

LYME BORRELIOSIS AS A CURRENT HEALTH PROBLEM OF THE 21ST CENTURY

BORELIOZA Z LYME JAKO AKTUALNY PROBLEM ZDROWOTNY XXI WIEKU

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Wkład autorów:

- A. Study design/planning
zaplanowanie badań
- B. Data collection/entry
zebranie danych
- C. Data analysis/statistics
dane – analiza i statystyki
- D. Data interpretation
interpretacja danych
- E. Preparation of manuscript
przygotowanie artykułu
- F. Literature analysis/search
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- G. Funds collection
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Summary

The aim of the paper is to present the current epidemiological situation of Lyme borreliosis in Poland as compared to the past years, with particular regard to Lublin Province. According to the Department of Epidemiology, Laboratory of Monitoring and Epidemiological Analysis, the National Institute of Public Health – National Institute of Hygiene (NIPH – NIH), the number of cases of Lyme borreliosis reported for surveillance has increased significantly in the past three years. In 2016, the number stood at 21 220, i.e. 36% more than in 2015. The assessment of safety and sanitation standards conducted by State Sanitary Inspection for the year 2015 in Lublin Province showed that the incidence of Lyme borreliosis was 50.9 and that it was higher than the incidence in Poland – 35.4. Lyme borreliosis is a serious epidemiological and clinical problem in occupational risk groups, i.e. people working in agriculture, forestry and hunting. In serological surveys carried out in Lublin Province in the years 2011-2014, there was a much higher percentage of positive results in workers of several forest inspectorates than in those doing physical work related to forest exploitation (41.0%), as compared to the administrative staff (21.4%).

Keywords: Lyme borreliosis, Lublin Province, *Borrelia burgdorferi*

Streszczenie

Celem pracy jest przedstawienie sytuacji epidemiologicznej boreliozy z Lyme w Polsce ze szczególnym uwzględnieniem województwa lubelskiego w porównaniu do sytuacji w minionych latach.

Według danych Zakładu Epidemiologii Pracowni Monitorowania i Analizy Sytuacji Epidemiologicznej Narodowego Instytutu Zdrowia Publicznego - Państwowego Zakładu Higieny liczba przypadków zgłoszonych do nadzoru w ciągu ostatnich 3 lat znacznie wzrosła. W 2016 roku liczba przypadków boreliozy z Lyme wynosiła 21 220, tj. 36% więcej niż w roku 2015. Przeprowadzona przez Państwową Inspekcję Sanitarną ocena stanu bezpieczeństwa sanitarnego województwa lubelskiego za rok 2015 pokazała, że zapadalność na boreliozę z Lyme wyniosła 50,9 i była wyższa niż zapadalność w Polsce – 35,4. Borelioza z Lyme stanowi poważny problem epidemiologiczny i kliniczny u osób z grup ryzyka zawodowego, tj. osób wykonujących prace w sektorze rolnictwa, leśnictwa i łowiectwa. W badaniach serologicznych przeprowadzonych na terenie województwa lubelskiego w latach 2011-2014 wśród pracowników kilku nadleśnictw stwierdzono znacznie wyższe odsetki wyników pozytywnych niż u osób wykonujących prace fizyczne związane z eksploatacją lasu (41,0%) w stosunku do pracowników administracyjnych (21,4%).

Słowa kluczowe: borelioza z Lyme, województwo lubelskie, *Borrelia burgdorferi*

Introduction

Lyme borreliosis is an infectious bacterial disease transmitted by ticks *Ixodes ricinus*. It is a multifocal inflammatory disease that affects joints, skin, heart muscle and nervous system. The problems in finding a fast and accurate diagnosis are due to the diversity of the clinical picture and difficulty in detecting the etiological agent, i.e. *Borrelia burgdorferi* spirochaete. Presently, the genospecies of *B. burgdorferi* sensu stricto, *B. garinii*, *B. afzelii*, *B. valaisiana* as well as *B. lusitaniae* and *B. spielmanii* are considered to be the cause of the disease in Eastern Europe. In Poland, the infection most often occurs in the north-eastern part of the country, largely in summer months (about 80% of the cases) – from May to November, when ticks are most active. It is forestry workers and farmers who are particularly vulnerable to getting infected with *B. burgdorferi*, as they belong to occupational risk groups. Ticks, which are spirochetes vectors, are predominantly found in forest areas, meadows, fields, forest and field boundaries, water reservoirs and plots [1,2,3,4].

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Aim of the study

The aim of the following paper is to illustrate the present epidemiological situation of Lyme borreliosis in Poland, with particular reference to Lublin Province, as compared to the situation in the past years.

Epidemiological situation of Lyme borreliosis in Poland

The epidemiological situation of Lyme borreliosis was assessed on the basis of the information on infectious diseases and intoxication in Poland in the years 2015, 2016 and 2017. The data were prepared and provided by the Department of Epidemiology, Laboratory of Monitoring and Epidemiological Analysis, the National Institute of Public Health – National Institute of Hygiene. The figures for Lublin Province were assessed on the basis of health policy programmes implemented by regional Self-government in the years 2016-2021 as well as an assessment of the health status of Lublin Province for the year 2015.

According to the above, the number of Lyme borreliosis cases reported for surveillance in the past three years has increased significantly. In 2015, 13,625 cases were recorded. Compared to 2014, where the number amounted to 13 870, a 2% decrease in the number of cases was observed. Unfortunately, further data were not so optimistic because the number of cases in 2016 grew to 21 220, i.e. 36% more than in 2015. The table below (Table 1) shows the number of cases and the incidence per 100 thousand population for the years 2014 - 2016 in Poland [5].

Table 1. Number of Lyme borreliosis cases and incidence per 100 thousand population in the years 2014 - 2016 in Poland

Medical category according to ICD-10	2014		2015		2016	
	Number of cases	Incidence per 100 thousand population	Number of cases	Incidence per 100 thousand population	Number of cases	Incidence per 100 thousand population
Lyme borreliosis	13 870	36,04	13 625	35,4	21 220	55,22

The incidence in 2014 was 36.04 per 100 thousand population and it was higher than in 2015 – 35.4. On the other hand, a sharp increase in incidence occurred in 2016, as it grew to 55.22 per 100 thousand population. The recent data show that the upward trend is most likely to continue. According to the Department of Epidemiology (NIPH – NIH), between 01.01.2017 and 15.04.2017, the number of cases of Lyme borreliosis stood at 4133. In comparison, in the same period of the previous year, 2,632 cases were registered [5].

The assessment of safety and sanitation standards conducted by the State Sanitary Inspection for the year 2015 in Lublin province showed that the incidence of Lyme borreliosis was 50.9 and that it was higher than the incidence in Poland – 35.4. Most cases were reported in the following counties: Tomaszów - 136, Biała Podlaska - 125, Lublin - 111, Kraśnik - 92. Further, the highest incidence in 100 thousand population was noted in the counties: Włodawa - 169.8, Tomaszów - 157.4, Parczew - 125.7, Kraśnik - 93.7 [6].

Table 2. Number of Lyme borreliosis cases and incidence for 100 thousand population in the years 2014 - 2015 in Lublin Province

Disease category according to ICD-10	2014		2015	
	Number of cases	Incidence per 100 thousand population	Number of cases	Incidence per 100 thousand population.
Lyme disease	855	39,7	1094	50,9

In 2014, 855 cases of Lyme borreliosis were recorded, at the incidence of 39.7. More than 29 of them were classified as occupational diseases. Out of the 855 cases, 143 (16.7%) of the patients were hospitalized. Lublin Province is one of those with the highest incidence of Lyme borreliosis after the following provinces: Podlaskie, Lesser Poland, Warmia-Masuria, Opolskie, Silesia and Subcarpathia [1].

Lyme borreliosis is a serious epidemiological and clinical problem in occupational risk groups; that is people working in agriculture, forestry and hunting. The serological surveys conducted in Lublin Province in the years 2011-2014 showed a much higher percentage of positive results among workers of several forest inspectorates than in those performing physical work related to forest exploitation (41.0%), as compared to the administrative staff (21.4%). Similar studies conducted among farmers in Lublin Province confirmed the occurrence of high rates of seropositive results in this group. *Borrelia burgdorferi* antigens were found in 33.0% of the examined persons. Comparing these results to the ones obtained in the previous years, one can observe that the incidence of Lyme borreliosis in farmers shows an upward trend [1,7,8].

Clinical manifestations of Lyme borreliosis and diagnosing the infection

The diagnosis of Lyme borreliosis is based on the criteria recommended by European Concerted Action on Lyme Borreliosis (EUCALB), the Centres for Disease Control and Prevention (CDC) in the USA and the Polish Society of Epidemiology and Infectious Diseases. The criteria include the following: [9]

1. Early stage:
 - a. localised
 - Erythema migrans,
 - Borrelial lymphocytoma,
 - b. disseminated
 - Multiple erythema migrans,
 - Lyme neuroborreliosis,
 - Lyme carditis,
 - Lyme arthritis.
2. Late stage:
 - a. Acrodermatitis chronica atrophicans,
 - b. Lyme arthritis,
 - c. Chronic neurosis.

Erythema migrans is a migrating erythema, pink-red in colour and not lifting the skin, with a diameter of more than 5 cm. It occurs most often within a month of the tick bite. The possible symptoms associated with the dissemination of spirochetes in the body include: fever, muscle aches, joints aches, headaches, lymphadenopathy and stiffness of the neck. A skin change and a reported tick bite should suffice to implement treatment. In order to confirm the diagnosis, the spirochete DNA could be detected by PCR or cultured [3,10,11].

Borrelial lymphocytoma is a rare form of Lyme borreliosis. It occurs in 2% of the patients in the form of a non-painful bulge, usually on the ear, nipple or scrotum. It tends to appear 2 months after infection, more often in children. A serological test for the presence of anti-*Borrelia burgdorferi* antibodies (seroconversion from the negative result to the positive one) should be performed. Additional diagnostics include histological examination – detection of spirochetes by culture and / or PCR from skin biopsy [2,3,11,12].

Lyme neuroborreliosis is the most common form of Lyme borreliosis. At the early stage, it may manifest itself as cranial nerve paralysis, most often of the facial nerve, which may be accompanied by inflammatory changes in the cerebrospinal fluid. In the late stage, neuroborreliosis can result in an inflammation of the brain and spinal cord. To diagnose the disease, it is significant to identify neurological symptoms. These include the presence of pleocytosis as well as intraventricular synthesis of anti-*Borrelia burgdorferi* antibodies. On the other hand, a possible diagnosis of neuroborreliosis can be established if at least two of the following three criteria are met: peripheral neuropathy develops, atrophic dermatitis on the legs occurs and *B. burgdorferi* antibodies are presents [2,3,11].

Lyme carditis is a complication of Lyme borreliosis that occurs in its early, disseminated phase, approximately 21 days after infection. It is characterized by an acute onset and atrioventricular conduction disorders. It more often affects men than women and rarely leads to myocarditis, pericarditis, a benign myocardial infarction or chronic congestive cardiomyopathy. Inflammatory myocarditis is caused by *B. burgdorferi* spirochetes; however, the prognosis is good as the disorders abate in more than 90% of the patients after treatment [3, 11].

Lyme arthritis is characterized by recurrent or persistent joint swelling of one or more large joints. Most often, it does not involve joint erosion. During the routine diagnosis, anti-*Borrelia burgdorferi* titre is evaluated, as joint fluid, culture or PCR from synovial fluid or periarticular tissue are rarely examined [2,3,11,13].

Acrodermatitis chronica atrophicans is a long-lasting redness and skin thinning on the distal parts of the limbs. It occurs a few or more years after infection (mean after 10 years). It is a chronic, long-term, usually progressive disease especially in elderly patients, more common in women. There may also appear skin lesions on the face and torso. Sometimes, the symptoms are accompanied by pain, itching and paraesthesia. The

diagnosis uses elevated levels of anti-*Borrelia burgdorferi* IgG antibodies, histological examination – detection of spirochetes in culture and / or PCR from skin biopsy [3,12,11].

Treatment

What is important in the treatment of Lyme disease is eliminating spirochetes by antibiotics. According to European standards and EBM (Evidence-Based Medicine), the length of treatment duration is from 10 to 28 days. Then, it is vital to reduce of the risk of inflammation with non-steroidal anti-inflammatory drugs and provide rehabilitation in the early and late stages of the disease [8,11,14].

Prevention

First-degree prophylaxis plays a significant role in the treatment of Lyme borreliosis, because no specific vaccination that would prevent it exists at the moment. It is essential for a person at risk to avoid risk factors as well as gain the necessary education, knowledge and awareness. Actions involve avoiding being bitten by wearing appropriate dressing and using repellents. In addition, a proper rapid removal of the tick lessens the risk of infection because the transmission of bacteria occurs after at least 24 hours of feeding. A tick that has been incorrectly removed, when its interior was in contact with a bite wound, significantly increases the risk of infection. It should not be squeezed, treated with chemicals or torn. Accordingly, while taking preventive measures it is essential to reliably assess the risk of disease and educate the prospective patients [1,3,11,15].

Summary and conclusions

Lyme borreliosis is now a major challenge in treatment and prevention. It is caused by varied antigenic species of the bacteria, changes in antigen expression during infection as well as antigenic variation of individual antigens. In addition, an accurate diagnosis is difficult to obtain due to maintaining a long-term immune response, a lack of standardized tests, and no unambiguous test for active disease [13,15].

In 2016, the number of cases and incidence of Lyme borreliosis in Poland rose sharply. Compared to the previous year, a 36% increase in morbidity was noted. There is therefore a great need for health education in society; a need for implementing prevention programmes and screening in order to increase detection of the disease in the early stage and significantly reduce the number of complications associated with its development.

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