Seroepidemiology of HTLV-1 and HTLV-2 Infection in Neyshabur City, North-Eastern Iran, during 2010-2014

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ABSTRACT

Background: Retroviruses of human T-lymphotropic viruses (HTLV-1 and HTLV-2) have been demonstrated to be endemic in the north-eastern region of Iran. This study was aimed to determine the HTLV-1 and HTLV-2 prevalence among healthy individuals in Neyshabur City during 2010-2014. Methods: A total of 8054 blood samples were collected from healthy participants in Neyshabur, North-Eastern Iran. The blood samples were screened for the presence of specific antibodies against HTLV-1 and HTLV-2 by using ELISA according to the manufacturer’s instructions. Results: The overall seropositivity rate for HTLV-1 and HTLV-2 was found to be 6.55% (528 out of 8054) among participants. Conclusion: Both HTLV-1 and HTLV-2 were demonstrated to be at a high rate in healthy individuals. However, a smaller number of asymptomatic carriers were found in this study, as compared to those identified in previous investigations in the city. DOI: 10.6091/21.1.57

Keywords: Human T-lymphotropic virus, Seroepidemiology, Enzyme-linked immunosorbent assay, Iran

INTRODUCTION

Human T-lymphotropic viruses (HTLV-1 and HTLV-2), classified in the retroviridae family, are among the first identified species[1-3]. HTLV-1 and HTLV-2 are widespread all over the world and are endemic in different areas, including North-Eastern Iran[4-6]. According to a previous study, the rate of HTLV-1 infection has been reported to be less than 0.26% in Mashhad, North-Eastern Iran, while it does not exceed 0.34% in other areas of the country[7]. The prevalence of HTLV-1 infection in other countries such as Turkmenistan, Brazil, Spain, Korea and Japan was found to be 0.007%[8], 1.9%[9], 0.001%[10], 0.27%[11], and 0.12%[12], respectively. HTLV-1- and HTLV-2-infected carriers remain asymptomatic for a long time, serving as a potential source for the transmission of the disease[13]. The aim of this investigation was to determine the prevalence of HTLV-1 and HTLV-2 among healthy individuals in Neyshabur, North-Eastern Iran, during 2010-2014.

MATERIALS AND METHODS

Study population
A total of 8054 healthy individuals from Neyshabur, North-Eastern Iran, were included in this study. Serum samples (5 ml) were prepared from the individuals and stored at -20°C until the ELISA test.
Serological assays and confirmation tests

Serum samples were screened for the presence of specific antibodies against HTLV-1 and HTLV-2 by ELISA (Dia.Pro Diagnostic Bioprobe, Italy) according to the manufacturer’s instructions.\(^\text{[14]}\)

Statistical analysis

The SPSS software (version 20) was employed to analyze all data using chi-square and t-test. A \(P<0.05\) was considered to be statistically significant.

RESULTS AND DISCUSSION

Of 8054 healthy individuals participated in the study, 1565 (19.4%) and 6489 (80.6%) were males and females, respectively. As shown in Table 1, the mean age of males and females was 46±3 and 51±3 years, respectively. The positivity of the samples was 65.5% (528 out of 8054), including 3.6% for HTLV-1 and 1.4% for HTLV-2. Table 2 indicates the total prevalence of HTLV-1 and HTLV-2 in each year.

Previous studies have revealed that HTLV-1 is endemic in North-Eastern Iran.\(^\text{[15]}\) Another study in Neyshabur has indicated that the prevalence of HTLV-1 is 7.2% (35 out of 483)\(^\text{[16]}\). However, the rate of HTLV-1 seropositivity has gradually decreased from 1.97% in 1996 to 0.26% in 2014\(^\text{[17-19]}\) in other regions of North-Eastern Iran. Similarly, the results of the present study demonstrated that the prevalence of HTLV-1 has decreased in Neyshabur from 2010 to 2014. In a survey carried out in Mashhad in 2012, the rate of HTLV-1 was detected to be 0.47%\(^\text{[20]}\). The seroprevalence of HTLV-1 did not exceed 0.19% in a study conducted by Safabakhsh et al.\(^\text{[7]}\). It seems that the reduction in HTLV-1 rate is mainly due to the improvement of blood donor selection and increased awareness among blood donors. However, in a study performed by Rafatpanah et al.\(^\text{[21]}\) in Mashhad, it was revealed that the prevalence of HTLV-1 is 20% (10 positive samples), although no evidence of HTLV-2 infection was found among immuneblotted samples and nested PCR.

In the current study, over 3% of healthy individuals were positive for HTLV-1 in all five years. To the best of our knowledge, there is a small number of published data regarding HTLV-2 prevalence in Iran. Also, a lower rate of positive HTLV-1 infection was identified in the present investigation, when compared to a previously study in Neyshabur\(^\text{[22]}\). This finding

### Table 1. Age- and sex-based distribution of individuals and overall HTLV-positive cases

<table>
<thead>
<tr>
<th>Variable</th>
<th>No.</th>
<th>Positive cases (%)</th>
<th>Odd Ratio (OR)</th>
<th>OR (95%CI)</th>
<th>(P) value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (year)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-19</td>
<td>429</td>
<td>13 (3.03)</td>
<td>Baseline</td>
<td></td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>20-29</td>
<td>2556</td>
<td>49 (1.92)</td>
<td>0.625</td>
<td>0.336-1.163</td>
<td></td>
</tr>
<tr>
<td>30-39</td>
<td>2018</td>
<td>88 (4.36)</td>
<td>1.459</td>
<td>0.807-2.637</td>
<td></td>
</tr>
<tr>
<td>≥40</td>
<td>3051</td>
<td>377 (12.36)</td>
<td>4.512</td>
<td>2.571-7.918</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>1565</td>
<td>130 (8.13)</td>
<td>1.386</td>
<td>1.128-1.704</td>
<td>0.002</td>
</tr>
<tr>
<td>Female</td>
<td>6489</td>
<td>398 (6.13)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 2. The annual prevalence of HTLV-1 and HTLV-2 investigated in this study

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>HTLV-1 (%)</th>
<th>HTLV-2 (%)</th>
<th>Total percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>Positive: 58 Total: 1350</td>
<td>3.01</td>
<td>ND</td>
<td>3.01</td>
</tr>
<tr>
<td>2013</td>
<td>Positive: 94 Total: 2337</td>
<td>4.11</td>
<td>ND</td>
<td>4.11</td>
</tr>
<tr>
<td>2012</td>
<td>Positive: 115 Total: 2188</td>
<td>5.12</td>
<td>ND</td>
<td>5.12</td>
</tr>
<tr>
<td>2011</td>
<td>Positive: 117 Total: 2057</td>
<td>5.13</td>
<td>ND</td>
<td>5.12</td>
</tr>
<tr>
<td>2010</td>
<td>Positive: 122 Total: 1789</td>
<td>5.74</td>
<td>ND</td>
<td>5.74</td>
</tr>
</tbody>
</table>

ND, not determined
highlights that Neyshabur is a major endemic region for HTLV-1. In addition, a higher prevalence of HTLV-1 was found in the age groups over 40 years, suggesting that there is a relationship between HTLVs and the age of individuals.

In the present study, a high rate of HTLV-1 among serum samples was detected using the ELISA test among healthy individuals in Neyshabur city during 2010-2014. The results from this study emphasize that HTLV is still an important endemic disease in Neyshabur. More importantly, the prevalence of HTLV-1 in Neyshabur was detected to be higher than other city (Mashhad) in all duration of this study, though being in a decreasing status compared to the previous reports.

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CONFLICT OF INTEREST. None declared.

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