Investigation of *Borrelia Burgdorferi* Seroprevalence in Van Region of Turkey

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ABSTRACT

A total of 460 sera (226 from women and 234 from men) were obtained randomly in the region of Van. In the sera samples, the antibody of *B. burgdorferi* was investigated. For the purpose of distinguishing between *B. burgdorferi* antigens and the other diseases with similar antigenic characteristics, rheumatoid factor and *Treponema pallidum* antibody assays were performed. At the end of the study, total seropositivity was found as 6.3%, being 5.75% in women and 6.84% in men. Besides, the rate of seropositivity in the rural areas of Van, especially Özalp (22.58%), Çaldırán (18.75%) and Başkale (10%) was found higher. In conclusion, Lyme borreliosis can not be ignored in the region of Van, especially in rural areas and preventive medicine services should be aware of this disease.

Turk J Immunol, 2008; 13: 5-9

Key Word: *Borrelia burgdorferi*, Seroprevalence, Van, Turkey

Received: 14.12.2007 Revised: 04.07.2008 Accepted: 25. 07. 2008

INTRODUCTION

Lyme disease is a multi-organ infection caused by spirochetes of the *Borrelia burgdorferi*, which are transmitted by ticks of the species *Ixodes*¹–⁵. This disease consists of multisystem disorders including mainly skin, nervous system and joints. A wide variety of disease manifestations make difficulty in clinical diagnosis of the disease in most times. Diagnosis of the disease is made by detection of the specific antibodies by using ELISA and Western blot technology⁶⁻⁷. Formerly, indirect immunofluorescence assay (IFA) was used for the detection of *B. burgdorferi* antibodies, but now more specific and sensitive tests such as ELISA are preferred. The sensitivity of the ELISA reaches to 92–100%⁸. Cross-reactions have been found between antibodies to the agent and a variety of antibodies such as lupus erythematosus, syphilis, rheumatoid arthritis and antiphospholipid antibodies⁹. Some antigens used in ELISA test can make a cross-reaction with the antibody of *Treponema spp*¹⁰. In this study, it was aimed to investigate the *B. burgdorferi* antibody positivity by using ELISA in the randomly obtained sera and its prevalence and the risk range of the disease in Van region.

MATERIALS AND METHODS

In this study, a total of 460 sera (226 from women, 234 from men) were obtained randomly in the region of Van. In the sera samples, the antibody of *B. burgdorferi* was investigated by using TKA 4HD EIA device (Teknolabo A.S.s.l.s.r.l, Italy) and *B. burgdorferi* IgG and IgM kits (Genzyme Virotech, Germany).
For the purpose of distinguishing between *B. burgdorferi* antigens and the other diseases with similar antigenic characteristics, rheumatoid factor (RipeTex® RF, Dade Behring, Germany) and *Treponema pallidum* antibody (RPR-nosticon® II, Bioérieux, France) assays were performed by using lam-agglutination test.

**RESULTS**

A total of 460 sera were evaluated for the antibody of *B. burgdorferi*. Of 460 sera samples, 31 were positive for the agent. While *Treponema pallidum* antibody test was negative in all samples, rheumatoid factor was positive in two samples as well. Because of rheumatoid factor positivity, these two samples were excluded considering it may be a cross-reaction and seropositivity was found as 6.3% (29 samples). These ratios were 5.8% in men and 6.8% in women. Collected data about seropositive sera together with their RPR and RF results and distribution of seropositive people according to their place of residence are shown at Table I, and distribution of seropositive sera among all sera

<table>
<thead>
<tr>
<th>IgM</th>
<th>IgG</th>
<th>RF</th>
<th>RPR</th>
<th>Gender</th>
<th>Profession</th>
<th>Residence</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>Female</td>
<td>Housewife</td>
<td>City Center</td>
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<td>+</td>
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<td>Male</td>
<td>Official</td>
<td>City Center</td>
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<td>City Center</td>
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<td>Female</td>
<td>Housewife</td>
<td>Başdağ village / Van</td>
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<tr>
<td>+</td>
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<td>Male</td>
<td>Self-employed person</td>
<td>Yassutepe village / Çaldıran</td>
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<td>+</td>
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<td>Male</td>
<td>Butcher</td>
<td>Başeğmez village / Çaldıran</td>
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<td>Male</td>
<td>Self-employed person</td>
<td>Başeğmez village / Çaldıran</td>
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<td>Male</td>
<td>Farmer</td>
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<td>Self-employed person</td>
<td>Hasköy village / Çaldıran</td>
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<td>Housewife</td>
<td>Yassutepe village / Çaldıran</td>
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<td>Özalp</td>
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<td>Housewife</td>
<td>Özalp</td>
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<td>-</td>
<td>Female</td>
<td>Housewife</td>
<td>Dönderdere village / Özalp</td>
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<td>Dönderdere village / Özalp</td>
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<td>-</td>
<td>Female</td>
<td>Housewife</td>
<td>Dönderdere village / Özalp</td>
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<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>Male</td>
<td>Beekeeper</td>
<td>Alaça village / Özalp</td>
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<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Female</td>
<td>Housewife</td>
<td>Bariçık village / Özalp</td>
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<tr>
<td>+</td>
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<td>Housewife</td>
<td>Başkale</td>
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<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Male</td>
<td>Self-employed person</td>
<td>Bilgeç village / Başkale</td>
</tr>
<tr>
<td>+</td>
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<td>-</td>
<td>-</td>
<td>Male</td>
<td>Ironmonger</td>
<td>Başkale</td>
</tr>
<tr>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Female</td>
<td>Housewife</td>
<td>Gevaş</td>
</tr>
<tr>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>Male</td>
<td>Unemployed</td>
<td>İskirt village / Gevaş</td>
</tr>
<tr>
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<td>-</td>
<td>-</td>
<td>Male</td>
<td>Farmer</td>
<td>Muradiye</td>
</tr>
<tr>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Female</td>
<td>Housewife</td>
<td>Muradiye</td>
</tr>
<tr>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Male</td>
<td>Farmer</td>
<td>Erciş</td>
</tr>
<tr>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Female</td>
<td>Housewife</td>
<td>Edremit</td>
</tr>
</tbody>
</table>

RPR: Rapid Plasma Reagin, RF: Rheumatoid factor
DISCUSSION

Serologic methods such as indirect immunofluorescence antibody test and ELISA or molecular techniques are used for diagnosis of *B. burgdorferi* antibody. In this study, ELISA was preferred due to its easily applicability and high sensitivity. But, RF and RPR antibody tests were applied to distinguish any cross reaction between them and the antibody to *B. burgdorferi*. Therefore, RF and RPR positive sera were excluded because of possible cross reaction with the antibody to *B. burgdorferi*.

There are some studies concerning seroprevalence of *B. burgdorferi* antibodies in Turkey. These studies have been performed either randomly or include the results of the disease. Utaş et al.\(^\text{11}\) declared that seropositivity rate of IgG and IgM antibodies to *B. burgdorferi* in 33 female, 17 male totally 50 patients who had probable Lyme disease symptoms and/or diseases that may have etiological relation with *Borrelia burgdorferi* was 10.0% and there were no differences between antibody positivity and gender or age groups. Hzel et al.\(^\text{12}\) reported that the seropositivity rate to *B. burgdorferi* using ELISA in 79 female, 36 male totally 115 patients with unknown etiology of complaints and symptoms consistent with Lyme disease was found as 10.4%. In the same study, 67 serum samples were collected from healthy blood donors and were analyzed by using the same technique; only 1.5% was found to be seropositive.

Demirci et al.\(^\text{13}\) reported that 65 male, 17 female totally 82 people with history of tick bite and 28 male, 14 female totally 42 people consisting of control group were investigated for *B. burgdorferi*

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Table 2: Distribution of seropositive ones among all sera according to the counties of Van province and their percentages.

<table>
<thead>
<tr>
<th>Residence</th>
<th>N</th>
<th>IgM seropositivity</th>
<th>IgG seropositivity</th>
<th>Overall seropositivity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Özalp</td>
<td>31</td>
<td>6.74</td>
<td>6</td>
<td>19.35</td>
</tr>
<tr>
<td>Çaldırıan</td>
<td>32</td>
<td>6.96</td>
<td>6</td>
<td>18.75</td>
</tr>
<tr>
<td>Bağkanı</td>
<td>30</td>
<td>6.52</td>
<td>3</td>
<td>10.01</td>
</tr>
<tr>
<td>Edremit</td>
<td>11</td>
<td>2.39</td>
<td>1</td>
<td>9.09</td>
</tr>
<tr>
<td>Gevaş</td>
<td>14</td>
<td>3.04</td>
<td>1</td>
<td>7.14</td>
</tr>
<tr>
<td>Muradiye</td>
<td>29</td>
<td>6.30</td>
<td>2</td>
<td>6.89</td>
</tr>
<tr>
<td>Van</td>
<td>185</td>
<td>40.22</td>
<td>7</td>
<td>3.78</td>
</tr>
<tr>
<td>Erçiçek</td>
<td>77</td>
<td>16.70</td>
<td>1</td>
<td>1.29</td>
</tr>
<tr>
<td>Bahçesaray</td>
<td>9</td>
<td>1.96</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Çatalı</td>
<td>12</td>
<td>2.61</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Gürpınar</td>
<td>19</td>
<td>4.13</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Saray</td>
<td>11</td>
<td>2.39</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>460</td>
<td>100</td>
<td>27</td>
<td>5.87</td>
</tr>
</tbody>
</table>

N: Number tested, n: number

Table 3: Distribution of seropositivity according to gender.

<table>
<thead>
<tr>
<th>IgM seropositivity</th>
<th>IgG seropositivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female 13/226 (%5.75)</td>
<td>Male 16/234 (%6.84)</td>
</tr>
<tr>
<td>n</td>
<td>n</td>
</tr>
<tr>
<td>13/226</td>
<td>5.75</td>
</tr>
<tr>
<td>14/234</td>
<td>5.98</td>
</tr>
</tbody>
</table>
seropositivity by ELISA method. They found IgG seropositivity as 17.0% in 82 people (study group) and 2.0% in control group, but IgM seropositivity was not detected in both groups. In a study performed in Trabzon area by Aydin et al., 90 individuals either dealing with animal breeding (60) or not (30) were investigated for B. burgdorferi and IgG seropositivity rate was 6.6% in both groups. Çelik et al. declared that B. burgdorferi seropositivity in 48 male, 47 female totally 95 people who lived in different villages in Denizli area was 18.9% by EIA assay. Tuncer et al. found that B. burgdorferi IgG seropositivity was 22.1% in rural area and 6.4% in city center; overall seropositivity being 16.9% in Antalya. B. burgdorferi seropositivity alters between 10-17% in groups with disease and 1.5-18.9% in randomized groups in Turkey.

When we looked at other studies performed in various countries, Ledo et al. found that B. burgdorferi antibody positivity was 3.45% in 1825 people in Spain. Hristea et al. reported that B. burgdorferi antibody positivity was 4.3% in healthy blood donors and 9.3% in forest workers in Romania. Hilton et al. declared that B. burgdorferi antibody positivity was 5% in 671 people in the Northeast of America. Gordillo et al. declared that B. burgdorferi antibody positivity was 0.3% in 2890 people in Mexico.

In the present study, the seropositivity rate is 6.3% in 460 people and this rate is 6.84% in men, 5.75% in women. It was found that the seropositivity rate is higher in Ozalp (22.58%), Çaldırânan (18.75%) and Baflâklâ (10%) than in Van city center and other living areas. This situation may be explained by the fact, that these areas are rural and the people living there keep animals densely. In studies performed in other countries, the seropositivity rate is between 0.3-9.3% and this rate alters from country to country. In the present study, high seropositivity rate in men is parallel with a study performed before and besides, higher seropositivity in rural area than city center is consistent with the results of other studies.

In this study performed in sera obtained from the different parts of Van, it was (-) established the seroprevalence of B. burgdorferi. These results and clinical findings showed that Lyme disease which has some difficulties in the diagnosis can not be ignored in our region especially in rural areas. Because most of the mild symptoms are difficult to understand such as arthralgia and chronic fatigue syndrome; it is hoped that this study can attract the attention to the disease in view of patients especially living in rural area dealing with animal breeding and preventive medicine services should be aware of this disease.

Acknowledgements

*This study was supported by a grant (2002-TF-67) from Yuzuncu Yıl University, the directorate of scientific research project.

CORRESPONDENCE

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REFERENCES