

*Faculty of Veterinary medicine Belgrade, University of Belgrade
Department of infectious animal diseases and diseases of bees
Section of zoonoses of Serbian Veterinary Association*

SECOND INTERNATIONAL EPIZOOTIOLOGY SYMPOSIUM

(XIV SERBIAN EPIZOOTIOLOGY DAYS)

PROCEEDINGS



Hotel "Srbija"

April 18-21st, 2012, Belgrade

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6. INCIDENCE OF LYME DISEASE IN HUMANS IN THE REGION OF AP VOJVODINA (SERBIA)

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Abstract

Lyme disease is a vector borne infection, caused by *Borrelia burgdorferi sensu lato complex*, from the family of *Spirochaetacea*. This complex consists of several *Borrelia* genotypes (13), but in some of them their pathogenicity for humans or/and domestic animals is still not confirmed. In Europe, Lyme disease can be caused by three similar *Borrelia*: *B. burgdorferi sensu stricto*, *B. garinii* and *B. afzelii*. Vectors for this disease are *Ixodidae* ticks. In USA, the main vector is *Ixodes scapularis* and *Ixodes pacificus*, in Europe *Ixodes ricinus* and in Asia *Ixodes persulcatus*. In humans, this disease is manifested by a wide range of different clinical symptoms. Some of them are characteristic (*eritema migrans*) and together with the data on tick bite can be enough for diagnosis. Research on Lyme disease in domestic animals has also been done. Mostly the studies have been done for dogs, because it most frequently occurs in dogs. Lameness, movement failure, arthritis and nephropathy are the most clinical manifestations in dogs, in the later stadium of the disease. Clinical symptoms can be seen in other domestic animals too, for example in horses, in which also lameness can be seen with movement difficulties.

The aim of this paper is to analyze the incidence of Lyme disease in Vojvodina, and demographic characteristics of the patients, based on the reported cases of this disease in humans.

Material and methods: Analysis is done based on the reported cases of Lyme disease in humans on the territory of AP of Vojvodina, in the period from 2002-2011. Descriptive method is applied. As indicators of frequency of this disease, relations, proportions and rates were used.

Results: During a 10 year period in the study, registered incidence of Lyme disease in Vojvodina is in the range from 8.1/100.000 (2005) to 14.5/100.000 (2009) and having it all in mind, the trend is growing. The largest number of patients with Lyme disease is registered from April to August, with maximum number of people with disease during May and June. The disease is registered in the whole territory of the province but the incidence rate is many times greater among the population of Southern Bačka district (26.2/100.000) compared to the other 6 districts in Vojvodina (2.8/100.000 – 6.9/100.000). The significance of Fruška Gora, as the focus of Lyme disease, confirms the data on the greatest incidence registered in the population of

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Beočin municipality (63.2/100.000). Demographic characteristics of the patients show that risk for Lyme disease exists for the persons of all ages and both genders. There is no difference registered among the rate of specific incidence in male (11.3/100.000) and female (10.7/100.000).

Conclusion: Foci for Lyme disease are widely spread in Vojvodina, but the risk of infection is the greatest for the human population living around Fruška Gora.

Key words: Lyme disease, humans, incidence

Introduction

Lyme disease is a vector borne infection, caused by *Borrelia burgdorferi sensu lato* complex, from the family of *Spirochaetacea*. This complex consists of several *Borrelia* genotypes (13), but in some of them their pathogenicity for humans or/and domestic animals is still not confirmed. In Europe, Lyme disease can be caused by three similar *Borrelia*: *B. burgdorferi sensu stricto*, *B. garinii* i *B. afzelii* (1,2). Genotype differences between these borrelia are responsible for different clinical manifestations of Lyme disease. *Borrelia afzelii* is most frequently manifested on the skin, *Borrelia burgdorferi* more frequently causes changes in joints and *Borrelia garinii* is more neurotropic (3).

Vectors for this disease are *Ixodide* ticks. In USA, the main vector is *Ixodes scapularis* and *Ixodes pacificus*, in Europe *Ixodes ricinus* and in Asia *Ixodes persulcatus* (4). The geographical distribution of Lyme disease foci is superimposed with the distribution of these vectors and the occurrence of the disease with their activity.

In humans, this disease is manifested by a wide range of different clinical symptoms. Some of them are characteristic (*eritema migrans*) and together with the data on tick bite can be enough for diagnosis. Research on Lyme disease in domestic animals has also been done. Mostly the studies have been done on dogs, because it most frequently occurs in dogs. Research on dogs with infected ticks on them can be used as a risk assessment indicator for the occurrence of Lyme disease in humans (5, 6). Lameness, movement failure, arthritis and nephropathy are the most clinical manifestations in dogs, in the later stadium of the disease. Clinical symptoms can be seen in other domestic animals too, for example in horses, in which also lameness can be seen with movement difficulties.

Aim of this paper is to analyze the incidence of Lyme disease in Vojvodina and demographic characteristics of the patients, based on the reported cases of this disease in humans.

Material and methods

Analysis is done based on the reported cases of Lyme disease in humans on the territory of AP of Vojvodina, in the period from 2002-2011. Descriptive method is applied. As indicators of frequency of this disease relation, proportions and rates were used.

Results During a 10 year period in the study, 2.239 cases of Lyme disease in humans were found. Registered incidence of Lyme disease in Vojvodina is in the range from

8.1/100.000 (2005) to 14.5/100.000 (2009) and having it all in mind; the trend is growing (Table 1).

Table 1. - Lyme disease in AP Vojvodina during the period from 2002 – 2011.

Year	No of cases	Incidence/10 ⁵
2002	195	9,6
2003	231	11,3
2004	209	10,3
2005	164	8,1
2006	180	8,9
2007	195	9,6
2008	244	12,0
2009	294	14,5
2010	289	14,2
2011	238	11,7

The largest number of patients with Lyme disease is registered from April to August, with maximum number of people with disease during May and June. The disease is registered in the whole territory of the province but the incidence rate is 4-9 times greater among the population of Southern Backa district (26,2/100.000) compared to the other 6 districts in Vojvodina (2.8/100.000 – 6.9/100.000) (Table 2).

Table 2. – Geographical distribution of Lyme disease in AP Vojvodina during the period 2002.-2011.

District	Total No of cases	Average incidence/10 ⁵
Južnobački	1557	26,2
Zapadnobački	148	6,9
Severnobački	104	5,2
Severnobanatski	85	5,1
Srednjobanatski	99	4,7
Sremski	158	4,7
Južnobanatski	88	2,8
Ukupno	2239	11,0

On the territory of all municipalities in Southern Bačka district and municipality Irig from Srem district, the incidence for Lyme disease is greater than the average values for the whole province. Based on the incidence found the greatest risk from Lyme disease is for the inhabitants in 9 municipalities, which are mostly located in Fruška Gora and beside the rivers (Tisa and Danube). The significance of Fruška Gora, as the focus of Lyme disease, confirms the data on the greatest incidence registered in the population of Beočin municipality (63.2/100.000) (Table 3).

Table 3.- Incidence of Lyme disease in some municipalities in AP Vojvodina during the period 2002-2011.

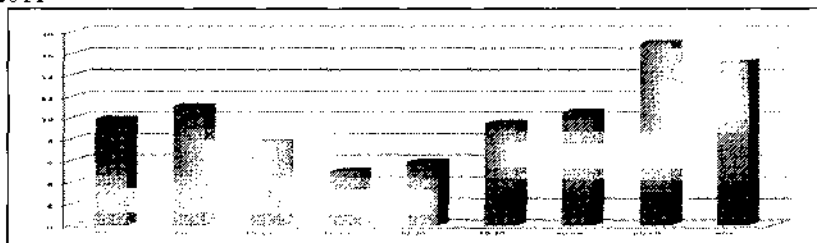
Municipality	Total No of cases	Average incidence/10 ⁵
Bač	44	27,1
Bačka Palanka	206	33,8
Beočin	102	63,4
Bečež	77	18,8
Žabalj	68	24,7
Temerin	54	19,1
Novi Sad	863	28,8
Sr.Karlovc	23	26,0
Irig	24	19,5

Demographic characteristics of the patients show that risk for Lyme disease exists for the persons of all ages and both genders. There is no difference registered among the rate of specific incidence in male (11.3/100.000) and female (10.7/100.000). A minor domination of males is only in the oldest age group, for which are specific incidence rates according to the gender in the ratio 1.2:1 (Table 4).

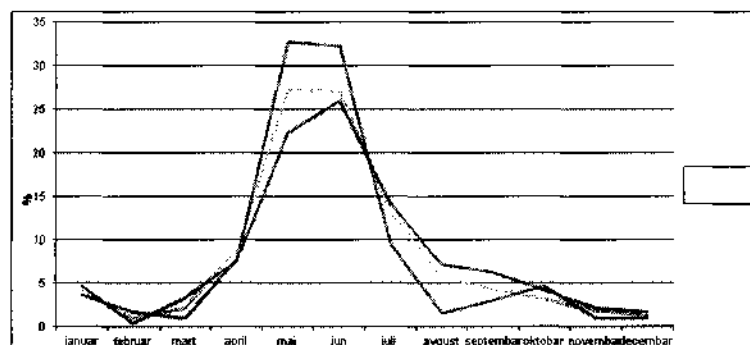
Table 4 – Specific incidence of Lyme disease in AP Vojvodina during the period 2002-2011.

Age	Gender	
	Male	Female
0-14	9,4	9,1
15-19	5,0	5,0
20-59	10,9	10,4
60+	16,8	14,0
Total	11,3	10,7

Age specific incidence has a bimodal distribution. The lowest is for age group from 15-19 and 20-29 years. In the younger age highest values are for children from 7-9 years old and in older people from 50-59 years old (Graph 1).

Graph 1 – Age specific incidence of Lyme disease in AP Vojvodina during the period 2002 – 2011

This disease has strongly seasonal nature. The highest number of sick people is registered from April until August, with the maximum number of patients in May and June, in which 54.4% of total number of patients for the studied period have been registered (Graph 2).



Graph 2. – Season distribution of Lyme disease in AP Vojvodina during the period 2002 – 2011

These two months represent the peak of the disease in every year of the studied period, yet the length of the disease season is different from year to year, due to the weather conditions.

Discussion

Global geographical distribution of Lyme disease is in correlation with the distribution of *Ixodidae* ticks. Foci of the disease are present in the region with a mild climate of North America and Eurasian countries, which is very friendly for a biological cycle of the vectors (7).

In USA Lyme disease is obligatory for reporting. During the period from 2000-2010, the number of registered cases was from 17.000 (in 2000 and 2001) to around 30.000 cases in 2009, when Lyme disease reached fifth place within the structure of diseases obligatory for reporting in our country (8). Although this disease is widely spread, there are significant differences in incidence. In 2010, registered incidence was 7,3/100.000, with the range from 0 to 73.1/100.000 in some countries and 94% of cases were reported in 12 countries, mostly from the eastern part of USA.

Surveillance system of Lyme disease in European countries is not compatible and agreed on, so the data cannot be compared directly. There are significant differences in the incidence of the disease and in the antibody prevalence between different countries and also between different regions within one country. Even with the insufficient data, the impression is that the incidence is higher in central and eastern parts of Europe than in the western countries and also in many European countries foci of this disease are being spread with the incidence increase (9).

Increase of the number of patients with Lyme disease is reported in the countries with low and high incidence. In GB during the last few years the incidence has grown four times, from 0.38/100.000 (2000) to 1.79/100.000 (2009) (10). In Slovenia,

Lyme disease is obligatory for reporting since 1988. During the nineties a growing trend was registered and a high incidence of over 100/100.000 (11). Today, this disease with the incidence from 308.7/100.000 (2009) and 244.1/100.000 (2010) is among the ten most frequent diseases obligatory for reporting (12).

In our country, in the period from 2006-2010, the number of reported cases of Lyme disease continuously increases, from 510 cases (in 2006) to 970 cases (in 2010) and the incidence rate is continuously lower in relation to the values registered in AP Vojvodina (13).

According to the geographical distribution of Lyme disease reported cases, it can be considered that the foci of this disease in Vojvodina are widely spread. The disease is registered in all districts, but the incidence in southern Backa district is 4-9 times higher than the values in other districts. Reported cases of Lyme disease in 9 municipalities, of which 8 are from the Southern Backa region and one from Srem (Irig) – represent 65% of all registered cases of Lyme disease in Vojvodina. The residents of municipality Beocin (Fruska Gora region) are exposed to the largest risk from Lyme disease, with the incidence of 63.4/100.000, indicating the significance of this region as a focus of Lyme disease.

Although all of the residents of infected regions are exposed to the risk of infection, demographic distribution of the patients in Vojvodina has a characteristic bimodal curve which is registered also in other countries (8, 14). High values of specific incidence in patients from 7-9 years old and increase of incidence for patients over 30 years is found in Vojvodina, with maximum values in the patients from 50-59 years old. The disease affects patients of both sexes equally, or with a minor domination of males or females (8, 12, 14). There is no difference among registered rate of specific incidence in male patients (11.3/100.000) and female patients (10,7/100.000) in Vojvodina, except in the oldest age group where a minor domination of male patients is registered.

This disease has a strong seasonal nature. The largest number of patients with *erythema migrans* is found in summer period when the activity of ticks and exposure of people for recreation or professionally, is greatest (8; 10). The increase of the number of patients is registered from April to August in Vojvodina, with the maximum number of patients in May and June.

Although Lyme disease in Vojvodina has a growing trend, there are oscillations in the number of patients and seasonal distribution, induced by climatic conditions. Global climate changes can have repercussions on the length of Lyme disease season and also on the incidence of the disease.

Conclusion

The increase of the number of Lyme disease patients shows that this disease will remain a significant problem for public health in Vojvodina for the future period.

Although the foci of Lyme disease in Vojvodina are widely spread, registered incidence shows that there are significant differences in the risk for residents of certain regions from infection.

The residents of one municipality in Fruška Gora are exposed to the highest risk from Lyme disease, because registered incidence there was 6 times higher compared to the incidence for Lyme disease in the rest of the province. This indicates to the significance of this region as a focus of Lyme disease.

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РАСПРОСТРАЊЕНОСТ ЛАЈМСКЕ БОЛЕСТИ КОД ЉУДИ
У АП ВОЈВОДИНИ (СРБИЈА)*

Шегуље З., Видић Б., Илић С., Савић С. Петровић В.

Кратак садржај

Лајмска болест је векторска природножаришна инфекција. Изазивају је *Borrelia burgdorferi sensu lato complex*, из фамилије *Spirochaetacea*. Овај комплекс чине више генотипова борелија (13), међутим за неке од њих још није утврђено да ли су патогени за људе и/или домаће животиње. У Европи, лајмску болест изазивају три сродне врсте борелија: *B. burgdorferi sensu stricto*, *B. garinii* и *B. afzelii*. Преносиоци обољења су иксодидни крпељи. У САД глави вектор је *Ixodes scapularis* и *Ixodes pacificus*, у Европи је *Ixodes ricinus* а у Азији *Ixodes persulcatus*. Код људи се ово обољење манифестује широким спектром клиничких манифестација. Неке од њих су тако карактеристичне (*erythema migrans*), да уз податак о убуду крпеља, могу бити довољне за постављање дијагнозе. Истраживања на тему лајмске болести код домаћих животиња су такође рађена. Обољење је најчешће и највише посматрано код паса, где су храмање, немогућност кретања, артритис и нефропатија најчешће клиничке манифестације у каснијем стадијуму обољења. Клинички симптоми се могу јавити и код других домаћих животиња, нпр код коње, код којих се такође јавља храмање и отежано кретање.

Циљ рада је да се на основу пријављених случајева лајмске болести код људи анализира распрострањеност жаришта ове зоонозе у Војводини и демографске карактеристике оболелих.

Материјал и метод рада: Анализа је направљена на основу пријављених случајева лајмске болести код људи на територији АП Војводине у периоду 2002-2011. година. Примењен је дескриптивни метод. За показатеље учесталости обог обољења су коришћени односи, пропорције и стопе.

Резултати: У посматраном десетогодишњем периоду регистрована инциденција лајмске болести у Војводини се налази у распону од 8,1/100.000 (2005) до 14,5/100.000 (2009) и у целини посматрано има растући тренд. Највећи број оболелих се региструје од априла до августа, са максималним бројем оболелих у мају и јуну. Ово обољење се региструје на подручју читаве Покрајине али је стопа инциденције вишеструко већа код становника Јужнобачког округа (26,2/100.000) у односу на осталих 6 округа у Војводини (2,8/100.000 - 6,9/100.000). О значају Фрушке Горе као жаришту лајмске болести, говори податак да је највећа инциденција регистрована код становника општине Беочин (63,2/100.000). Демографске карактеристике оболелих показују да су ризику од лајмске болести изложене особе свих узраста и оба пола. Нема разлике између регистроване стопе специфичне инциденције за особе мушког пола (11,3/100.000) и особе женског пола (10,7/100.000).

Закључак: Жаришта лајмске болести су у Војводини широко распрострањена али је ризик од инфекције највећи за становништво подручја која гравитирају Фрушкој Гори.

Кључне речи: лајмска болест, људи, инциденција