

Assess the knowledge of medical students about HTLV-1 in Mashhad University of medical sciences

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Article Info

Article type:

Research

Article History:

Received: 2022-07-26

Accepted: 2022-10-24

Published: 2022-11-20

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Keywords:

Human T-cell Lymphotropic Virus
Type 1 (HTLV-1)
Medical Students
Knowledge
Attitudes

ABSTRACT

Introduction: Human T-cell lymphotropic virus type 1 (HTLV-1) is known to be endemic in the population of northeastern Iran. This study was conducted with the aim of investigating the knowledge and attitude of medical students of Mashhad University of Medical Sciences about the HTLV-1 virus.

Material and Methods: The present study was a descriptive-analytical study that was conducted in Mashhad Medical School from April to June 2014. The research population included all medical students studying at the time of the study (307 people). The tool of data collection was a questionnaire including 4 parts of demographic characteristics, the amount of information resources used, the level of awareness about HTLV-1 infection and measuring the attitude of students towards HTLV-1 infection. The data was analyzed in the form of descriptive statistics using SPSS 16.0 software.

Results: A total of 271 people responded to the questionnaire (response rate: 88/27). Among the participants, 130 were male and 141 were female. The majority of students, 161 people got their information from the classroom and 157 people were natives of Mashhad. The information obtained from the description of the questions and the percentage of correct answers to the questions showed that the level of students' knowledge about this infection was average with an average score of 16.66 out of 40 points, and the average score of the students' attitude was reported as 68.11 with an average level.

Conclusion: The obtained results reported the level of knowledge of the target group as medium-low, and the level of attitude of this group as medium-high. Also, there was a direct relationship between the amount of information and the level of attitude with the year of entering the university and studying in the university, which reports the slope of this change as low.

Cite this paper as:

Rafat Panah Bayegi H, Jarahi L, Mahmoudabadi M, Sarbaz M, Mousavi Baigi SF, Kimiafar K. Assess the knowledge of medical students about HTLV-1 in Mashhad University of medical sciences. *Front Health Inform.* 2022; 11: 125. DOI:

[10.30699/fhi.v11i1.394](https://doi.org/10.30699/fhi.v11i1.394)

INTRODUCTION

Human T-cell lymphotropic virus type 1 (HTLV-1) is the first human retrovirus that was discovered in 1980 by Dr. Poise and colleagues by studying a disease with skin lesions caused by T-cells and reported in the journal *Nature* [1]. The virus was associated with a type of T-cell malignancy, which has since been named adult T-cell lymphoma leukemia

(ATL). Takatsuki and colleagues isolated this virus from patients with a type of leukemia. According to the studies, this virus belongs to the family of retroviruses and is a type of delta viruses [2]. This virus was first identified in 1979 in patients with human T-cell proliferative disease as human retroviruses [3]. In 1981, another research was done by Hinoma on a new retrovirus, which he called Adult T-cell Leukemia Virus (ATLV). In 1981, Miyoshi

isolated the components of this virus from leukemia patients. In 1983, Popovic succeeded in isolating this virus from patients with leukemia. Investigations by Gallo and colleagues showed that the known virus (ATLV) is the same HTLV, which was named HTLV-1 at the 1983 London meeting [4]. Most of the people infected with this virus will die for the rest of their lives. Carriers remain asymptomatic and only nearly 10% of them may suffer from diseases caused by this virus. Adult T-cell leukemia (ATL) and tropical spastic paraparesis with myelopathy caused by HTLV-1 virus, HAM/TSP are among the diseases related to this infection in endemic areas [5].

ATL is often fatal and its prevalence is reported to be higher in southern Japan than in other regions. Molecular studies about this disease have confirmed the presence of integrated provirus in cancer cells. About 1 to 5 percent of people infected with the virus are involved in this disease and it occurs mostly in people aged 40 to 70 years infected with the virus, and the incidence is higher in men than women. HAM/TSP, with progressive spastic paraparesis with sphincteric disorder is specified. 0.3 to 4% of people infected with the virus have HAM/TSP, and the prevalence of this disease is higher in women than in men. This disease occurs between the ages of 30 and 50, and sexual transmission is the main way of transmitting the infection leading to this disease. The association of autoimmune diseases such as polymyositis, Graves' and arthritis with HAM/TSP has been reported [5-7].

Diseases related to this virus in America were mostly seen in immigrants from the Caribbean islands and Jewish immigrants from Mashhad. Guy de Dee and colleagues observed and reported the positive serological test of this virus in Caribbean colonists [8]. The prevalence of this infection in the world reaches 15 to 20 million people, and this infection has been reported in southern Japan, the countries of the Caribbean Basin, Africa (Saharan), South America, New Guinea and the native Solomon Islands [9].

The most important way of transmission of this virus is through mother's milk infected with the virus to the baby, and other ways of transmission, including the injection of infected blood and sexual intercourse, especially in Iran, are in the second and third place of transmission [10] and in the neighboring areas of Japan in South Korea, Turkmenistan [11], and China have reported a high prevalence of this infection in the general population. Evidence shows that this virus has a high prevalence in the general population of African countries, including Cameroon, Gabon, and Benin, and moderate prevalence in Mozambique, Ethiopia, Senegal, and Central Africa [4, 6, 12-14]. This infection is rare in Western Europe [6]. Studies have shown a low prevalence of this infection in blood donors from Saudi Arabia, Kuwait, Lebanon, Germany, England, Spain, France, Italy, Sweden,

Greece, and the Netherlands, and this infection in blood donors the regions of Martinique, French Guiana, Curacao, Guyana, Guadeloupe, Jamaica, Venezuela, Colombia, Bolivia, Chile, Peru, Brazil and Argentina are common [3, 6, 7, 15, 16]. The first study of the prevalence of this infection in Mashhad in 2015 on the target population of medical diagnostic laboratories and blood donation volunteers showed that the prevalence of this infection in this target population was 3%, and the same study did not report any positive cases [17]. In another study conducted in 2018, the overall prevalence of infection in the general population of Mashhad was determined to be 12.2% (men 1.46% and women 2.66%) [18]. Considering the endemicity of this virus in the northeast of the country (6) and its high prevalence in Mashhad (2.12% in 2018) [1]. If we look a little more closely at the reports of the prevalence and incidence of this infection worldwide, we will see that many of the cases reported in places with very low prevalence of HTLV-1 were immigrants from endemic areas or had continuous and close relationships with this group. And this shows the necessity of screening for this infection and prevention based on education in endemic areas. Therefore, public awareness based on scientific knowledge is the best way to deal with this infection. And sometimes the non-scientific treatment of this category of diseases imposes a heavy psychological burden on the society, such as the name "Khorasan AIDS" for the HTLV-1 infection in the past years, which imposed a lot of psychological pressure on the society. Although these two viruses (HIV and HTLV) are in the same taxonomic category and have similarities in terms of structure and ways of transmission of infection, but there are many differences, including the mode of pathogenesis, lethality, and the mechanism of action of these two infections distinguishes [19].

Considering the contagiousness of this infection and the lack of definitive treatment or vaccine against this infection, one of the best ways to control infection is prevention and the main way of prevention is to educate everyone, which is expected to reduce the infection through controlling the occurrence of new cases of infection, especially in Endless endemic areas. So far, no definitive treatment or vaccine has been discovered to control the occurrence of this disease, so we expect the best way to control the occurrence of this disease is prevention [1]. On the other hand, this requires all medical personnel to have sufficient and correct knowledge about the HTLV-1 virus and a professional attitude towards the disease, reducing fear and misconceptions in patients. It is very important that medical students are aware and have a positive attitude towards the treatment of disease so that they can become better doctors who behave in accordance with the highest standards of medical knowledge and medical

professionalism. A better understanding of students' prior knowledge and attitudes toward HTLV-1 will serve as a tool to create better educational programs to counter misconceptions and encourage empathy with patients [20-25]. The majority of previous studies have investigated the attitude and knowledge of medical students about HIV/AIDS virus [26-35], and few studies have been conducted in relation to the knowledge of HTLV-1 virus. In 2022, Fowler et al. conducted a qualitative study to investigate perceptions of HTLV-1 using semi-structured interviews with 30 Indigenous Australians, 26 non-Indigenous health care professionals and 3 non-Indigenous community workers. They found that HTLV-1 remains a neglected infection in Australia. Knowledge of HTLV-1 is held by the privileged medical elite and is not transmitted to indigenous people living in affected communities [36]. In fact, increasing the awareness of medical students leads to the creation of more knowledgeable doctors and, as a result, a healthier society [37, 38]. However, according to our knowledge, there was no study aimed at investigating the knowledge and awareness of medical students regarding our HTLV-1 virus.

Therefore, this study was conducted with the aim of investigating the knowledge and attitude of medical students of Mashhad University of medical sciences about the HTLV-1 virus.

MATERIAL AND METHODS

The present study is a descriptive-analytical study, and in this study, the study population was medical students (semester 3 to 14 of general medicine course) of Mashhad University of Medical Sciences in 2013. In this study, due to the presentation of a 1-unit course on virology in the 3rd semester and the lack of academic treatment of the students in the 1st and 2nd semesters with this subject, we had to remove these two groups from the sample population. In this study, non-probability quota sampling method was used, in which the selected population was categorized and evaluated and studied based on demographic characteristics and the number of people in each category.

According to the notification of medical education, the total number of medical students was 1471 (154 entering 88, 190 entering 89, 236 entering 90, 268 entering 91, 316 entering 92, 307 entering 93). According to Morgan's table, the total number of selected samples was determined to be 307 people, the samples were divided according to the entrances and the entrances quota was 88: 32 questionnaires, 89: 40 questionnaires, 90: 49 questionnaires, 91: 56 questionnaires, 92: 66 questionnaires, 93: 64 questionnaires.

The questionnaire was predicted. Among the 307 questionnaires expected to be distributed among the

sampled population, 36 questionnaires were not delivered and from the other 271 questionnaires, it could be assessed that the number of participants in the table below is divided according to the year of entering the university. They were. The entry criteria for people to this program were as follows: must be a student, must be a medical student of Mashhad University of medical sciences, must be a medical student, must enter from 2009 to 2014. The exit criterion was the lack of consent to participate in the project. In order to design the questionnaire, a wide review of the literature regarding the research topic was done. Several standard questionnaires were obtained (20-24), each of which covered a part of the research objectives. Finally, by combining the obtained questionnaires and adding some necessary items, a researcher-made questionnaire was designed; then the questionnaire was approved by three faculty members.

All agreed on the relevance of the questions and some minor changes were made in the wording of the questions. In this way, the questions were checked by 4 professors and the items that were not suitable were corrected. The questionnaires approved by the students were completed and the collected information was entered into the SPSS (ver 16) software as quantitative inputs. Quantitative and qualitative analysis and data reliability were performed by calculating Cronbach's alpha, which was considered reliable over 0.75. The questionnaire included three parts: a) knowledge assessment, the questionnaire included 40 knowledge assessment questions, the options of which were selected (yes-no-don't know).

In this section, the answers to the questions were given in a key form, and in the statistical analysis of the questions in this section, only the correct answer was given the desired score. b) Attitude measurement, this part included 20 attitude measurement questions, the options of which were chosen (totally agree-agree-no opinion-disagree-strongly disagree). In this section, the answers to the questions were given in key form, and in the statistical analysis of the questions in this section, the most correct answer was given the most points. In this section, the most correct answer was specified and the scores of other answers were also specified. Data description was expressed with central and dispersion indices and tables and graphs. Descriptive methods such as concentration and dispersion indices were used, and chi-square or chi-square tests were used to check the relationship between variables. The significance level in this study is 0.5. All the principles of ethics in research according to Helinsky's statement have been observed in it. After the description of the research, the patients entered the research with informed consent. All people's information has been used confidentially and without revealing names.

RESULTS

Out of 271 students participating in the research, 141

(52%) were women and 130 (48%) were men. Most of the students (22.1%) entered in 2013. Among the participants, 157 people (57.9%) were native and 114 people (42.1%) were non-native (Table 1).

Table 1: Demographic characteristics of students

Information items		N (%)
Sex	Male	130 (48)
	Female	141 (52)
Entering year	1388	29 (10.7)
	1389	33 (12.2)
	1390	48 (17.7)
	1391	46 (17)
	1392	55 (20.3)
	1393	60 (22.1)
Residence	native	157 (57.9)
	non-native	114 (42.1)

There was a significant difference in obtaining information between different information sources ($P=0.002$). So, out of a total of 271 participants in the study, 161 (59.4%) stated the most important source of information for obtaining classroom information and 110 (40.6%) stated miscellaneous sources (Table 2).

Table 2: Various sources of information to obtain information

	Number	%	P-value
Other sources	110	40.6	0.002
Classroom	161	59.4	
Total	271	100	

In the analysis of the questions related to awareness, it was observed that the majority of the students, 206 (76%) said that this infection was transmitted through blood, 182 (67.2%) said that it was transmitted from mother to child during childbirth, and 181 (66.8%) said that The best way to prevent this infection is education, they had the necessary knowledge and also the least knowledge regarding acute diffuse inflammations, especially abdominal-visceral (16%) and acute genital infections (1.8%)) was through this virus. The results show that the students' level of knowledge about this infection was average with an average score of 16.66 out of 40 (Table 3)

In the analysis of the questions related to the attitude, it was observed that most of the students (216 people, 79.9%) respectively stated that in their opinion medical students should have more information about this infection, there should be more content and information in the curriculum. Medical students were concerned about this infection

(201 people, 74.2%) and considered general education useful in controlling this infection (167 people, 61.6%) and the lowest attitude was regarding easy identification of patients respectively (7.8%) and that this disease is divine punishment (7.0%). The average score of the students' attitude was 68.11 with an average level. The obtained results reported the level of knowledge of the target group as medium-low, and the level of attitude of this group as medium-high. Also, the amount of information and the level of attitude were directly related to the year of entering the university and studying in the university, which reduced the slope of this change ($P<0.001$) reports. (Table 4)

DISCUSSION

In this study, 271 students were examined in terms of the level of knowledge and attitude of HTLV-1 disease. The results showed that most of the students had average knowledge and attitude about HTLV-1 disease. The classroom was expressed as an important source of information acquisition by students.

The results of this study showed that there was a significant difference between different information sources in obtaining information ($P=0.002$). So that out of a total of 271 people participating in the research, 161 people (59.4%) said the most important source of information in order to get classroom information and 110 people (40.6%) said miscellaneous sources. In contrast, Shivaraj et al. found in their research that medical students had sufficient information about the methods of transmission of the AIDS virus (blood transfusion, unsterilized needles, and mother-to-child transmission). Most of the students stated that the transmission of this virus can be prevented by using proper precautions. Most of the participants used mass media, especially television, to get information [25]. Also, Baytner-Zamir et al found in their research that the majority of medical students had a high level of knowledge about the AIDS virus. Newspapers and radio and television were the most important sources of information for obtaining information. Students had a high knowledge in the field of ways of transmission of this virus [26].

Joshi et al found in their research that most of the students had the necessary knowledge in the field of prevention of contracting this virus through protected sexual contact. Most of the students mentioned the media as a source of information. The majority had the necessary knowledge about the transmission of this virus from mother to child [27].

Table 3: Measuring students' knowledge about HTLV-1 virus

Correct Number (%)	Scientific information about the HTLV-1 virus
106 (39.11)	This virus is similar in structure to the HIV virus.
54 (19.93)	This virus is similar to HIV virus in terms of function and immune response.
49 (18.8)	This virus is found free in the serum of living organisms
206 (76)	This infection is transmitted through blood transfusion.
47 (17.3)	The possibility of transmission through receiving dense red blood cells and platelets is more than transmission through plasma.
169 (60.9)	The infection is transmitted through unprotected sexual contact.
165 (60.5)	Transmission can occur from mother to child during pregnancy.
182 (67.2)	Transmission can occur from mother to child during childbirth.
132 (48.7)	The infection can be transmitted through prolonged breastfeeding.
174 (64.2)	A contaminated syringe is one of the ways of transmission.
166 (61.3)	This infection is transmitted through the use of shared razors.
145 (53.5)	This infection is transmitted through the use of shared eating utensils.
156 (57.6)	This infection is transmitted through the use of shared bathrooms and toilets.
135 (49.8)	Using the swimming pool transmits this infection.
169 (62.4)	Unconventional sexual contact transmits this infection.
89 (32.8)	Humans do not get this infection through sexual contact during menstruation.
52 (19.2)	Washing the genitals with water after sexual contact reduces the possibility of transmission of infection.
118 (43.5)	Most people with this infection show symptoms of the disease.
67 (24.7)	This infection can cause HAM/TSP.
92 (33.9)	This infection can cause ATL.
35 (12.9)	This infection can cause inflammation of the iris.
39 (14.4)	This infection can cause skin infection in children.
22 (8.1)	This infection causes acute infections of the genital tract.
67 (24.7)	This infection causes infertility.
41(16)	This infection can cause widespread acute inflammations, especially abdominal-intestinal.
118 (43.5)	The best way to prevent is vaccination.
181 (66.8)	The best way to prevent is education.
75 (27.7)	Screening plays an essential role in controlling this infection.
114 (42.1)	This infection has a definitive treatment.
100 (36.9)	This infection has a vaccine.
160 (59)	Iran is one of the countries with high prevalence of HTLV-1 in the world.
168 (62)	Razavi Khorasan is one of the endemic areas for this infection.
131 (48.3)	Tehran is one of the endemic areas for the spread of this infection.
123 (45.4)	The prevalence of this infection is higher in the western half than in the eastern half.
144 (53.1)	In deprived areas, the prevalence of this infection is higher.
73 (26.9)	The southern half has a higher prevalence of this infection due to the hot weather.
123 (45.4)	An epidemic of infection has been reported in frequent blood recipients in the country and high endemic areas.
66 (24.4)	Due to infection screening, the prevalence of this infection in frequent blood recipients is very low.
154 (56.8)	Neishabur is one of the areas with high prevalence of this infection.
132 (48.7)	Mashhad, Torbat, Heydarieh, and Sabzevar are among the most common areas for this infection.

Table 4: Measuring students' attitudes regarding HTLV-1 virus

Attitudinal information regarding HTLV-1 virus	Very agree Number (%)	Agree Number (%)	No idea Number (%)	Disagree Number (%)	Very disagree Number (%)
This infection is very similar to AIDS	64 (23.6)	75 (27.7)	110 (40.6)	19 (7)	3 (1.1)
The patients of this infection and AIDS are both from the weak and unrestrained group of the society.	64 (23.6)	40 (14.8)	110 (40.6)	82 (30.3)	3(1.1)
Khorasan AIDS is a suitable name for HTLV-1 infection.	59 (21.8)	44 (16.2)	90 (33.2)	43 (15.9)	35 (12.9)
Patients with this infection are easily identified.	13 (4.8)	8 (3)	111 (41)	115 (42.4)	24 (8.9)
I will not get this infection.	27 (10)	27 (10)	164 (60.5)	45 (16.6)	8 (3)
People infected with this virus should be warned.	33 (12.2)	32 (11.8)	97 (35.8)	93 (34.3)	16 (5.9)
These patients are often dangerous.	24 (8.9)	41 (15.1)	98 (36.2)	89 (32.8)	19 (7)
These patients should be treated immediately after detection.	48 (17.7)	96 (35.4)	93 (34.3)	32 (11.8)	2 (7)
In my opinion, these people should not be treated.	2 (7)	29 (10.7)	90 (33.2)	82 (30.3)	68 (25.1)
Infected people should be quarantined so that the disease does not spread to others.	12 (4.4)	13 (4.8)	94 (34.7)	105 (38.7)	47 (17.3)
These people should not be quarantined, but they do not have the right to participate in society, education and social activities.	8 (3)	29 (10.7)	84 (31)	74 (27.3)	76 (28)
These people should not be deprived of their former rights because of their contamination	51 (18.8)	104 (38.4)	61 (22.5)	25 (9.2)	30 (11.1)
This disease is divine punishment	3 (1.1)	16 (5.9)	81 (29.9)	60 (22.1)	111 (41)
These patients are more than unrestrained.	17 (6.3)	31 (11.4)	102 (37.6)	90 (33.2)	31 (11.4)
Addicts just get sick	6 (2.2)	23 (8.5)	77 (28.4)	113 (41.7)	52 (19.2)
Following religious orders can reduce the incidence of this disease in the society	37 (13.7)	56 (20.7)	115 (42.4)	39 (14.4)	24 (8.9)
The education and information provided so far about this infection has been sufficient	20 (7.4)	14 (5.2)	69 (25.5)	83 (30.6)	84 (31)
I find public education useful in infection control.	96 (35.4)	71(26.2)	59 (21.8)	20 (7.4)	24 (8.9)
In my opinion, medical students should have more information about this infection.	159 (58.7)	57 (21)	51 (18.8)	3 (1.1)	1 (4)
More materials and information should be included in the curriculum of medical students about this infection.	122 (45)	79 (29.2)	66 (24.4)	3 (1.1)	1 (4)

The current study showed that the majority of students, 206 (76%) believe that this infection is transmitted through blood, 182 (67.2%) are transmitted from mother to child during childbirth, and 181 (66.8%) believe that the best way of prevention is This infection is education, they had the necessary knowledge and also the least knowledge regarding acute diffuse inflammations, especially

abdominal-visceral (41 people, 16%) and acute genital infections (21 people, 1.8%) through it was a virus. In this regard, Al-Rabeei et al. found in their research that students had average knowledge about the AIDS virus. Students were respectively the most knowledgeable about the transmission of this virus through unprotected sexual contact, contaminated syringe, from mother to child and contaminated blood. The source of information for students to

obtain information was mass media (newspaper, magazine, television and radio) [28]. Also, Myint et al. found in their research that most of the students were aware that this virus can be transmitted from mother to child during breastfeeding and that the transmission of this virus can be prevented through protected sex, and most of them believed that health education can play a role in increasing students' awareness about the ways of transmission of this virus [29]. In addition, Albujeer et al. found that most medical and dental students had an average level of knowledge about the AIDS virus. In this study, there was no high-level attitude regarding the AIDS virus among any group of students. The score of awareness and attitude had no significant relationship with age, gender and marital status. However, medical students had more knowledge and attitudes towards AIDS than dental students [30].

The results showed that most of the students (216 people, 79.9%) respectively stated that in their opinion, medical students should have more information about this infection, there should be more materials and information in the curriculum of medical students about this infection (201 people, 74.2%) and public education was considered useful in controlling this infection (167 people, 61.6%) and the lowest attitude regarding easy identification of patients respectively (21 people, 8.8%) and that this disease is divine punishment (19 people, 0.7%). In this regard, Javed found that most students had little knowledge about the transmission of the AIDS virus and its treatment. Students' attitude was at a weak level. There was no significant difference between the knowledge and attitude of male and female students. The students had the necessary knowledge about the transmission of this virus through contaminated blood products [31].

Haroun et al. found that among students, girls had more knowledge about the AIDS virus than boys. Among the participants, graduate students had more knowledge than other students. There was no significant difference between married and unmarried students in the field of knowledge about the AIDS virus. Most of the students had the necessary knowledge about the transmission of this virus from mother to child during childbirth and breastfeeding and its transmission through contaminated needles and razors. Among the participants, boys and girls had similar knowledge about the methods of transmission of the AIDS virus. There was a significant difference between girls and boys in the treatment of this virus [32].

Singh et al. found that most dental students had a good level of knowledge about the AIDS virus. Most of the participants had the necessary knowledge about the transmission of this virus through contaminated needles and that patients infected with this virus can infect dentists. The least knowledge of the students

was related to the oral manifestations of this disease and its transmission through aerosols. In this study, there was a significant relationship between knowledge and gender and ethnicity. However, there was no significant relationship between attitude and gender or ethnicity, or between awareness and attitude among dental students. There was no significant relationship between age and knowledge about the virus. Most of the students are aware of the transmission of this virus through contaminated needles, and they were less aware of the oral manifestations of this virus. Most of the students disagreed that treating AIDS means a waste of national resources, and they stated that it is their right to know that their patient is infected with the AIDS virus [33].

In addition, Kumar et al. stated that male students had more knowledge and attitudes about the AIDS virus than female students. Most of the dental students had the necessary knowledge about the transmission of this virus through the wound caused by the needle (Needle stick). Most of the students had a negative attitude that the treatment of AIDS patients leads to the waste of national resources [34]. Li et al. also reported that most dental students had good knowledge about AIDS. Despite their good level of knowledge, the majority of students had a negative attitude towards AIDS. Most of them had high knowledge in the field of transmission of this virus through the contact of an open wound with blood infected with this virus and wounds caused by needles. Most of them had a strong attitude that knowing that their patient is infected with the AIDS virus is one of their rights and they should use the necessary support and efforts to improve the health of society [35].

CONCLUSION

In short, the results showed that the level of knowledge and attitude of the students towards this infection is average and even in the field of knowledge and pathogenicity and attitude towards the infection, it is low and we need to review the general education and medical education of the general medicine course for this infection. It seems that due to the endemicity of the spread of this infection in Razavi Khorasan, especially Mashhad, Neishabur and Sabzevar, and due to the lack of definitive treatment against this infection and also due to the mode of transmission, vaccination is the best way to deal with this infection as previously mentioned.

In this type of infections, the best way to prevent is to educate the public and especially the personnel of the treatment and health system. Among these, the education of medical students has a special place due to their involvement with the patient and the importance of correct and timely diagnosis and

screening and familiarity with the specific ethical issues of dealing with patients and sufferers. On the other hand, this study shows that we need to increase the level of students' knowledge about this infection, which can improve the attitude of the medical community and the general public towards HTLV-1 infection. So that we don't see harmful and irresponsible encounters with this infection again. It is suggested that periodic studies be conducted to measure the knowledge and attitude towards this infection in the target population of students and personnel of healthcare services, as well as hold training courses to train personnel and include more material in students' courses in a systematic manner.

ACKNOWLEDGMENTS

This article is taken from the plan approved by the meeting of the research council and the meeting of the ethics committee of Mashhad University of

Medical Sciences with the grant number 931196, which was approved by the ethics committee of Mashhad University of Medical Sciences with the code IR.MUMS.REC.1393.764.

AUTHOR'S CONTRIBUTION

All authors contributed to the literature review, design, data collection and analysis, drafting the manuscript, read and approved the final manuscript.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest regarding the publication of this study.

FINANCIAL DISCLOSURE

No financial interests related to the material of this manuscript have been declared.

REFERENCES

- Hedayati-Moghaddam MR. Seroepidemiology of human T-cell lymphotropic virus type 1 infection in Iran: An overview. *Journal of Medical Council of Islamic Republic of Iran*. 2013; 30(4): 367-78.
- Thyagarajan D, Bastian I, Stark RJ, Day BJ, Dax EM, Gilligan BS. HTLV-I associated myelopathy in a Seychellois immigrant. *Med J Aust*. 1993; 159(1): 29-31. PMID: 8316110 DOI: 10.5694/j.1326-5377.1993.tb137701.x [[PubMed](#)]
- Hedayati-Moghaddam MR, Jafarzadeh Esfehiani R, El Hajj H, Bazarbachi A. Updates on the epidemiology of the human T-cell leukemia virus type 1 infection in the countries of the eastern mediterranean regional office of the world health organization with special emphasis on the situation in Iran. *Viruses*. 2022; 14(4): 664. PMID: 35458394 DOI: 10.3390/v14040664 [[PubMed](#)]
- Eusebio-Ponce E, Anguita E, Paulino-Ramirez R, Candel FJ. HTLV-1 infection: An emerging risk. Pathogenesis, epidemiology, diagnosis and associated diseases. *Rev Esp Quimioter*. 2019; 32(6): 485-96. PMID: 31648512 [[PubMed](#)]
- Boostani R, Lotfinejad N, Zemorshidi F, Vahidi Z, Rezaee SA, Farid R, et al. Planning and management to control and eliminate HTLV-1 infection in Iran. *Iran J Basic Med Sci*. 2021; 24(3): 264-6. PMID: 33995937 DOI: 10.22038/ijbms.2021.50803.11562 [[PubMed](#)]
- Kalinichenko S, Komkov D, Mazurov D. HIV-1 and HTLV-1 transmission modes: Mechanisms and importance for virus spread. *Viruses*. 2022; 14(1): 152. PMID: 35062355 DOI: 10.3390/v14010152 [[PubMed](#)]
- Enose-Akahata Y, Vellucci A, Jacobson S. Role of HTLV-1 Tax and HBZ in the pathogenesis of HAM/TSP. *Front Microbiol*. 2017; 8: 2563. PMID: 29312243 DOI: 10.3389/fmicb.2017.02563 [[PubMed](#)]
- Williams CKO. Global HTLV-1/2 burden and associated diseases. In: *Cancer and AIDS*. Springer, Cham; 2019.
- Willems L, Hasegawa H, Accolla R, Bangham C, Bazarbachi A, Bertazzoni U, et al. Reducing the global burden of HTLV-1 infection: An agenda for research and action. *Antiviral Res*. 2017; 137: 41-8. PMID: 27840202 DOI: 10.1016/j.antiviral.2016.10.015 [[PubMed](#)]
- Ghaffari J, Kowsarian M, Mahdavi MR, Shahi KV, Rafatpanah H, Tafreshian AR. Prevalence of HTLV-I infection in patients with Thalassemia major in Mazandaran. *Jundishapur Journal of Microbiology*. 2013; 6(1): 57-60.
- World Health Organization. Human T-lymphotropic virus type 1: Technical report [Internet]. 2021 [cited: 15 Jun 2022]. Available from: <https://www.who.int/publications/i/item/9789240020221>
- Ngoma AM, Omokoko MD, Mutombo PB, Nollet KE, Ohto H. Seroprevalence of human T-lymphotropic virus (HTLV) in blood donors in sub-Saharan Africa: A systematic review and meta-analysis. *Vox Sang*. 2019; 114(5): 413-25. PMID: 30972789 DOI: 10.1111/vox.12779 [[PubMed](#)]
- Afonso PV, Cassar O, Gessain A. Molecular epidemiology, genetic variability and evolution of HTLV-1 with special emphasis on African genotypes. *Retrovirology*. 2019; 16(1): 1-5. PMID: 31842895 DOI: 10.1186/s12977-019-0504-z [[PubMed](#)]
- Caron M, Besson G, Padilla C, Makuwa M, Nkoghé D, Leroy E, et al. Revisiting human T-cell lymphotropic virus types 1 and 2 infections among rural population in Gabon, central Africa thirty years after the first analysis. *PLoS Negl Trop Dis*. 2018; 12(10): e0006833. PMID: 30359373 DOI: 10.1371/journal.pntd.0006833 [[PubMed](#)]
- Pouliquen J-F, Hardy L, Lavergne A, Kafiludine E,

- Kazanji M. High seroprevalence of human T-cell lymphotropic virus type 1 in blood donors in Guyana and molecular and phylogenetic analysis of new strains in the Guyana shelf (Guyana, Suriname, and French Guiana). *J Clin Microbiol.* 2004; 42(5): 2020-6. PMID: 15131164 DOI: 10.1128/JCM.42.5.2020-2026.2004 [[PubMed](#)]
16. Anguita E. Seroprevalence and trends of HTLV-1/2 among blood donors of Santo Domingo, Dominican Republic, 2012-2017. *Rev Esp Quimioter.* 2021; 34(1): 44-50. PMID: 33305921 DOI: 10.37201/req/117.2020 [[PubMed](#)]
 17. Ramezani A, Aghakhani A, Banifazl M, Boland-Ghamat Z, Foroughi M, Gachkar L, et al. Frequency of human T-cell lymphotropic virus (HTLV) type 1 and 2 infection in HIV infected patients. *Iranian Journal of Pathology.* 2012; 7(1): 9-13.
 18. Hedayati-Moghaddam MR. A systematic review for estimation of HTLV-I infection in the blood donors of Iran. *Iran J Basic Med Sci.* 2013; 16(3): 196-201. PMID: 24470861 [[PubMed](#)]
 19. Shivaraj B, Chandrashekar M, Ranganath T. A study on awareness about HIV/AIDS among first year medical students of Bangalore Medical College and Research Institute. *Journal of Evolution of Medical and Dental Sciences.* 2015; 4(58): 10023-7.
 20. Cooper CM, James K, Wilks RJ. HTLV-1 related knowledge, attitude and behaviour patterns among mothers who participated in the Jamaica breastfeeding intervention study (1996-2000). *West Indian Med J.* 2010; 59(1): 35-40. PMID: 20931911 [[PubMed](#)]
 21. O'Grady L. Meeting health information needs of people with HIV/AIDS: Sources and means of collaboration. *Health Info Libr J.* 2008; 25(4): 261-9. PMID: 19076672 DOI: 10.1111/j.1471-1842.2007.00764.x [[PubMed](#)]
 22. Hogan TP, Palmer CL. Information preferences and practices among people living with HIV/AIDS: results from a nationwide survey. *J Med Libr Assoc.* 2005; 93(4): 431-9. PMID: 16239938 [[PubMed](#)]
 23. Dadgar Moghaddam M, Khajedaluae M, Khadem-Rezaiyan M. A Population-based Study into Knowledge, Attitudes and Beliefs (KAB) about HIV/AIDS. *Razavi International Journal of Medicine.* 2016; 4(1): e34349.
 24. Khani H, Bidarmaghzi M, Halajian E, Azad ME, Majdi M, Khezri M. Knowledge, attitudes, belief and practices in high school students related to AIDS in Mazandaran province, Iran. *Journal of North Khorasan University of Medical Sciences.* 2011; 3(3): 21-32.
 25. Baytner-Zamir R, Lorber M, Hermoni D. Assessment of the knowledge and attitudes regarding HIV/AIDS among pre-clinical medical students in Israel. *BMC Res Notes.* 2014; 7: 168. PMID: 24650351 DOI: 10.1186/1756-0500-7-168 [[PubMed](#)]
 26. Joshi AV, Nikam K, Hungund BR, Viveki RG, Nikam SV, Halappannavar A, et al. Knowledge about and attitude towards HIV/AIDS among first year medical students: A cross-sectional study. *Journal of the Scientific Society.* 2013; 40(3): 155.
 27. Shamsipour M, Khajehkazemi R, Haghdoost AA, Setayesh H, Kariman Majd S, Mostafavi E. Knowledge, attitude, and practice of clerical students with respect to HIV/AIDS in Iran, 2011. *J Relig Health.* 2016; 55(1): 26-37. PMID: 25344879 DOI: 10.1007/s10943-014-9964-6 [[PubMed](#)]
 28. Al-Rabeei N, Dallak A, Al-Awadi F. Knowledge, attitude and beliefs towards HIV/AIDS among students of health institutes in Sana'a city. *East Mediterr Health J.* 2012; 18(3): 221-6. PMID: 22574474 DOI: 10.26719/2012.18.3.221 [[PubMed](#)]
 29. Myint KY, Naing KS, Hanni M. Knowledge, awareness and attitudes related to HIV/AIDS among undergraduate medical students of Universiti Malaysia Sabah. *International Conference on Education and New Learning Technologies.* Barcelona, Spain; 2012.
 30. Hamid Albujeer AN, Shamshiri AR, Taher A. HIV/AIDS awareness among Iraqi medical and dental students. *J Int Soc Prev Community Dent.* 2015; 5(5): 372-6. PMID: 26539388 DOI: 10.4103/2231-0762.164788 [[PubMed](#)]
 31. Javed M, Chaudhry R. Knowledge about attitude towards HIV/Aids among first year medical students: A cross-sectional study. *Pakistan Journal of Medical and Health Sciences.* 2013; 8(2): 295-8.
 32. Haroun D, El Saleh O, Wood L, Mechli R, Al Marzouqi N, Anouti S. Assessing knowledge of, and attitudes to, HIV/AIDS among university students in the United Arab Emirates. *PloS One.* 2016; 11(2): e0149920. PMID: 26913902 DOI: 10.1371/journal.pone.0149920 [[PubMed](#)]
 33. Singh VP, Osman IS, Rahmat NA, Bakar NAA, Razak NFNA, Nettem S. Knowledge and attitude of dental students towards HIV/AIDS patients in Melaka, Malaysia. *Malays J Med Sci.* 2017; 24(3): 73-82. PMID: 28814935 DOI: 10.21315/mjms2017.24.3.9 [[PubMed](#)]
 34. Kumar S, Tadakamadla J, Areeshi AYBH, Tobaigy HAWM. Knowledge and attitudes towards HIV/AIDS among dental students of Jazan University, Kingdom Saudi Arabia. *Saudi Dent J.* 2018; 30(1): 47-52. PMID: 30166871 DOI: 10.1016/j.sdentj.2017.10.003 [[PubMed](#)]
 35. Li R, Dong W, He W, Liu Y. Chinese dental students' knowledge and attitudes toward HIV/AIDS. *J Dent Sci.* 2016; 11(1): 72-8. PMID: 30894949 DOI: 10.1016/j.jds.2015.09.001 [[PubMed](#)]
 36. Fowler F, Einsiedel L. A qualitative study exploring perceptions to the human T cell leukaemia virus type 1 in central Australia: Barriers to preventing transmission in a remote aboriginal population. *Front Med (Lausanne).* 2022; 9: 845594. PMID: 35572972 DOI: 10.3389/fmed.2022.845594 [[PubMed](#)]
 37. Mousavi Baigi SF, Sarbaz M, Marouzi P, Kimiafar K. Evaluating the impact of digital game on learning medical terminology of paramedical students: Protocol for a randomized controlled trial. *Stud*

Health Technol Inform. 2022; 295: 51-4. PMID: 35773804 DOI: 10.3233/SHTI220658 [[PubMed](#)]

38. Mousavi Baigi SF, Moradi F, Vasseifard F, Mohammad

Abadi F, Mazaheri Habibi MR. The effect of nutrition training on knowledge of students at university of medical sciences. Topics in Clinical Nutrition. 2022; 37(3): 236-41.