

The current situation of Lyme borreliosis and the first seroepidemiology survey in dogs in Albania

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Abstract

Lyme borreliosis is the most prevalent vector borne disease in Europe with *Borrelia burgdorferi* sensu lato as a causative zoonotic pathogen.

During the period 2011-2015, at the Institute of Public Health in Tirana, Albania, the samples of suspected patients were diagnosed with serology technique-ELISA, as a primary diagnostic testing and 11 cases resulted positive with an average of 2.5 cases per year.

Immunoglobulin IgM alone or in combination with IgG was detected in 9 (81.8%) cases, whereas in 4 (36.4%) cases there was only IgG. Early manifestation with EM were registered in 27.3% (3/11) of the cases and late manifestations with only neurologic disorders (no arthritis or cardiac manifestations in combination with other conditions) were registered in 72.7% (8/11) of the cases. The most affected age-group included individuals aged 26-36 years (range: 17-68 years) and for the first time the disease was recorded in pediatric ages (7 years and 9 years old boys). Most of the cases 5 (45.5%) resulted from Tirana.

In retrospective, for the first time, during 1999-2000, a sero-epidemiological study was performed in 85 dogs from several parts in Albania. The IFA test was used for the diagnosis and 49.4% (42/85) [95%CI=38.3%-60.4%] of the dogs resulted seropositive. Positive dogs were mostly from rural areas. This is the first survey for the detection of antibodies regarding this infection in dogs in Albania. More studies are needed to have a more thorough representation of the situation, especially to determine the genospecies that circulate in Albania.

Keywords: Albania, dog, human, Lyme borreliosis, zoonosis.

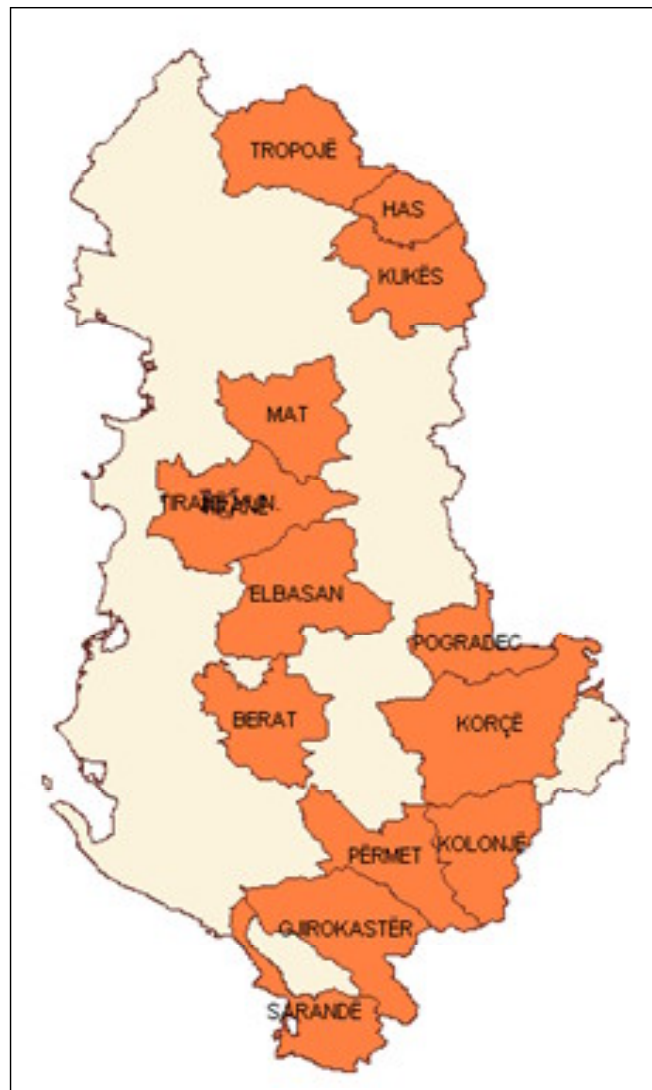
Introduction

In recent years there is an emergence and re-emergence of infectious diseases in many parts of the world and Lyme borreliosis is one of them. Lyme borreliosis is a vector borne zoonosis caused by the spirochete *Borrelia burgdorferi* sensu lato and transmitted by the infected ticks of *Ixodes ricinus*. *Borrelia burgdorferi* sensu lato species complex comprises at least 19 genospecies. In Europe are found five genospecies that are pathogenic to humans with a variety of clinical manifestations: *B. burgdorferi* sensu stricto, *B. afzelii*, *B. garinii*, *B.*

bavariensis and *B. spielmanii* (1).

Lyme borreliosis is the most prevalent vector borne disease in Europe and the incidence seems to increase from south to north (2-4). In Albania the first case of the disease in humans was registered in 1982 and up to 2015 there are 38 in total. Based on our literature, in the period of 1982-2007 there are registered 27 cases, with an average of 1 case/year. The range of the age-group is 18-67 years old and 3.7% are fatal cases (5). The first laboratory diagnosis of Lyme borreliosis was conducted in 1989. From 50 patients clinically suspected, 15 (30%) resulted positive

Figure 1. Distribution of *Ixodes ricinus*



with ELISA test. Apart the febrile condition presented in these patients, other symptoms are EM, neurological disorders/diseases; meningitis and facial paralysis (6). The tick vector *Ixodes ricinus* in Albania is found in Tropoja, Has, Kukës, Tirana, Kolonja, Përmet, Berat, Burrel, Elbasan, Korçë, Pogradec, Gjirokastër and Saranda (Figure 1) (7). No data exist about the genospecies that are circulating in Albania.

In retrospective, the preliminary data shows a seropositivity of 41.7% for Lyme borreliosis in dogs and a positive human case (8). The purpose of this study is to present a serosurvey in dogs in several parts in Albania and the current situation of Lyme borreliosis in humans.

Methods

Humans: The samples are all suspected patients by clinical physicians and diagnosed with commercial serology technique-ELISA as a primary diagnostic testing following the protocol of the kit. A questionnaire completion was performed for each suspected patient, containing the demographic data, travel information, tick bite information, clinical signs and symptoms related to the disease. A Lyme borreliosis case definition is applied in our laboratory.

Dogs: During 1999-2000, blood samples from 85 dogs of different ages and breeds, were randomly collected. The samples mainly 66 (77.6%) come from

During 2011-2015, a total of 11 cases have resulted positive, with an average of 2.5 case/year. A total of 10 patients were admitted to hospital. One patient which was diagnosed with EM; no need to admit to hospital. No deaths were registered. The most affected age-group is 26-36 years (range 17-68 years old). Two cases, 7 and 9 years old boys are registered in pediatric age in 2014 and 2013 respectively. 6 (54.5%) cases are male and 5 (45.5%) are female. In 27.3% (3/11) of the cases we have early manifestation with EM and 72.7% (8/11) of the cases show late manifestation including neurologic disorders. No arthritis or cardiac manifestations in combination with other conditions as clinical signs and symptoms of Lyme borreliosis, were suspected by clinical physicians. The first choice test, ELISA detected specific immunoglobulin IgM only or in combination with IgG in 9 (81.8%) of the cases and in 4 (36.4%) were only IgG. A total of 5 (45.5%) come from Tirana, but one of them referred to get the disease with EM manifestation, during his traveling in Llogara/Vlora. In Dibër, Durrës, Kukës, Lezhë, Shkodër and Fier are registered 1 case each.

Dogs

A total 42 (49.4%) 95%CI (38.3 - 60.4) out of 85 dogs were seropositive for *Borrelia garinii*.

We found seropositive dogs in 11 out of 13 study areas (Table 1).

Table 1. Positive dogs according to district's area

District's area	No. of dog tested	IFAT (%)
Tirana (urban)	26	11 (12.9)
Allias	1	1 (1.17)
Kashar	7	3 (3.5)
Laprakë	1	0 (0.0)
Linzë	1	1 (1.17)
Petrelë	14	7 (8.24)
Shkozë	1	1 (1.17)
Selitë	1	0 (0.0)
Tufinë	10	8 (9.5)
Vorë	4	1 (1.17)
Lushnje	1	1 (1.17)
Durrës	17	7 (8.24)
Saranda	1	1 (1.17)
Total	85	42 (49.4)

The age-group 0-3 years old is the most affected with the higher seroprevalence 27 (31.8%) of the total. Most of the seropositive dogs presented antibodies in the threshold titre 1:128 followed by 11 in 1:256 and 6 in the titre 1:512 (Table 2).

Table 2. Borrelia garinii positive dogs according to age and titre

Age group (years)	No. of dogs tested	No. of positive dogs at the given titre			Total N (%)
		1: 128	1 : 256	1:512	
0-3	54	13	8	6	27 (31.8)
4-6	18	8	2	0	10 (11.8)
7-9	10	2	1	0	3 (3.5)
> 9	3	2	0	0	2 (2.3)
Total	85	25	11	6	42 (49.4)

Local breed with 30.6% (26/85) is more affected followed by German shepherd 15 (17.6%) and only 1 (1.2%) is of Doberman breed (Table 3). Male: female ratio is 1.6:1.

Table 3. Positive cases according to dog's breed

Dog's breed	No of dogs tested	IFAT (%)
Local	59	26 (30.6)
Dachshund	1	0 (0.0)
Terrier	3	0 (0.0)
German shepherd	20	15 (17.6)
Doberman	1	1 (1.2)
Rottweiler	1	0 (0.0)
Total	85	42 (49.4)

Positive dogs were mostly from rural areas.

Discussion

A clinical sign as erythema migrans is an indicator for diagnosis and there is no need of tests for antibodies detection. Suspected patients by clinical physicians are diagnosed in the laboratory with the first choice test – ELISA, which is recommended to be used both in primary care and in more specialized and reference laboratories (3). Only 3 (27.3%) out of the 11 cases show early manifestation with EM. Taking in consideration that about 60-80% of the LB cases occur in early manifestation with a predominated skin rash- Erythema migrans (2,4) and the rest is late manifestation where up to 12% exhibit neuroborreliosis, it is

important to consider that in Albania the proportion of the disease could be much higher than it is reported in our study. Although there is no official case definition, laboratory confirmation of *Borrelia* infection is needed for all clinical manifestations, except for the early skin manifestations.

We have an increase since the first case registered in 1982. Only in the period of 2011-2015 there are 11 cases, with an average of 2.5 case/year compared with the period 1982 – 2010 where there were registered 27 cases with an average of 1 case/year.

For the first time the disease is recorded in pediatric age, in 7 and 9 years old boys. The most affected age-group was 26-36 years (range: 17-68 years old). These could be explained with the frequency

of outdoor activity and the degree of contact with the tick vector. No information on tick exposure is recorded and as we know, tick bite is a key indicator for *Borrelia* infection, which means the high prevalence in our study and the presence of *Ixodes ricinus* (7,9) in several part of Albania indicated for the existence of infected ticks. Reporting of Lyme borreliosis is not mandatory and there is no surveillance system in the country so this data does not represent the whole country. In retrospective, this is the first survey that shows the existence of antibodies for *Borrelia garinii* in

dogs in Albania. Depending on genospecies used, period, region, place, several serosurveys show the presence of antibodies anti-*Borrelia* with the seropositivity that varies from 0.4% in Spain (10), 1.47% in Italy (11), 4.9% in Germany (12), 6.5% in Czech Republic (13), and 24.7% in Serbia (14). In our survey 49.4% of dogs are found seropositive with antigen of *B. garinii* 1B 29 which is not a local isolated strain.

More studies are needed to have a more thorough representation of the situation, especially to determine the genospecies that circulate in Albania.

Conflicts of interest: None declared.

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