

Epidemiology of Lyme disease among workers of forest inspectorates in Poland

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Abstract

Introduction. Lyme disease (*Lyme borreliosis*, LB) is a systemic tick-borne disease. Its symptoms include dermatological changes and systemic manifestations such as musculoskeletal, neurologic, and cardiac. The etiologic agent of LB is a spirochete known as *Borrelia burgdorferi* (B.b.) with rodents and small mammals as its animal reservoir. In Poland, there are approximately 9–10 cases of the disease per 100,000 inhabitants each year.

Objective. Analysis of the incidence of Lyme borreliosis and the clinical picture of the disease among foresters.

Material and methods. The research material consisted of data collected in a diagnostic survey conducted by use of a survey questionnaire method. The study involved 100 randomly selected workers of the forest inspectorate in Podkarpackie Voivodeship. Group I consisted of men between 30–45 years old with an average length of service of 14 years (48%); group II consisted of men between 45–55 years old with an average length of service of 24 years (52%).

Results. Only 25% of the foresters from the first group, younger in age and with shorter service, had never been bitten by a tick, while 60% were bitten once, and 15% had been repeatedly bitten. In the second group, older in age and with longer service, only 3% had never been bitten by a tick, 35% were bitten once, while 62% had been repeatedly bitten. LB was diagnosed in 30% of the research participants from the first group and in 45% from the second group. Most frequently, LB was diagnosed as a result of the presence of erythema migrans (55%), ELISA test (20%), and Western Blot test (22%). The most frequent symptoms among the participants were: erythema migrans (45%), fever and shivers (35%), muscle pain and cramps (15%), other symptoms (5%). Permanent presence of symptoms was reported by 70% of the participants, 25% experienced symptoms periodically, and 5% only sporadically.

Conclusions. LB occurs more frequently among foresters older in age and with longer service (45%); in the younger group – 30%. Despite knowledge on preventive methods, there is no effective preventive method for this disease.

Key words

Lyme disease, foresters diseases, epidemiology

INTRODUCTION

Lyme disease (*Lyme borreliosis*, LB) is a systemic tick-borne disease. Its symptoms include dermatological changes and systemic manifestations such as musculoskeletal, neurologic, and cardiac [1]. The etiologic agent of LB is a spirochete known as *Borrelia burgdorferi* (B.b.) and its animal reservoir are rodents and small mammals. Symptoms of the disease are noticed in humans and domesticated animals, such as breeding animals or cats and dogs [2]. Disease occurrence in endemic areas is related to geographic occurrence of the Ixodes tick. In this case, the highest incidence is reported in north-eastern USA, Central Europe, Scandinavia, and Russia [3]. In Poland, such endemic areas are Białowieża and Podlaskie Voivodeships, as well as the Masuria and Suwałki Regions. Climate change, mild winters, migration of animals and other factors are the reason why the whole of Poland should be regarded today as an endemic area of the disease. There have even been reported cases of tick bites and infections during walks in city parks [3]. In Poland, there are approximately 9–10 cases of the disease per 100,000 inhabitants each year. If one takes into consideration misdiagnoses and false negative test results, lack of symptoms

or the ignoring of them, as well as non-reporting of all cases of the disease, one has to conclude that the number of infections may be even ten times higher than shown by the official statistics [4]. As far as geographical range of the disease is concerned, LB occurs throughout the whole of Poland. A broad-based research on the spreading of ticks infected with *B. burgdorferi*, including more than 20,000 ticks gathered in more than 100 posts in 10 Voivodeships in 1993–2001, showed that tick prevalence ranged from 6–15% in the studied Voivodeships, including equally both rural areas and city parks [5].

OBJECTIVE

The aim of the study was to analyze the incidence of LB and the clinical picture of the disease among foresters.

MATERIALS AND METHOD

The study involved 100 randomly selected workers of the forest inspectorate in Podkarpackie Voivodeship. Group I consisted of men between 30–45 years old with an average length of service of 14 years (48%); group II consisted of men between 45–55 years old with an average length of service of 24 years (52%).

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The research material consisted of data collected in a diagnostic survey conducted by use of a survey questionnaire method.

RESULTS

Only 25% of the foresters from the first group, younger in age and with shorter service, had never been bitten by a tick, while 60% were bitten once, and 15% had been repeatedly bitten. In the second group, older in age and with longer service, only 3% had never been bitten by a tick, 35% were bitten once, while 62% had been repeatedly bitten. LB was diagnosed in 30% of the research participants from the first group and in 45% from the second group. Most frequently, LB was diagnosed as a result of the presence of erythema migrans (55%), ELISA test (20%), and Western Blot test (22%), while on the basis of other symptoms, LB was diagnosed in 3% of the sufferers. The most frequent symptoms among the participants were erythema migrans (45%), fever and shivers (35%), muscle pain and cramps (15%), other symptoms (5%). Permanent presence of symptoms was reported by 70% of the participants, 25% experienced symptoms periodically, and 5% only sporadically.

The research additionally concerned evaluation of knowledge on tick bites prevention among the foresters surveyed. As many as 97% of the foresters claimed that they know all the bite-prevention methods, while 3% were not familiar with all of them. In the first group, 75% of the surveyed wear protective clothing, and 55% conduct a regular self-inspection after work. In the second group, 55% wear proper clothing to prevent tick bites, and 40% conduct a regular self-inspection after work. The great majority of the participants (60%) have never suffered from any other tick-borne infection or disease, while 34% stated that they suffered from such infections, and 6% did not remember such an incident.

During LB treatment, 40% of patients reported substantial mood improvement as a result of the treatment, 38% reported slight mood improvement 7% did not report positive treatment results, while 15% reported deterioration in mood. As many as 65% of LB sufferers regard the treatment as positive, 8% as negative, and 27% as neutral.

DISCUSSION

According to the WHO, Europe is an endemic area as far as LB occurrence is concerned. The incidence of LB ranges from several to more than 100 cases per 100,000 inhabitants [6]. There may also occur differences between various regions within one country. In Slovakia, the infection rate ranges from 8%-22.5%. In Germany, 17.9% of infections were reported, 9.3% in Spain, and 16% in Norway. 18% of infected ticks were reported in the USA and 12.9% in Canada [7].

The first information on Lyme disease in Poland appeared in 1986. Since then, many data relating to the epidemiology and clinical picture of this disease in some regions of Poland have appeared in Polish literature [5]. The research conducted in Poland has proved the prevalence of characteristic antibodies in 60–70% of workers in the region of Białowieża, 71% in the Krkonoše Mountains, and 23% in the Lublin Region [6]. Such high rate of infected ticks is

reflected in the results of serological surveys conducted on humans, particularly foresters, who are exposed to parasites due to their profession. The percentage of the occurrence of antibodies against *Borrelia burgdorferi* in foresters' blood serum, at times reaches up to several dozen percent, e.g. 43.2% in south-east Poland, 66.7% in Lower Silesia, and from 35%-61.9% in the region of the West Pomeranian Voivodeship. In other countries, the percentage of foresters and other workers highly exposed to tick bites and who have antibodies against *B. burgdorferi* antigens, is diversified and reaches 30% in Germany, 12.8% in Slovakia, and 7.5% in Italy [7].

In the research by Dybowska et al., (2007), the frequency of the occurrence of serologic indicators of B.b. infection was nearly 33%, ranging from about 14% in the Lutówko forest inspectorate to 48.2% in forest inspectorate in Szubin. This indicates the irregular occurrence of ticks infected with Lyme disease in the Kuyavian-Pomeranian Voivodeship [6]. What is more, Pancewicz (2003) claims that the highest incidence of LB is found to occur in people who work in forests. According to his research conducted in the Podlaskie Voivodeship, the percentage of infected workers of forest inspectorates increased from 23.81% in 1995 to 38.55% in 1997, and up to 43.56% in 2000 [8]. LB was diagnosed in 30% of participants with shorter service and in 45% with longer service. No correlation between length of service and the frequency of occurrence of serologic indicators of infection was noticed ($p=0.64$). Similar observations were made by Dybowska et al., as well as by Niścigorska [6,9].

60% of the surveyed from the first group in the presented study had been bitten once, while 15% had been repeatedly bitten. In the second group, 35% had been bitten once, while 62% had been repeatedly bitten. According to Dybowska et al., (2007), among those participants with characteristic antibodies, there were 4 who were bitten only once. The others admitted that they had been repeatedly bitten by ticks. These observations are in accordance with the data described in the literature [6, 8, 9, 10].

The most frequent symptoms among the participants were erythema migrans (45%), fever and shivers (35%), muscle pain and cramps (15%). The permanent presence of symptoms was reported by 70% of the participants, 25% experienced symptoms periodically, and 5% only sporadically. Dybowska et al. (2007) have proved that only somewhat more than 20% of the surveyed experienced LB symptoms. In these cases, the most frequent symptoms were erythema migrans and Lyme arthritis [6]. In the research by Pancewicz (2003), 43% of the sufferers experienced changes affecting the joints, and in 31% the nervous system was affected [8].

In the research by Wójcik-Falta et al. (2009), among cases of systemic LB, about 7% of the sufferers admitted that they noticed skin changes that resembled erythema migrans and did not reported them to the physician. Among systemic LB sufferers, 5% suffered from changes in joints (inflammatory joint effusion), while 56% suffered from non-specific muscle and joint pain. Meningitis was diagnosed in 2% of the analyzed cases, and facial nerve paralysis was experienced by 2% of the patients [7].

CONCLUSIONS

1. Not every tick-bitten forester suffers from LB.
2. LB occurs more frequently among foresters older in age and with longer service (45%); in the younger group – 30%.
3. Despite knowledge on prevention methods, there is no effective prevention method for this disease.

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