

Comparison of opportunities to learn about HTLV-1/HTLV-1-related diseases and HIV/AIDS among nursing students in Nagasaki University

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Abstract

Aim : This study was performed to evaluate the means by which nursing students in one area of the Kyushu/Okinawa region, Japan, obtained information regarding human T-cell leukemia virus type 1 (HTLV-1)/HTLV-1-related diseases in comparison with human immunodeficiency virus (HIV)/acquired immune deficiency syndrome (AIDS).

Methods : A self-administered anonymous structured questionnaire survey was conducted in August 2014 among 79 nursing students in their 4th year of study at Nagasaki University in the Kyushu/Okinawa region, Japan. The questionnaire elicited responses related to sources of information regarding HTLV-1/HTLV-1-related diseases and HIV/AIDS when the study participants were in junior high school, high school, and university.

Results : A total of 60 (75.9%) participants completed the questionnaire. All participants had opportunities to obtain information regarding HIV/AIDS between junior high school and the last 2 years of university. However, five (8.3%) participants reported having had no chances to obtain information regarding HTLV-1/HTLV-1-related diseases in any period. The participants with greater numbers of formal and informal information sources regarding HTLV-1/HTLV-1-related diseases in the junior high school and high school periods and of formal information sources in the university period also had greater numbers of informal information sources regarding HTLV-1/HTLV-1-related diseases in the university period ($r_s = 0.286, P = 0.027$; $r_s = 0.384, P = 0.002$; $r_s = 0.477, P < 0.001$, respectively).

Conclusions : Due to the prevalence of HTLV-1 infection in Japan, education related to this virus should be provided from an early age, e.g., as part of compulsory education in junior high school. Accumulation of educational input, including early exposure, can develop a readiness among nursing students to learn about HTLV-1 infection.

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Introduction

Human T-cell leukemia virus type 1 (HTLV-1) is a type C virus belonging to the *Retroviridae* family in the genus *Deltaretrovirus*, which affects 10–20 million people worldwide, mainly in Japan, sub-Saharan Africa, the Caribbean, and South America. Although the majority of infected people remain asymptomatic, the virus is also associated with severe

diseases, such as adult T-cell leukemia/lymphoma, inflammatory syndromes, and others¹⁾. The human immunodeficiency virus (HIV) is also a member of the *Retroviridae* family, which is known to cause acquired immunodeficiency syndrome (AIDS). Both viruses share common modes of transmission, i.e., sexual contact, via contaminated blood, and mother-to-child transmission through breastfeeding¹⁾.

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Japan has a high prevalence of HTLV-1 infections, especially in the Kyushu/Okinawa region, which has the highest prevalence rate in the world, affecting 1% of the general Japanese population according to the Ministry of Health, Labour and Welfare (MHLW). However, the prevalence of HIV infection in Japan is quite low compared to other countries, with a level of less than 0.1% of the general Japanese population according to the AIDS/STI-Related Database Japan. This database also indicates that the general Japanese population has limited knowledge about HIV/AIDS and sexually transmitted infections (STIs), with an accuracy rate of only 20%, despite education about HIV/AIDS prevention in schools and society. HTLV-1 was first isolated from a patient in 1979¹⁾. In 2010, the MHLW began taking measures to prevent mother-to-child transmission of the virus by covering the costs of HTLV-1 testing in antenatal care, despite the prior introduction of HIV testing. This was because of the increasing prevalence of HTLV-1 infection not only in the Kyushu/Okinawa region, but also in other regions of Japan, including Tokyo Metropolitan Area. In addition, education regarding prevention of HIV infection was introduced as part of compulsory education in 1992 in Japan, but education regarding prevention of HTLV-1 infection has not yet been introduced in schools.

Recognition regarding prevention of HIV infection among the general population has been achieved in Japan, although the accuracy rate still requires improvement²⁾. However, the rate of recognition regarding prevention of HTLV-1 infection among the general population may be very low, because even medical health professionals in fields related to HTLV-1/HTLV-1-related diseases were unaware that the prevalence of infection with this virus is high in the Kyushu/Okinawa region until the MHLW conducted a nationwide study on HTLV-1 infection in 2009³⁾. This study was performed to evaluate the means by which nursing students in one area of the Kyushu/Okinawa region obtained information regarding HTLV-1/HTLV-1-related diseases in comparison with HIV/AIDS. Even if the level of recognition of HTLV-1/HTLV-1-related diseases is high among nursing students in an area with a high HTLV-1 infection prevalence rate, it is necessary to extensively promote knowledge regarding prevention of HTLV-1 infection among the general Japanese population.

Methods

A self-administered anonymous structured questionnaire

survey was conducted in August 2014 among 79 nursing students in their 4th year of study at a university located in the Kyushu/Okinawa region of Japan. The questionnaire elicited responses regarding the means of obtaining information regarding HTLV-1/HTLV-1-related diseases and HIV/AIDS when the study participants were in junior high school, high school, the first 2 years of university, and the last 2 years of the university period. Means of obtaining information were categorized as formal information sources, i.e., “lectures at school” for junior high school and high school periods, “lectures (general subjects),” “lectures (special subjects),” and “hands-on practice” for the university period, and “textbooks” for all periods, or informal information sources, i.e., “newspapers,” “pamphlets,” and “the Internet and TV” for all periods.

Fisher’s exact test was performed for comparison of opportunities to obtain information about HTLV-1/HTLV-1-related diseases and HIV/AIDS in different school periods. The *t* test and Spearman’s rank correlation coefficient (r_s) were used to analyze the relationships between number of information sources about HTLV-1/HTLV-1-related diseases and HIV/AIDS in different school periods. The relationships between numbers of formal and informal information sources regarding HTLV-1 and HIV were also analyzed by Spearman’s rank correlation coefficient. Analyses were performed using IBM SPSS ver. 22. In all analyses, $P < 0.05$ was taken to indicate statistical significance.

This study was approved by the ethical review board of our institution (Reference number: 16020483). The study participants were informed about the objectives of the study, both orally and in written documents, and were asked to participate voluntarily. Submission of the completed questionnaire was considered to indicate agreement to participation in the study.

Results

A total of 60 (75.9%) participants completed the questionnaire. All study participants reported having had opportunities to obtain information regarding HIV/AIDS between junior high school and the last 2 years of university. However, five (8.3%) study participants reported having had no chances to obtain information regarding HTLV-1/HTLV-1-related diseases in any period.

Table 1 shows a comparison between opportunities to obtain information regarding HTLV-1/HTLV-1-related diseases and HIV/AIDS according to the school period. Even with regard to HIV knowledge, 16 (26.7%) students in the junior high school period, four (6.7%)

in the high school period, eight (13.3%) in the first 2 years of university, and eight (13.3%) in the last 2 years of university reported having had no opportunities to obtain related information. Seven of the 16 study participants that did not have opportunities to obtain knowledge regarding HTLV-1/HTLV-1-related diseases in the first 2 years of university also reported having had no such opportunities in the last 2 years of university. All eight study participants without opportunities to obtain HIV/AIDS knowledge in the first 2 years of university also reported having had no opportunities to obtain such knowledge in the last 2 years of university. The study participants with opportunities to obtain HTLV-1/HTLV-1-related diseases knowledge in the last 2 years of university were more likely to have also had opportunities to

obtain HIV/AIDS knowledge in the last 2 years of university (Fisher's exact test, $P = 0.006$).

Table 2 demonstrates comparisons between the numbers of information sources regarding HTLV-1/HTLV-1-related diseases and HIV/AIDS according to the school period. Study participants reported having significantly greater numbers of information sources regarding HIV/AIDS than HTLV-1/HTLV-1-related diseases in all periods. In addition, the study participants with greater numbers of information sources regarding HTLV-1/HTLV-1-related diseases also had greater numbers of information sources regarding HIV/AIDS in the last 2 years of university ($r_s = 0.566, P < 0.001$).

Table 3 presents different information sources regarding HTLV-1/HTLV-1-related diseases and HIV/

Table1. Comparison of opportunities to obtain information about HTLV-1/HTLV-1 related diseases and HIV/AIDS among nursing students ($n = 60$)

		HIV/AIDS knowledge in junior high school				<i>P</i>	HIV/AIDS knowledge in high school			
		No		Yes			No		Yes	
		<i>(n = 16)</i>		<i>(n = 44)</i>			<i>(n = 4)</i>		<i>(n = 56)</i>	
		<i>n</i>	%	<i>n</i>	%		<i>n</i>	%	<i>n</i>	%
HTLV-1/HTLV-1 related diseases knowledge in junior high school	No	16	100.0	39	88.6	0.311				
	Yes	0	0.0	5	11.4					
HTLV-1/HTLV-1 related diseases knowledge in high school	No						4	100.0	44	78.6
	Yes						0	0.0	12	21.4
										0.574
		HIV/AIDS knowledge in the first two years of university				<i>P</i>	HIV/AIDS knowledge in the last two years of university			
		No		Yes			No		Yes	
		<i>(n = 8)</i>		<i>(n = 52)</i>			<i>(n = 8)</i>		<i>(n = 52)</i>	
		<i>n</i>	%	<i>n</i>	%		<i>n</i>	%	<i>n</i>	%
HTLV-1/HTLV-1 related diseases knowledge in the first two years of university	No	4	50.0	12	23.1	0.192				
	Yes	4	50.0	40	76.9					
HTLV-1/HTLV-1 related diseases knowledge in the last two years of university	No						5	62.5	7	13.5
	Yes						3	37.5	45	86.5

Fisher's exact test.

Table2. Number of information sources about HTLV-1/HTLV-1 related diseases and HIV/AIDS among nursing students ($n = 60$)

	HTLV-1/HTLV-1 related diseases	HIV/AIDS	<i>P</i> (t-test)	R_s	<i>P</i> (R_s)
	Mean ± SD	Mean ± SD			
Junior high school (0 – 5)	0.13 ± 0.47	1.63 ± 1.31	< 0.001	0.058	0.659
High school (0 – 5)	0.33 ± 0.73	2.03 ± 1.19	< 0.001	0.037	0.778
The first two years of university (0 – 7)	1.58 ± 1.34	2.33 ± 1.55	< 0.001	0.222	0.089
The last two years of university (0 – 7)	1.73 ± 1.29	2.30 ± 1.68	0.002	0.566	< 0.001

The *t* test was performed to compare means numbers of information sources about HTLV-1/HTLV-1 related diseases and HIV/AIDS. Spearman's rank Correlation Coefficient (R_s) was calculated between numbers of information sources for HTLV-1/HTLV-1 related diseases and HIV/AIDS.

AIDS at different school periods. Among the study participants with opportunities to obtain information regarding HTLV-1/HTLV-1-related diseases in the junior high school and high school periods, most obtained this knowledge through formal information sources, such as lectures at school and/or textbooks. On the other hand, more than 40% of study participants with opportunities to obtain information regarding HIV/AIDS did so through informal sources, such as the Internet and/or TV, in the junior high school and high school periods in addition to through formal sources. In the university period, the study participants obtained information mainly from special subjects and textbooks regarding HTLV-1/HTLV-1-related diseases and HIV/AIDS, respectively. Throughout all periods from junior high school to university, study participants had informal information sources regarding HIV/AIDS, such as the Internet and TV, in addition to formal information sources, but this was not the case for HTLV-1/HTLV-1-related diseases.

Table 4 shows the relationships between numbers of formal and informal information sources regarding HTLV-1/HTLV-1-related diseases and HIV/AIDS. The study participants with greater numbers of formal information sources regarding HTLV-1/HTLV-1-related diseases in the junior high school and high school periods also had greater numbers of informal information sources regarding HTLV-1/HTLV-1-related diseases in these periods ($r_s = 0.496$, $P < 0.001$). The study participants with greater numbers of formal and informal information sources regarding HTLV-1/HTLV-1-related diseases in the junior high school and high school periods and of formal information sources in the university period also had greater numbers of informal information sources regarding HTLV-1/

HTLV-1-related diseases in the university period ($r_s = 0.286$, $P = 0.027$; $r_s = 0.384$, $P = 0.002$; $r_s = 0.477$, $P < 0.001$, respectively).

Discussion

Knowledge related to both HTLV-1/HTLV-1-related diseases and HIV/AIDS was provided to nursing students as special subjects at university, but opportunities to obtain knowledge regarding HTLV-1/HTLV-1-related diseases before entering university, such as in the junior high school and high school periods, were limited compared to those regarding HIV/AIDS, although both viruses belong to the *Retroviridae* family and have the same modes of transmission. In addition, the prevalence of HTLV-1 infection is much higher than that of HIV infection in Japan. Nursing students that had opportunities to obtain knowledge regarding HTLV-1/HTLV-1-related diseases at an early age, such as in junior high school and high school, were more likely to have opportunities to obtain additional knowledge regarding HTLV-1/HTLV-1-related diseases in the university period. Nursing students with opportunities to obtain knowledge regarding HTLV-1/HTLV-1-related diseases from formal information sources were more likely to have had opportunities to obtain additional knowledge regarding HTLV-1/HTLV-1-related diseases from informal information sources. That is, the study participants can access and recognize formal information regarding HIV/AIDS because they have been exposed to informal information regarding HIV/AIDS, but they did not access or recognize formal information regarding HTLV-1/HTLV-1-related diseases because of a lack of exposure to informal information regarding HTLV-1/HTLV-1-related diseases. On the other hand, the study participants had received the

Table 3. Mode of information source about HTLV-1/HTLV-1 related diseases and HIV/AIDS ($n = 60$)

	Information source on HTLV-1/HTLV-1 related diseases				Information source on HIV/AIDS			
	JHS	HS	F2UN	L2UN	JHS	HS	F2UN	L2UN
	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)
Lecture at school	3 (5.0)	9 (15.0)			40 (66.7)	50 (83.3)		
Lecture (general subjects)			6 (10.0)	1 (1.7)			16 (26.7)	5 (8.3)
Lecture (special subjects)			42 (70.0)	44 (73.3)			50 (83.3)	45 (75.0)
Hands-on practice			4 (6.7)	7 (11.7)			1 (1.7)	7 (11.7)
Textbook	4 (6.7)	6 (10.0)	31 (51.7)	34 (56.7)	21 (35.0)	24 (40.0)	34 (56.7)	33 (55.0)
Newspaper	0 (0.0)	0 (0.0)	1 (1.7)	4 (6.7)	5 (8.3)	8 (13.3)	5 (8.3)	8 (13.3)
Pamphlet	0 (0.0)	1 (1.7)	6 (10.0)	6 (10.0)	7 (11.7)	11 (18.3)	10 (16.7)	15 (25.0)
Internet, TV	1 (1.7)	4 (6.7)	5 (8.3)	8 (13.3)	25 (41.7)	29 (48.3)	24 (40.0)	25 (41.7)

JHS, Junior high school; HS, High school; F2UN, The first two years of university; L2UN, The last two years of university

Table 4. Relationships between numbers of formal and informal information source about HTLV-1/HTLV-1 related diseases and HIV/AIDS among nursing students ($n = 60$)

		Information source on HTLV-1/HTLV-1 related diseases				Information source on HIV/AIDS			
		JHS & HS: formal	JHS & HS: informal	University: formal	University: informal	JHS & HS: formal	JHS & HS: informal	University: formal	University: informal
		r_s	r_s	r_s	r_s	r_s	r_s	r_s	r_s
Information source on HTLV-1/HTLV-1 related diseases	Junior high school & high school: formal	r_s	1.000						
		(P)							
	Junior high school & high school: informal	r_s	0.496	1.000					
		(P)	(< 0.001)						
Information source on HIV/AIDS	University (for 4 years) : formal	r_s	0.253	0.198	1.000				
		(P)	(0.051)	(0.129)					
	University (for 4 years) : informal	r_s	0.286	0.384	0.477	1.000			
		(P)	(0.027)	(0.002)	(< 0.001)				
	Junior high school & high school: formal	r_s	0.228	0.083	0.285	0.139	1.000		
		(P)	(0.080)	(0.529)	(0.027)	(0.289)			
	Junior high school & high school: informal	r_s	-0.178	0.060	0.158	0.226	0.194	1.000	
		(P)	(0.174)	(0.648)	(0.229)	(0.083)	(0.138)		
University (for 4 years) : formal	r_s	0.079	0.034	0.657	0.270	0.324	0.318	1.000	
	(P)	(0.548)	(0.796)	(< 0.001)	(0.037)	(0.012)	(0.013)		
University (for 4 years) : informal	r_s	-0.132	-0.047	0.360	0.380	0.358	0.464	0.502	1.000
	(P)	(0.315)	(0.720)	(0.005)	(0.003)	(0.005)	(< 0.001)	(< 0.001)	

Spearman's rank Correlation Coefficient (r_s) was calculated.
JHS, Junior high school; HS, High school

same educational contents at university, but a few did not recognize their learning related to HTLV-1 and HIV infection. It is necessary to consider that this study was conducted in Nagasaki prefecture, which has one of highest prevalence rates of HTLV-1 infection in not only Japan, but also in the Kyushu/Okinawa region. Therefore, the participants in this study have had greater opportunities to receive information about HTLV-1/HTLV-1-related diseases, especially at university. Educational outcomes may be influenced by the sensitivity and readiness of nursing students to receive information. Early exposure to knowledge and formal information sources, such as lectures at school, may increase student awareness and allow them to obtain additional knowledge, even from informal sources.

HIV/AIDS-related knowledge has been commonly provided in junior high school and high school. For example, educational programs on HIV/AIDS prevention were implemented not only among junior high school students, but also among their teachers and parents in Japan⁴⁾. However, a study conducted among the working-age population demonstrated that older age was associated with having prejudice toward HIV-infected colleagues, although they did not show such prejudice toward colleagues infected with hepatitis B virus and/or hepatitis C virus in Japan⁵⁾. On

the other hand, greater knowledge about HIV/AIDS was associated with less negative attitude toward HIV infection among the non-medical working population in Japan⁶⁾. In addition, a study conducted among gay bar customers indicated that not only greater knowledge about HIV/AIDS, but also knowing someone with HIV/AIDS and talking about HIV with friends were important factors for taking HIV testing⁷⁾. Education related to accurate knowledge about HIV/AIDS should be provided in schools and society in general.

A previous study conducted among physicians and veterinarians in charge of infectious disease control at local government offices indicated that tuberculosis, influenza, and HIV/AIDS are the three top priority infectious diseases for education among the general population in Japan. However, education related to these infectious diseases among the general population has been provided for many years in Japan⁸⁾. If education related to HIV/AIDS prevention is still a priority in Japan, means of measuring the quality of educational approaches are required. Although education related to HIV/AIDS prevention in Japan is important, greater priority should be placed on education related to HTLV-1/HTLV-1-related diseases among the general population and medical health students, such as nursing students, due to the current increase in prevalence of HTLV-1 in the Kanto region

and throughout the country, despite the plateau or decrease in prevalence in the Kyushu/Okinawa region³⁾.

This study had several limitations. The data were self-reported and the participants received education in different prefectures and junior/high schools. We did not objectively assess knowledge and level of exposure to information regarding HTLV-1/HTLV-1-related diseases and HIV/AIDS, and therefore cannot make definitive conclusions about the relationships between level of exposure to information and acquired knowledge regarding HTLV-1/HTLV-1-related diseases and HIV/AIDS. In addition, the amounts of data were insufficient to discuss the relationships between education regarding prevention of HTLV-1 and HIV infections and trends in prevalence of HTLV-1 and HIV infections. For example, no data regarding the study participants' sexual behavior were obtained, and therefore we cannot propose appropriate measures to prevent HTLV-1 and HIV infections as STIs.

Conclusions

This study demonstrated that the majority of nursing students have had opportunities to learn about HTLV-1/HTLV-1-related diseases as special subjects at university in Nagasaki prefecture, although these results cannot be generalized to other nursing educational institutions. Similar to education related to HIV/AIDS prevention, that related to HTLV-1/HTLV-1-related diseases should also be provided in pre-service education for health professionals, such as nursing education, due to the high prevalence of HTLV-1 infection in Japan. Accumulation of educational input, including early exposure to information, can develop sensitivity among nursing students to learning about HTLV-1 infection.

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Disclosure statement

The authors have no conflicts of interest to declare.

Author contributions

J.T. and M.N. contributed to interpretation of findings from the analysis and logically composed

the manuscript. R.I., M.O., and F.M. designed the study and both collected and analyzed data. M.O. conceptualized and supervised the study and wrote a draft of the manuscript. M.O., R.I., M.O., F.M., J.T., and M.N. edited and approved the manuscript.

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