Seroprevalence of Hepatitis A Antibodies among a Sample of School Children

Hussein Metwalli Abdel Maksoud, Khaled El-Mola and Hany Awadallah

The aim of this study was to estimate the prevalence of Ig anti-HAV in students aged from 6-12 years old in Damietta Governorate and to identify factors associated with the prevalence of this infection. The present study included 1000 children, aged 6-12 years, selected from pediatric outpatient clinic, regardless of their vaccination history. They were selected during the period from September 2012 to September 2014. The following data related to identification and socio-demographic characteristics were documented: The individual gender, age, residence, number of household members, number of rooms, number of people sleeping together in the same room, family income, educational level of parents or guardians, availability of piped water supply, presence of sewage and the existence and number of bathrooms in the house. Then IgG and IgM were estimated. Age ranged from 6 to 12 years with a mean of 8.87±1.95 years; 56.7% of cases were males, 66.4% live in rural areas, 46.5% of cases were of low socioeconomic standard and 24.2% of middle standard; previous vaccination was reported in 2.7% of cases, active infection reported in 1.9% cases and previous infection (clinical or subclinical) was reported in 86.5% of cases. Finally, ALT cases ranged from 8-65 IU mL⁻¹ with a mean of 12.53±5.40 IU mL⁻¹ and AST ranged from 8-29 with a mean of 12.07±2.56 IU mL⁻¹. Positive cases were younger (7.94±2.09 vs. 8.89±1.94, respectively); of low socioeconomic standards (37.7%), had significantly higher ALT and AST. No case of actively infected group had previous vaccination or old infection. In old infection or vaccination, there was no significant difference between positive and negative cases as regard to age, gender or socioeconomic status. However, there was significant increase of previous vaccination in positive cases (3.1%) when compared to negative cases (0.0%) and significant increase of positive IgM in negative IgG cases. In addition, there was significant increase of liver enzymes in cases negative for IgG when compared to positive cases. There was high endemicity of hepatitis A virus infection in school age children. The active infection reported in minor percentage and the condition was self-limiting. Thus, most positive cases were not vaccinated or had active clinical infection. Seroconversion is due to subclinical infection. Thus, IgG and IgM estimation must be done before vaccination.

Key words: Hepatitis A, antibodies, seroprevalence

1Department of Pediatric,
2Department of Tropical Medicine, Al-Azhar Faculty of Medicine, Al-Azhar University, Egypt
INTRODUCTION

The Hepatitis A Virus (HAV) is a member of Picornaviridae family of viruses. This family had small, non-enveloped, single-stranded RNA viruses (Cuthbert, 2001). The transmission is exclusively by the fecal-oral route and enhanced by poor hygiene, overcrowding and contaminated food or drink (Hussain et al., 2006). Children are a specific age group, where Hepatitis A Virus (HAV) infection is a common disease. In addition HAV is endemic in areas with no or poor hygiene and sanitation. HAV infection accounts for 25% of all clinically evident acute hepatitis; it affects 10 million persons annually worldwide (Wasley et al., 2006). The typical complains included low appetite and malaise and it mainly presented with jaundice. Hepatitis A is a self-limiting disease; as signs and symptoms lasting for a few weeks. Hepatitis A is not known to cause chronic hepatitis (Velasco-Mondragon et al., 2012).

For detection of previous infection, it is usually done by the presence of serum IgG hepatitis A antibody (anti-HAV) which persists for years and possibly provide lifelong immunity against all strains of HAV. In addition, HAV rarely causes fulminant hepatitis. Thus, the fatality rate associated with the infection is extremely low (Kumar, 2010). With development of vaccination against hepatitis A, HAV infection has declined significantly. The annual incidence rates of clinical disease started to decline from 12/100000 in 1995 to 2.6/100000 in 2003 and 1.0/100 000 in 2007 (Chaves et al., 2009; Daniels et al., 2009). The Advisory Committee on Immunization and Practices (ACIP) in 1996, recommended the vaccinating children aged ≤24 months in high-risk communities; in 1999 ACIP recommended more extended routine coverage for the same age group and in 2006, ACIP recommended vaccination for all children in starting at age 12-23 months (Velasco-Mondragon et al., 2012). Several countries in the Middle East have been reported a decline in the seroprevalence of HAV during the past two decades. This is attributed to improved sanitary and hygienic conditions in these countries. Paradoxically, this decline has been accompanied by a significant increase in the incidence of acute clinical disease, partly because a significant proportion of infections are currently occurring in older age groups and partly because case finding and reporting has improved (Yassin et al., 2001). In addition, in these countries, virtually all children experience asymptomatic infection with hepatitis A before the age of 5 years. As the majority of children in these countries experience early exposure to infection, the symptomatic disease that occurs in a small minority may still pose a significant disease burden (Gupta and Chawla, 2008).

The aim of this study was to estimate the prevalence of Ig anti-HAV in students aged from 6 to 12 years old in Dametta Governorate and to identify factors associated with the prevalence of this infection.

MATERIALS AND METHODS

The present study included 1000 children, aged 6-12 years; selected from pediatric outpatient clinic; regardless of their vaccination history. They were selected during the period from September 2012 to September 2014. The following data related to identification and socio-demographic characteristics were documented: The individual gender, age, residence, number of household members, number of rooms, number of people sleeping together in the same room, family income, educational level of parents or guardians, availability of piped water supply, presence of sewage and the existence and number of bathrooms in the house. Then, 5 mL blood samples were collected and sent to the Laboratory, where laboratory tests were performed. All blood samples were centrifuged and stored in a freezer at -20°C. Later these samples were further processed. The IgG and IGM, anti-HAV were tested by the method of enzyme immunoassay (ELISA) with microparticle. The reagent used came from Abbott Laboratories. The study was approved by the Local Ethics Committee of Al-Azhar University Hospital.

Statistical analysis: The Statistical Package for Social Science (SPSS) version 16 computer package was used for statistical analysis. Quantitative data was expressed as mean and Standard Deviation (SD); while quantitative data was expressed as relative frequency and percent distribution. Unpaired student (t) test and Chi square tests were used for quantitative and qualitative data, respectively. The p<0.05 was considered significant.

RESULTS

General data of studied cases were presented in Table 1. Age ranged from 6-12 years with a mean of 8.87±1.95 years; 56.7% of cases were males; 66.4% live in rural areas; 46.5% of cases were of low socioeconomic standard and 24.2% of middle standard; previous vaccination was reported in 2.7% of cases; active infection reported in 1.9% and previous infection (clinical or subclinical) was reported in 86.5% of cases. Finally, ALT cases ranged from 8-65 IU mL⁻¹ with a mean of 12.53±5.40 IU mL⁻¹ and AST ranged from 8-29 with a mean of 12.07±2.56 IU mL⁻¹.

Comparing cases with active infection to negative cases and those with old infection; it was found that...
In old infection or vaccination, there was no significant difference between positive and negative cases as regard to age, gender or socioeconomic status. However, there was significant increase of previous vaccination in positive cases (3.1%) when compared to negative cases (0.9%) and significant increase of positive IgM in negative IgG cases. In addition, there was significant increase of liver enzymes in cases negative for IgG when compared to positive cases (Table 3).

**DISCUSSION**

Hepatitis A is an infectious disease caused by the Hepatitis A Virus (HAV). It is exclusively transmitted by the fecal-to-oral route. Polluted water and contaminated foods are the most common vehicle of transmission which mostly occur with poor hygiene. Most cases of HAV infection are asymptomatic and occur during adolescence or infancy. Mild jaundice is the most likely symptom to occur in symptomatic cases (Kim, 2008).

In Korea, the indication for the HAV vaccine differs according to patient age. Patients aged under 30 years should be vaccinated without serologic testing even if they are not at high risk and those aged above 30 years should be vaccinated despite negative serologic tests (KCDCP, 2012). However, in Egypt, there was no regular system for vaccination against hepatitis A infection. Thus, the present study was designed to estimate sero-prevalence of hepatitis A virus infection (both IgM for acute infection and IgGs for previous infection or vaccination).

Active infection was reported in 19 cases (1.9%), while IgG was positive for 86.5% of cases. Active infection was significantly associated with younger age, low socioeconomic status, with significant increase of liver enzymes. No cases had previous vaccination or IgG antibodies. On the other hand, old infection was not associated with younger age, gender or socioeconomic status. These results indicated that, there was higher rate of seroprevalence of HAV in school age children; it is usually due to previous asymptomatic infection. Vaccination was reported only in 2.7% of cases and active infection in 1.9%.

Results of the present study are in contradiction to those reported by Velasco-Mondragon et al. (2012) who reported that, a younger age appeared to be a strong predictor of anti-HAV seropositivity. In addition, previous studies reported that age was one of the strongest predictors of anti-HAV seropositivity (Sac et al., 2009; De Alencar Ximenes et al., 2008; Silva et al., 2007).

Indeed, in countries where HAV vaccination is not provided and in the USA prior to vaccination, seropositivity rates would increase with age because
antibodies acquired through natural infection provide lifelong immunity. With the introduction of vaccines and decreasing natural infection, the main source of antibodies will be vaccines rather than natural infection and age patterns shift (Velasco-Mondragon et al., 2012).

Results of the present study are comparable to those reported by Previsani et al. (2000) and David (2004) who reported that the highest incidence of hepatitis A infection has been reported in developing countries of Africa, Central and South America and South-East Asia. In these countries, virtually all children experience asymptomatic infection with hepatitis A before the age of 5 years.

As the majority of children in these countries experience early exposure to infection, the symptomatic disease that occurs in a small minority may still pose a significant disease burden (Bhowmick et al., 2005; Gupta and Chawla, 2008).

In short, results of the present study revealed that, there was high endemicity of hepatitis A virus infection in school age children. The active infection reported in minor percentage and the condition was self-limiting. Thus, most positive cases were not vaccinated or had active clinical infection. Seroconversion is due to subclinical infection. Thus, IgG and IgM estimation must be done before vaccination.

REFERENCES


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