Some intestinal helminths of Norway rat *Rattus norvegicus* (Berkenhout, 1769) in Basrah, Iraq

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**Abstract:**

Three helminth species, one cestode *Hymenolepis diminuta* and two nematodes *Protospirura magna*, *Pterygodermatites tani* are found through the survey done on 55 Norway rats *Rattus norvegicus* were collected from several localities of Basrah center during the period from January till April (2004). The percentage of infection was (69%) in total helminths. Comparison with previous studies carried out in Iraq, showed that the two nematodes reported in present study are recorded for the first time in Iraq.

**Introduction:**

Rodents are known to carry a variety of organisms that may cause diseases in humans and domestic animals (Gratz, 1994), through feces, urine and hair remnants (Villafane et al., 2004). It is important to survey theirs parasites to understand the source of the zoonotic infections (Seong et al., 1995).

Norway rats (*Rattus norvegicus*) are capable of breeding all year round if there is a stable supply of food and cover (Linsey, 1995). For this reason it is well known for its close association with human activities and the increase in population density and ranging behavior might have led to more frequent animal to animal contact and hence offered more scope for transmitting the parasites, particularly if there were more contact between infected and susceptible individuals (Quy et al., 1999).


The aim of present study is to gain information of helminth fauna of rodents in Iraq.

Materials and Methods:

55 Norway rats Rattus norvegicus (Berkenhout, 1769) were caught alive from several localities in Basrah center during four months (January, February, March, April, 2004) by using metal traps. The collected animals were dissected in the laboratory, internal viscera were removed in normal saline and examined at the same time under dissecting microscope.

Cestodes:

The cestodes were relaxed in cold water during 24 hours, fixed in hot A.F.A. (Alcohol-Formalin-Aetic acid), stained in iron acetocarmine, dehydrated in graded series of ethylalcohol, cleared in tuollene and mounted on slides with Canada balsam as cited in Georgiev et al (1986).

Nematodes:

The recovered nematodes were killed in hot water, fixed in A.F.A., preserved in 70% ethylalcohol plus 5% pure glycerine, cleared and temporary mounted by lactophenol (Garcia and Ash, 1979).

After preparation the helminths for study were drawn with a camera lucida. Measurements were taken with an ocular micrometer of Olympus microscope (mm). Cestode identification was based on keys by Yamaguti (1959). The nematodes identification follows Yamaguti (1961); Khera (1954) and Mahmoud (1974).

Results and Discussion:

Of 55 Rattus norvegicus examined, 38 (69%) were found to be infected with three species of helminths. One cestode Hymenolepis diminuta, and two nematodes Protospirura magna, Pterygodermatites tani.
The taxonomic scheme of these parasites as follows:

**Phylum:** Platyhelminthes

**Class:** Cestoda

**Order:** Cyclophyllidea

**Family:** Hymenolepididae

**Subfamily:** Hymenolepidinae

*Hymenolepis diminuta*

**Phylum:** Nemathelminthes

**Class:** Nematoda

**Order:** Spiruridea

**Suborder:** Spirurina

**Family:** Spiruridae

**Subfamily:** Spirurinae

*Protospirura magna*

**Family:** Ricturiidae

*Pterygodermatites tani*
*Hymenolepis diminuta*:

This tapeworm was found in small intestine of 14(25.4%) rats with an intensity of infection (3):

The worm is medium in size, scolex with four round suckers, rostellar hooks are absent. There are multistrobila its length less than width. The male reproductive organs involve three spherical testes, one poral and two aporal, cirrus sac oval. While the female reproductive organs involve bilobed ovary lying in the middle of segment with oval vitelline gland, seminal receptacle oval, uterus filled with spherical eggs.

The life cycle of the rat tapeworm (*Hymenolepis diminuta*) includes two hosts. The eggs are passed out with feces from the definitive host, inside the intestine of grain beetle (*Tenebrio molitor*) the embryo (oncosphere) hatches from the egg, penetrates the intestinal tract, and subsequently transforms into the larval stage (cysticercoid) in the hemocoel. Beetle infected with the cysticercoid larva of *H. diminuta* are ingested by the rat. After release from the digested beetle, the cysticercoids evaginate their scoleces and attach to the wall of the small intestine of the rat (Brant and Hanelt, 2000). Humans, usually children, may accidentally be infected through the same mechanism (Marangi *et al* 2003). Hundered cases have been reported in human infections (Cohen, 1989; Levi *et al*., 1987) and (Panpiglione *et al*., 1987). The human form of *H. diminuta* is often asymptomatic, but abdominal pain, irritability itching an eosinophilia have been reported. Praziquantel is the drug of choice for the treatment of *H. diminuta* infection (Jones, 1979).

This worm was reported in most studies done on Iraqi rodents, it is recorded in Baghdad (Mahmoud, 1974; Jawdat and Mahmoud, 1980; Al-Barwari *et al*., 1987; Al-Zahidy, 2001), in Basrah (Al-Hadithi *et al*., 1985; Al-Zihiry, 2002), in Erbil (Hussein, 1986; Molan *et al*., 1988), in Mosul (Salih, 1975), in Hilla city (Al-Morshidy, 2001).

*Protospirura magna* Fig. 1

This worm found coiled in stomach of 18(32.7%) rats with intensity of infection (4.2).

**Female:**

The worms are large 37.35-47.72 length by 1.55-3 width and have a thick cuticle with transversely striations. The mouth is surrounded by two trilobed lips which followed by cylindrical vestibule have transversely striated. The oesophagus is long and not divided into two portions, 5.5-6.1 length by 0.37-0.42 width. The nerve ring is surrounded the oesophagus and lying at the distance of 0.41-0.48 from the interior end. The tail conical 0.33-0.43 length. The eggs embryonated measures 0.05-0.06 length by 0.02-0.03 width.
Male:
The male is smaller than female, 30-33.2 length by 0.66-0.83 width. The esophagus long and boardest in its posterior portion, 2.96-3.23 length by 0.22-0.25 width and surrounded by nerve ring which situated at the distance 0.27-0.33 from interior end. Spicules unequal, the long spicule is measure 1.12-1.28, while the short spicule is measures 0.8-0.96. The tail conical, 0.33-0.43 length.

Protopirura spp. found in the stomach of rodents are cosmopolitan in distribution. Their natural habitat is the stomach, but after the death of host it often migrates into the small intestine (Seo et al., 1968). The genus Protopirura has a close association with Mastophorus (Spirocercidae: Mastophorinae) and it is difficult to distinguish between them (Schacher and Cheong, 1960), because the distinct position is still confused (Rojas and Digiani, 2003). Hasegawa (1990) summarized the status of Protopirura and recognized 9 species. Several species of this genus were recorded in the world parasitizing different rodent hosts. Ordaz and Espinoza (1995) recorded a new species P. mexicana from Peromyscus difficilis (Rodentia: Cricetidae) in Hidalgo, Mexico. Other new species P. kaindensis were recorded parasitizing the stomach of Pseudomydromys murinus from Papua New Guinea (Smals, 2001), while Oliver and Flores (2002) isolated the nematode P. chanchanensis from R. norvegicus and a new recorded helminth for R. rattus in Lima, Peru. Jiménez-Ruiz and Gardner (2003) report occurrence of P. mumidica as a new host and

locality from long-nosed mice Oxymycterus paramensis in Bolivia. Moreover the nematode P. muricola was reported from spiny mouse Acomys dimidiatus during field work in south of the Sinai peninsula of Egypt (Lowrie et al., 2004). In Iraq Jawdat and Mahmoud (1983) reported P. muris and P. muricola from stomach of Mus musculus, Rattus rattus, R. norvegicus and Nesokia indica from several localities for the first time in Iraq, while unidentified species were recorded by Al-Hadithi et al. (1985) from the stomach of R. norvegicus in Basrah center and no measurements were given for this species in the study. The presence of P. magna in the present study is the first record in Iraq and its measurements were similar to those taken in the original description by Khera (1954) in India. A range of insect species including cockroaches has been found to be suitable intermediate hosts.
Figure (1): Protospirura magna.
**Pterygodermatites tani**  Fig. 2

Only females of this nematode were found in the small intestine of 10(18.1%) of rats with intensity of infection (3).

The female is large, 25.93-33.2 length by 0.43-0.72 width. Cuticle thick and have about 90 pairs of subventral combs arranged in two rows and extending to the level of anus. Mouth subterminal, opening dorsally, contain number of chitinized teeth. Esophagus muscular, 4.06-6.18 length by 0.04-0.06 width. Nerve ring is situated at a distance 0.1-0.17 from the interior end. Vulva at the distance 3.11-4.15 from the interior end. Uterus long and branched, 26.97-29.05 length. Eggs embryonated with thick shelled, 0.04-0.05 length by 0.034-0.038 width. Tail conical, 0.2-0.41 length.

*Pterygodermatites* syn. (*Rictularia* spp.) have been reported from various parts of the world as parasites of rodents, carnivora, insectivora, bats and lizards (Cuckler, 1939). Some arthropods serve as intermediate hosts of this nematodes (King and Babero, 1974). A human infection was recorded by a gravid female found in histopathological sections of an appendix in a postmortem examination (Kenney *et al.*, 1975).

Hall (1913) noted the species of this genus fall into two well defined groups: first those from carnivora, the female of which have over 100 pairs combs and spines, of which the majority are combs, and in which there is no well-defined transition from combs to spine in the region of the vulva. Second those from rodents, insectivora and bats, in the female of which there are less than 100 combs and spines, and a fairly sharp transition from one to the other in the region of the vulva. The male of present species is characterized by absence of gubernaculum and caudal papillae. Female with 91 to 93 pairs of subventral combs (Gupta and Trivedi, 1983).

Several species from this genus were recorded from different localities in Iraq. Mahmoud (1974) recorded unidentified species from rats in Baghdad, too in Baghdad Al-Zahidy (2001) recorded *P. witenbergi* from black rat *Rattus rattus* as a new record in Iraq, the same species were isolated from same host in Hilla city (Al-Morshidy, 2001). In Basrah Province, two species were recorded for the first time in Iraq, *P. ratti* were isolated from *Rattus* and *P. plagiostrongylus* were isolated from the small intestine of Hedgehog *Hemiechinus auritus* (Al-Zihiry, 2002).
Figure (2): *Pterygodermatites tanii.*
References:


