

OCCURENCE OF PARAMPHISTOMIDAE (TREMATODA: DIGENEA) IN SMALL RUMINANTS IN SPREAD BELGRADE AREA

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Abstract

Today, breeding of small flocks of sheep and goats has increased on Belgrade area. Alongwith the increasing number of flocks the interest in examination of their health status increased as well. A study about occurrence of Paramphistomidae trematodes in small ruminants at spread Belgrade area was conducted. During the period from March 2009 to January 2010 a total of 91 flocks of goats ($n = 22$) and sheep ($n = 69$), from 6 Belgrade districts, were examined. Paramphistomidae parasites were found in 7 out of 67 goats (prevalence of 10.44%) and 12 out of 89 sheep (prevalence of 13.48%) examined by necropsy. After histological examination, the paramphistome trematodes were identified as *Paramphistomum cervi*. *P.cervi* has been previously found in sheep and cattle in Serbia, but this is the first report of *P.cervi* in goats.

Key words: Paramphistomidae, small ruminants, *Paramphistomum cervi*, Belgrade area

INTRODUCTION

Urban and peri-urban livestock keeping has been hailed as a source of livelihood by some households in cities around the world (Mireri et al 2007, Pavlovic et al.2012). With the limited grazing spaces, urban farmers have opted for animals which require less space such as small ruminants and pigs.

Further, the breeding of small ruminants (goats and sheep) increased during last decade on Belgrade area, too. They are usually kept under extensive conditions and graze or brows on any land that is not being cultivated (Pavlovic et al. 2009).

In pasture breed condition helminth infections are common especially during late spring and autumn months (Pavlovic et al. 2012, Zugic 2012) Research of goats and sheep parasites were performed sporadically in the last 20 years in Serbia and little is known about this topic. Most of the research related to gastrointestinal and lung helminth infections (Pavlovic et al. 2010b, 2011a).

For this reason, the aim of our study was to investigate the occurrence of platyhelminths infection with special care to the platyhelminths

of genus *Paramphistomum* (Digenea: Paramphistomidae) at spread Belgrade area.

MATERIALS AND METHODS

The study about helminths of small ruminant at spread Belgrade area was conducted from March 2009 to January 2010. During the study, we examined a total of 91 flocks of goats and sheep from 6 Belgrade districts.

A total of 67 goats and 89 sheep we were analyzed by post-mortem examination.

The paramphistomes parasites recovered from animals were fixed in 10% buffered formalin and prepare to histological examination

Selected parasites were embedded in paraffin, sectioned medio-sagittal to 5-6 micrometers, and stained with hematoxylin-eosin.

Identification of these flukes was originally based on morphological criteria established by Nasmark (1937). These criteria were later revised by Eduardo (1982a). Identification is based on the morphology of the acetabulum, pharynx, terminal genitalium, tegumental papillae, and internal organs of flukes.

RESULTS

At post-mortem examination of 67 goats and 89 sheep, *Paramphistomum* specimens were found at 10.44% (7/67) goats and 13.48% (12/89) sheep. Number of mature parasites found in sheep was 223 to 850 and 74 to 282 in goats.

The largest number of adult parasites was found in the rumen and, to a lesser extent in the omasum and reticulum.

Young parasites were found in all animals attached in a brownish-pink cluster in the mucosa of the duodenum, just distal to the pylorus, with the wall and folds so thickened that the intestinal lumen was almost completely occluded. Erosions and minor hemorrhages were visible in the mucosa, and the intestinal content was discoloured red. The serosa was reddened, blood vessels enlarged and prominent. Within the pale areas there were irregular patches upto 1mm in diameter

At the primary site of infestation, the rumen, destruction of the papillae was detected, as well as hyperplasia of the epithelium and inflammatory reaction with the lymphocytes, similar to that described by Singh et al (1984), Pavlovic et al. (2007) and Seck et al. (2007).

Determination of species we performed based the morphological characteristic as observed of acetabulum and the genital atrium at histological cuts of parasites.

The acetabulum was examined for determination of genera and the genital atrium and acetabulum for determination of *Paramphistomidae* species. The dorsal part of the acetabulum was characteristic. The dorsal circular muscle was divided into two parts, the dorsal exterior circular muscle series 1 and the dorsal exterior circular muscle series 2. These circular muscle layers are used for the determination of the genus *Paramphistomum*. The ventral exterior circular muscle series, the ventral interior circular muscle series, the radial muscle fibers, the external longitudinal and median circular muscle series of the acetabulum specifically identified the parasites as *P.cervi* (Vujic 1965, Vishnyakov 1980).

According to Eduardo (1982a) the body surface of *P. cervi* is lacking tegumental papillae, the genital opening of *P. cervi* is of gracile type. According to the literature, the genital atrium of *P. cervi* is located at the level of the

posterior part of the esophagus (Willmoth, 1950), which is more posterior than in flukes studied by us. The genital atrium of *P. cervi* is located at the level of the posterior part of the esophagus and the absence of tegumental papillae observed in *P. cervi* is just a normal morphological variation seen in one species. These entire morphological characteristic we occurred during our determination of occurred paramphistomides to concluded that was *Paramphistomum cervi*.

DISCUSSIONS

Although infections with trematodes are less frequent, related to gastrointestinal helminths, they can also cause serious health problems, including fasciolosis and distomatosis (Pavlovic et al., 2007). Paramphistomiasis is a seldom-reported plathyhelminth infection in ruminants (Horak 1971, Silvestre et al. 2000). The development of *Paramphistomum* sp. includes an intermediate host - a snail of the genus *Bulinus* (Soulsby 1977). After the ingestion of the metacercaria by the final host, the development is completed after the passage through the rumen, abomasum, and small intestine (Vujic, 1965).

The prepatent period is 8 week in cattle and 10 week in sheep (Rangel-Ruiz et al., 2003) and under normal conditions, the complete infection cycle takes 3-4 month.

The disease is characterized by sporadic epizootics with acute parasitic gastroenteritis, followed by high morbidity and mortality of predominantly young animals (Seck et al., 2007).

Infections of paramphistomes are worldwide spread, especially at Africa countries and East Asia (Sissay et al., 2007, Seck et al., 2007). In Southern and Eastern Europe, the species *Paramphistomum microbothrium*, *P. cervi* and *P. ichikawai* (Horak, 1971, Kotrla and Kotrla 1982, Vishnyakov, 1980, Silvestre et al., 2000) have been recorded in domestic and wild ruminants. In Serbia, *P.cervi* has been found in sheep and cattle, *P.microbothrium* has been found in sheep and cattle as well as in deer and red deer (Vujic and Petrovic, 1971, Pavlovic et al., 2007, 2012a).

CONCLUSIONS

During a study performed in 2009-2010, we examined a total of 91 flocks of goats and sheep from 6 Belgrade districts at 10.44% (7/67) goats and 13.48% (12/89) sheep we occurred infection with paramphistomidae fluke. After histological determination, we concluded that occurred paramphistomes belonging to the species *Paramphistomum cervi*. This is the first report of *P.cervi* in goats in Serbia.

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REFERENCES

- Eduardo S. L., 1982a. The taxonomy of the family Paramphistomidae Fiscoeder, 1901 with special reference to the morphology of species occurring in ruminants. I. General considerations. Systematic Parasitology, 4, 7-57.
- Eduardo S. L., 1982b. The taxonomy of the family Paramphistomidae Fiscoeder, 1901 with special reference to the morphology of species occurring in ruminants. II. Revision of the genus Paramphistomum Fiscoeder, 1901. Systematic Parasitology, 4, 189-238.
- Fiscoeder F., 1901. Die Paramphistomiden der Saugeithiere. Zoologischer Anzeiger 24, 367-375.
- Horak I. G., 1971. Paramphistomosis of domesticated ruminants. In Advances in parasitology, Vol. 9. B. Davies (ed.). Academic Press, New York, New York, 33-72.
- Kotrla B., Kotrla A., 1982. The incidence of flukes of the genus Paramphistomum in Czechoslovakia. Veterinary Medicine (Praha) 27(8), 483-490.
- Mireri C., Atekyereza P., Kyessi A., Mushi N., 2007. Environmental risks of urban agriculture in the Lake Victoria drainage basin: A case of Kisumu municipality, Kenya. Habitat International, 31, 375-386.
- Nasmark K. E., 1937. Revision of the trematode family Paramphistomidae. Zoologiska Bidrag fran Uppsala, 16, 301-565.
- Pavlovic I., Ivetic V., Savic B., 2007. Occurrence of *Paramphistomum microbothrium* (Fiscoeder 1901) in deer (*Cervus elaphus*). Lucrari Stiintifice, 50, 601-602.
- Pavlovic I., Savic B., Ivetic V., Radanovic O., Zutic M., Jakic-Dimic D., Bojkovski J., 2009. The effect of parasitic infections to production results of sheep of IV Balkan Conference of Animal Science BALNIMALCON 2009, Challenges of the Balkan Animal industry and the Role of science and Cooperation., Stara Zagora, Bulgaria, Proceeding, 389-391.
- Pavlovic I., Andelic-Buzadzic G., 2010a. Osnovi dijagnostike parazitskih bolesti zivotinja za studente visoke poljoprivredne skole strukovnih studija u Sapeu studijski program: strukovna veterina. Naucni institut za veterinarstvo Srbije, Beograd.
- Pavlovic I., Ivanovic S., Zujovic M., Tomic Z. 2010b. Plucna strongilidoza koza. Zbornik naucnih radova Instituta PKB Agroekonomik, 16 (3-4), 171-177.
- Pavlovic, I., Knezevic, N., 2011. Nematode parasites of sheep in spread Belgrade area at measure to its contol 1 9th International Congress of Mediterranean federation of Health and Production of Ruminants, Beograd, Proceeding, 328-330.
- Pavlovic I., Savic B., Ivanovic S., Girovic D., 2012a. First occurrence of *Paramphistomum microbothrium* (Fiscoeder 1901) in roe deer (*Capreolus capreolus*) in Serbia. Journal of Wildlife Diseases 48(2), 520-522.
- Pavlovic I., Ivanovic S., Zugic G., Jovic D., Bojkovski J., Pajic M. 2012b. Seasonal distribution of gastrointestinalhelminths of small ruminants in spread Belgrade area. Lucrari Stiintifice Medicina Veterinara Timisoara, XLV(3), 155-160.
- Seck M.T., Marchand B, Ba C.T. 2007. Etude histopathologique du rumen de bovins infestes par *Carmyerius marchandi* (Gastrothylacidae) et par *Paramphistomum microbothrium* (Paramphistomidae), dans la region sud du Senegal. Annales de Medeine Veterinaire, 151, 200-206.
- Silvestre A, Sauve C., Cabaret J., 2000. Caprine *Paramphistomum daubneyi* (Trematoda) infection in Europe. Veterinary Record, 146(23), 74-75.
- Singh R.P., Sahai B.N., Jha G.J. 1984. Histopathology of the duodenum and rumen of goats during experimental infections with *Paramphistomum cervi*. Veterinary Parasitology, 15(1), 39-46.
- Sissay M.M., Uggle A., Waller P.J., 2007. Prevalence and seasonal incidence of nematode parasites and fluke infections of sheep and goats in eastern Ethiopia. Tropic Animal Health Production, 39(7), 521-531.
- Soulsby L., 1977. Helminth, Atropods and protozoa of Domesticated Animals, Baillier, Tindall and Cassell ed. London.
- Vishnyakov Yu. I., 1980. Differential diagnosis of paramphistome infections in ruminants. Doklady Vsesoyuzno i Akademii Selskhozayalstvenih Nauk imeni V. I. Lenin 6, Moscow.

- Vujic B., 1965. Paramphistomosis in ruminants and methods to its identification. Veterinaria, 14, 471-478.
- Vujic B., Petrovic Z., 1971. A contribution to the knowledge of paramphistomides in Yugoslavia and their determination. Premiere Multicolloque Europeen de Parasitologie. Rennes, France, Proceedings. 388-391.
- Willmoth S., 1950. On the species of *Paramphistomum* Fiscoeder, 1901 occuring in Britain and Ireland with notes on some material from the Netherlands and France. Journal of Helminthology, 24 (4), 155-170.
- Zugic G., 2012. Influence of ecological factors to season dynamic of gastrointestinal strongylidae of small ruminants at pasture in Belgrade area. PhD disertation, University „Singidunum” Faculty of Applied Ecology „Futura” Belgrade.