigue, and weight loss (3, 8). The diagnosis of disease is based on hypereosinophilia and detecting *trichostrongylus* eggs in the stool. The first choice treatment for trichostrongyliasis is pyrantel pamoate. However, mebendazole 100mg PO bid x3d and albendazole 400 mg PO once a day are alternative agents (8). Herein we reported an outbreak of trichostrongyliasis in Qaemshahr city in Mazandaran province, north of Iran during May to June 2020.

## Methods

The investigation was designed as a retrospective cross-sectional study. The location of study was Qaemshahr city in north of Iran. Each participant provided about 5 g of feces for examination. Participants were interviewed about their personal behaviors using a standard questionnaire, and underwent a physical examination to assess clinical presentations potentially linked to trichostrongyliasis. Fecal specimens were processed at the field-work site using the modified cellophane thick smear method. Each entire slide was examined under a microscope and all helminth eggs were counted as eggs per gram. The diagnosis of trichostrongyliasis cases was confirmed by hypereosinophilia and existence of *Trichostrongylus* eggs in the stool. Ten milliliters of blood was drawn from each participant for initial laboratory investigation, hematocrit, total and differential white blood cell counts including biochemical tests. Then, the collected data were analyzed using SPSS software (ver. 16).

## Results

Mazandaran province is situated on the southern coast of the Caspian Sea in the north of Iran. It has a damp climate with yearly average rainfall of 977 mm. The outbreak of trichostrongyliasis took place during May to June 2020. Totally 12 patients from Qaemshahr city (located in the center of Mazandaran province), involved in the study. The outbreak description was as follow as describe briefly; a 50-year-old housewife presented for the treatment of untreated abdominal pain and diarrhea that lasted for one month. This problem began to develop one month before when she hosted a family party. Her abdominal pain had increased in frequency in the last month but her diarrhea has decreased in the last week, and occurs once a week. H2 blocker (e.g. famotidine) and proton pump inhibitor (e.g. pantoprazole) has had no effect for her complications. There was a family history of abdominal pain and diarrhea as same as her complaint that her husband, her daughter, her daughter's husband, her daughter's two girls, her two sons and their wives. This problem began to develop one month before since all of the family were gathered together for family party. All family member has history of eating fresh vegetables in the mentioned family party. Their symptoms lasted for one month and some of them used H2 blocker and proton pump inhibitor for these problems, but the symptoms had no improvement and some of them even got worse by these treatment. The pain seemed to be worse towards the early morning. Another case during May to June 2020 was found accidentally with laboratory data. She was 78 years old and had no abdominal symptoms and no diarrhea. She had no contact with animals, but was in contact with birds. The demographic feature, past medical history, clinical characterization and laboratory data of patients is described on [table 1](#).

These patients undertook a course of treatment consisting antihelminth drug; (albendazole 400 mg orally two times a day on empty stomach) for adult and albendazole

**Table 1. Characterization of trichostrongyliasis patients**

	Variables	N=12
<b>Demographic Features</b>	Age range in years	10-78
	Male gender	5(41.6%)
	Education level (primary school or lower)	6(50%)
	Farmer or laborer	3(25%)
	Lived in rural area	9(75%)
<b>Underlying Diseases</b>	Consuming unwashed vegetable	7(58%)
	Chronic diseases <sup>a</sup>	2(16.6%)
	Viral infectious diseases <sup>b</sup>	1(8.3%)
	Other diseases <sup>c</sup>	1(8.3%)
<b>Signs and Symptoms</b>	Abdominal pain	91.6%
	Diarrhea	83.3%
	Vomiting	41.6%
	Nausea	50%
	Anemia	8.3%
	Chill	16.6%
<b>Laboratory Data</b>	Leukocytosis	3(25%)
	Eosinophilia	12(100%)
	Eosinophilia range	5%-69%
	Existence of <i>Trichostrongylus</i> eggs in the stool	12(100%)

<sup>a</sup> chronic disease: chronic heart disease<sup>b</sup> viral infectious disease: Covid-19<sup>c</sup> Other diseases: hemorrhoids

100 mg orally, two times per day for children for 7-9 days. Based on the patient's reports, no progress was seen during the treatment, and there was no need for further therapy. During the last days of care, they didn't experienced abdominal pain and diarrhea and reported feeling generally more energetic than before commencing care. Then we followed them up by stool test and eosinophilia by the laboratory data. Finally, we found out that the eosinophilia recovered and no ova of parasites have seen in stool test.

## Discussion

Trichostrongyliasis is a nematode infection between humans and herbivorous animals that affects gastrointestinal system (1-3). About 10 species have been able to infect humans that among them, infection caused by 9 species have been reported in Iran (7-10). Considering human infections, variety of *Trichostrongylus* species including *T. orientalis*, *T. colubriformis*, *T. vitrinus*, *T. axei*, *T. capricola*, *T. probolurus*, *T. skrjabini*, and *T. lerouxi*, has been reported

from Iran. Studies on the epidemiology and diversity of the genus *Trichostrongylus* in human infections are still very limited. The real prevalence may be underestimated because most of the patients are asymptomatic or develop mild gastrointestinal disorders (11). Epidemiological studies have demonstrated trichostrongyliasis as a common parasitic infection in domestic ruminants and humans in different regions of Iran (6, 12). In a meta-analysis by Rahimi et al, the overall seroprevalence rate of *Trichostrongylus* in the general population in Iran was 10% (95% confidence interval = 1.6–17%). (6). Recent studies indicate a decreasing trend in the prevalence of trichostrongylosis in both animals and humans in Iran. However, human trichostrongylosis is still a health problem in some regions of the country. The prevalence of diseases in Khouzestan, Guilan, and Mazandaran provinces have been reported 18.1%, 3.05%, and 2.1% respectively in recent years (6,7,13,14). Most infected individuals don't have any symptoms but some patients suffer from abdominal pain, bloating, flatulence, skin rash, nausea,

vomiting, diarrhea, and fatigue and weight loss and in high load of parasite, patient could have anemia and dry skin (2, 3, 8, 15, 16). In our study 83.3% of patients had diarrhea and abdominal pain, which began one month before infectious workout. All of them probably were infected from unwashed vegetable or unfiltered water. In current study the diagnosis were confirmed by seeing ova in microscopic study and patients in this study had several features with the history of consuming unwashed vegetable contaminated with manure. Another history that lead us to diagnosis was that all members of the family that had gathered together for family party a month before demonstrated the same signs and symptoms, and the onset of symptoms in them was concurrent. Other important information that we collected by history taking was that patients mentioned to the use of unwashed vegetable which have been grown with sheep and cow manure and non-filtered water. In current study the right diagnosis made based on eosinophilia in laboratory data and based on history taking and following-up by stool test and the treatment results were satisfactory.

### Conclusion

Our study indicated that trichostrongyliasis may be a major parasitic etiology for gastrointestinal symptoms in rural residents of endemic areas especially whenever there is a history of eating fresh vegetables fertilized with fresh livestock manure, or close contact with herbivorous animals.

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