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

Mohammad Salehi¹, Seyyed Khalil Shokouhi Mostafavi², Abdolmajid Ghasemian³, Mahmoud Gholami⁴, Abdolrahim Kazemi-Vardanjani⁴ and Mohammad Karim Rahimi²

¹Medical Diagnostic Laboratory of Neyshabur, Center of Medical, Pathological and Genetic Diagnostic Services, Iranian Academy Center for Education, Culture and Research (ACECR), Mashhad Branch, Mashhad, Iran; ²Department of Microbiology, Islamic Azad University, Tehran Medical Science Branch, Tehran, Iran; ³Department of Microbiology, Faculty of Medicine, AJA University of Medical Sciences, Tehran, Iran; ⁴Department of Biology, Faculty of Sciences, University of Isfahan, Isfahan, Iran; ⁵Shahrekord University of Medical Sciences, Shahrekord, Iran

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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 Bioprophes, 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 6.55% (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 |
|---------------------------------------------|-----------------|-----------------|-----------------|
| Variable                  | No.  | Positive cases (%) | Odd Ratio (OR) | OR (95%CI) | \(P\) value |
| Age (year)                |      |                  |                |            |             |
| 0-19                      | 429  | 13(3.03)          | Baseline       |            | \(<0.0001\) |
| 20-29                     | 2556 | 49(1.92)          | 0.625          | 0.336-1.163 |             |
| 30-39                     | 2018 | 88(4.36)          | 1.459          | 0.807-2.637 |             |
| \(\geq\)40                | 3051 | 377(12.36)        | 4.512          | 2.571-7.918 |             |
| Gender                    |      |                  |                |            |             |
| Male                      | 1565 | 130(8.31)         | 1.386          | 1.128-1.704 | 0.002       |
| Female                    | 6489 | 398(6.13)         |                |            |             |

| Table 2. The annual prevalence of HTLV-1 and HTLV-2 investigated in this study |
|---------------------------------------------|-----------------|-----------------|
| Year           | Number | HTLV-1 (%) | HTLV-2 (%) | Total percentage |
| 2014           | Positive: 58 Total: 1350 | 3.01 | ND | 3.01 |
| 2013           | Positive: 94 Total: 2337 | 4.11 | ND | 4.11 |
| 2012           | Positive: 115 Total: 2188 | 5.12 | ND | 5.12 |
| 2011           | Positive: 117 Total: 2057 | 5.13 | ND | 5.12 |
| 2010           | Positive: 122 Total: 1789 | 5.74 | ND | 5.74 |

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.

REFERENCES

