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ORIGINAL: Seroepidemiological study of Hepatitis A in Medical Students of Mazandaran University of Medical Sciences in 2019

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ABSTRACT

Introduction: Hepatitis A (HA) is a common infectious disease caused by the HA virus that primarily affects the liver. We need to determine the safety status and infection rate in the community. Therefore, we decided to study the Seroepidemiological of HA in medical students of Mazandaran University of Medical Sciences in 2019.

Material and Methods: This was a cross-sectional descriptive-analytical study prospectively examining anti-HAV antibodies in medical students of Mazandaran University of Medical Sciences in 2019. Patient demographic data, laboratory results of anti-HAV IgG and vaccination history were recorded. Four cc of blood were drawn from each student for the anti-HAV IgG test and after the test was performed. Data were analyzed using SPSS 24 software.

Results: One hundred and fifty-five students were interviewed. The mean age (standard deviation) of the students in this study was 23.81 (1.47) years. Ninety-nine (63.9%) of the students were male. Therefore, it was caused by previous infection with HAV and 120 (77.4%) cases were considered susceptible individuals whose serum anti-HAV IgG was negative. This was not seen to be statistically significant (P=0.754). According to the test, 77.4% of the predictions were correct. None of the variables of sex, age, history of underlying disease, place of residence, and history of travel had a significant effect on the incidence and positivity of anti-HAV IgG.

Conclusion: This study showed that the incidence of anti-HAV IgG was positive in 22.6% of the students, which is much lower than previous studies. This may be due to the higher level of health in this segment of the population.

Introduction

Hepatitis A (HA) is a common infectious disease caused by the HA virus that primarily affects the liver. Symptoms in adults include fever, weakness, anorexia, nausea, abdominal discomfort, and jaundice (1, 2). HAV is an RNA virus of the picornavirus family that is distinguished from other human pathogens by a slow and

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nonlytic replication cycle (3). The virus is transmitted fecal-orally and frequently via contaminated drinking water. Several outbreaks of infection with the virus have been reported due to consumption of contaminated food and water. Another way the virus can be transmitted is through sexual contact or close contact with an infected person. Infection with the virus in children is usually asymptomatic, but the risk of symptoms increases with age, and acute hepatitis, severe illness and death usually occur in old age. The clinical course of this disease is varied and most patients recover from infection within two months, although recurrence of infection occurs in 10 to 15% of patients within the first 6 months (4, 5).

The disease is more prevalent in developing countries than in developed and industrialized countries. In underdeveloped countries, the disease is endemic and often affects people at a young age, but symptoms are milder in people. In developed countries, due to the high level of health, the disease occurs sporadically and most people contract the disease at an older age, and the symptoms of the disease are more severe, even leading to fulminant hepatitis in some cases. The disease pattern is closely related to health, social and economic status, and advances in socio-economic and health conditions have led to changes in the epidemiology of the disease around the world (4, 6). Therefore, this study aimed to investigate the seroepidemiology of HA in medical students of Mazandaran University of Medical Sciences in 2019.

Methods

This was a cross-sectional descriptive-analytical study prospectively examining anti-HAV antibodies in medical students from Mazandaran University of Medical Sciences in 2019. The sampling method in this study was a census. Students with a history of HAV and a history of HAV vaccination were excluded from the study.

For this purpose, all students were evaluated based on their eligibility criteria. Patient demographic data (age, sex, place of residence, travel history, underlying disease), laboratory results of anti-HAV IgG and vaccination history were recorded in the specific information form of each student. After explaining the objectives of the study and the implementation of the plan to the student, verbal consent was obtained from the student to participate in the study.

Four cc of blood were drawn from each student for the anti-HAV IgG test and after the test was performed. The study participants were assured that their data would be kept confidential, that no fees would be imposed on the students, and that they could withdraw from the study at any time. During the course of the study, the student was excluded from the study if any part of the required information was falsified or untraceable.

Data were statistically analyzed using SPSS software version 24. Qualitative variables based on number (percentage) and quantitative variables based on mean ± standard deviation were presented. Student t-test was used to examine the relationship between quantitative variables and normal distribution, and Mann-Whitney test was used for variables that did not have normal distribution. Logistic regression was also used to evaluate the odds ratio of risk factors for hepatitis A. A P-value of less than 0.05 was considered a statistically significant difference.

Results

One hundred and fifty-five students were interviewed. The mean age (standard deviation) of the students in this study was 23.81 (1.47) years, with a minimum age of 21 years and a maximum age of 27 years, with a mean age of 24 years. In terms of gender, 99 (63.9%) of the students were male and 56 (36.1%) were female. 148 (95.5%) were residents of the city. In terms of travel history, 16 (10.3%) of the students had travel history, most of them were in Mashhad in 4 cases, Tehran in 4 cases, Gonbad Kavous in 3 cases, Tabriz in 2 cases, and other cases,

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one case each. Travel was made to the cities of Shiraz, Urmia and Bojnourd (***Table 1***).

Table 1. Demographic information of students surveyed in the study

Variable		Frequency (%)
Sex	Male	99 (63.9)
	Female	56 (36.1)
Age	<24	98 (63.2)
	>24	57 (36.8)
Place of residence	Urban	148 (95.5)
	Rural	7 (4.5)
Underlying disease	None	151 (97.4)
	Convulsions	2 (1.3)
	Hypertension	1 (0.6)
	Diabetes mellitus	1 (0.6)
Travel history		16 (10.3)

Anti-HAV IgG was positive in 35 (22.6%) of the students. Therefore, it was caused by previous infection with HAV and 120 (77.4%) cases were considered susceptible individuals whose serum anti-HAV IgG was negative. 25 (25.3%) of male students had anti-HAV IgG positive, which was not statistically significant (P= 0.290). Thirty-four (23%) of urban students and 1 (14.3%) of rural students had anti-HAV IgG positive, which was not statistically significant (P= 0.591). The frequency of anti-HAV IgG in the studied students was examined in relation to age, which was not statistically significant (P= 0.653). Two (12.5%) of the students with recent travel history had anti-HAV IgG positive antibodies, which was not statistically significant (P= 0.308) (***Table 2***). The frequency distribution of anti-HAV IgG in the studied students was examined according to the history of the underlying disease. All positive cases were seen in students who had no history of the underlying disease and in students with a history of positive antibody cases. This was not seen to be statistically significant (P= 0.754).

Logistic regression was used to examine the odds ratio of risk factors for hepatitis A. According to the test, 77.4% of the predictions were correct, but the table below shows Wald coefficients and statistics and degrees of freedom and probability values for each of the variables. But none of the variables of sex, age, history of underlying disease, place of residence, and history of travel had a significant effect on the incidence and positivity of anti-HAV IgG, the results of which are shown in ***Table 3***.

Discussion

Hepatitis A is an acute viral disease that is considered a health problem in the world and in developing countries due to its high prevalence. Iran, like other countries in Asia and Middle East, is one of the regions where the prevalence of this disease is very high (1-3).

Table 2. Frequency of HAV-IgG antibodies in students studied in the study

Variable		HAV-IgG		P-value
		Negative	Positive	
Sex	Male	74	25	0.290
	Female	46	10	
Age	<24	114	34	0.591
	>24	6	1	
Place of residence	Urban	77	21	0.653
	Rural	43	14	
Travel history		14	2	0.308

Table 3. Assessing the odds ratio of risk factors for hepatitis A using logistic regression

Variable	B	S.E.	Wald	df	Sig.	Exp(B)
Sex	-0.106	0.133	0.632	1	0.427	0.900
Age	0.402	0.429	0.876	1	0.349	1.494
Place of residence	0.304	1.132	0.072	1	0.789	1.355
Underlying disease	0.765	0.796	0.923	1	0.337	2.149
Travel history	20.040	19966.496	0.000	1	0.999	505088261.600

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In the past, most people in developing countries acquired the necessary immunity to this pathogen naturally during childhood through contact with it and were immune to it in adulthood. With the increase in personal health levels and lifestyle changes in these areas, changes in the epidemiology of the disease have been observed and the age of infection has increased in these societies. Since the increase in the age of onset of the disease is associated with an increased risk of dying from it, developed societies should not use immunosuppressive methods such as vaccination to reduce the risk of immunization. The natural predisposition of people to this disease, the possibility of the need to vaccination in some areas (4). The study of this issue and determine the strategy for the use of vaccination requires accurate information on the prevalence in different parts of the country. Studies on the prevalence of hepatitis A in Iran are very few and none of them have reported the prevalence of this disease in the normal population. This study was conducted to respond to the mentioned need.

In the present study, the frequency distribution of HAV -IgG antibodies in the studied students were examined according to sex, age group, place of residence, history of underlying disease and recent travel history, none of the variables were statistically Logistic regression was used to evaluate the odds ratio of risk factors for hepatitis A, but after testing none of the variables were sex, age, history of underlying disease, place of residence and previous history. Travel had no significant effect on the incidence and prevalence of hepatitis A antibodies. In this regard, studies were conducted in Iran. In the study of Salehi et al (18), the sero-epidemiology of hepatitis A in the rural population under 30 years of age in Zabol was evaluated and the results of this study showed that 202 individuals (88.6%) had antibodies to HAV, indicating that this infection is hyperemic in this region. The prevalence of HAV infection was 85.6% in males and 91.4% in females. However, this difference was not significant based on chi-square test. The results showed that infection occurred from the first year of life and increased rapidly, so that 79.6% of children under five years of age and 100% of children aged 19-15 years had hepatitis A infection. In another study by Mohebbi and colleagues, HAV seroepidemiology was performed in Tehran province and the results showed that HAV antibodies were positive in 405 patients (90.4%). There was no significant association between different age groups and gender with antibody positivity (8). For the differences in the results of the studies, we can consider the reason that our study was conducted only among medical students and the sample size was smaller than the previous two studies. On the other hand, this study was conducted among individuals. They are assumed to have almost high level of health and this generalization makes the results impossible for other people in the community.

Similarly, in another study by Alian et al. in Sari, 1034 individuals were screened for HAV antibodies, of which 60% were urban dwellers and 40% were rural dwellers. The highest prevalence of antibodies was found in the age group of 15-25 years. In this age group, 52.4% of urban dwellers and 82.4% of rural dwellers and 64.3% of individuals were positive for HAV antibodies (9). In this study, the frequency of positive cases was much higher than our study and this may also be due to the reasons mentioned above. On the other hand, the sample size in the study of Alian et al. was much larger than in our study and was studied in all social classes. In another study in Qom province, Nowruz et al. investigated the prevalence of hepatitis A and E among individuals above 15 years of age in this province. In this study, 720 samples were tested for the presence of hepatitis A and E by ELISA method. The serum prevalence of HAV was 78.6% (582 individuals). The relationship between these viruses and age and area of residence was found to be statistically significant (10). Qadir et al. examined 697 residents of Gonbad Kavus city and Kalaleh villages in Golestan province for the presence of hepatitis A by ELISA method. The results showed that 687

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patients (98.6%) of the study population were anti-HAV IgG positive (5).

On the other hand, studies similar to ours were conducted but in a specific population. For example, Ghorbani et al. tested antibodies to HAV in military personnel in a cross-sectional study. 800 subjects, all men, were enrolled in the study. None of the subjects had a history of hepatitis. Demographic variables were not significantly associated with HAV (11). In another study on the age of children, Jahanara et al. showed that out of 400 children studied, 42.8% of the children were safe against HAV, of which 59.1% were boys and 40.9 % were girls. In this study, there was a significant association between the age of one year and the level of immunity, but there was no significant association between the level of immunity and the demographic characteristics of the patients (12).

On the other hand, studies have been conducted outside Iran which help to compare the results obtained in our country with other countries. In this regard, in a study conducted in 2018 in two Korean hospitals, Kim et al. tested anti-HAV IgG in 170 hemodialysis patients. Anti- HAV antibodies were found in 163 patients (95.9%) and no significant relationship was found between the two hospitals. (13) And similar to this study, Mayor et al. tested anti- HAV antibodies in 469 patients from 20 hemodialysis centers in Michigan in 1982. The mean prevalence of HAV antibodies was 59.5% (14). The difference between these studies and our study was that these studies examined a group of individuals undergoing hemodialysis. However, comparisons with studies conducted in Iran show that in most studies, as in our study, it was emphasized that this incidence had no relationship with the demographic variables of the patients.

Conclusion

The results of the present study showed that the incidence of anti-HAV IgG was positive in 22.6% of the students, which is much lower than previous studies, and this may be due to the higher level of health in this segment of the population. Therefore, it cannot be generalized to all population groups. However, future studies in other universities need to be conducted among undergraduates as medical students after completing the project course are mainly sent to deprived areas and face poor health conditions. They need to design and implement an immunization program for these students.

Ethical standards statement

This study was approved by the Research Ethics Committee of Mazandaran University of Medical Sciences (IR.MAZUMS.REC. 1398.777).

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Conflicts of interest

The authors declare no conflict of interest regarding publication of this article.

Authors' contributions

All authors have intellectually committed to the study design and process. The final manuscript was revised and accepted by all authors.

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