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Original Research

Seroprevalence of hepatitis A virus among newly admitted medical students in Dhamar, Yemen

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Abstract

Background: Health science students are at increased risk of hepatitis A virus (HAV) infection even under accidental infection. The occurrence of HAV infection is routinely diagnosed serologically by detection of specific anti-HAV in a serum sample. Hepatitis A infections in developing countries are substantially underestimated because HAV infections in young children are mostly asymptomatic and therefore unrecognized

Aim: The study aims to determine the seroprevalence of HAV-IgG antibody among medical students to assess the prevalence of acquired immunity to HAV infection.

Methods: A cross-sectional study was conducted among 1st year medical students. Information was collected by pretested structured questionnaire. The anti-HAV-IgG antibodies was assessed, serological results were then added to questionnaire chart of all participants.

Results: The seropositivity of HAV (anti-HAV IgG antibodies) in newly admitted students was 88 (94.6%). Medical student's residence, gender, the household size, the source of drinking water, availability of toilet and individual or family history of hepatitis did not significantly influence the anti-HAV (IgG) positivity in studied subjects ($P > 0.05$).

Conclusion: Our results indicate that majority of the medical students were seropositive for IgG anti-HAV and had acquired immunity to HAV infection and hence at a decreased risk of developing HAV infection as a result of occupational exposure.

Keywords: Seroprevalence, hepatitis A virus, Anti-HAV IgG, Medical students, Yemen.

1. Introduction

Hepatitis A is the most common form of acute viral hepatitis worldwide [1]. The virus was visualized for the first time in stool specimens by immune electron microscopy in 1973 by Feinstone et al. [3]. The virus belongs to family Picornaviridae and genus Hepatovirus, is non-enveloped, single stranded RNA. It has icosahedral nuclocapsid appearance with a diameter of 27 nm. Seven HAV genotypes were described and four of these may infect humans [2]. HAV is transmitted by the faecal-oral route, by person-to-person contact, or ingestion of contaminated food or water. A number of studies on the possibility of infection with HAV among blood or blood products recipients, or haemodialysed patients, have not confirmed that such procedures may be relevant in HAV transmission. Transplacental transmission of HAV has not been reported [6].

HAV has a worldwide distribution but improvements in public health sanitation have led to a decline in the incidence of hepatitis A infections in the developed countries and to a shift of the time of first exposure to older age groups [4]. This is not in the developing countries where sanitation is still a major public health

issue and nearly all children are infected with HAV before the age of nine. An important source of epidemic outbreaks could also be associated with frozen food. The global trade of potentially contaminated products, may be responsible for multi- country outbreaks of HAV infection [7].

The occurrence of HAV infection is routinely diagnosed serologically by detection of specific anti-HAV in a serum sample. For diagnosis of acute hepatitis cases, the presence of HAV antibody IgM proves etiology of HA, while past infection HAV antibody IgG are used.

HAV antibody IgG became detectable in all the patients beginning from the third week after admittance [5]. However, the possibility of prophylaxis against HAV has become possible since the 1990s when specific vaccines were marketed [7]. At present, vaccination against HAV is performed in some countries on a mass scale, in other countries the vaccine is offered on demand to individual persons or to people exposed to HAV due to their work.

There is substantial underestimation of hepatitis A infections in developing countries because HAV infections in young children are mostly asymptomatic and therefore unrecognized [4]. In Yemen there are limited publications concerning the seroprevalence of HAV antibody IgG, therefore our study focusing on this problem. The aim of the study is to determine the seroprevalence of HAV antibody IgG among medical students to assess the prevalence of acquired immunity to HAV infection.

2. Methods

Study Design

A cross-sectional study was conducted among 1st year medical students, Academic year 2021/2022, Faculty of medicine, Thamar University, Dhamar governorate, Yemen. A total of 93 first-year medical students were included in this study.

Data collection

Data were collected using a questionnaire that was used to obtain information about the demographic and socioeconomic characteristics of the participants in this study, as well as the associated risk factors of HAV infection, medical history, and known risk factors for hepatitis transmission. Serological results were added to the questionnaire chart for all participants.

Laboratory procedures

Approximately, a volume of 5 ml of venous blood was collected from each participant. After separation by centrifugation, serum was stored in the laboratory at−20°C. IgG anti-HAV antibody was evaluated by Chemiluminescent Microparticle Immunosorbent Assay.

The ARCHITECT HAV Ab-IgG assay is a two-step immunoassay for the qualitative detection of IgG anti-HAV in human serum and plasma using CMIA technology.

The presence or absence of IgG anti-HAV in the sample is determined by comparing the chemiluminescent signal in the reaction to the cutoff signal determined from an ARCHITECT HAV Ab-IgG calibration. Specimens with signal to cutoff (S/CO) values > 1.00 are considered reactive for IgG anti-HAV. Specimens with S/CO values < 1.00 are considered nonreactive (8).

Statistical Analysis

Statistical analysis was carried out by using Statistical Package for the Social Science IBM SPSS, version 25.0. Data was presented as mean ± standard deviation or number (percentages).

Ethical consideration

The protocol of this study was approved by Thamar University Medical Ethics Committee (TUMRC) of Thamar University Faculty of Medicine and Health Sciences (TUFMHS), Dhamar (Reference Number: TUMEC-19019). Informed consent was obtained from all participants after the purpose of the study was explained in detail.

3. Results

Demographic characteristics of study group

A total…. A total of 93 newly admitted medical students from Thamar University were included in the study. The characteristics of the 93 participants are described in Table 1. Most participants resided in Thamar 71 (76.3%) and 22 (23.7%) in other regions. 66 of participants resided with 5-9 other household members and 27 participants with 10 and more household members. 6 (6.5%) of participants had past history of liver disease. Family history of HAV 7 (7.5%). Piped water and toilet facilities were available in 66 (71%) and 64 (68.8%) of the households respectively, Table 1. The mean age of the participants was (20.07 ± 1.5) years (range: 17-27). 57 (61.3%) of participants were male, Table 2.

Table 1: Demographic characteristics of study group (n= 93)

Variable	Frequency	Percentage
Gender		
Male	57	61.3
Female	36	38.7
Residence		
Dhamar	71	76.3
Other	22	23.7
Family members		
5-9	66	71.0
≥10	27	29.0
Source of water supply		
Piped water	66	71.0
Mineral water	7	7.5
Water truck	20	21.5
Availability of toilet		
Yes	64	68.8
No	29	31.2

Table 2: Mean age of the participants (Years)

Gender	N	Mean (±SD)	Minimum	Maximum
Male	57	20.50 (±1.6)	17	25
Female	36	19.38 (±1.0)	18	23
Total	93	20.07 (±1.5)	17	25

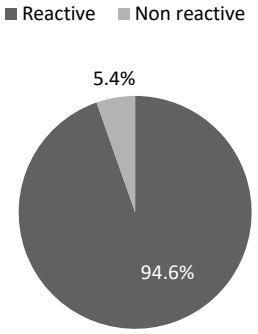

Figure 1: Seroprevalence of anti-HAV IgG antibodies

A total of 88 (94.6%) newly admitted students had seropositive for HAV while 5 (5.4%) were negative.

Table 3: Prevalence of IgG anti-HAV among participants according to demographic characteristics

		Anti HAV IgG		
		Positive	Negative	
Variables	**Total No.**	**no (%)**	**no (%)**	***P value***
Residence				
Dhamar	71 (76.3)	67 (94.4)	4 (5.6)	
Other	22 (23.7)	21(95.5)	1 (4.5)	0.5
Gender				
Male	57 (61.3)	55(96.5)	2 (3.5)	
Female	36 (38.7)	33(91.7)	3 (8.3)	0.3
Family members				
5-9	66 (71.0)	63 (95.5)	3 (4.5)	
≥ 10	27 (29.0)	25 (92.6)	2 (7.4)	0.6
Source of water supply				
Piped water	66(71.0)	62 (93.9)	4 (6.1)	
Mineral water	7 (7.5)	7 (100)	0 (0)	
Water truck	20 (21.5)	19 (95)	1 (5)	0.7
Availability of toilet				
Yes	64 (68.8)	59 (92.2)	5 (7.8)	
No	29(31.2)	29 (100)	0 (0)	0.3
Past history of liver disease				
Yes	6(6.5)	6 (100)	0 (0)	
No	87 (93.5)	82 (94.3)	5 (5.7)	0.7
Past history of jaundice				
Yes	12(12.9)	12 (100)	0 (0)	0.4
No	81(87.1)	76 (93.8)	5 (6.2)	
Family history of HAV infection				
Yes	7(7.5)	6 (85.7)	1 (14.3)	
No	86 (92.5)	82 (95.3)	4 (4.7)	0.3
Autoimmune liver disease				
Yes	1(1.1)	1 (100)	0 (0)	
No	92 (98.9)	87 (94.6)	5 (5.4)	0.9

The prevalence of IgG anti-HAV in participants according to their characteristics is shown in Table 2. Medical students residence, gender, the household size, the source of drinking water, availability of toilet and individual or family history of hepatitis, all did not significantly influence the results of anti-HAV (IgG), ($P > 0.05$).

4. Discussion

In this study the overall prevalence was very high (94.62%), it was lower than reported by Scott et al. (99.7%) in 1988 from the northern governorates of Yemen[9]. But it was more than reported by study conducted in Aden which has showed that the overall prevalence was (86.6%)[10].

The participants in this study (20.07± 19.4 years) are younger than reported by Scott et al. (mean age 24.2 ±14.6 years). [9] But older than reported by study conducted in Aden (18.2 ± 19.4 years)[10].

Most reports from the Middle East also indicate high rates of previous exposure to HAV among adults, with antibody prevalence > 95% in Egypt, Qatar, some areas of Saudi Arabia, Oman, Syria, Iran, Morocco and Algeria. This may change with current socioeconomic development: similar rates were seen in Japan 30 years earlier (1973), while only 50% were seropositive in 2003[10].

There were no significant differences in HAV seroprevalence by gender. These results were in agreement with the results of other study in Yemen (Aden city)[10].

In our study, no significant relation between anti-HAV IgG positivity and source of drinking water. Although, in another study that was performed by Iran, the prevalence of anti-HAV IgG positivity in three faculties of Isfahan, Kermanshah, and Hamedan was detected with significantly lower rate in the students who were applied piped water in accordance with rural piped or well water (RR = 0.58; P < 0.001)[11].

Results of this study showed no significant relation between anti-HAV IgG positivity and an increasing number of family members. Similar results were shown in previous study in Iran, but this was in contrast to another study that was performed on students of Turkey a significant relation was shown between anti- HAV IgG positivity and an increasing number of family [11,12].

The restrictions of this study included assessment of hepatitis A infection only in newly admitted medical students, locally sample of students, and absence of information about the vaccination rate of HAV in our country. Priority should be given to improving water quality, sanitation coverage, food hygiene and public health awareness of the risk of contracting infection.

5. Conclusion

The results in our study indicating that majority of the medical students were seropositive for IgG anti-HAV , they had acquired immunity to HAV infection and hence at a decreased risk of developing HAV infection as a result of occupational exposure. Therefore, vaccination against HAV for medical students should not be considered. To control HAV infection in Yemen, Strategies should be given to improving hygiene, sanitation, healthy water supply and public health awareness about the risk factors of HAV infection.

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Competing interests

The authors declare that they have no competing interests.

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