



Prevalence of Gastrointestinal and Blood Parasites of Rodents in Tabriz, Iran, with Emphasis on Parasitic Zoonoses

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Abstract

Objective: Rodents as reservoirs of many common human diseases (zoonoses) are the cause of health and economic problems in society. Because of the prevalence of parasitic infections of mice in different parts of Iran, this study was performed to investigate the gastrointestinal and blood parasitic zoonoses of rodents in Tabriz, Iran, between 2011 and 2012.

Materials and Methods: A total of 57 rodents including 36 *Rattus norvegicus*, 11 *Rattus rattus*, 8 *Mus musculus*, and 2 unknown species of rodents were captured alive from different parts of Tabriz city and studied. The rodents were examined for helminth and blood infection.

Results: Helminth and blood infection were only observed in *Rattus norvegicus* and *Rattus rattus* species and other species were not contaminated. There was no blood parasite in rodents. Different gastrointestinal worm species identified in *Rattus norvegicus* consisted of *Trichosomoides crassicauda* (51.2%), *Hymenolepis diminuta* (22.3%), *Gongylonema pulchrum* (12.1%), *Hymenolepis Nana* (4.31%) and *Trichocephal Spp.* (2.18%). Different gastrointestinal worm species identified in *Rattus rattus* consisted of *Gongylonema pulchrum* (21.17%), and *Trichosomoides crassicauda* (28.24%).

Conclusion: Due to the presence of zoonotic parasitic agents in the studied rodents that easily enter human dwellings, controlling these animals and improvement of the sewerage system of the study area are of particular importance.

Keywords: Gastrointestinal and Blood Parasite, Iran, Rodents, Tabriz

Introduction

Rats are the most commonly found rodents in the city and its surrounding areas. The breeding of rats, in recent years, has rapidly increased due to the abundance of food resources and lack of environmental hygiene in urban areas (1-3). Rats impose economic damages and significant costs on the public health system (4,5). Many parasites of rodents are common with humans too, and some parasites can be transferred from rodents to humans. For example, in the disease caused by the *Hymenolepis nana* parasite, gastrointestinal disorders, neurological complications, alternating diarrhea, vomiting, and dizziness have been observed in humans (6-9). One of the concerns of the

people, especially health care providers, is the contamination caused by both wild and domestic rats. Considering the damages and economic losses suffered by humans due to rodents, and the importance of sanitation, it is necessary to fight rodents in order to reduce the amount of contamination and occurrence of serious illness and to create a healthy city (10-14). Given the importance of rodents in terms of transmission of disease-causing agents, including parasites, to humans, studying the potential for transmission of these agents in each geographic region is essential for health. Due to the difference in prevalence of rats' parasitic infections in different parts of Iran, this study aimed to investigate the gastrointestinal and

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blood parasites of rodents in Tabriz, Iran, with an emphasis on parasitic zoonosis in 2011-2012.

Materials and Methods

This one-year cross-sectional study was conducted between 2011 and 2012. The study population consisted of the wild rodents caught in Tabriz, Iran. During the study that was conducted from summer 2011 to winter 2012, a total of 57 rodents including 36 *Rattus norvegicus*, 11 *Rattus rattus*, 8 *Mus musculus*, and 2 unknown species from different areas of Tabriz were caught alive and studied. After catching the rodents, they were transferred to the laboratory of parasitology, Faculty of Veterinary Medicine, Islamic Azad University, Tabriz Branch. After anesthetizing the rodents and recording their external characteristics, necropsy was performed. The entire gastrointestinal tract was removed and placed on palates containing physiological saline. Furthermore, the stomach was opened by scissors and studied for the presence of helminth infection with a dissecting microscope. To identify the gender and the species of worms isolated, acetocarmine staining and valid identification keys were used. Moreover, for detection of blood parasites in rats, 5 cc of blood was taken from their hearts, and blood smears were prepared and stained using Giemsa stain. Finally, the data were classified and frequency distribution tables were prepared.

Results

During the study, a total of 57 rodents (including 36 *Rattus norvegicus*, 11 *Rattus rattus*, 8 *Mus musculus*, and 2 unknown species) were captured (Figure 1). Table 1 shows the frequency distribution of captured rodents in Tabriz during 2011 and 2012. Contamination was observed only in the *Rattus norvegicus*, and *Rattus rattus* species; other species were not contaminated. In this study, no blood parasites were isolated. Table 2 summarizes the frequency distribution of rats' contamination to other parasites. Various gastrointestinal worm species identified from *Rattus norvegicus* were *Trichosomoides crassicauda* (51.2%), *Hymenolepis*

diminuta (22.3%), *Gongylonema pulchrum* (12.1%), *Hymenolepis nana* (4.31%), and *trichocephal* Spp. (2.18%). Different species of intestinal worms identified from *Rattus rattus* were *Gongylonema pulchrum* (21.17%) and *Trichosomoides crassicauda* (28.24%).

Discussion

The results of this study indicated that gastrointestinal parasite infection in rats, in the study area, was only observed in species of *Rattus norvegicus* and *Rattus rattus*. These rodents are semi-domesticated and omnivorous, and they live in sewage channels, slaughterhouses, waste disposal sites, food storage, and farms. Therefore, they have greater prevalence than mice and have more contamination (14-16). However, the *Mus musculus* lives mostly in homes; thus, its environment is cleaner, resulting in less contamination (17,18). Among the parasitic worms reported, *Hymenolepis diminuta*, *Hymenolepis nana*, *Gongylonema pulchrum*, and *Trichocephala* Spp. were zoonotic (19,20).

In Iran, few studies have been conducted on parasitic infestations of laboratory animals kept in conventional conditions. In the study by Alborzi et al. (19) and Alborzi (20) helminth infections of the gastrointestinal tract of laboratory rats and wild rats in Ahvaz were from *Syphacia muris*, *Hymenolepis diminuta*, and *Hymenolepis nana* with prevalences of 71%, 1.14%, and 4.1%, respectively. The results of the present study showed a significant difference with that of the study by Alborzi et al. (19), Alborzi (20) in terms of gastrointestinal nematodes and cestodes contamination. One reason for this could be the differences in geographic conditions. The suitable humidity of the East Azerbaijan province is the cause of the high prevalence of nematodes and cestodes in different species of animals (21,22).

Unwanted entrance of wild rodents to the eligible homes with conventional conditions, especially the access of these animals to food storage sites, is another reason for parasitic infection of laboratory animals and the human population (23-25).



Figure 1. Examined rats caught for contamination of gastrointestinal helminths

Table 1. Frequency distribution of species of rodents captured in the city of Tabriz in Years 2011-2012

Type of rodent	Number	Percentage
<i>Rattus norvegicus</i>	36	63.16
<i>Rattus rattus</i>	11	19.30
<i>Mus musculus</i>	8	14.04
Unknown	2	3.50
Total	57	100

Table 2. Frequency distribution of rats' contamination with intestinal parasites

Parasite/Type of rodent	Trichosomoides crassicauda (%)	Hymenolepis diminuta (%)	Gongylonema pulchrum (%)	Hymenolepis nana (%)	Trichocephal Spp. (%)	Without contamination (%)
Rattus norvegicus	51.20	22.3	12.10	4.31	2.18	7.91
Rattus rattus	28.24	-	21.17	-	-	50.59

Regarding parasitic contamination in wild rodents, several local studies in Isfahan, Khorasan, Khuzestan, and Mazandaran have been conducted by the Health Research Stations of Tehran University of Medical Sciences and the Pasteur Institute of Iran, and other academic centers. Furthermore, a wide range of gastrointestinal parasites have been observed in rodents, and many of them have zoonotic importance and threaten public health and human populations (26-29). Fortunately, in this study, no blood parasite was isolated from the rodents. This might be due to the weather conditions and the cold climate of Tabriz that does not allow the development and activity of hosts (insects and arachnids) of rat blood protozoa, such as *Babesia microti* and *Trypanosoma lewisi*.

Conclusion

Due to the presence of zoonotic parasitic agents in the studied rodents that easily enter human dwellings, controlling these animals and improvement of the sewerage system of the study area are of particular importance.

Ethical issues

We have no ethical issues to declare.

Conflict of interests

We declare that we have no conflict of interests.

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