

## RELATIONSHIP OF VIRAL INFECTIONS AND TUBERCULOSIS WITH HEALTH LITERACY IN FEMALE CONVICTS

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### ABSTRACT

**Aim:** The aim of this study was to investigate the relationship between health literacy and infectious diseases such as HIV, Hepatitis B, Hepatitis C and tuberculosis in female prisoners.

**Methods:** In this study, 220 female convicts in a prison in Bursa in Yenisehir were evaluated. In the study, the Health Literacy Scale European Union Short Form (HLS-EU-Q16) was applied to female prisoners. In addition, Hepatitis B and Hepatitis C, chest X-ray and PPD results of female convicts were examined.

**Results:** The mean HLS-EU-Q16 score of the prisoners evaluated in the study was  $42.68 \pm 7.76$ , and 10% of the female convicts had insufficient health literacy. There was a statistically significant negative correlation between the age of the women and their health literacy scores ( $r = -0.222$ ,  $p = 0.001$ ). HLS-EU-Q16 scores were statistically significantly different ( $p < 0.05$ ) according to family income, marital status, occupation and education. HLS-EU-Q16 mean scores were found to be lower in convicts with chronic disease ( $p < 0.05$ ), those with hypertension ( $p < 0.05$ ), those with hyperlipidemia ( $p < 0.05$ ), and those who have a tattoo ( $p < 0.05$ ). The mean of HLS-EU-Q16 in cases who were not vaccinated against hepatitis in the past were lower than those who were vaccinated in the past ( $p < 0.05$ ).

**Conclusions:** Health literacy was adequate in most of the women prisoners. In this research, as a contribution to the literature, we found that tattooing had an inverse relationship with health literacy. Physicians should be aware that women with tattoos may be prisoners at risk with lower health literacy.

**Keywords:** Health literacy, communicable diseases, HIV, hepatitis, prisoners, tattoo

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## Introduction

The concept of health literacy is not definitive, but despite the different definitions in the literature, most researchers have stated that health literacy is a process related to illiteracy, socio-economic well-being, health and the development of health education (1-5). For this reason, it has been stated that health literacy is mainly based on education. This process is based on understanding, achieving the individual's own goals, and developing their knowledge and skills (1,2). Health literacy and development refers to a person's ability to interact and apply, using acquired information and acquiring new information, and the ability to identify risk factors (6,7).

In the literature, health literacy has been frequently investigated in the normal and patient population, and the effects of different demographic and clinical characteristics on health literacy have been studied. In contrast, health literacy has been insufficiently studied in people who have committed a crime or remain in prison. Most of the research conducted on prisoners is aimed at applications and discussions to increase the level of health knowledge in these people. Considering that prisoners mainly consist of a class with a disadvantage in terms of illness and health, it has been stated that health education in prison can be useful for public health, and increasing health literacy in these people can contribute to this situation (13).

Infectious diseases such as HIV, Hepatitis B virus (HBV), Hepatitis C virus (HCV) and tuberculosis are more common in convicts than in the normal population (14,15). In addition, it is important that people be aware of these diseases, and if there are signs of disease and illness, they should inform the doctors working in penitentiary institutions. For this reason, the level of health literacy of prisoners living in an isolated environment and a social environment can be important for both their own health and the health

of people staying and serving in a penitentiary institution. However, health literacy in convicts, where infectious diseases are common, has not been sufficiently studied. Therefore, in this study, it was aimed to investigate the relationship between infectious diseases such as HIV, HBV, HCV, and tuberculosis and health literacy in female convicts.

## Methods

The research was conducted between 2020 and 2021. Detailed information about the study was then given to all individuals by the physician who took part in this study and provided health services to the convicts. The cases who volunteered to participate in the study were evaluated with a face-to-face interview by the physician in terms of demographic and clinical data and health literacy skills.

The number of participants planned to be included in the pre-study study was calculated as 250. Due to the Covid-19 pandemic, the change of places of convicts in penitentiary institutions prevented reaching the required number. For this reason, 220 female convicts were evaluated in this study. The criteria for admission to the study were to be a female convict in the Yenisehir district execution institution of Bursa Province, to be over the age of 18 and to volunteer to participate in the research. The exclusion criteria; the presence of a condition that prevents communication or the presence of a significant mental restriction of the person or the presence of a neurological disorder that may interfere with understanding measurement tools.

The research was carried out in a cross-sectional pattern. Signed consent was obtained from all the cases evaluated in the study in connection with their volunteering to participate in the study. Ethical approval was obtained from the hospital's ethical committee.

The HLS-EU Q-16, which was developed in order to measure health literacy in adult people, consists of a total of 16 questions, and getting a high score from the measurement tool indicates increased health literacy (16). The HLS-EU Q-16 is of the 5-point Likert type, and the answers given for each question are scored between 0 and 4. A score of 33 and above on the scale indicates that people have a sufficient level of health literacy. The validity-reliability study of the HLS-EU Q-16 in Turkey was conducted in 2018 and the evaluations showed that it is a valid and reliable measurement tool to be used in measuring health literacy (17).

### Statistical Analysis

The demographic and clinical characteristics of the female convicts in the study were evaluated with descriptive statistical analyses such as frequency, percentage, average and standard deviation. In the study, the relationship between age and HLS-EU Q-16 scores of female convicts was examined by Pearson Correlation Analysis. HLS-EU Q-16 score averages according to family income status and education status were compared with One-Way ANOVA analysis. The HLS-EU Q-16 score averages among marital status and occupational groups were analyzed using Kruskal Wallis H test. Among the binary group variables that may increase the risks associated with chronic

diseases and, infectious diseases, the HLS-EU Q-16 score averages were compared with the Independent Groups t test when the number of subjects was sufficient ( $n \geq 30$ ), and with the Mann Whitney U test when it was not sufficient. The effectiveness of HLS-EU Q-16 scores in increasing the risk of tuberculosis according to HBV, the risk of suspicion of tuberculosis as a result of chest X-ray and the risk of tuberculosis according to the results of PPD, and in addition, the risk of contracting infectious diseases were examined by Univariate Binary Logistic Regression Analysis. The conformity of the data to normal distribution was checked with kurtosis and skewness ( $\pm 1.5$ ) values. The significance level was determined as  $p < 0.05$  for all analyses.

### Results

The mean age of the female convicts evaluated in the study was  $34.32 \pm 10.85$  (min.=18.00, max.=76.00). It was found that none of the female convicts evaluated in the study had a diagnosis of HIV. It was found that HBV was diagnosed in 11 (5.0%) and HCV was diagnosed in 1 (0.5%) female convict. In addition, as a result of chest X-ray, it was thought that 11 (5.0%) women had a compatible appearance with tuberculosis, and according to PPD test results, the tuberculosis result could be positive in 18 (8.2%) of the cases (Table 1).

**Table1.** Infectious disease characteristics of female convicts evaluated in the research

		n	%
HIV	No	219	100.0
HBV	No	209	95.0
	Yes	11	5.0
HCV	No	219	99.5
	Yes	1	0.5
Chest X-ray	No Tuberculosis	209	95.0
	Tuberculosis	11	5.0
PPD positivity	No	202	91.8
	Yes	18	8.2

HIV: Human Immunodeficiency Virus; HBV: Hepatitis B Virus; HCV: Hepatitis C Virus; PPD: Purified Protein Derivative

Twelve (5.5%) of the female convicts evaluated in the study had a history of substance use, and 154 (70.0%) of the women had a tattoo. Of the female convicts, 27 (12.3%) reported that they had a blood transfusion, 164 (74.5%) had received dental treatment in the

past, 109 (49.5%) had surgery in the past, 158 (71.8%) had given birth, 57 (26.0%) had been vaccinated for HBV, and 33 (15.0%) had a family history of tuberculosis (Table 2).

**Table 2.** Characteristics of female convicts and increased risk of infectious disease

		n	%
History of substance use	No	208	94.5
	Yes	12	5.5
The presence of a tattoo	No	66	30.0
	Yes	154	70.0
Blood transfusion	No	193	87.7
	Yes	27	12.3
Dental treatment	No	56	25.5
	Yes	164	74.5
History of surgery	No	111	50.5
	Yes	109	49.5
History of childbearing	No	62	28.2
	Yes	158	71.8
HBV vaccination history	No	162	74.0
	Yes	57	26.0
Family history of tuberculosis	No	187	85.0
	Yes	33	15.0

The HLS-EU Q-16 mean values of female convicts evaluated in the study were  $42.68 \pm 7.76$  (min.=21.00, max.=64.00). It was found that 22 (10%) of the female convicts had an insufficient level of health literacy. There was a statistically significant negative correlation between HLS-EU Q-16 scores and age values ( $r=-0.222$ ,  $p=0.001$ ).

According to the One-Way ANOVA analysis, it was found that the HLS-EU Q-16 score averages of female

convicts differed at a statistically significant level according to the income status of the family ( $p=0.005$ ) and the educational status of the women ( $p<0.001$ ). According to the Kruskal Wallis H test, the HLS-EU Q-16 score averages of female convicts differed at a statistically significant level according to marital status ( $p=0.001$ ) and occupational status of ( $p<0.001$ ) (Table 3).

**Table3.** HLS-EU Q-16 scores of female convicts and demographic characteristics

		Median	Standard Deviation	p-value
Income status of the family	Low	39.92	7.65	0.005 <sup>a</sup>
	Moderate	43.87	7.80	
	High	43.11	6.80	
Marital Status	Single	45.84	6.65	0.001 <sup>b</sup>
	Married	41.92	7.69	
	Divorced	43.43	7.26	
	Her husband has passed away	36.59	8.37	
Profession	No	41.00	8.18	<0.001 <sup>b</sup>
	Officer	52.17	6.46	
	Worker	42.87	4.87	
	Retired	46.97	6.57	
	Private Sector	40.65	7.40	
	Housewife	43.32	7.59	
Education	Illiterate	37.40	6.60	<0.001 <sup>a</sup>
	Primary	40.93	5.67	
	Secondary	43.49	5.56	
	High	48.00	5.57	
	Licence	50.48	7.08	

a=One-way ANOVA Analysis, b=Kruskal Wallis H test

According to the Independent Group t test, the HLS-EU Q-16 score averages of female convicts with chronic diseases were statistically significantly lower than the averages of female convicts without chronic

diseases ( $p=0.008$ ). According to the Mann Whitney U test, the HLS-EU Q-16 score averages of women with HT diagnosis were statistically significantly lower than those of women without HT diagnosis ( $p<0.001$ ) and women with hyperlipidemia diagnosis than those without this diagnosis ( $p=0.018$ ) (Table 4).

**Table4.** HLS-EU Q-16 scores of female convicts and chronic diseases

		Mean	Standard Deviation	p-value
Chronic Disease	No	43.64	7.36	0.008 <sup>a</sup>
	Yes	40.68	8.21	
Hypertension	No	43.54	7.54	<0.001 <sup>b</sup>
	Yes	37.23	6.93	
Asthma/ COPD	No	42.62	7.60	0.777 <sup>b</sup>
	Yes	43.03	8.65	
Hyperlipidemia	No	42.93	7.57	0.018 <sup>b</sup>
	Yes	32.20	9.09	
Diabetes Mellitus	No	42.71	7.87	0.819 <sup>b</sup>
	Yes	42.00	4.90	

a=Independent Groups t test, b=Mann Whitney U test

Independent groups t test analysis found that the HLS-EU Q-16 score averages of female convicts with tattoos ( $p=0.016$ ), women with a birth history

( $p=0.002$ ) and those without HBV vaccination history ( $p=0.014$ ) were statistically significantly lower (Table 5).

**Table 5.** Variation of HLS-EU Q-16 scores and increased risk of infectious disease

		Mean	Standard Deviation	p-value
History of substance use	No	42.72	7.81	0.931 <sup>a</sup>
	Yes	42.08	7.10	
Presence of a tattoo	No	44.59	9.69	0.016 <sup>b</sup>
	Yes	41.86	6.63	
Blood transfusion	No	42.71	7.85	0.994 <sup>a</sup>
	Yes	42.48	7.19	
Dental treatment	No	41.93	6.83	0.312 <sup>b</sup>
	Yes	42.94	8.05	
History of surgery	No	42.86	7.58	0.610 <sup>b</sup>
	Yes	42.50	7.96	
History of childbearing	No	45.31	7.28	0.002 <sup>b</sup>
	Yes	41.65	7.71	
HBV vaccination history	No	41.90	7.63	0.014 <sup>b</sup>
	Yes	44.82	7.79	
Family history of tuberculosis	No	42.86	7.91	0.430 <sup>b</sup>
	Yes	41.70	6.87	

a=Mann Whitney U test; b=Independent Groups t test; HBV: Hepatitis B Virus

According to the Univariate Logistic Regression analysis, HLS-EU Q-16 scores were not effective at a statistically significant level in increasing the risk of HBV ( $p=0.115$ ).

In the Univariate Logistic Regression analysis, HLS-EU Q-16 scores were not effective at a statistically significant level in increasing the risk of tuberculosis according to the results of chest X-ray ( $p=0.272$ ).

In the Univariate Logistic Regression analysis, HLS-EU Q-16 scores were not effective at a statistically significant level in increasing the risk of tuberculosis according to the results of PPD ( $p=0.499$ ).

In the Univariate Logistic Regression analysis, HLS-EU Q-16 scores were not effective at a statistically significant level in increasing the risk of infectious diseases ( $p=0.143$ ).

## Discussion

The mean HLS-EU-Q16 score of the prisoners evaluated in the study was 42.68, and 10% of the female convicts had insufficient health literacy. There was a statistically significant negative correlation between the age of the women and their health literacy scores. HLS-EU-Q16 scores were statistically significantly different according to family income, marital status, occupation and education. HLS-EU-Q16 mean scores were found to be lower in convicts with chronic disease, those with hypertension, those with hyperlipidemia, and those who have a tattoo. The mean of HLS-EU-Q16 in cases who were not vaccinated against HBV in the past were lower than those who were vaccinated in the past.

There were no cases of HIV diagnosis among female convicts. In a review examining HIV prevalence among convicts, it was found that HIV prevalence among women is lower, and HIV prevalence among prisoners varies between 0-20% in different countries (18). In an assessment conducted in the general population in Turkey, it was assessed that the prevalence of HIV among women is lower than men. In a study conducted among prisoners in Turkey, the prevalence of HIV was 0.61% (19). When the results obtained from this research are evaluated, it can be said that the prevalence of HIV among female convicts is lower in Turkey compared to other countries. In this study, the lack of HIV-diagnosed individuals limited the investigation of the relationship between health literacy and the risk of contracting HIV. Therefore, investigating the relationship between HIV and health literacy in larger samples may contribute to the literature.

Five percent of female convicts were diagnosed with HBV. HBV is one of the most common human diseases, a disease that infects billions of people and has killed more than 1 million people due to chronic liver disease associated with HBV (20). A study conducted on prisoners found that the HBV positivity rate was 8.7% (21). In a study conducted on prisoners in Turkey, it was estimated that the HBV surface antigen (HBsAg) positivity rate was 2.6% (22). When the results in the literature and research are evaluated together, it can be said that HBV is a common infection.

HCV rate in female convicts was 0.5%. In a review, it was evaluated that the incidence of HCV diagnosis varies between 12% and 31% in people staying in prisons (23). In another study, the prevalence of HCV among prisoners was 1.4% in Asia where the prevalence of HCV is higher among the prisoners. An estimated 2.2 million prisoners in the entire world have

HCV positivity (24). The findings obtained from this research show that the diagnosis of HCV among female convicts is lower than the data in the literature.

In this study, the rate of tuberculosis in imaging in female convicts was 5%, and according to PPD tests, 8.2% of the convicts were suspected to have tuberculosis. In the radiological screening of prisoners in the Marmara region in Turkey, tuberculosis diagnosis was suspected in 130 cases among 4615 cases with imaging, and it was estimated that tuberculosis was present in 108 cases per 100,000 individuals among those examined, in accordance with these results (25). In studies conducted on detainees in other countries, the prevalence of tuberculosis varies from 8.3% to 19%. When the information in the literature is examined, it can be said that the results obtained from the current research are consistent with other data, and that tuberculosis is a common infectious disease among female prisoners. Although tuberculosis is a treatable disease, it shows a high prevalence in poor countries. It is known that insecurity, random living conditions, malnutrition, ignorance, inadequate medical infrastructure and, above all, the HIV infection epidemic in these countries explain this situation. In addition, the prevalence increases in times of war or famine (26).

In this study, the level of health literacy in people who have had tattoos was lower than those without tattoos. There are several medical risks, including the propagation of infectious diseases with the tattoo, especially HBV, HIV, *Treponema pallidum*, papillomavirus, and the risk of contamination by *Mycobacterium tuberculosis* and other organisms. Therefore, in terms of protecting the public health in this area, there is the need for providing the necessary training (27). It is known that the necessary training and supervision activities are not provided for tattoo facilities and the population in Turkey. For this reason,

it is not known whether adequate hygiene conditions are provided where tattoos are done. In this research, the low health literacy associated with people who have tattoos may lead to a greater increase in the risk of infectious diseases in these people in later years since tattooing can occur as a repetitive behavior. Cases of behavioral addiction related to getting a tattoo have been reported in the literature (28). For this reason, questioning the place and health information level of convicts who have tattoos, and providing the necessary information about infectious diseases in these people may be useful from the point of view of public health.

### **Limitations**

In this research, the concept of health literacy is limited to the results obtained from the HLS-EU-Q16. One of the limitations of this study is that the number of participants is limited and only female convicts are evaluated in the study. Another limitation of the study is that the prisoners staying in the single remand home were evaluated in the study. For this reason, the results of this research are limited to convicts in the region where measurements were taken. Another limitation of the study is that the data were collected cross-sectional. It is known that in some cases, assessments and tests must be repeated for the final diagnosis of infectious patients. For this reason, this situation constitutes a limitation for the research.

### **Conclusions**

Infectious diseases such as HIV, HBV, HCV and tuberculosis among convicts staying in penitentiary institutions may pose important health problems for all individuals serving and staying in the institution. For this reason, developing health education appropriate to the nature of prisoner homes and informing convicts about it could contribute to increasing health literacy. In this study, health literacy varied according to

demographic and clinical characteristics of female convicts, but health literacy was not an effective factor in increasing the risk of infectious diseases. For this reason, it would be useful for physicians working in prison institutions to focus on the health literacy of their patients and to know that the health information levels of convicts are limited by their demographic background. In addition, investigating the relationship between infectious diseases and health literacy among convicts in larger samples would contribute to the literature.

**Conflict of Interest:** The authors declare that there is no conflict of interest.

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