Original Article

Seroprevalence of Hepatitis A in Hemodialysis Patient Candidate for Kidney Transplant Younger Than Forty Years

Sara Abolghasemi[1], Shahnaz Sali[1], Ensieh Arabsaghari[1*], Yasan Sadeghian[1], Fariba Samadian[2], Amirhesam Alirezaie[2], Shirin Manshouri[1], Mahmoud Parvin[3], Mohammad Hassan Shabani[4]

[1] Infectious Diseases and Tropical Medicine Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran
[2] Department of Nephrology and kidney transplantation, Shahid Beheshti University of Medical Sciences, Tehran, Iran
[3] Department of pathology, Labbafinejad Medical Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran
[4] Head of Transplant and Certain Diseases of Tehran University, Tehran, Iran

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Abstract

Background: Hepatitis A is a common infection during childhood, especially in developing countries. It can cause severe complications in immunocompromised patients. Due to the increasing number of kidney transplants in the country and epidemiologic shift of HAV which was observed in previous studies, we're going to evaluate the seroprevalence of hepatitis A in hemodialysis patients less than forty years serving kidney transplant candidates to follow vaccination policy for them.

Materials and Methods: In a cross sectional study during 2014-2015 hepatitis A antibody levels in hemodialysis patients less than forty years in kidney transplant candidates examined in 12 hospitals in Tehran, Iran. Their serums were tested for anti HAV IgM and IgG by ELISA kits.

Results: Hepatitis A virus antibody was positive in 66 (72.5%) of 91 patients. The prevalence of HAV was 0% at the range of younger than 20 and 45% in under 25 years age group. This significantly increased prevalence by increasing the age, and there was according to epidemiological shifts which were shown in other studies.

Conclusion: Due to the availability of vaccine and hepatitis severe complications in immunocompromised individuals, as well as a low prevalence of positive serology in individuals under 25 years, it seems the check of antibodies in patients undergoing kidney transplantation and vaccination in seronegative persons is a logical.

Keywords: Dialysis; Hepatitis A; Seroprevalence

***Corresponding Author:** Ensieh Arabsaghari, Infectious Diseases and Tropical Medicine Research Center, Shahid Beheshti University of Medical Sciences, Tehran, IR Iran. Tel: (+98) 21 22439963, Fax: (+98) 21 22439964. Email: esaghari@gmail.com

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Introduction

One of the most common viral infections for liver is hepatitis A which is a RNA virus belonging to the *Picornaviridae* family with a worldwide distribution. Pattern of the disease includes infection during early childhood followed by life-long immunity[1]. During last decades, the age of infection by this virus has shifted from early childhood to adolescence or even later since to an improvement in sanitation[2,3]. Hepatitis A virus (HAV) is mainly transmitted through ingestion of contaminated food or water or through contact with an infected patient (oral-fecal way) and infection is closely related to standards of hygiene and sanitation[1,4].

The expression of clinical symptoms depends on and

varies with the age of the infected person. While children with less than 6 years of age mostly have asymptomatic infection hepatitis A is not a clinical problem[5]. Thus, vaccination for hepatitis A is generally not recommended in communities where new infections are mainly limited to children. With increasing age, HAV infection leads to a more serious disease, older persons usually experience some specific symptoms of this illness, e.g., jaundice and dark urine lasting for several weeks, and rarely acute liver failure and death[6]. So, in communities where a significant percentage of adults have no immunity, the increased morbidity that occurs with hepatitis A amongst adults might justify vaccination, especially when travelling to an endemic area[2].

A study in 1980 in Iran, indicated that 95% of the blood donors had serologic markers of a previous infection with HAV[7]. Routine vaccination against hepatitis A is not currently recommended in Iran. However the current status is uncertain, especially in the general population. During recent decades and in parallel to improvement in health care systems among developing countries, the pattern of this viral infection has shifted from childhood to adolescence with more severe and Annual medical and work loss costs of hepatitis A are significant even in low-endemic countries. Recently, Iran has witnessed a substantial improvement in the standard of living and general health, even in remote rural areas[8]. As a result, we might expect an increase in the percent of adults susceptible to HAV[4]. Such an increased susceptibility, if of a large enough magnitude, might justify routine vaccination of children.

In haemodialysis patients, data on hepatitis A vaccination is limited[9,10]. These patients are known to be immunocompromised and are at increased risk of developing severe hepatitis[10].

These patients and especially those with underlying liver disease like chronic hepatitis B or C should be vaccinated against hepatitis A. In the several studies vaccination against HAV and HBV is recommended for patients with chronic liver disease evaluated for liver transplantation if they are not immunized[11,12].

The aim of the following study is to investigate the current seroprevalence of HAV in hemodialysis patient younger than forty years.

Methods

A cross sectional observational study was conducted from November 2014 to February 2016. Blood was collected at blood collection centers of 12 hospitals including Moddares, Ashrafi-Esfehani, Shohada, Imam-Hossein, Loghman, Taleghani, Labbafi-Nejad, Resalat dialysis center, Sorena, Madaen, Shariati and Pediatric clinical center from hemodylysis patients under forty years old.

Using a questionnaire, epidemiological data including age, gender and level of education were collected. With prior written consent, clinical history and relevant data were recorded and 2 ml of blood was collected from the study cases. Sera were separated, stored at -80°C and were tested for HAV antibody (IgG and IgM) by ELISA technique using the ELISA kit (Dignostic Bioprobes, Italy). The cut-off value was determined by the mean absorbance of the calibrator values. The presence or absence of anti-HAV was determined by comparing the absorbance values of unknown samples with the absorbance values below/ above the cut-off values of the controls. A preformed semi structured data collecting form was used as a data collection instrument. Data were collected by researcher and analyzed by Statistical Package for Social Science (SPSS) version18 program. The p value <0.05 is considered as statistically significant.

Results

Hepatitis A virus antibody (total) was found positive in 66 (72.5%) of 91 haemodialysis patients between 15-40 years old. There were 66 (72.7%) men and a mean age of patients is 21.7.

Table 1 shows sex-specific distribution of anti-HAV antibody among our patients. There was no significant relationship between seropositivity and sex ($p= 0.945$). According to the level of education, participants were categorized as follows: 2.1% of the study population were “uneducated;” 31.8% of subjects had a “preliminary education;” 36.2% completed third year of high school; 5.4 % of subjects had high school diploma, 12% had continued their education after diploma, 2.1 had continued their education in graduate school and 9.8% were unanimous. Seroprevalence of anti-HAV antibody

Table 1: Seroprevalence of anti-HAV antibody according to sex and level of education.

	Negative No (%)	Positive No (%)
Sex		
Male	18 (27.3%)	48 (72.7%)
Female	7 (28%)	18 (72%)
Education		
Uneducated	0 (0%)	2 (100%)
Preliminary	5 (17.3%)	24(82.7%)
High school	10 (30.3%)	23 (69.7%)
Diploma	3 (60%)	2 (40%)
Post-diploma	2 (18.2%)	9 (81.8%)
Graduate School	1 (50%)	1(50%)
Unanimous	4 (45%)	5 (55%)

Table 2: Anti-HAV positivity with age.

Age(yrs)	N	HAV antibody	
	(%)	Positive	Negative
15-19.9	5 (0)	0	5
20-24.9	11(45.5)	5	6
25-29.9	20 (80)	16	4
30-34.9	28 (75)	21	7
35-40	27 (88.9)	24	3

according to the level of education is shown in Table 1. All of uneducated individuals were found anti-HAV positive. However, there was no statistically significant different in anti-HAV seroprevalence among participants with different levels of education ($p = 0.289$).

Age distribution of the patients who were positive for HAV antibody shows that with the advancement of age, anti-HAV positivity increases.

Anti-HAV of 15-19.9 years age group was found to be 0%, it gradually increased to 45.5% in 20-24.9 year age group, 80 % in 25-29.9, 75% in 30-34.9% and finally to 88.9% in 35-40 year age group. Anti-HAV positivity of 35-40 year age group was significantly higher than other groups (Table 2).

Discussion

Acute viral hepatitis caused by HAV is an acute, self-limiting infection[13]. Hepatitis A virus infection is very common in early childhood before the age of five with asymptomatic or mild pattern[14]. Immunity that develops following natural infection is stronger and persists longer than that develops following vaccination.

HAV epidemiological pattern are highly dependent on socio-economic conditions, and level of hygiene. The seroprevalence distribution of HAV by age group may reflect current hepatitis A endemicity in countries and regions. Iran is located in the vicinity of countries of Middle East and south Asia with high endemicity of HAV infection. HAV is highly prevalent in the Iranian population. Previous studies reported, mostly based on healthy blood donors, a rate of 95% or more in adults[7,15].

In this cross-sectional study, we investigated the seroprevalence of HAV among hemodialysis patient younger than forty years in 12 hospitals in Tehran-Iran.

Although in the current study, the seroprevalence of anti- HAV in male was slightly greater than female subjects, the difference was not statistically significant. It seems that there is no difference in predisposition of both genders to HAV infection in the country.

In the present study the prevalence of HAV at the age range of 15-19.9 years was 0%. Anti-HAV seroprevalence increased with age from 0% in 15-19.9 year age group to 45% in the 25-29.9 year age group. Similar results were also observed in other

studies in Bangladesh[16]. Ahmed *et al,*[16] found a high prevalence (74.8%) of anti-HAV among Bangladeshi children and adult. He also reported anti-HAV positivity of 38% in 1-5 year age group, 75.2% in 5-10 year age group, 80.4% in 11-15 year age group and 98.5% in 15-20 year age group. Saha *et al,*[17] also reported anti-HAV positivity of 40% in 1-5 year age group which gradually increased to 98.4% in >30 year age group. Another study by Sheikh *et al,*20 reported anti-HAV positivity of 100% in 15-20 year age group. Farajzadegan[18] in a review article in 2014 that examines 16 Seroepidemiology hepatitis A systematic review achieved the significant results. Seropositive prevalence varies in different locations and it was between 8-19%. This difference is linked to the health and socio-economic level. The prevalence was lower in urban areas than rural and there is no difference in sex, in addition other studies in Egypt and Saudi Arabia and Iraq have also been that way. We studied the prevalence of sero-positive residents of *subetalurbs* of Tehran with Tehran residents which showed no significant difference (78% vs. 70%).

We also determined the seroprevalence of HAV in seven groups of education. The serprevalence of HAV antibody was lower in participants with higher educations (Table 1); the rate was 100% in uneducated peoples.

24 kidney transplants per million people annually in Iran and Iranian done very successfully in the region has had a kidney transplant[19]. It is also one of the vaccines Hepatitis A vaccine is recommended in organ transplantation[20]. An immune response in patients before and after transplantation of a kidney transplant to 98% and even 74% in some studies was 26.9%.

Negative serological prevalence of 27.5% in hemodialysis patients in our study showed that responding to transplant patients to hepatitis A can Jeon Considering the looks you in his study in 2011, 31.8%[21] prevalence of positive serology in patients under forty years kidney transplant showed a 26.9% response to the vaccine due to screen antibodies in the patients in chronic kidney disease and transplantation is needed before vaccination[22].

Regarding to low endemicity of hepatitis A infection in recent years in the Iran, it seems logic that efforts should be made to vaccinate high-risk populations along with more improvement in environmental hygiene and sanitations[18]. Studies from some other regions of the world have reported same result as decreases in the endemic prevalence of infectious hepatitis along with improvement in socio-economic markers of life[23-25].

Finally, making decisions for controlling HAV and providing a national vaccination guideline is a complex process which depends on many variables such as disease burden, feasibility, cost effectiveness, and vaccine efficacy, among others[26]. At the end, this study considers Iran one of the countries with low endemicity which has recommended vaccination for high risk choices.

Conclusion

In conclusion, due to the low prevalence of seropositive for hepatitis A in patients less than twenty years of age in our study was, it seems to set policy of the vaccination in routine childhood immunizations of the country needs to do a study with sufficient sample size and widespread.

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References

1. Jacobsen K, Koopman J. Declining hepatitis A seroprevalence: a global review and analysis. Epidemiology and infection. 2004;132:1005-1022.
2. Hendrickx G. Has the time come to control hepatitis A globally? Matching prevention to the changing epidemiology. Journal of viral hepatitis. 2008;15:1-15.
3. Melnick J L. History and epidemiology of hepatitis A virus. Journal of Infectious Diseases. 1995;171:S2-S8.
4. Jacobsen K, Koopman J. The effects of socioeconomic development on worldwide hepatitis A virus seroprevalence patterns. International Journal of Epidemiology. 2005;34:600-9.
5. Gust I D. Epidemiological patterns of hepatitis A in different parts of the world. Vaccine. 1992;10:S56-S58.
6. Franco E, Meleleo C, Serino L, Sorbara D, Zaratti L.
7. Farzadegan H, Shamszad M, Noori-Arya K. Epidemiology of viral hepatitis among Iranian population--a viral marker study. Annals of

the Academy of Medicine, Singapore. 1980;9:144-8.
8. Pourshams A. Golestan cohort study of oesophageal cancer: feasibility and first results. British journal of cancer. 2005;92:176-81.
9. Wood A J, Lemon S M, Thomas D L. Vaccines to prevent viral hepatitis. New England journal of medicine. 1997;336:196-204.
10. Kuramoto I, Fujiyama S, Matsushita K, Sato T. Immune response after hepatitis A vaccination in haemodialysis patients: comparison with hepatitis B vaccination. Journal of gastroenterology and hepatology. 1994;9:228-31.
11. Hoofnagle J H, Doo E, Liang T J, Fleischer R, Lok A S. Management of hepatitis B: summary of a clinical research workshop. Hepatology. 2007;45:1056-75.
12. Aoufi S. In Transplantation proceedings. 2946-2948 (Elsevier).
13. Mathur P, Arora N. Epidemiological transition of hepatitis A in India: issues for vaccination in developing countries. Indian Journal of Medical Research. 2008;128, 699.
14. Das K. The changing epidemiological pattern of hepatitis A in an urban population of India: emergence of a trend similar to the European countries. European journal of epidemiology. 2000;16:507-10.
15. Malekzadeh R, Khatibian M, Rezvan H. Viral hepatitis in the world and Iran. J Irn Med Council. 1997;15:183-200.
16. Ahmed M. High prevalence of hepatitis A virus antibody among Bangladeshi children and young adults warrants pre-immunization screening of antibody in HAV vaccination strategy. Indian journal of medical microbiology. 2009;27, 48.
17. Saha S. Seroprevalence of Hepatitis A Infection by Age Group and Socioeconomic Status in Bangladesh. International Journal of Infectious Diseases. 2008;12:101-2.
18. Farajzadegan Z. Systematic review and meta-analysis on the age-specific seroprevalence of hepatitis A in Iran. Journal of research in medical sciences: the official journal of Isfahan University of Medical Sciences. 2014;19:56.
19. Mahdavi-Mazdeh M. Renal replacement therapy in Iran. Urol J. 2007;4:66-70.
20. Duchini A. Goss J A. Karpen S, Pockros P J. Vaccinations for adult solid-organ transplant recipients: current recommendations and protocols. Clinical microbiology reviews. 2003;16:357-64.
21. Stark, K. et al, Immunogenicity and safety of hepatitis A vaccine in liver and renal transplant recipients. Journal of Infectious Diseases. 1999;180:2014-7.
22. Jeon H. Efficacy and safety of hepatitis A vaccination in kidney transplant recipients. Transplant Infectious Disease. 2014;16:511-5.
23. Darwish M A, Faris R, Clemens J D, Rao M R, Edelman R. High seroprevalence of hepatitis A, B, C, and E viruses in residents in an Egyptian village in The Nile Delta: a pilot study. The American journal of tropical medicine and hygiene. 1996;54:554-8.
24. Abdal Aziz A, Awad M. Seroprevalence of hepatitis A virus antibodies among a sample of Egyptian children; 2008.
25. Salama I, Samy S, Shaaban F, Hassanin A, Abou Ismail L. Seroprevalence of hepatitis A among children of different socioeconomic status in Cairo; 2007.
26. Gentile A. The need for an evidence- based decision- making process with regard to control of hepatitis A. Journal of viral hepatitis. 2008;15:16-21.