International Journal of Veterinary Sciences Research
2015 Vol. 1, No. 2, pp. 31-35
ISSN(e): 2410-9444
ISSN(p): 2413-8444
DOI: 10.18488/journal.110/2015.1.2/110.2.31.35

EXAMINATION OF ORIBATID MITES FOR CYSTICERCOIDS OF *MONIEZIA* SP

Reena K. K.[1] --- Jobin Thomas[2†] --- Nirmal Chacko[3] --- Lucy Sabu[4] --- K. Devada[5]

[1]*PhD Scholar, Dept. of Veterinary Parasitology, IVRI, Izatnagar, UP, India*

[2]*Research Assistant, LRS, Thiruvazhamkunnu, KVASU, Palakkadu, Kerala, India*

[3]*Senior research Fellow, Dept. of Microbiology, KVASU, Mannuthy, Thrissur, Kerala, India*

[4,5]*Professor, Dept. of Veterinary Parasitology, KVASU, Kerala, India*

ABSTRACT

Two hundred oribatid mites separated from the soil collected from the vicinity of the manure pits of Cattle and Goat farms under the Kerala Veterinary & Animal Sciences University, Mannuthy using Berlese apparatus. All the mites separated were identified upto family level as Mochlozetidae. On dissection of all the collected mites, one fully developed and an immature cysticercoid could be detected from only one mite.

Keywords: Oribatid mites, Dissection, Cysticercoid.

Contribution/ Originality

This study is one of very few studies which have investigated the role of intermediate host in spreading of cestodiasis. The infection status of intermediate host is the major risk factor for infection in definite host. So it is very important to know the prevalence of infection in intermediate host for taking proper control measures against the disease. Much work has not been done in this field so far. So this is a good initiative and work can be carried forward on a higher level.

1. INTRODUCTION

Cestodiasis is a widely prevalent condition in ruminants resulting in poor performance especially in young stock. It is caused mainly by tapeworms of the genus *Moniezia*, that parasitize the small intestine. The infection is manifested by digestive disturbances and emaciation especially in heavy infections of young stock. Oribatid mites ingest the eggs, which hatch and develop into cysticercoids in the haemocoel of the mite. As reported by Barbara, et al. [1]

† *Corresponding author*

ingestion of an infected mite by ruminants releases the cysticercoids, each of which can develop into an adult tapeworm in the small intestine of the definitive host [2]. *Moniezia expansa* is commonly affecting sheep and goats. *Moniezia benedeni*, more common in cattle, can also be found in sheep and goats. Sheep and goats serve as intermediate hosts for several other species of tapeworms [2]. Segments of moneizia can be seen in the feces of sheep and goats. They have a white, grain-like appearance. Adult worms, often up to a meter or more in length, can be expelled and passed in the environment. Eggs of *Moneizia* are triangular in shape [3]. Till date there is no much research works regarding the prevalence of oribatid mites infected with cysticercoids of *Moneizia* sp. in soil samples. This study includes examination of oribatid mites for cysticercoids of *Moneizia* sp. in soil samples collected from the vicinity of goat and cattle farms.

2. MATERIALS AND METHODS

2.1. Collection of Samples

Random soil samples were collected from the vicinity of the manure pits of Kerala Veterinary & Animal Sciences University cattle farm and goat farm for a period of two months (May and June). Soil along with the roots of the grass was collected in the morning hours between 6.00 to 7.00 am. The collected samples were transferred into polythene bags, labeled and tied loosely with a rubber band for transportation to laboratory as early as possible, for the purpose of extraction of mites. A total number of 420 soil samples could be collected from different places with a frequency of 7 samples per day.

2.2. Extraction of Mites

Mites were collected following the extraction principles of Berlese [4] and Tullgren [5]. The process of extraction was carried out in an Open glass funnel apparatus. Soil organisms including oribatid mites are highly sensitive to the intensity of light and heat in the environment and desiccation of soil in which they live. Majority of them are negatively phototropic and on exposure to heat and light, move away. This behaviour of soil animals is best utilized for their extraction from soil samples. Desiccation of soil samples by heat helped to drive the fauna from top to bottom and gradually out of the sample, through the sides of the funnel into the collecting vial.

2.3. Open Glass Funnel Apparatus

The sample container was a glass funnel with a diameter of 15cm. A suitably sized fine muslin cloth tied loosely to the mouth of the funnel acted as the base of the sample container in which the soil samples were placed. The funnel was inserted in a 200 ml glass cylinder containing 10 ml of 70 per cent alcohol. The heat source was provided with an electric bulb of 50 W at a distance of approximately 10 cm from the soil sample (Fig. 1). The combined effect of heat and light caused gradual desiccation of the soil sample, there by compelling the soil mites to come out

of the soil. The extracted mites were transferred into petri plates and sorted out using a fine needle and camel hair brush No.1 under a dissection microscope and the morphological characters were studied.

3. RESULTS AND CONCLUSION

A total of 200 oribatid mites collected were examined under a stereoscope dissection microscope (Fig. 2). All were of the family *Mochlozetidae* (Fig. 3). They are characterized by 14 pairs of notogastral setae and 5 to 6 pairs of genital setae combined with medially interrupted dorsosejugal suture [6]. All the oribatid mites were dissected. A fully developed and a developing cysticercoid were found in one oribatid mite (Fig.4 & 5) from the soil sample collected from goat farm. The cysticercoid was characterized as metacestode stage with a single non-invaginated scolex withdrawn into a small vesicle with practically no cavity, measuring about 124 µm in length and 94 µm in width. The developing cysticercoids measured 34 µm in length and 18 µm in width.

Moniezia spp. infections are usually non-pathogenic. Heavy infections have been linked to higher incidences of diarrhea, unthriftiness and enterotoxaemia. Oribatid mites are the intermediate hosts of *Moniezia* sp. Grandjean [6]. In the present work, out of the 200 mites collected, only one is found positive for cysticercoid, although most of the animals in cattle and goat farm were infected with *Moniezia*. Since the development of mites in the intermediate host is volume demanding, the number of cysticercoids per mite is limited and usually does not exceed one to three cysticercoids [7]. The present study also reveals a single mite infected with a developing and developed cysticercoids. The prevalence of infected mites in natural conditions is usually low and does not exceed 3% [7]. In our investigation, the rate of infection in mites is only 0.5%. This does not mean that the infection rate is less in animals. The low rate of infection in oribatid mites is attributed to high density of oribatid mites in soil [8], which results in the dilution of infection in mites, variation of infection rate in different species of oribatid mites [7] and change in infection rate with change in temperature [9]. The size of the mite [6]., structure of the mouth parts [10], habitat preference and behavior of the mites [11] are also the factors affecting the infection rate.

4. ACKNOWLEDGEMENTS

Authors are very thankful to Dean, College of Veterinary and Animal Sciences University for providing all the facilities for doing this work

REFERENCES

[1] M. F. Barbara, H. Schatz, and M. Maraun, "Community structure, trophic position and reproductive mode of soil and bark-living oribatid mites in an alpine grassland ecosystem," *Exp Appl Acarol*, vol. 52, pp. 221–237, 1998.

[2] E. J. L. Soulsby, *Helminthes, arthropods and protozoa of domesticated animals.* Bailliere: Tindall and Cassell, 1989.

[3] P. A. Howe, "Coccidiosis in goats," in *Proc. Refresher Course for Veterinarian, post Graduate Committee in Vet. Sci. University of Sydney*, 1980, pp. 285- 290.

[4] A. Berlese, "Apparecchio per raccogliere presto ed in gran numeropiccoliartropodi," *Redia*, vol. 2, pp. 85-89, 1905.

[5] A. Tullgren, "Einsehreinfacher ausleseapparat fur terricole tierformen. Z.," *Angew. Ent.*, vol. 4, pp. 149-150, 1918.

[6] F. Grandjean, "Les mochlozetidae n. fam. (Oribates)," *Acarologia*, vol. 2, pp. 101–148, 1960.

[7] H. G. Sengbusch, *Review of oribatid mites-anoplocephalan tapeworm relationships (Acari: Oribatei: Cestoda: Anoplocephalidae). In: Dindal, D.L. (Eds). Biology of oribatid mites.* Syracuse: State University of New York, 1977.

[8] R. Schuster, L. Coetzee, and J. F. Putterill, "Oribatid mites (Acari, Oribatida) as intermediate hosts of tapeworms of the family anoplocephalidae (Cestoda) and the transmission of monieziaexpansacysticercoids in South Africa," *Veterinary Research*, vol. 67, p. 47, 2000.

[9] D. Borcard and P. Legendre, "Environmental control and spatial structure in ecological communities: An example using oribatid mites (Acari, Oribatei)," *Environmental and Ecological Statistics*, vol. 1, pp. 37-61, 1994.

[10] M. J. Mitchell, "Effects of physical parameters and food resources on oribatid mites in forest soils. In: Rodriguez, J.G. (Eds)," *Recent Advances in Acarology*, vol. 1, pp. 585-592, 1979.

[11] J. Caley, "Ultrastructural studies of the cysticercoid of moniezia expansa (Anoplocephalidae) with special reference to the development of the cyst," *Zeitschriftfür Parasitenkunde*, vol. 38, pp. 251-262, 1975.

Figures

Fig-1. Open Glass Funnel Apparatus

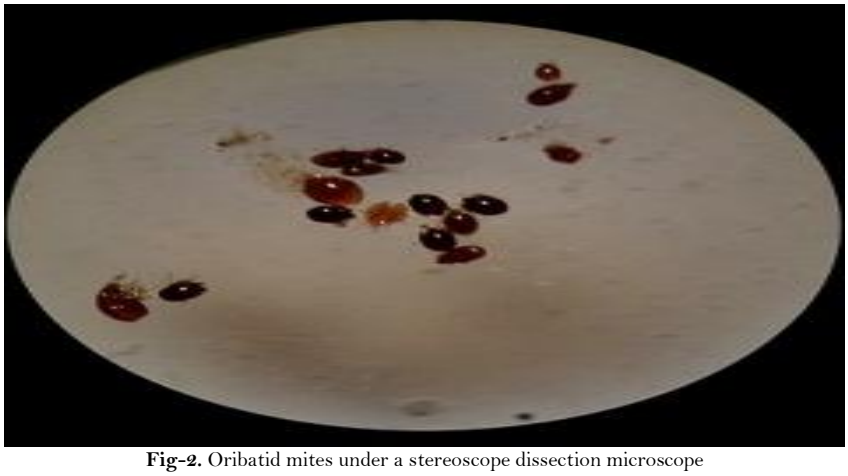

Fig-2. Oribatid mites under a stereoscope dissection microscope

Fig-3. Mites of family *Mochlozetidae*

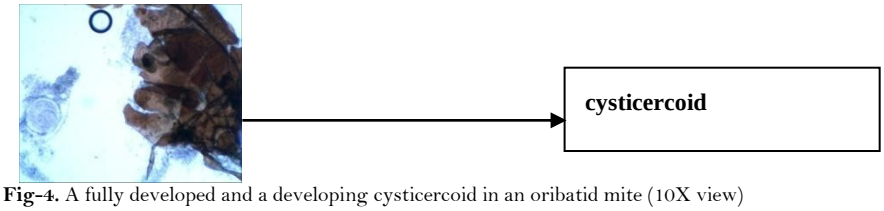

Fig-4. A fully developed and a developing cysticercoid in an oribatid mite (10X view)

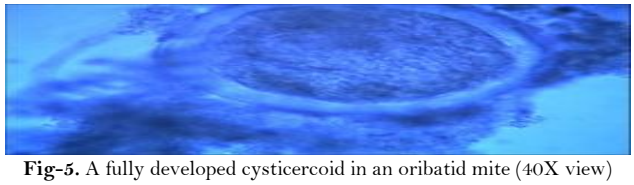

Fig-5. A fully developed cysticercoid in an oribatid mite (40X view)