



Research Article

GASTROINTESTINAL HELMINTH INFECTION OF LABORATORY MICE AND WILD RODENTS IN AIZAWL, MIZORAM

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Abstract- The aim of this study was to investigate various helminth infections of laboratory mice, musk rats as well as in wild rats which were trapped from various areas of Aizawl. The study showed that the laboratory mice were infected with mostly two species of cestodes and one species of nematode. The musk rats were found to be infected with one species of cestode namely *Rodenolepis microstoma* and one species of nematode, *Capillaria hepatica*. However, *Trichinella* sp larvae could be recovered from muscle of wild rats. The prevalence of helminthic infection in laboratory mice were *Hymenolepis diminuta* (30%), *Hymenolepis nana*, (20%), *Cysticercus fasciolaris* (5%) and *Syphaciamuris* (10%), respectively. In musk rats, *Rodenolepis microstoma* (5%), *Capillaria hepatica* (5%) and in wild rats *Trichinella* sp larvae (1%) were recorded. Since most of the helminths found in rodents are of zoonotic importance, the results suggest that rats either domestic or wild may be acted as a source of helminth transmission to human in this region of India.

Keywords- Rodents, Helminths, Zoonosis, Aizawl, Mizoram.

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Introduction

Rats besides causing great damage to the ecosystem can also harbour a variety of helminths of zoonotic importance. Some previous studies have been done on the occurrence of helminths in rodents in India [1-3]. However, little is known about parasite diversity in laboratory mice and wild rodents in Mizoram where wild rat populations are very high. It is well recognized that they are the hosts of various helminths and because of close proximity to human they pose a great threat to health hazard to human being [4]. The dissemination of parasitic infection takes place when faeces containing eggs are passed along with the rodent droppings and contaminating agricultural lands, stored grains, water sources and in various edible things [5]. In Mizoram, 31% of the total forest area is covered by bamboo forests and the outbreak of rodents population is a common phenomenon particularly during bamboo flowering. There are several reports on the occurrence of the helminths in rodents across the world [6-8] which clearly indicate the wide diversity of helminths in these animals.

The present study is therefore underscores helminth biodiversity among rodents in correlation with habitat so that an evaluation of the risk for helminth transmission to humans can be ascertained. We examined laboratory reared mice as well as trapped musk rats and wild rats in different locations of Aizawl district, Mizoram.

Materials and Methods:

A total number of 100 laboratory mice and 20 numbers of musk rats were examined. We were also able to capture 20 wild rats altogether through trapping device. The musk rats were captured near bamboo forests, rice fields, house yards, godowns and from animal barns. Cotton wool soaked in chloroform was used for induction of anaesthesia followed by euthanasia of the musk rats and wild rats. Five dead laboratory mice were also brought to the laboratory for post-mortem examination. Each visceral organ was looked carefully for recovery of

helminth parasites. The parasites recovered were cleared in 0.85% physiological saline with the help of camel brush several times before undergoing whole mount permanent preparation as per standard procedures. Cestodes were transferred from 70% alcohol and stained in Semichon's carmine stain for 2-4 hours. Then the specimens were transferred to 70% alcohol for 20-30 minutes. The parasites were then destained in 70% acid ethanol for 30 seconds to 15 minutes depending upon the stain, the size and type of the worm. In the next step, the specimens were put into 70% basic ethanol for 30 seconds to 15 minutes, transferred to 70% ethanol for 10 minutes and then 95% ethanol for 20-30 minutes and then in 100% ethanol with 2-3 changes for 20-30 minutes each. Then the specimens were cleaned in xylene with two changes for 20-30 minutes each. Finally, the specimens were permanently mounted on Canada Balsam. The nematodes were isolated and preserved in 70% alcohol. Nematodes were cleaned with lactophenol and mounted on a temporary slide. The prevalence of particular parasite in a particular rat and parasite intensity in each infected rat were recorded. Identification of the parasites were done using standard keys. Faecal samples were also examined by conventional method for the detection of helminth eggs and identified as per Souls by (1982) [9]. The muscle samples of 20 wild rats were digested into pepsin solution after thorough mincing with fine scissors.

Results:

The results of the distribution of parasites in different hosts and their locations. The different parasite recovered and the eggs of helminths and [Fig-1(a-c)]. Out of 100 numbers of laboratory mice examined, 10(10%) were found to be positive for *Syphacia muris* [Fig-2], 30(30%) were positive for *Hymenolepis diminuta* [Fig-3], 20 (20%) were positive for *Hymenolepis nana* [Fig-4] and 5(5%) were positive for *Cysticercus*

fasciolaris [Fig-5]. From 20 muscle samples, one was positive for *Trichinella sp* larvae [Fig-6]. Out of 20 musk rats examined, 2 (10%) were found positive for *Rodenolepis microstoma* [Fig-7]. One musk rat showed a large number of *Capillaria hepatica* in liver and pancreas [Fig-8]. No trematodes or acanthocephalan could be recovered in the present investigation.

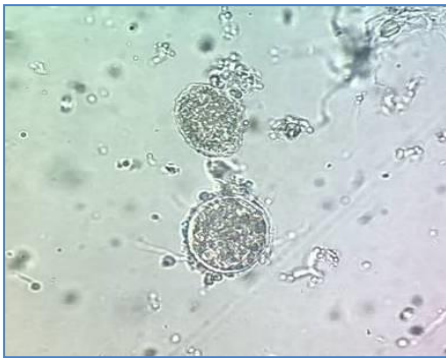


Fig-1a *Hymenolepis diminuta* ova



Fig-1b *Syphacia muris* ova

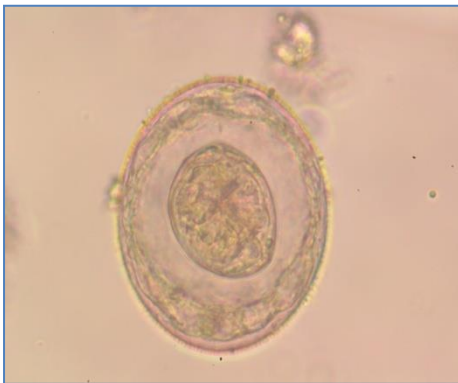


Fig-1c *Hymenolepis nana* ova



Fig-1d *Capillaria hepatica* egg



Fig-2 *Syphacia muris*



Fig-3 Scolex of *Hymenolepis diminuta*

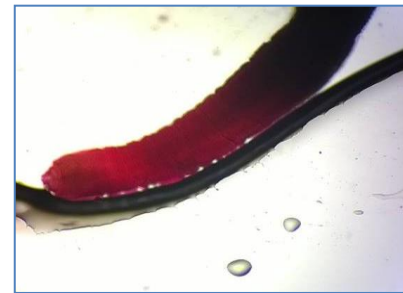


Fig-4 *Hymenolepis nana*



Fig-5 *Cysticercus fasciolaris*



Fig-6 *Rodenolepis microstoma*



Fig-7 *Trichinella sp*



Fig-8 *Capillaria hepatica* in liver of musk rat

Discussion

Rodents have been studied for gastrointestinal helminths in different parts of India as well as different parts of world but scanty information regarding the load of helminths in rodents are available from North-Eastern region of India. In present study, the predominant species of cestode was *Hymenolepis diminuta* followed by *Hymenolepis nana* and *Cysticercus fasciolaris* in the liver of laboratory mice. Among nematodes, only 10 mice were found positive for *Syphacia muris*. Malsawant luangi and Tandon also recorded almost similar percentage (9.37%) of *Syphacia muris* from *Rattus nitidus* from this region [3]. The high prevalence of *Hymenolepis diminuta* in mice agreed to that recorded by other co-workers [1,10]. One species of cestode have been recovered from wild musk rats namely *Rodenolepis microstoma*. This is the first time to the best of our knowledge that *Rodenolepis microstoma* has been found in the GI tract of wild rodents in India. None of the previous studies by various Indian workers have reported *Rodenolepis microstoma* in the GI tract of rodents. However, molecular identification required for validity of this species. Only one musk rat was found positive for *Capillaria hepatica* infection at post-mortem examination. However, rats were least commonly infected with *Trichuris muris* and *Capillaria spp* [2]. One muscle sample was positive for *Trichinella splarvae*, which require molecular technique to identify the actual species involved.

The absence of any trematode in the present investigation is clearly understood in the sense that trematodes need aquatic snails for the completion of their life cycle and terrestrial habitat of rodents in this part of country preclude the possibilities of such infection. The study provides basic information on GI helminths of rodents from one of the North-Eastern parts of India. However, further studies are needed in other parts of North-Eastern states in order to analyse the potential of helminth zoonosis in India.

Conclusion

Rat and mice harbour several helminth parasites which not only affect its host but also pose for threat to human health.

Conflict of interest statement

We declare that we have no conflict of interest.

Author Contributions

SG and LR prepared the initial version of the manuscript and conducted

Laboratory works. SKB and LK helped in the collection of literature and supervised the work and GP done the scientific and technical corrections.

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Abbreviations

SG: Subhamoy Ghosh
LR: Leena Roy
SKB: Sonjoy Kumar Borthakur
GP: Gautam Patra
LK: Lalrinkima

Ethical approval

This article does not contain any studies with human participants or animals performed by any of the authors.

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