

LYME DISEASE – THE GREAT IMITATOR**

S. Savić-Jevđenić^{1*}, Ž. Grgić¹, B. Vidić¹, A. Petrović²

¹ Scientific Veterinary Institute "Novi Sad", Rumenački put 20, Novi Sad 2100, Serbia

² Faculty of Agriculture Novi Sad, Dositeja Obradovića Square, Novi Sad 21000, Serbia

* Corresponding author, e-mail: sara@niv.ns.ac.yu

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Abstract: Lyme disease, or *Lyme borreliosis* can occur in domestic animals and in people, with no characteristic symptoms. That is why Lyme disease is often diagnosed and treated as some other disease. Clinical symptoms of this disease are not specific and they can look like a number of different diseases, which is why the disease is called – the great imitator. The reservoirs of the disease are ticks *Ixodes ricinus*. During the research from 2005 to 2007 it was established that the prevalence with *Lyme borreliosis* exists within the tick population.

The objective of this paper is a survey of the presence of Lyme disease in different populations of different animal species (horses, cattle, sheep and dogs) in the region where the infection of ticks with *Borrelia burgdorferi* was established in the percentage of 25-28%.

The methods used were the ones for the determination of *Borrelia burgdorferi* in ticks, with a dark field microscopy, and also the presence of antibodies against *Borrelia burgdorferi* was determined with a complement fixation reaction, in the blood sera of horses, sheep, cattle and dogs.

As the result it was found that the cause of Lyme disease, *Borrelia burgdorferi* is constantly present within the tick population. In examined horses and cattle the presence of antibodies against *B. burgdorferi* was not found, while in sheep and dogs, the presence of antibodies was found.

Any seropositive animal, and also an infected tick, represents a danger for the human population and also for other animals, which are in the surrounding. Lyme disease is usually not mortal, but it can create a lot of problems leading to the decrease of production in domestic animals or an illness with clinical symptoms in humans, horses and dogs.

Key words: Lyme disease, ticks, *Lyme borreliosis*

Introduction

Lyme disease is the best known tick-borne disease. The cause is a spirochete, *Borrelia burgdorferi*, so it is often called *Lyme borreliosis*. The disease looks like a number of different diseases in humans and in animals and has no special clinical symptoms. In humans the illness usually looks like a flu, but it can be serious like *Alzheimer* disease. In animals the disease can look like a chronic arthritis, or fever. Without any therapy, in people, Lyme disease can cause the destruction of joints, it can create heart problems, and neurological complications, and in animals it can also cause the destruction of joints, heart and kidney problems.

In USA, infection with *B.burgdorferi*, or Lyme disease, was reported for the first time in Old Lyme, state Connecticut. In the year 1975. the disease was reported in 43 states. Lyme disease is not reported only in USA, but all over the world. (Rothwell *et al.* 1989).

In the literature the connection of the appearance of Lyme disease in animals, the infection of tick population with *B.burgdorferi* and the number of people with diagnosed *Lyme boreliosis* in a certain region was described.(Nicholson and Mather, 1996).

In our region, the transmission of Lyme disease is done by the *Ixodes ricinus* ticks. Tick larvae are usually fed on the rodents, especially mice. Nymphs are fed on all animals and usually are the most responsible for the spreading of the disease among animals and to humans. The biggest danger for humans and a great chance for the infection is cohabitation with animals which carry ticks. Direct infection among animals and from animals to humans is not possible. The most endangered animals by Lyme disease are dogs.

Positive serological findings have been reported in dogs, cats, horses and ruminants, but clinical symptoms were usually found in dogs and are very similar to those in humans – lameness, which goes from one leg to another, especially in the region of carpus or tarsus. There can also be joint swelling with painful and worm joints, kidney disorders and neurological problems. Symptoms can be seen up to 2 to 5 months after infection. Positive serological finding in domestic animals is not an indication for therapy, if there are no clinical symptoms. Ticks, small rodents and other vertebrates are natural reservoirs for *Borrelia burgdorferi*. In mice and rabbits, lesions in skin can be found.

The occurrence of Lyme disease is connected to season, meaning that it depends on tick population and their life cycle. Most frequently, the disease

appears in late spring and during the whole summer, when nymphs are active and animals and humans are often outside in the nature. For the transmission of *B.burgdorferi* from tick to the host, at least 24 hours are needed. Lyme disease can be transmitted by nymphs and adults. It is more often that nymphs transfer the infection, because they are small and can hardly be seen, especially in hairy animals, so it usually takes more than 24 hours to spot the nymph on the skin. Tick larvae rarely carry the infection.

In domestic animals (horses and cattle) the clinical symptoms can also be seen (*Burgess, 1988*) such as lameness and swelling joints, and also stiffness, laminitis, miscarriages and fever. Serologically positive animals do not always have clinical symptoms, which means that *B.burgdorferi* doesn't always have to cause the disease in domestic animals. There are subclinical cases of the disease, when there are no clinical symptoms, which makes the diagnostic process more complicated. The disease appears usually one month after the infection from ticks. In horses and cattle that had some clinical symptoms, with serology tests, the presence of *B.burgdorferi* was confirmed, the microorganism was isolated from the blood, synovial fluid, colostrum and urine.

Clinical symptoms of *Lyme borreliosis* in horses (*Parker and White, 1992; Butler et al., 2005; Madigan 1993*) are chronically weight loss, sporadic lameness, small increase of body temperature, swelling joints and anterior uveitis. Also neurological symptoms can occur (*Kristoferitsch, 1991*) such as depression, behavior changing, dysphasia and encephalitis, usually in the chronic form of the disease.

In cattle (*Stefanickova et al., 2002*) Lyme disease occurs usually as a heard disease. In acute form there can be increased body temperature, swelling joints and reduced milk production. Also a constant weight loss, lameness and miscarriage can be found.

In dogs, the symptoms of Lyme disease are (*Popović i sar., 1993*) inapetence, lethargy, lymphadenopathy, stiffness and pain in joints. Nonerosive arthritis is a sign that the illness has been going on for some time. As following symptom of Lyme disease in dogs, glomerulonephritis can be found with damaged tubules. In endemic regions atrioventricular heart blockade was found.

Sheep are often the source of the infection, for the ticks that feed on them, even though there are no clinical symptoms (*Ogden et al., 1997*). Three stages of *Ixodes ricinus* ticks are fed on the sheep – larva, nymphs and adults, and most of the times there are a lot of ticks present at the same time. In sheep and goats, the disease is mostly in chronic form, sub clinical or

without any symptoms at all. Sometimes the lameness is seen, arthritis with pain and constant small increase of body temperature (*Travniček et al.*, 2002).

Diagnostic of Lyme disease is complicated because the symptoms are not characteristic, so the diagnostics depend on the experience of the veterinarian and the possibility to recognize the disease. Final diagnostic can be done after serology tests. Serological methods (*Stefanickova et al.*, 2002, *Gall and Pfister*, 2006, *Chang et al.*, 2000) which can be used are ELISA, Western blot, complement fixation and molecular methods.

Material and methods

Material for the research were live ticks collected from the field and blood sera from domestic animals: horses, cattle, sheep and dogs. The ticks were collected during few seasons from 2005 to spring 2007. Blood samples from the animals were taken during the three spring months (march, April and may). Sera were separated from the blood, and they were kept adequately until the analysis was done. Blood samples were taken from 15 horses, 84 cattle, 201 sheep and 27 dogs.

The examination of ticks was done by dark field microscopy, for determination of the presence of spirochete *B.burgdorferi*.

The blood samples of animals were analyzed by a complement fixation reaction, for the presence of specific antibodies against *B.burgdorferi*. The reaction was done with a *Borrelia burgdorferi* antigen, Virion and 2% ram erythrocyte solution.

Results and discussion

By the examination of ticks with dark field microscopy for the presence of *B.burgdorferi*, it was established that 25-28% of tick population (depending on the location) is infected with *B.burgdorferi*, the cause of Lyme disease. Presence of *B.burgdorferi* is determined in nymphs and adult ticks.

From 15 horse blood samples, taken from different locations, not one was positive for the presence of specific antibodies against *B.burgdorferi*. Also in 84 cattle blood samples, not one was positive for the presence of specific antibodies against *B.burgdorferi*.

From 201 sheep blood samples, the presence of specific antibodies against *B.burgdorferi* was found in 67 samples.

From 27 dog blood samples, the presence of specific antibodies against *B.burgdorferi* was found in 8 samples. All the data are given in Table 1.

Table 1. The presence of *B.burgdorferi* in the tick population in 2007, in the region of Vojvodina

Total number of examined ticks in 2007	Number of positive ticks to <i>B.burgdorferi</i> - adults-	Number of positive ticks to <i>B.burgdorferi</i> – nymphs-	Percentage of positive ticks to <i>B.burgdorferi</i> – total -
250	12	53	26%

In sheep samples that gave positive result, there were no clinical symptoms in those sheep, no lameness or joint disorders. This means that sheep can be seropositive to *B.burgdorferi*, without any clinical symptoms, or indications that the animal has Lyme disease. These sheep can be the source of infection for the ticks that feed on them, and then the infected ticks spread the infection to other animals or humans. Seropositive sheep are primarily danger for the humans and dogs which are around them.

Table 2. Presence of specific antibodies against *B.burgdorferi* in blood samples of horses, cattle, sheep and dogs in 2007, in the Vojvodina region

Animal	Number of examined samples	Number of positive samples to <i>B.burgdorferi</i>	% of positive samples to <i>B.burgdorferi</i>
Horses	15	0	-
Cattle	84	0	-
Sheep	201	67	33
Dogs	27	8	30

In dogs that had seropositive reaction, it was noticed that they had difficulties while walking, joint swelling (in 2 dogs), lameness, and loss of will for walking. The appetite was unchanged in all of the dogs. Mostly the dogs were old, with a few episodes of tick bites.

Conclusion

After the research on tick population, it can be concluded that *B.burgdorferi*, as the cause of Lyme disease is present in the tick population in the region and in the percentage of 25-28%. After the examination of

blood samples of different animals, which can be in contact with ticks, it can be concluded that only among sheep and dog population there are seropositive animals. In sheep, with no regard to the fact that they were seropositive to Lyme disease, no clinical symptoms were found. In dogs, seropositive animals had clinical symptoms, and difficulty while walking was the most obvious one.

LAJMSKA BOLEST – VELIKI IMITATOR

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Rezime

Nakon višegodišnje analize krpelja u regionu Vojvodine, došlo se do zaključka da je Lajmska bolest definitivno prisutna u populaciji krpelja. Kao takva je i opasnost za domaće životinje i ljude ovog regiona. Bilo je i prijavljenih kliničkih slučajeva pasa, koji su dijagnostikovani kao Lajmska bolest. Iz tog razloga se sprovelo pilot istraživanje na različitim vrstama domaćih životinja, uključujući i pse, da bi se utvrdilo da li postoje seropozitivne životinje, ili ne i ako postoje, u kolikom procentu. Utvrđeno je da među pregledanim uzorcima konja i goveda nisu nadjene seropozitivne životinje. Broj pregledanih uzoraka je bio relativno mali za ove dve vrste životinja, tako da ne bi trebalo posmatrati ovaj podatak kao odraz sveukupne situacije. Među preglednim uzorcima krvi poreklom od ovaca i pasa, pronađen je određen broj seropozitivnih životinja. Kod seropozitivnih ovaca nisu primećeni klinički simptomi, dok kod pasa jesu i uglavnom je to bilo otežano kretanje. Može se zaključiti da ovce kao najčešći domaćini krpelja mogu da predstavljaju i izvor infekcije za njih, s obzirom da imaju imunološki odgovor na uzročnika, a nema kliničkih simptoma. Dok su psi vrsta koja može da oboli od Lajmske bolesti, sa simptomima koji su slični onima koji se mogu javiti i kod ljudi.

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