

STUDY REGARDING THE EVOLUTION OF LYME DISEASE MONITORED IN OLTENIA, FOR THREE YEARS, FROM 2010 TO 2012

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Abstract. Lyme disease (Lyme borreliosis) is an infectious disease caused by *Borrelia burgdorferi*, a spirochaeta transmitted to the human being through the bite of the infected ticks. The main vector to spread the disease is the ticks of the genus *Ixodes*. At the human being, the disease occurs as a result of prolonged parasitization by infected ticks. The name of the disease is given by the name of Lyme city from Connecticut, United States of America, where in 1975, a group of children were diagnosed with juvenile rheumatoid arthritis. The pathogen was discovered in 1982 by the American microbiologist Willy Burgdorfer, who succeeded to identify a spirochaeta in a species of ticks. This spirochete was named *Borrelia burgdorferi sensu stricto* and the disease produced by it, Lyme disease, an infectious disease which supposes a multi systemic affection. Lyme borreliosis also present in Romania, is a part of the transmissible diseases under surveillance. The three time increasing, in 2010, of the Lyme disease in Romania, compared to 2009, determined the introduction of Lyme disease record by the National Center for the Prevention and Control of Transmissible Diseases Bucharest in order to obtain epidemiologic information that, analysed, should allow a better understanding and recommendation of measures for public health. The epidemiologic analysis regarding Lyme disease in Oltenia was realised in 2010-2012 period. From 2010 to 2012, the number of Lyme disease cases progressively increased. The highest number of the Lyme disease confirmed cases was recorded in 2012.

Keywords: Lyme disease, vector, spirochaeta, epidemiologic analysis, confirmed cases.

Rezumat. Studiu privind evoluția cazurilor de boală Lyme aflate în supraveghere în Oltenia, în perioada 2010-2012. Boala Lyme (borrelioza Lyme) este o boală infecțioasă produsă de *Borrelia burgdorferi*, o spirochetă, care se transmite la om prin mușcătura căpușelor infectate. Principalul vector de transmitere al bolii îl reprezintă căpușele din genul *Ixodes*. La om, boala se produce ca urmare a parazitării prelungite de către căpușele infectate. Numele bolii este dat de localitatea Lyme din Connecticut, Statele Unite ale Americii, unde în anul 1975, un grup de copii au fost diagnosticați cu artrită reumatoidă juvenilă. Agentul patogen a fost descoperit în anul 1982, de către microbiologul american Willy Burgdorfer, care a reușit să identifice o spirochetă, într-o specie de căpușă. Această spirochetă a fost denumită *Borrelia burgdorferi sensu stricto*, iar afecțiunea produsă de ea, boala Lyme, o boală infecțioasă ce presupune o afectare multisistemică. Borrelioza Lyme prezintă și în România, face parte din categoria bolilor transmisibile aflate în supraveghere. Creșterea de 3 ori, în anul 2010, a incidenței bolii Lyme în România, comparativ cu anul 2009, a determinat introducerea de către Centrul Național pentru Prevenirea și Controlul Bolilor Transmisibile București a *Fișei de supraveghere a cazului de Boală Lyme*, pentru a obține informații epidemiologice care analizate să permită o înțelegere mai corectă și recomandarea de măsuri de sănătate publică. Analiza epidemiologică privind cazurile de boală Lyme luate în supraveghere din Oltenia este realizată pentru o perioadă de trei ani, 2010-2012. În perioada 2010-2012 numărul de cazuri de boală Lyme intrate în supraveghere în Oltenia a crescut progresiv, concomitent crescând și numărul de cazuri de boală Lyme confirmate în Oltenia. Cel mai mare număr de cazuri de boală Lyme confirmate în Oltenia, s-a înregistrat în anul 2012.

Cuvinte cheie: boala Lyme, vector, spirochetă, analiză epidemiologică, cazuri confirmate.

INTRODUCTION

Lyme disease (Lyme borreliosis) is an infectious disease produced by *Borrelia burgdorferi*, a spirochaeta transmitted to the human being through the infected ticks. The main vector to transmit the disease is represented by the ticks of the genus *Ixodes* (WHITE, 2005). The infestation with *Borrelia burgdorferi* is got by the immature ticks from *Ixodes ricinus* complex from the source represented by small infected mammals, the responsible cycle for sustaining this disease in the nature (WHITE, 2005).

At the human being, the disease is produced as a consequence of a prolong parasitization of the infected ticks from the vegetation or from pets. Lyme borreliosis is considered to have the greatest prevalence in the diseases transmitted by ticks in the world and it is considered to be the most common disease with vectorial transmission from North America and Eurasia (CIOLPAN, 2008).

The name of the disease is given by Lyme city from Connecticut, United States of America, where a group of children were diagnosed in the same time with juvenile rheumatoid arthritis. As a consequence, the clinic, medical, epidemiologic and ecologic researches were deepen. The disease cases were predominantly recorded in summer and in the beginning of fall. In some families, more members were affected, but the beginning of the disease was in different years, that started the idea of a vector as the transmission of the disease (WHITE, 2005). The pathogen was discovered in 1982 by the American microbiologist Willy Burgdorfer that succeeded to identify a spirochete in a tick species. This was named *Borrelia burgdorferi sensu stricto* and the disease was named Lyme. After that, they noticed that the borrelioses are a larger group of spirochaeta and they were named *Borrelia burgdorferi sensu lato* - a complex of genospecies. The *B. burgdorferi* complex is spread in the United States of America, *B. afzelii* and *B. garinii* in Europe (CODREANU-BĂLCESCU & CODREANU, 2010).

In Romania, there are approximately 25 species from the genus *Ixodes* (VLADIMIRESCU, 2012). The incriminated vector in transmitting the Lyme borreliosis is *Ixodes ricinus* tick. This tick is largely spread in Romania (VLADIMIRESCU, 2012). Lyme disease is an infectious disease that supposes a multisystemic affectation. In spreading the disease a series of factors are involved: global warming, urbanization and other human factors - the expansion of the suburban neighborhoods, deforestation, the increase of the contact limits with huge densities of ticks (CODREANU-BĂLCESCU & CODREANU, 2010).

Lyme borreliosis, also present in Romania, is a part of the transmissible diseases under surveillance - diseases spread through vectors. According to The Report for the year 2009, The Analysis of the Transmissible Diseases Evolution, realised by the National Institute for Public Health, the National Center for the Surveillance and Control of Transmissible Diseases, along 2009, 146 cases of possible Lyme disease were reported according to HG 589/2009 and introduced in the Unique Register. From these, 64 were confirmed, 43 were classified as probable, and the rest of 39 were disproved. The classification of the cases was done according to The Monitoring Methodology of Lyme disease.

The three times increase, in 2010 of Lyme disease cases in Romania, compared to the previous year, determined the introduction of Lyme disease record by the National Center for the Prevention and Control of Transmissible Diseases Bucharest, in order to obtain epidemiologic information which, once analysed, should allow a better understanding and recommendation of public health measures.

As a consequence of the personal researches regarding Lyme disease cases in Dolj County, on one side, as well as the cases appeared in Oltenia, compared to the ones reported at the national level, we realized this study. The epidemiologic analysis regarding Lyme disease cases supervised in Oltenia is realized for the period 2010-2012, in two stages: the first one for the 2010-2012 period and the second stage, 2013-2016 period.

MATERIAL AND METHODS

The used data for this analysis are extracted from the yearly Reports regarding The Analysis of the transmissible Supervised Diseases Evolution from 2010-2012 period and Lyme disease - The descriptive epidemiologic analysis of Lyme disease supervised for 2010-2012 period, realized by the National Institute for Public Health Romania/National Center of the Surveillance and Control of Transmissible Diseases. The data extracted were registered in tables. The data processing was done through mathematic methods and the graphs were realized using Microsoft Excel.

RESULTS AND DISCUSSIONS

Stage I. The analysis of the supervised Lyme diseases cases in Oltenia in the period 2010-2012.

The analysis of Lyme disease cases in Oltenia (2010).

In Oltenia, seven cases of Lyme disease were supervised, their distribution on counties being given in the table below (Table 1).

Table1. Lyme disease cases supervised in the five counties of Oltenia (2010).

Counties	Confirmed	Infirmid	Probable	Suspected/possible	Total
Dolj	1	1	0	0	2
Gorj	1	0	0	0	1
Mehedinți	2	0	0	0	2
Olt	0	1	0	0	1
Vâlcea	1	0	0	0	1
Total	5	2	0	0	7

According to *The 2010 Year Report, The Analysis of the supervised transmissible diseases evolution*, realised by the National Institute for Public Health, The National Center for the Surveillance and Control of Transmissible Diseases, at national level, 556 cases of Lyme disease were supervised, thus classified: 263 confirmed cases, 222 disproved, 51 probable cases and 30 suspected cases. The incidence of the disease in the year 2010 (confirmed plus probable cases) was 1.5 ‰, three times higher compared to the year 2009 (0.5 ‰).

The reporting of the cases from Oltenia, supervised in 2010, compared to the cases at the national level (2010) reveals the following aspects: supervised cases: 1.23% from the cases at the national level; confirmed cases: 1.90% from the cases at the national level; infirmed cases: 0.76% from the cases at the national level. The final classification of Lyme diseases, in Oltenia, for 2010, is presented in the graph below (Fig. 1):

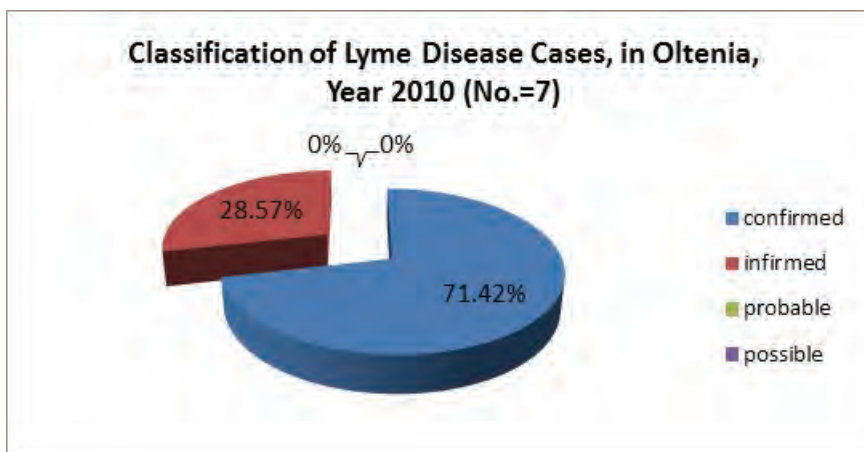


Figure 1. The state of the Lyme disease cases supervised in Oltenia (2010).

Analysis of Lyme disease cases in Oltenia (2011).

In 2011, 20 cases of Lyme disease were supervised, 10 cases being confirmed. Their distribution on counties is given in the table below (Table 2).

Table 2. Lyme disease cases supervised in Oltenia (2011).

Counties	Confirmed	Infirmed	Probable	Suspected//possible	Total
Dolj	2	6	0	-	8
Gorj	3	0	0	-	3
Mehedinți	0	1	0	-	1
Olt	1	1	1	-	3
Vâlcea	4	0	1	-	5
Total	10	8	2	-	20

In Romania, according to *The Year 2011 Report, The Analysis of the Supervised Transmissible Diseases evolution*, realised by the National Institute for Public Health, National Center of the Surveillance and Control of Transmissible Diseases, in 2011, 861 cases of Lyme disease were supervised and classified, 52% more than in the previous year. The cases were thus classified: 354 confirmed, 432 disproved, 75 probable. At the national level, the number of the confirmed cases increased with 34.6% compared to 2010 and the probable ones with 47%. The total reported cases at the National Center of Statistics and Informatics in Public Health (429) increased with 36.6%. The incidence at the national level was 2‰.

The analyses of the cases supervised in Oltenia in 2011, compared to the ones at the national level in 2011 emphasize the following situation: supervised cases: 2.32 % from the cases at the national level; confirmed cases: 2.82 % from the cases at the national level; infirmed cases: 1.82 % from the cases at the national level; probable cases: 2.66 % from the cases at the national level. The final classification of Lyme disease cases, in Oltenia for 2011, is presented in the above graph (Fig. 2).

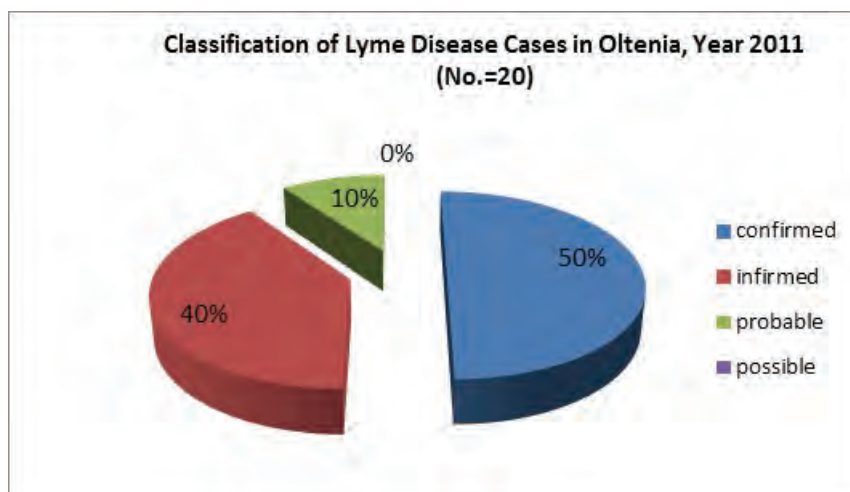


Figure 2. The state of the Lyme disease cases supervised in Oltenia (2011).

The Analysis of Lyme disease in Oltenia (2012).

In 2012, 72 cases were supervised in Oltenia, 21 cases being confirmed. Their distribution on counties is given in the table below (Table 3).

Table 3. Lyme disease cases supervised in Oltenia (2012).

No.	Counties	Confirmed	Infirm	Probable	Suspected/possible	Total
1.	Dolj	2	0	0	-	2
2.	Gorj	3	8	1	-	12
3.	Mehedinți	0	0	0	-	0
4.	Olt	8	39	3	-	50
5.	Vâlcea	8	0	0	-	8
	Total	21	47	4	-	72

According to *The Year 2012 Report, The Analysis of the Supervised Transmissible Diseases evolution*, realised by the National Institute for Public Health, National Center of the Surveillance and Control of Transmissible Diseases, in 2012, 1,762 cases of Lyme disease were supervised and classified, two times more than in the previous year (861). The cases were thus classified: 698 confirmed cases, 873 infirmed cases, 191 probable cases. The number of the confirmed cases doubled and the number of the probable ones is 2.5 times higher compared to 2011. The total number of the reported cases at the National Center of Statistics and Informatics in Public Health (889) doubled compared to the previous year. The incidence at the national level was 4.16%, double compared to the previous year (2 %).

In 2012, in Oltenia, 72 cases of Lyme disease were supervised, being the highest number recorded in 2010-2012 period. From the analysis of Lyme disease supervised cases in Oltenia compared to those supervised at the national level, in 2012, some aspects are pointed out: supervised cases: 4.08 % from the cases at the national level; confirmed cases: 3% from the ones at the national level; infirmed cases: 5.38% from the ones at the national level; probable cases: 2.09 % from the ones at the national level.

The final classification of Lyme disease cases, in Oltenia for 2012, is presented in the graph below (Fig. 3):

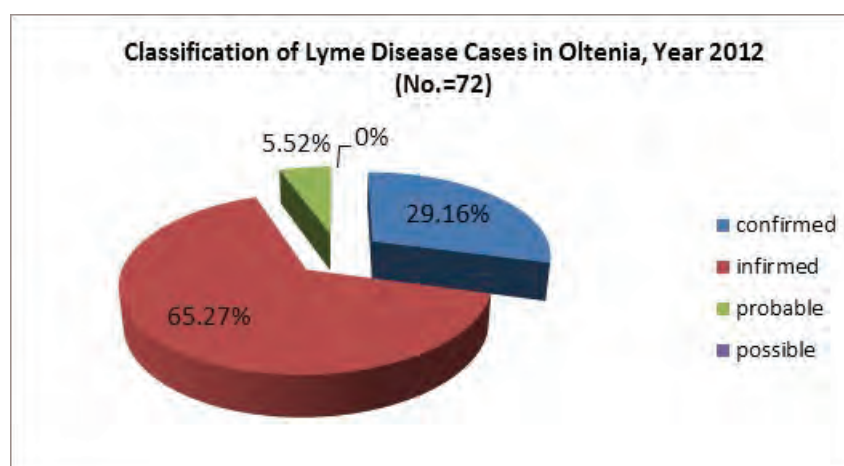


Figure 3. The state of the supervised Lyme disease cases in Oltenia (2012).

The analysis of the supervised Lyme disease in Oltenia, in 2010-2012 period is presented in the below table (Table 4, Fig. 4), in which all the cases of Lyme disease are recorded, along the three years: confirmed cases, infirmed cases, probable and suspected ones. It is to be noticed a progressive increase of Lyme disease cases in this period.

Table 4. Lyme disease cases supervised in Oltenia in 2010-2012 period.

Years	Confirmed	Infirm	Probable	Suspected	Total
2010	5	2	0	-	7
2011	10	8	2	-	20
2012	21	47	4	-	72
Total	36	57	6	-	99

Analyzing the recorded data, we notice the fact that the number of the supervised Lyme disease in Oltenia in 2011 is 2.85 times higher than in 2010 and the number of the supervised Lyme disease in 2012 is 3.6 time higher than in 2011.

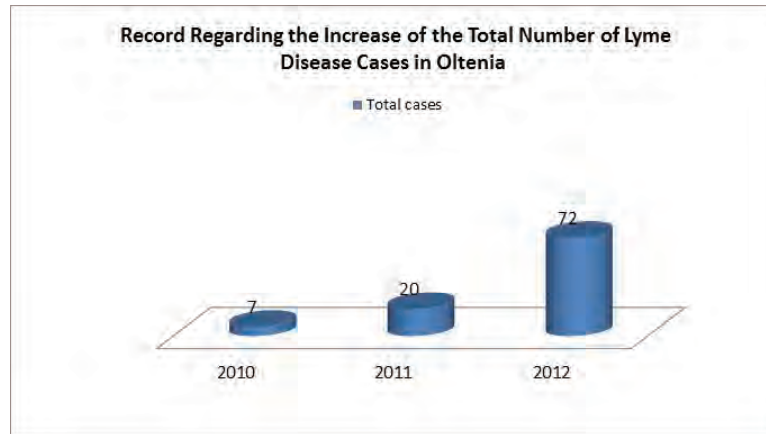


Figure 4. The supervised number of Lyme disease evolution in Oltenia (2010-2012).

From the analysis of the graphs in Figs. 5 and 6, an increase of the confirmed cases and also of the total supervised cases is noticed in Oltenia in the years 2010, 2011 and 2012.

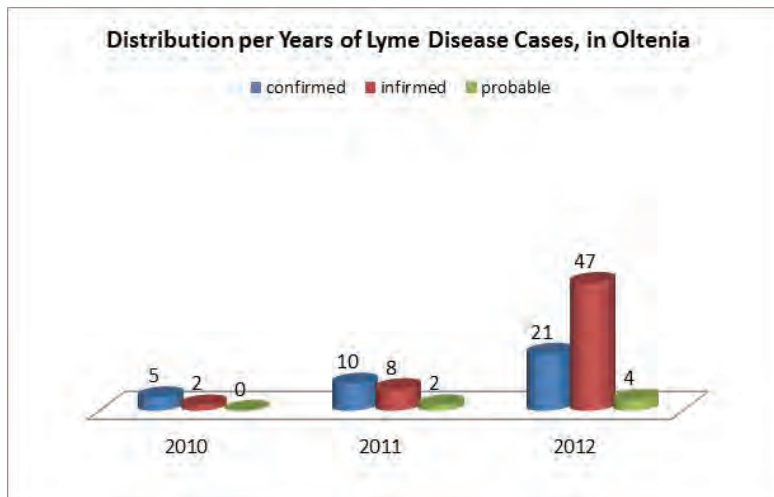


Figure 5. The supervised number of Lyme disease evolution in Oltenia (2010-2012).

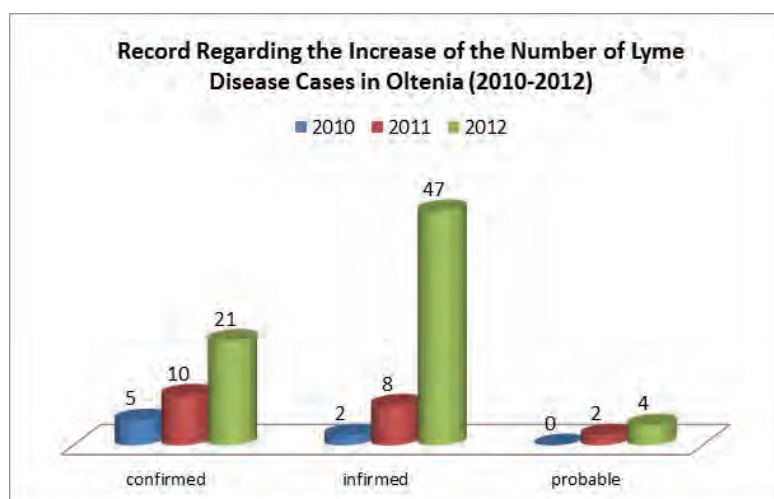


Figure 6. The increase of the supervised Lyme disease cases in Oltenia (2010-2012).

The number of the confirmed cases in Oltenia, in 2011 doubled compared to the year 2010. The number of the confirmed cases in Oltenia, in 2012 doubled compared to the year 2011.

Analyzing the graph (Fig. 7) we notice that the highest number of confirmed Lyme disease cases in the year 2010 was recorded in Mehedinți County. In Olt County, there was not confirmed any case.

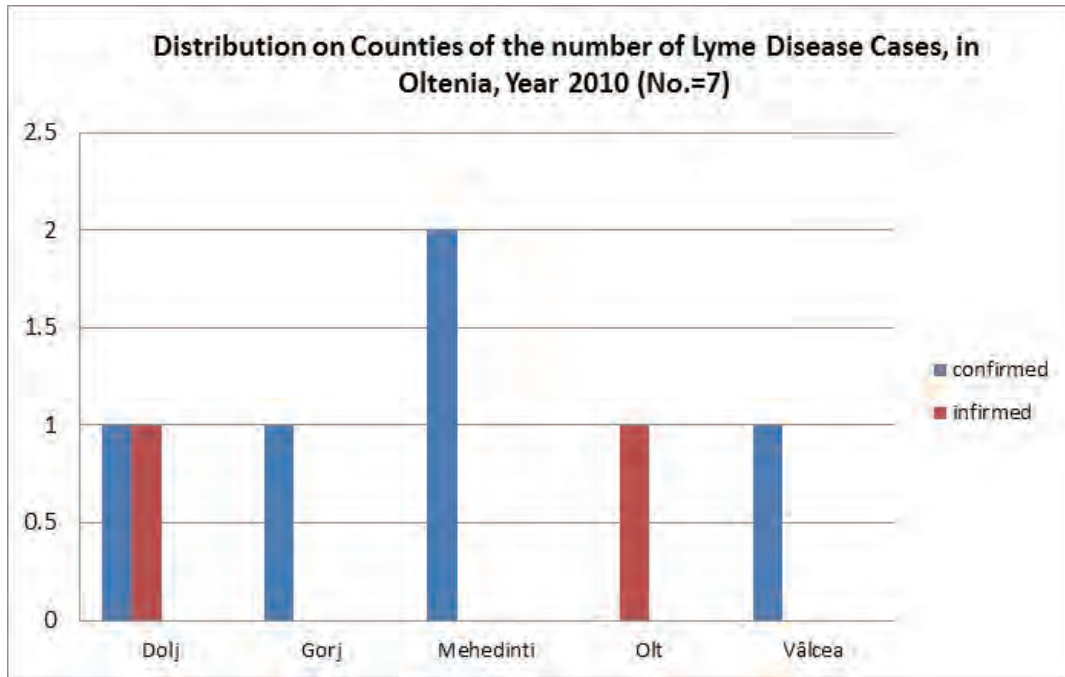


Figure 7. Distribution on counties of Lyme disease cases (2010).

Analyzing the graph (Fig. 8) we notice that the highest number of Lyme disease cases in 2011 is recorded in Vâlcea County. In Mehedinți County, no case was confirmed.

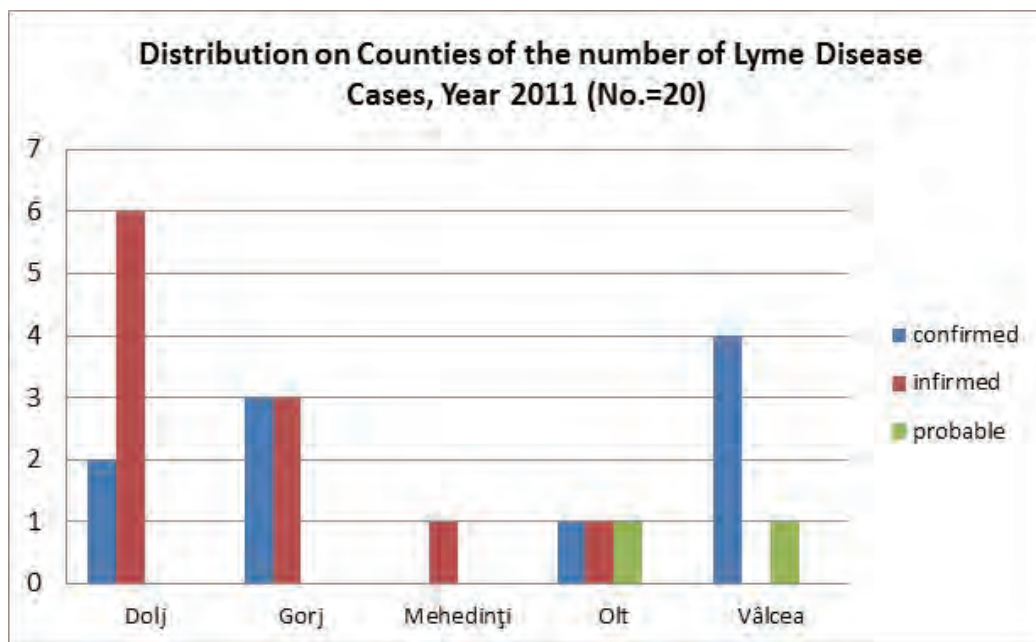


Figure 8. Distribution on counties of Lyme disease cases (2011).

Analyzing the graph (Fig. 9) we notice that in Olt and Vâlcea counties there were the highest number of cases in Oltenia. In Mehedinți County, no case was recorded.

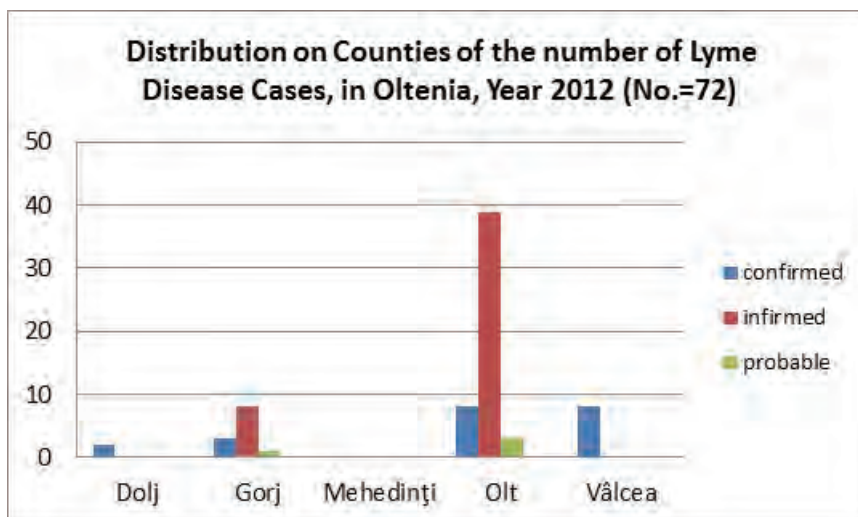


Figure 9. Distribution on counties of Lyme disease cases (2012).

CONCLUSIONS

In conclusion, we underline some important aspects related to Lyme borreliosis in the last years in Oltenia region and at national level.

At the national level, it was registered a yearly increasing number with important values: in 2011, 52 % compared to 2010; from these, the confirmed cases increased with 34.6 % and the probable ones with 4.7%. The incidence of the disease increased without a break, from 1.5 to 10,000 inhabitants, to 2% 000 and 4.16%000 in the three years according to The Annual Reports (2011, 2012, 2013) of the National Center of the Surveillance and Control of Transmissible Diseases.

In Oltenia, an increase of the total reported cases was recorded, as well as of the confirmed ones. The first position of the confirmed cases varied in the three years: Mehedinți County (2010), Vâlcea County (2011) and Vâlcea and Olt county (2012). The percentage of the supervised Lyme borreliosis cases from the total reported cases in the country also increased: 2010-1.23 % from which 1.90 % confirmed; 2011-2.32 % from which 2.82% confirmed and 2012-4.08 % from which 3% confirmed.

The preliminary data, hereby presented, point out the importance and necessity of monitoring and knowing Lyme disease in the next years. The vectors of the disease should be systematically prospected especially in the zones with a high percentage of the cases, to identify the pathogens, the taxonomy and the ecology of the tick-vector.

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