

## Seroprevalence of hepatitis A among individuals with chronic hepatitis B infection in Isfahan Province, Iran

Parisa Shoaei<sup>1</sup>, Somayeh Najafi<sup>2</sup>, Laleh Zeid Abadi Nejad<sup>1</sup>, Behrooz Ataei<sup>3\*</sup>, Majid Yaran<sup>3</sup>, Zary Nokhodian<sup>1</sup> and Bahareh Vakili<sup>1</sup>

<sup>1</sup>Nosocomial Infection Research Center, Isfahan University of Medical Sciences, Isfahan, Iran.

<sup>2</sup>Acquired Immunodeficiency Research Center, Isfahan University of Medical Sciences, Isfahan, Iran.

<sup>3</sup>Infectious Diseases Research Center, Isfahan University of Medical Sciences, Isfahan, Iran.

\*Author correspondence: Behrooz Ataei. Infectious Diseases and Tropical Medicine Research center, Isfahan University of Medical Sciences, Isfahan, Iran. Email: ataei@med.mui.ac.ir.

**Abstract.** Hepatitis A virus (HAV) is an important widespread virus and available evidences have shown that HAV superinfection with Chronic liver disease leads to more severe complications. The aim of the present study was to assess the seroepidemiology of HAV infection in patients with chronic hepatitis B in Isfahan Province, Iran in order to evaluate the necessity of vaccination for these patients. A descriptive cross-sectional study was conducted from spring 2010 to spring 2011. The target population of this study was 51 patients with chronic hepatitis B infection who had referred to diseases Infectious and Tropical Medicine Research Center of Isfahan, Iran. Subject's characteristics were collected by questionnaire. IgG anti-HAV antibody was evaluated by Enzyme-Linked Immunosorbent Assay (ELISA) and statistical analysis was done by SPSS software using descriptive statistics. The mean age of the subjects was  $38 \pm 14.2$  years. Most of the cases were male (78.1%), 42% of CHB patients were below or equal to 30 years. The anti-HAV seropositivity was (100%) so all of the patients had a previous history of infection with HAV. According to the high HAV immunity in our study (100%), vaccination was not required in these patients. However vaccination against HAV in chronic HBV patients with anti-HAV seronegativity may prevent super infection and development of fulminant or severe hepatitis in these patients.

**Keywords:** Chronic Hepatitis B virus, Hepatitis A virus, Seroprevalence.

### 1. Introduction

Hepatitis A Virus (HAV) is an important cause of viral infections of the liver throughout the world particularly in developing countries. The virus is primarily transmitted when an uninfected person ingests food or water contaminated with the

faeces of an infected person. The epidemiology of illness is closely associated with inadequate clean drinking water, socioeconomic status (SES) and poor personal hygiene (Lee et al., 2010). Hepatitis B virus infection is a major public health problem worldwide. Nearly one third of the world's population have been

Received  
January 17, 2015

Accepted  
May 18, 2015

Released  
June 30, 2015



Open Access  
Full Text Article



infected in past or present with HBV and approximately, 5% of the world's population, 350-400 million persons has chronic HBV infection (European Association for the Study of the Liver, 2012). Most of the HBV surface antigen carriers (HBsAg positive) live in developing countries and necessity of HAV vaccination in these patients is related to HAV seroprevalence in each country.

In regions with intermediate HAV prevalence, testing for previous HAV infection in population aged over 20 years is neither cost benefit nor essential and immunization should be performed in individuals below 20 years who have a negative IgG anti-HAV antibody test (Lee et al., 2010). Reduction of HAV seroprevalence especially in children is an indicator of decreased incidence of HAV in population because children play an important role in HAV transmission (Park, 2006; Jacobsen and Wiersma, 2010, Merat et al., 2010). The superinfection of hepatitis A virus infection in the HBsAg carriers increases the risks of developing fulminant hepatic failure therefore superinfection with HAV in HBV-related CLD remains problematic in these days (Lee et al., 2010). Islamic Republic of Iran is a country in which hepatitis B prevalence is intermediate (Poorolajal and Majdzadeh, 2009).

Available evidences have shown that HAV super infection with HCV or HBV leads to more severe clinical consequences than only infection with HCV or HBV therefore vaccination against HAV may prevent co-infection phenomena in patients already infected with HCV or HBV (Jacobsen and Wiersma, 2010). Few data are available on prevalence of HAV antibody among chronic hepatitis B patients in Iran (Roushan et al., 2007).

The aim of the present study was to assess the seroepidemiology of HAV infection in patients with chronic hepatitis B in Isfahan Province, Iran, in order to evaluate the necessity of vaccination for these patients.

## Materials and methods

### Patients and study design

A descriptive cross-sectional study was conducted from spring 2010 to spring 2011. The target population of this study was patients with chronic hepatitis B infection who had referred to Infectious Diseases and Tropical Medicine Research Center of Isfahan, Iran.

Patients with human immunodeficiency virus infection and a past medical history of HAV vaccination were excluded from the study. Subjects' characteristics were gathered by a check list and some of information such as age; gender, education and history of intravenous drug use were recorded. The research protocol was approved by the Ethical Committee of Isfahan University of Medical Sciences in Iran. Contribution in the study was voluntary and informed written consent was obtained from all of the study participants. Chronic hepatitis B (CHB) is defined as persistent detection of HBsAg for >6 months after initial exposure to the virus (Jacobsen and Wiersma, 2010; Center for Disease Control and Prevention, 2007).

### Laboratory procedures

5 mL of blood vein sample was obtained from each participant and serum was stored at -20 °C until used. IgG anti-HAV antibody was evaluated by Enzyme-Linked Immunosorbent Assay (Dia.Pro Diagnostic Kit, Bioprobes S. R. L.) according to the manufacturer recommendations.

### Statistical analysis

Statistical analysis was done by SPSS software (version 19, 2010). Descriptive statistics of demographic variables and other characteristics of the subjects were computed. Means and standard deviation (SD) were calculated for quantitative variables.

**Table 1.** Characteristics of individuals who participated in this study.

Characteristics	Number	Percent
<b>Sex</b>		
Male	40	78.1
Female	11	21.6
<b>Education</b>		
Illiterate	4	12.1
Preliminary	7	21.2
Secondary	6	18.2
Diploma and above	16	48.5
<b>Intravenous drug use</b>		
Yes	4	7.8
No	47	92.2
<b>Age (year)</b>		
≤ 30	21	42.0
31-40	7	14.0
41-50	15	30.0
51-60	3	6.0
≥ 61	4	8.0
<b>Age (mean ± SD)</b>	51	38 ± 14.2 year

## Results

### Characteristics of the patients

A total of 51 patients (40 males and 11 females) with chronic hepatitis B virus infection were included in the study. The age ranges of individuals were from 18 to 64 years with the mean age (mean ± SD) 38 ± 14.2. Only 7.8% of CHB patients had a history of intravenous drug use and nearly half of the patients (48.5%) had diploma and college education. The anti-HAV seropositivity was 100% thus all of the patients had a previous history of infection with HAV. Characteristics of individuals who participated in this study are shown in Table 1.

## Discussion

Viral hepatitis continues to be a serious public health problem worldwide. HBV infected individuals are important high risk group of acquiring complication after HAV infection than healthily individuals. A number of studies have reported that acute HAV co-infection resulted acute hepatic failure and death in patients undergoing chronic hepatitis infection (Lee et al., 2010; European Association for the Study of the Liver, 2012; Shavakhi et al., 2008; Elgouhari et al., 2008). The superinfection of viral

hepatitis in patients with chronic liver disease may intensify underlying liver disease (Center for Disease Control and Prevention, 2007). Hepatitis A infection usually is a self-limited disease in healthy people, while in elder individuals and patients with chronic HBV infection or other chronic liver diseases may lead to more severe complications. These patients seemed to be at high risk of fulminant hepatic failure and death due to acute hepatitis A (Roushan et al., 2007; Shavakhi et al., 2008; Elgouhari et al., 2008). The overall HAV seroprevalence in our study was 100% that is almost close to other similar studies that was performed in different parts of Iran (95.7% and 96.5%, respectively in Shiraz and Tehran) (Shavakhi et al., 2008). In our study seroepidemiology of IgG anti-HAV in age groups and between female and male were equal but in other reports that have been published in different parts of Iran, Korea, Thailand, Italy, and USA, indicated that older patients (aged > 40 years) are more likely to be exposed to HAV than younger adults (Roushan et al., 2007; Shavakhi et al., 2008; Kim et al., 2010). Although the number of our patients was limited but our findings showed that about half of the patients (48%) were older than 30 years.

In recent years in developed countries there has been a marked

epidemiological shift in age-specific HAV in the general population, therefore increasing of HAV seronegativity in adolescence is considerable and proper vaccination program should be performed (Shavakhi et al., 2008; Cho et al., 2011). In other similar studies in Tehran and Mazandaran due to high prevalence of hepatitis A (more than 90%) in patients with chronic liver disease vaccination was not required in these patients (Roushan et al., 2007; Shavakhi et al., 2008). Centers for Disease Control and Prevention (2007) have recommended that in patients with chronic liver diseases vaccination program against HAV should be conducted regularly and these patients are considered as a prior group for HAV vaccination. In our region vaccination against HAV in chronic hepatitis B patients is not routinely done, however to prevent severe complicate due to HAV superinfection in this group a planned vaccination program is necessary in seronegative HAV individuals.

Finally this study has certain limitation. For example the number of patients who took part in the study was not adequate and if we had performed this research in a larger group we could have found seronegative HAV individuals that needed vaccination. Also we did not conduct a HAV seroprevalence comparison between HBs Ag positive patients with general healthy population (HBs Ag negative). Therefore further studies should be conducted to draw a firm decision on how to approach these patients.

## Conclusion

In conclusion, the present study shows that previous infection with HAV is highly prevalent in chronic HBV patients in Isfahan province and HAV immunization is not required in these patients but vaccination of HAV seronegative patients may prevent super infection phenomena in patients that already infected with HBV. Also given the changing epidemiology of the HAV infection and certain limitations of this study further studies is deserved.

## Acknowledgment

The authors are grateful to Research Council of Isfahan University of Medical Sciences for financial support of this study.

## Conflict of interest statement

Authors declare that they have no conflict of interests.

## References

- Center for Disease Control and Prevention. HBV a silent killer. 2007. Available from: <[http://www.cdc.gov/ncidod/diseases/hepatitis/b/hbv\\_silent\\_killer](http://www.cdc.gov/ncidod/diseases/hepatitis/b/hbv_silent_killer)>. Accessed in: Jan. 16, 2015.
- Cho, H. C.; Paik, S. W.; Kim, Y. J.; Choi, M. S.; Lee, J. H.; Koh, K. C.; Yoo, B. C.; Son, H. J.; Kim, S. W. Seroprevalence of anti-HAV among patients with chronic viral liver disease. *World J. Gastroenterol.*, v. 17, p. 236-241, 2011.
- Elgouhari, H. M.; Abu-Rajab Tamimi, T. I.; Carey, W. D. Hepatitis B virus infection: understanding its epidemiology, course, and diagnosis. *Cleve Clin. J. Med.*, v. 75, n. 12, p. 881-889, 2008.
- European Association for the Study of the Liver. EASL clinical practice guidelines: Management of chronic hepatitis B virus infection. *J. Hepatol.*, v. 57, n. 1, p. 167-185, 2012. Available from: <[http://www.easl.eu/assets/application/files/ef520780b91cf4f\\_file.pdf](http://www.easl.eu/assets/application/files/ef520780b91cf4f_file.pdf)>. Accessed in: Jan. 17, 2015.
- Jacobsen, K. H.; Wiersma, S. T. Hepatitis A virus seroprevalence by age and world region, 1990 and 2005. *Vaccine*, v. 28, n. 41, p. 6653-6657, 2010.
- Kim, J. I.; Kim, Y. S.; Jung, Y. K.; Kwon, O. S.; Kim, Y. S.; Ku, Y. S.; Choi, D. J.; Kim, J. H. Factors influencing the severity of acute viral hepatitis A. *Korean J. Hepatol.*, v. 16, n. 3, p. 295-300, 2010.
- Lee, S. H.; Kim, H. S.; Park, K. O.; Park, J. W.; Chun, S. Y.; Lim, S. J.; Cho, H. J.; Kim, S. J.; Park, H. W.; Moon, H. K.; Shin, W. G.; Kim, K. H.; Jang, M. K.; Lee, J. H.; Kim, H. Y. Prevalence of IgG anti-HAV in patients with chronic hepatitis B and in the general healthy population in Korea. *Korean J. Hepatol.*, v. 16, n. 4, p. 362-368, 2010.

- Merat, S.; Rezvan, H.; Nourai, M.; Abolghasemi, H.; Jamali, R.; Amini-Kafiabad, S.; Maghsudlu, M.; Pourshams, A.; Malekzadeh, R. Seroprevalence and risk factors of hepatitis A virus infection in Iran: a population based study. **Arch. Iran Med.**, v. 13, n. 2, p. 99-104, 2010.
- Park, C. H.; Cho, Y. K.; Park, J. H.; Jun, J. S.; Park, E. S.; Seo, J. H.; Lim, J. Y. Changes in the age-specific prevalence of hepatitis A virus antibodies: a 10-year cohort study in Jinju, South Korea. **Clin. Infect Dis.**, v. 42, n. 8, p. 1148-1150, 2006.
- Poorolajal, J.; Majdzadeh, R. Prevalence of chronic hepatitis B infection in Iran: a review article. **J. Res. Med. Sci.**, v. 14, n. 4, p. 249-258, 2009.
- Roushan, M. R.; Bijani, A.; Sagheb, R.; Jazayeri, O. Prevalence of hepatitis A IgG in individuals with chronic hepatitis B infection in Babol. **East Mediterr. Health J.**, v. 13, n. 5, p. 1108-1113, 2007.
- Shavakhi, A.; Somi, M. H.; Farhang, S.; Majidi, G.; Majidi, T.; Pouri, A. A. Prevalence of hepatitis A in Iranian patients with chronic liver disease. **Iran J. Clin. Infect Dis.**, v. 3, p. 189-192, 2008.