



# Seroprevalence of Hepatitis A Antibody in Patients Admitted to the Psychiatric Ward of Sina Hospital, Hamadan

Peyman Eini<sup>1\*</sup>, Abbas Moradi<sup>2</sup>, Roghayeh Sedighi<sup>3</sup>, Pooya Eini<sup>4</sup>

<sup>1</sup>Department of Infectious Diseases, Hamadan University of Medical Sciences, Hamadan, Iran

<sup>2</sup>Department of Community and Preventive Medicine, Hamadan University of Medical Sciences, Hamadan, Iran

<sup>3</sup>General Practitioner, Hamadan University of Medical Sciences, Hamadan, Iran

<sup>4</sup>Medical Student, Shahid Beheshti University of Medical Sciences, Tehran, Iran

**\*Corresponding author:**

Peyman Eini, Associate Professor of Infectious Diseases, Hamadan University of Medical Sciences, Hamadan, Iran.  
Email: eini@umsha.ac.ir

Received: 14 Apr. 2018

Accepted: 8 Aug. 2018

ePublished: 29 Dec. 2018

## Abstract

**Background:** Hepatitis A virus (HAV) is one of the most common health problems worldwide and has the highest prevalence in societies with low to moderate social class. The aim of this study was to evaluate the prevalence of hepatitis A antibody in the patients admitted to the psychiatric ward of Sina hospital, Hamadan, Iran.

**Methods:** In this descriptive cross-sectional study, 270 patients hospitalized in the psychiatric ward of Sina hospital were evaluated in 2015. Blood samples were analyzed by ELISA method and the HAV IgG antibody were measured in them. SPSS software version 16.0 was used to analyze the data.

**Results:** Hepatitis A test result was positive in 70.4% of the participants. The per capita income, household size, sex, educational level, place of residence, and occupational status were not significantly different between the patients who were seropositive for the hepatitis A antibody and HAV negative patients ( $P < 0.05$ ). The highest incidence was observed in the people with mood disorders. However, there was no difference in the type of disease between the patients who were seropositive for the IgG antibody and the HAV negative patients.

**Conclusions:** Based on the results, the prevalence of HAV among urban and rural populations was not significantly different. The study patients were seropositive for IgG antibodies for HAV in the rates similar to those of populations with high prevalence of the disease, indicating a low level of health status in the community.

**Keywords:** Hepatitis A virus, Hepatitis A antibodies, Psychiatric hospital



## Background

Many have called hepatitis the “disaster of the century”. The cost of treatment of this disease is very high, but there is yet no hope for recovery in all cases. What is important in this disease is that it is a preventable one but with rapid onset.<sup>1</sup>

Viral hepatitis is a major health problem in developing countries as well as in developed countries. Hepatotropic viruses are named A, B, C, D, E, and G.<sup>2</sup> Studies have shown that the prevalence of the disease decreases with age while clinical symptoms increase with age.<sup>3</sup>

The incubation period of hepatitis A is four weeks and its clinical manifestations are different.<sup>4</sup> Hepatitis A virus (HAV) is the most common cause of acute viral hepatitis around the world<sup>5</sup> and it is responsible for half of all cases of hepatitis.<sup>6</sup> In Iran, HAV is the main cause of acute viral hepatitis.<sup>7</sup>

Mild fever is the initial symptom of the disease. One to 5 days before yellowing of the skin, the patient may become aware of dark urine and pale stool.<sup>8</sup> It appears that most hepatitis cases in children in the United States

are due to HAV.<sup>2</sup> Hepatitis A is a gastrointestinal disease with fecal-oral transmission.<sup>9</sup> The disease can spread quickly in highly populated communities due to its fecal-oral route of transmission.<sup>10</sup>

The fecal shedding of virus occurs late in the incubation period. It reaches the maximum level right before the onset of symptoms and continues to a lesser extent after two weeks of jaundice. The incubation period ranges from 15 to 50 days, with an average period of about 4 weeks.<sup>2</sup>

Poverty, unhealthy drinking water, poor waste management system, and population density all contribute to the transmission of the virus.<sup>11</sup> The prevalence of infection is clearly tied to the socio-economic status of the target area.<sup>12</sup>

In the acute phase of the disease, the antibody is of IgM type which cannot be measured anymore after 6 months of the disease. However, IgG increases with improvement of the disease, remains in the body for many years, and confers long-term immunity to the disease.<sup>13</sup>

The risk of chronic hepatitis such as hepatitis C is high among psychiatric patients due to the prevalence of illicit

drug use in these patients. If a person with hepatitis B or C is also infected with HAV, the risk of fulminant hepatitis will increase. Vaccination against HAV can decrease the risk of fulminant hepatitis in these patients.

With all these in mind, this study was conducted to evaluate seroprevalence of hepatitis A antibodies among psychiatric patients hospitalized in Sina Hospital, Hamadan, Iran.

## Methods

This cross-sectional descriptive study was conducted on the patients admitted to Sina hospital in Hamadan, west of Iran, in 2014. The patients reluctant to participate in the experiment after explaining the goals of the study, as well as those who had previously been vaccinated against the disease, were excluded from the study.

To conduct the test, 4 mL venous blood samples were taken from each patient and then tested by ELISA for hepatitis A IgG antibody.

In this study, 270 patients were examined. Information on age, sex, occupational status, educational level, per capita income, place of residence, drinking water supply, and household size were gathered.

Data were extracted manually and then analyzed using SPSS software version 16.0. Analytical statistics including chi-square and odds ratio (OR) were used to compare the seroprevalence of HAV in different subgroups at 95% confidence interval. The significance level was considered  $P < 0.05$ .

## Results

Of the study population (280 patients), 190 patients (70.4%) were seropositive for hepatitis A IgG antibody and 80 (29.6%) were negative.

The mean age of our participants was 36.39 (range: 5-62) years in the seropositive group and 39.85 (range: 20-79) years in the HAV negative group ( $P = 0.59$ ). The mean age of the total number of participants in the study was 37.63 years. The average income was 7 million Rls. per month for all the participants. The average income was 9 million Rls. for the seropositive patients and 5 million Rls. for the seronegative group ( $P = 0.367$ ).

The average household size in this survey was 4.42 people per household. It was 4.51 for the seropositive patients and 4.8 for the seronegative patients ( $P = 0.385$ ).

Of the 280 patients in this study, 247 (91.5%) were male and 23 (8.5%) were female. Moreover, 176 patients (92.6%) were male and 14 (7.4%) were female in the seropositive group, while in the seronegative group, there were 71 male patients (88.8%) and 9 female patients (11.2%) ( $P = 0.297$ ) (Table 1).

Furthermore, of the 280 patients, the distribution of middle school, diploma, associate's degree, and bachelor's degree was 6.7%, 88.5%, 3.7%, and 1.1%, respectively. In this regard, in the seropositive group, 163 patients

(60.4%) had middle school educational level, 15 patients (5.6%) had diploma, 10 patients (3.7%) had associate's degree, and 2 patients (0.7%) had bachelor's degree and in the seronegative group, 76 patients (28.1%) had middle school educational level, 3 patients (1.1%) had diploma, and one patient (0.4%) had bachelor's degree ( $P = 0.101$ ) (Table 2). In this study, 68.9% of the subjects were inhabitants of urban areas and 31.1% were those of rural areas. In this regard, 132 patients (48.9%) in the seropositive group lived in the city and 58 patients (21.5%) lived in the village, while in the negative group for hepatitis A antibodies, 54 patients (20%) lived in the city and 26 patients (9.6%) lived in the village ( $P = 0.749$ ).

In terms of occupation, 7.8% (21 patients) were employee, 7% (19 patients) were farmer, 26.4% (66 patients) were unemployed, 11.1% (30 patients) were homemaker, and 49.6% (134 patients) were self-employed.

In terms of distribution of occupation in the positive group for hepatitis A antibodies, 6.7% (18 patients) were employee, 34.8% (94 patients) were self-employed, 5.6% (15 patients) were farmer, 15.9% (43 patients) were unemployed, and 7.4% (20 patients) were homemaker, while in the seronegative group, 1.1% (3 patients) were employee, 14.6% (40 patients) were self-employed, 1.5% (4 patients) were farmer, 8.5% (23 patients) were unemployed, and 3.7% (10 patients) were homemaker ( $P = 0.392$ ) (Table 3).

In terms of drinking water supply, all of the study patients used tap water.

Regarding the psychiatric disorders, the rates of mood

**Table 1.** Distribution of HAV Antibody by Sex

Sex	Positive for IgG Antibody	Negative for IgG antibody
Male	176 (92.6%)	71 (88.8%)
Female	14 (7.4%)	9 (11.2%)

**Table 2.** Education Level of the Patients

Education Level	Positive for IgG Antibody	Negative for IgG Antibody
Middle school	163 (60.4%)	76 (28.1%)
Diploma	15 (5.6%)	3 (1.1%)
Associate's degree	10 (3.7%)	—
Bachelor's degree	2 (0.7%)	1 (0.4%)

**Table 3.** Distribution of Patients in Terms of Occupation

Occupation	Positive for IgG Antibody	Negative for IgG Antibody
Employee	18 (6.7%)	3 (1.1%)
Self-employed	94 (34.8%)	40 (14.6%)
Farmer	15 (5.6%)	4 (1.5%)
Unemployed	43 (15.9%)	23 (8.5%)
Homemaker	20 (7.4%)	10 (3.7%)

disorders, psychotic disorders, substance abuse, and personality disorders were 63.7%, 24.1%, 1.9%, and 10.4%, respectively.

In the positive group of patients for hepatitis A antibodies, 117 patients (43.3%) suffered from mood disorders, 48 (17.8%) from psychotic disorders, 3 (1.6%) from substance abuse, and 22 (11.6%) from personality disorders. In the negative group of patients for HAV, the rates of mood disorders, psychotic disorders, substance abuse, and personality disorders were 20.4%, 6.3%, 0.7% and 2.2%, respectively ( $P = 0.574$ ). In addition, in terms of the prevalence of study diseases, Bipolar I, Bipolar II, schizophrenia, major depressive disorder (MDD), posttraumatic stress disorder (PTSD), paranoid, borderline, schizoaffective disorder, obsessive-compulsive disorder, substance abuse, and dementia were observed in 41.1%, 7.2%, 8.5%, 23.3%, 7%, 2.5%, 5.1%, 1.2%, 1.1%, 1.9%, and 1.1% of patients, respectively ( $P = 0.487$ ).

## Discussion

As a current health problem, hepatitis A is one of the most common diseases worldwide, although its mortality and morbidity rates are low, except for adults. In the United States, the annual clinical cost of HAV infection is estimated around \$200 million.<sup>14</sup>

Clinical, serological, and epidemiological findings on this disease would be very valuable for determining the changes in the epidemiology of the disease and the risk factors in the transmission of it. Among the important tools for understanding the frequency and determining the rate of infection is the measurement of anti-HAV IgG antibody in these populations and the specific groups. IgG appears during convalescence and plays a major role in preventing reinfection.<sup>15</sup>

The current study was the first study on the seroprevalence of hepatitis A in the patients admitted to the psychiatric ward of Sina hospital in Hamadan as a referral center for infectious and psychiatric diseases.

The results of this study showed that overall seroprevalence of HAV was 70.4% among the admitted patients. In this regard, the results of this study are in line with the results of a study conducted by Mohebbi et al<sup>16</sup> in Tehran as well as the results of studies carried out in East Golestan (98.7%)<sup>17</sup> and Zabol (88.6%)<sup>18</sup>; however, they are in contrast to the findings of studies in Isfahan and Tabriz, which reported the prevalence as 8.9% and 23.9%, respectively.<sup>19,20</sup>

In comparison to the studies from other countries, in a study conducted in Luxembourg, for example, the rate of hepatitis A antibody was 42% in the age group of over 4 years.<sup>21</sup> Among world countries, China has been listed as an area with the highest prevalence of HAV and approximately 72.7% of the population are positive for the antibody.<sup>22</sup> In the neighboring countries of Iran, however,

the prevalence is different. In studies conducted on general population in Turkey and Kuwait, the overall prevalence rates were found 71.3% and 28.8%, respectively.<sup>23,24</sup> This rate in the United Arab Emirates was below 50%.<sup>25</sup> In Lebanon, 78% of people over 50 were positive for HAV antibody.<sup>26</sup> The mean age was 36.39 years for patients who were seropositive for the antibody against HAV and 39.85 years for seronegative patients and the age range was 34.91- 38.48 years.

In this study, only adults were studied, while other age groups were not included. The present study was the first study to examine the relationship between income level and seropositivity of antibodies against HAV. The results of this study showed that there was no significant relationship between the income level and seropositivity/seronegativity in patients ( $P = 0.367$ ).

Another objective of this study was to investigate the relationship between household size and seropositivity of antibodies against HAV. Since the transmission of the disease occurs through fecal-oral route, various studies have shown that it more likely occurs in crowded families.<sup>27,28</sup>

However, in the present study, there was no significant difference in the household size between seropositive and seronegative patients for the hepatitis A antibody ( $P = 0.385$ ).

In this study, most of the participants were self-employed (49.6%) and all women were homemakers (11.1%). The survey showed no relationship between occupational status and seropositivity/seronegativity in patients ( $P = 0.392$ ). Furthermore, 68.9% of the patients were living in the city and 31.1% in the village. There was no significant difference in the place of residence between two groups of seropositive and seronegative patients ( $P = 0.749$ ). Of course, the rate of patients living in the village was higher in the positive group, which may be attributed to the socioeconomic level as a determinant of the incidence of HAV, as shown in various studies.<sup>8,29</sup> On the other hand, in the study by Shamsizadeh et al,<sup>30</sup> it was stated that the place of residence had no direct effect on the incidence of the disease, which somehow is in line with our study results.

## Conclusions

According to the results of this study and those of other studies in all parts of the world, vaccination is recommended for patients who are prone to HAV (such as patients suffering from mental illnesses and patients with chronic hepatitis C) in order to prevent the disease. This could lessen the burden of the disease on the society.

## Ethical Approval

This study was supported financially by Vice-chancellor of Research and Technology, Hamadan University of Medical Sciences. (Number:IR.UMSHA.REC.1394.340).

**Conflict of Interests**

None.

**Acknowledgments**

The authors thank the Research Deputy of Hamadan University of Medical Sciences, Hamadan, Iran, for their financial support.

**References**

- Salehi M, Sanei M, Khosravi S. Etiology of acute viral Hepatitis in Zahedan. *Pajouhesh Dar Pezeshki*. 2003;26(4):245-8.
- Chen BF. Different pre-S deletion patterns and their association with hepatitis B virus genotypes. *World J Gastroenterol*. 2016;22(35):8041-9. doi: [10.3748/wjg.v22.i35.8041](https://doi.org/10.3748/wjg.v22.i35.8041).
- Alavian SM. Iraq: A Hot Zone for HAV Infection? *Hepat Mon*. 2005;5(3):53-6.
- Lee S. Hepatitis A vaccination in patients with chronic liver disease in Taiwan. *J Viral Hepat*. 2000;7 Suppl 1:19-21.
- Rothstein KD. Hepatitis A vaccination in patients with chronic liver disease: to screen or not to screen? *Am J Gastroenterol*. 2002;97(7):1590-3. doi: [10.1111/j.1572-0241.2002.05882.x](https://doi.org/10.1111/j.1572-0241.2002.05882.x).
- Koff RS. Hepatitis A. *Lancet*. 1998;351(9116):1643-9. doi: [10.1016/s0140-6736\(98\)01304-x](https://doi.org/10.1016/s0140-6736(98)01304-x).
- Provost PJ, Hilleman MR. Propagation of human hepatitis A virus in cell culture in vitro. *Proc Soc Exp Biol Med*. 1979;160(2):213-21.
- Neefe JR, Gellis SS, Stokes J Jr. Homologous serum hepatitis and infectious (epidemic) hepatitis; studies in volunteers bearing on immunological and other characteristics of the etiological agents. *Am J Med*. 1946;1:3-22.
- Gadgil PS, Fadnis RS, Joshi MS, Rao PS, Chitambar SD. Seroepidemiology of hepatitis A in voluntary blood donors from Pune, western India (2002 and 2004-2005). *Epidemiol Infect*. 2008;136(3):406-9. doi: [10.1017/s0950268807008643](https://doi.org/10.1017/s0950268807008643).
- Koenig A, Stepanova M, Felix S, Kalwaney S, Clement S, Younossi ZM. Vaccination against hepatitis A and B in patients with chronic liver disease and type 2 diabetes: has anything changed? *Liver Int*. 2016;36(8):1096-100. doi: [10.1111/liv.13164](https://doi.org/10.1111/liv.13164).
- Buckley GJ, Strom BL. Eliminating the public health problem of hepatitis B and C in The United States. Washington, DC: National Academies Press; 2016.
- Jacobsen KH, Koopman JS. Declining hepatitis A seroprevalence: a global review and analysis. *Epidemiol Infect*. 2004;132(6):1005-22.
- Ripabelli G, Sammarco ML, Campo T, Montanaro C, D'Ascenzo E, Grasso GM. Prevalence of antibodies against enterically transmitted viral hepatitis (HAV and HEV) among adolescents in an inland territory of central Italy. *Eur J Epidemiol*. 1997;13(1):45-7.
- Dominguez A, Soldevila N, Salleras L. Vacunacion frente a la hepatitis A. *Vacunas*. 2014;15:51-8. doi: [10.1016/S1576-9887\(14\)70068-8](https://doi.org/10.1016/S1576-9887(14)70068-8).
- Stapleton JT. Host immune response to hepatitis A virus. *J Infect Dis*. 1995;171 Suppl 1:S9-14.
- Mohebbi SR, Rostami Nejad M, Tahaei SM, Pourhoseingholi MA, Habibi M, Azimzadeh P, et al. Seroepidemiology of hepatitis A and E virus infections in Tehran, Iran: a population based study. *Trans R Soc Trop Med Hyg*. 2012;106(9):528-31. doi: [10.1016/j.trstmh.2012.05.013](https://doi.org/10.1016/j.trstmh.2012.05.013).
- Ghadir MR, Jafari E, Rezvan H, Amini Kafiabad S, Vaez Javadi M, Pourshams A. Hepatitis A and E in the east of Golestan province. *Journal of Medical Council of IRI*. 2007;25(1):34-8.
- Mohebi SR, Rostaminejad M, Pourhoseingholi MA, Tahaei SM, Habibi M, Azimzadeh P, et al. Seroepidemiologic study of HAV infection in Tehran Province: a population based study. *Scientific Journal of Kurdistan University of Medical Sciences*. 2011;16(2):86-92.
- Ataei B, Nokhodian Z, Javadi AA, Kasaeyan N, Farajzadegan Z, Shoaie P, et al. [Seroepidemiology of Hepatitis A virus Infections in Over 6-years Population in Isfahan Iran: A Community-Based Study]. *Journal of Isfahan Medical School*. 2008;25(86):46-53.
- Liu J, Zhang S, Wang Q, Shen H, Zhang M, Zhang Y, et al. Seroepidemiology of hepatitis B virus infection in 2 million men aged 21-49 years in rural China: a population-based, cross-sectional study. *Lancet Infect Dis*. 2016;16(1):80-6. doi: [10.1016/s1473-3099\(15\)00218-2](https://doi.org/10.1016/s1473-3099(15)00218-2).
- Mossong J, Putz L, Patiny S, Schneider F. Seroepidemiology of hepatitis A and hepatitis B virus in Luxembourg. *Epidemiol Infect*. 2006;134(4):808-13. doi: [10.1017/s0950268805005789](https://doi.org/10.1017/s0950268805005789).
- Lu J, Zhou Y, Lin X, Jiang Y, Tian R, Zhang Y, et al. General epidemiological parameters of viral hepatitis A, B, C, and E in six regions of China: a cross-sectional study in 2007. *PLoS One*. 2009;4(12):e8467. doi: [10.1371/journal.pone.0008467](https://doi.org/10.1371/journal.pone.0008467).
- Kanra G, Tezcan S, Badur S. Hepatitis A seroprevalence in a random sample of the Turkish population by simultaneous EPI cluster and comparison with surveys in Turkey. *Turk J Pediatr*. 2002;44(3):204-10.
- Alkhalidi J, Alenezi B, Al-Mufti S, Hussain E, Askar H, Kemmer N, et al. Seroepidemiology of hepatitis A virus in Kuwait. *World J Gastroenterol*. 2009;15(1):102-5.
- Safiabadi M, Rezaee-Zavareh MS, Alavian SM. Estimation of Hepatitis A Virus Infection Prevalence Among Eastern Mediterranean and Middle Eastern Countries: A Systematic Review and Pooled Analysis. *Hepat Mon*. 2017;17(2):e44695.
- Sacy RG, Haddad M, Baasiri G, Khoriaty A, Gerbaka BJ, Abu-Elyazeed R. Hepatitis a in Lebanon: a changing epidemiological pattern. *Am J Trop Med Hyg*. 2005;73(2):453-6.
- Al Rashed RS. Prevalence of hepatitis A virus among Saudi Arabian children: A community-based study. *Ann Saudi Med*. 1997;17(2):200-3.
- Ehsanipour F, Shayanfar N, Azimi M. Seroprevalence of Hepatitis A Infection in Children Referred to Rasoul Akram Hospital. *Razi Journal of Medical Sciences*. 2006;13(51):25-32.
- Lemon SM, Binn LN. Antigenic relatedness of two strains of hepatitis A virus determined by cross-neutralization. *Infect Immun*. 1983;42(1):418-20.
- Norouzirad R, Shakurnia AH, Assarehzadegan MA, Serajian A, Khabazkhoob M. Serum levels of anti-hepatitis B surface antibody among vaccinated population aged 1 to 18 years in ahvaz city southwest of iran. *Hepat Mon*. 2014;14(1):e13625. doi: [10.5812/hepatmon.13625](https://doi.org/10.5812/hepatmon.13625).