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Hymenolepis nana infection in laboratory rats: A case report

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Abstract

The present report is based on incidental finding of *Hymenolepis nana* in laboratory wistar rats procured for experimental purposes. During the routine fecal examination to ensure that the rats were free of parasitic infections, presence of tapeworm eggs containing a six hooked oncosphere was observed. Necropsy performed on a rat carcass revealed presence of catarrhal enteritis and cestodes with segments wider than long. Microscopy revealed tape worms embedded in the intestinal mucosa by means of an intact armed scolex having four suckers, rostellum and trapezoidal segments. Additionally, thickened intestinal wall, goblet cell hyperplasia and infiltration of inflammatory cells was also noticed. Subsequent treatment of the remaining rats with Fentas plus @ 20mg/Kg fenbendazole and 10mg/kg praziquantel cured the infection

Keywords: *Hymenolepis nana*, infection, laboratory, case report

Introduction

Rodents are routinely employed for experimental studies. Before commencement of an experiment, animals must be healthy and free of all pathogens including parasites as their presence will impact the outcome of experimental parameters to be studied. Rodents are also known reservoirs of many zoonotic infections viz. *Hymenolepiasis* which causes nausea, vomiting, abdominal pain, diarrhea and anal or nasal itching [4]. This infection occurs worldwide including India [1, 6, 7].

Hymenolepis nana and *Hymenolepis diminuta* are two commonly occurring species causing hymenolepiasis in rodents and humans. The two worms can be differentiated by the morphology of their scolices. Scolex of *H. nana* consists of four suckers and a retractable rostellum armed with hooks. On the other hand, the scolex of *H. diminuta* is not armed with hooks even though it also has four suckers similar to that of *H. nana*. *H. nana* is the most common cestode affecting man especially young children.

H. nana is a tiny worm which measures around 15 to 40 mm in length. This cestode needs only one host to complete its lifecycle but it can also cycle through two hosts. Rodents are the primary definite hosts of *H. nana* infection. Insects such as fleas or beetles feed on rodent feces and get infected. Accidental ingestion of parasitized insects by humans can infect them. Secondly, infection can also be transmitted among humans by a feco-oral route through food and water contaminated with *H. nana* eggs [5]. Thirdly, internal autoinfection is also possible as the eggs of *H. nana* can hatch within the gastrointestinal tract of humans. The larval stages of *H. nana* remain localized inside the gut wall and do not migrate to extra-intestinal locations. The human infection can be effectively treated using the drug praziquantel. Since rodents can harbor a sub clinical infection also, the personnel working in close proximity to rodents are at a high risk to contract the infection unknowingly. The present study reports the incidental occurrence of *H. nana* in laboratory rats which were bought for an altogether different experimentation purpose.

2. Materials and methods

Twenty, 3 month old rats were purchased for carrying out research work in the Division of Veterinary Parasitology at Sher-e-Kashmir University of Agricultural sciences and Technology of Jammu, RS Pura, Jammu. To ensure that rats must be free of any parasitic load before the commencement of conduct of experimental trial, their feces were examined using conventional methods. Microscopic examination of rat feces revealed presence of numerous globular to subspherical eggs. A hexanth embryo was clearly visible within the oncosphere (Fig 1).

A rat died before the experiment began and a thorough necropsy conducted on it revealed heavy infection of cestodes. The worms were collected and their morphology was studied under a stereomicroscope. Gross lesions in the intestines were recorded. For histopathological examination, tissue sections from the intestines were collected in 10% neutral buffered formalin. Paraffin blocks were prepared, 4-6 μ sections were cut and stained using routine haematoxylin and eosin staining [3]. The remaining rats were treated with fentas plus @ 20mg/Kg fenbendazole and 10mg/kg praziquantel.

3. Results and Discussion

Morphology of the tapeworm as studied under stereomicroscope revealed presence of a scolex with a tetrad of suckers and a rostellum armed with hooks. Neck was slender and the segments were broader than long. Mature segments were hermaphrodite with a unilateral genital pore. These features confirmed the tapeworm as *H. nana*.

Necropsy revealed lesions limited to the intestinal tract. Severe catarrhal enteritis was seen with marked thickening and congestion of the intestinal wall. Presence of tapeworms in large numbers occluded the intestinal lumen (Fig 2).

Histopathologically, numerous intestinal tapeworms were noticed with trapezoidal proglottids being attached to a scolex armed with four suckers and hooks by means of a slender neck. Additionally, encysted worms and cysticeroid larvae

were noticed embedded into the mucosa by means of scolex having morphological features typical for *H. nana* i.e. presence of a tetrad of suckers, rostellum and hooks.(Fig 3 and 4). Infiltrating lymphocytes were appreciated in lamina propria and submucosa. The intestinal villi were severely atrophied and stunted. Fusion of villi or their severe necrosis and desquamation was also appreciated in many sections.

Similar pathological lesions in intestines affected with hymenolepiasis have also been described by others [1, 2].

H. nana is also called as dwarf tapeworm and its life cycle is direct. After ingestion of eggs, hexacanth larvae is released into intestinal lumen which penetrates the intestinal mucosa and develops into a cysticeroid larvae. The cysticeroids move back into the intestinal lumen after destruction of the villi. Subsequently evagination of scolices occurs which enables the parasites to attach to the intestinal wall. Adults have gravid proglottids which disintegrate in the small intestine to release eggs in the stool [5]. These eggs can be ingested by fellow rodents and unsuspecting humans via contaminated feed and water.

In our case, treatment with Fentas plus completely cured the remaining rats as later on the rat fecal samples were found to be negative for *H. nana* eggs.

Conclusion: Routine screening of laboratory rats for experimental purposes confirmed the presence of *H. nana* infection. *H. nana* infection in experimental rats is matter of zoonotic concern for personnel handling laboratory animals.

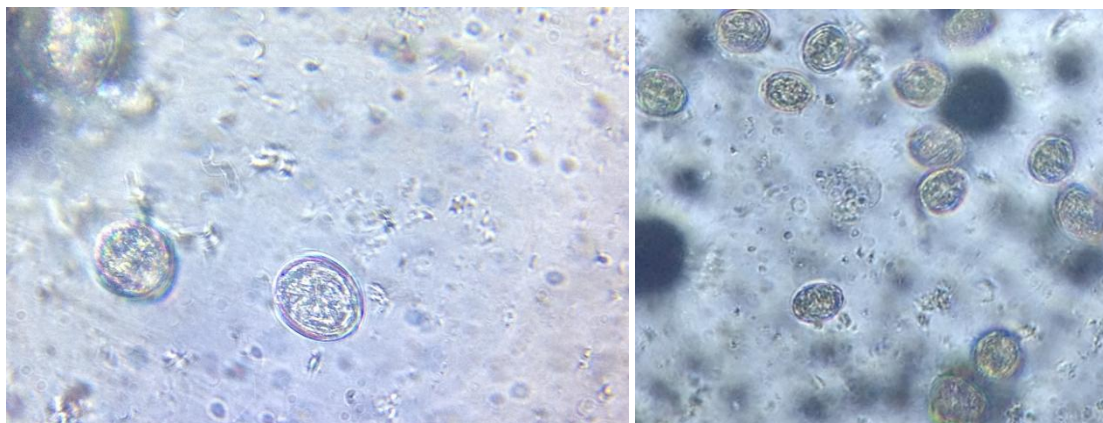


Fig 1: Globular to subspherical eggs of *H. nana* with a hexacanth embryo.



Fig 2: Tapeworm gravid segments occluding the intestinal lumen

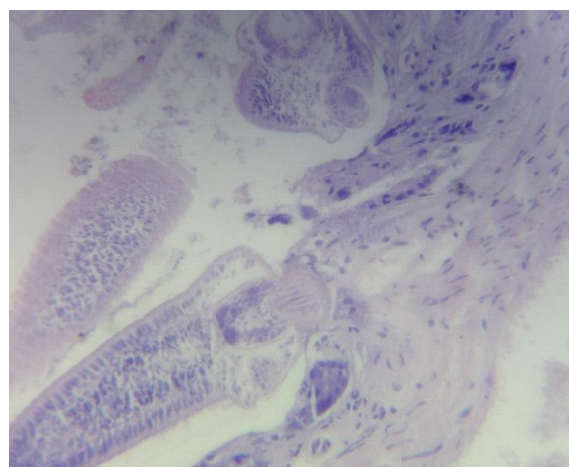


Fig 3: *H. nana* scolex armed with rostellum and hooks embedded in the intestinal submucosa causing severe atrophy of the mucosal villi H&E 400X

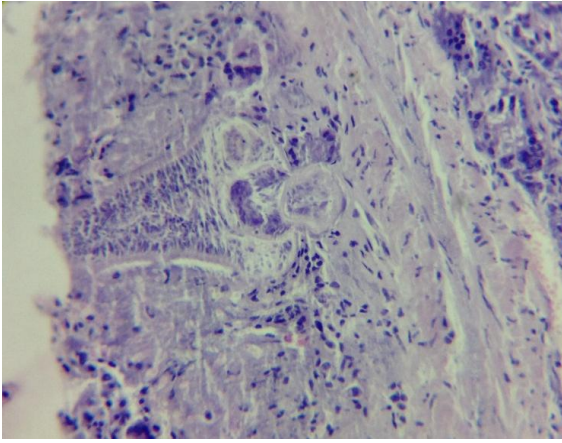


Fig 4: *H. nana* head embedded in the intestinal mucosa armed with rostellum and hooks. The intestinal villi are blunted and infiltrating cells are present in mucosa and submucosa. (H&E 400X)

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