Journal of Medical Sciences

ISSN 1682-4474

science alert

ANSInet
an open access publisher
http://ansinet.com

Research Paper

JMS (ISSN 1682-4474) is an International, peer-reviewed scientific journal that publishes original article in experimental & clinical medicine and related disciplines such as molecular biology, biochemistry, genetics, biophysics, bio-and medical technology. JMS is issued eight times per year on paper and in electronic format.

For further information about this article or if you need reprints, please contact:

Hussein Metwalli A. Maksoud
Department of Pediatric,
Al-Azhar Faculty of Medicine,
Al-Azhar University, Egypt

J. Med. Sci., 14 (6-8): 303-306
August-December, 2014
DOI: 10.3923/jms.2014.303.306

Seroprevalence of Hepatitis A Antibodies among a Sample of School Children

[1]Hussein Metwalli Abdel Maksoud, [2]Khaled El-Mola and [3]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

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

ANSInet
Asian Network for Scientific Information

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 Damietta 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 $p \leq 0.05$ 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

Table 1: General characteristics of studied cases

Variables	Statistics
Age	8.87±1.95, 6-12
Gender	
Male	567 (56.7)
Female	433 (43.3)
Residence	
Rural	664 (66.4)
Urban	336 (33.6)
Socioeconomic status	
Low	465 (46.5)
Middle	242 (24.2)
High	293 (29.3)
Previous vaccination	27 (2.7)
Positive IgM (active infection)	19 (1.9)
Positive IgG (old infection or vaccination)	865 (86.5)
ALT	12.53±5.40, 8-65
AST	12.07±2.56, 8-29

Values in parenthesis showing percentage results

Table 2: Comparison between cases with positive and negative IgM

Variables	Positive IgM	Negative IgM	Test	p-value
Age	7.94±2.09	8.89±1.94	2.09	0.036*
Gender				
Male	11 (57.9)	556 (56.7)	0.01	0.91 ns
Female	8 (42.1)	425 (43.3)		
Residence				
Rural	13 (68.4)	651 (66.4)	0.04	0.85 ns
Urban	6 (31.6)	330 (33.6)		
Socioeconomic status				
Low	14(73.7)	451 (46.0)	6.97	0.031*
Middle	4(21.1)	238 (24.3)		
High	1(5.3)	292 (29.8)		
Previous vaccination	0 (0.0)	27 (2.8)	0.53	0.46 ns
Positive IgG	0 (0.0)	865 (88.2)	124.09	<0.001*
ALT	47.42±10.25	11.86±1.94	15.10	<0.001*
AST	23.42±4.40	11.85±1.94	11.43	<0.001*

Values in parenthesis showing percentage results

Table 3: Comparison between cases with positive and negative IgG

Variables	Positive IgG	Negative IgG	Test	p-value
Age	8.88±1.98	8.78±1.89	0.57	0.56 ns
Gender				
Male	493 (57.0)	74 (54.8)	0.22	0.63 ns
Female	372 (43.0)	61 (45.2)		
Residence				
Rural	567 (65.5)	97 (71.9)	2.07	0.15 ns
Urban	298 (34.5)	38 (28.1)		
Socioeconomic status				
Low	397 (45.9)	68 (50.4)	2.75	0.25 ns
Middle	217 (25.1)	25 (18.5)		
High	251 (29.0)	42 (31.1)		
Previous vaccination	27 (3.1)	0 (0.0)	4.33	0.037*
Positive IgM	0 (0.0)	19 (14.1)	124.09	<0.001*
ALT	11.81±1.94	17.15±12.98	4.77	<0.001*
AST	11.84±1.95	13.53±4.66	4.14	<0.001*

Values in parenthesis showing percentage results

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 (Table 2).

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 (Table 3).

DISCUSSION

Hepatitis A is an infectious disease caused by the Hepatitis A Virus (HAV). It is exclusively transmitted by 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

Bhowmick, K., A. Mammen, P.D. Moses, I. Agarwal, L. Mathew and G. Kang, 2005. Hepatitis A in pediatric acute liver failure in southern India. Indian J. Gastroenterol., 24: 34-34.

Chaves, S.S., N. Darling and T. Santibanez, 2009. Hepatitis A vaccination coverage among children aged 24-35 months-United States, 2006 and 2007. Morbidity Mortality Weekly Rep., 58: 689-694.

Cuthbert, J.A., 2001. Hepatitis A: Old and new. Clin. Microbiol. Rev., 14: 38-58.

Daniels, D., S. Grytdal and A. Wasley, 2009. Surveillance for acute viral hepatitis-United States, 2007. MMWR Surveillance Summary, 58: 1-27.

David, A.M., 2004. Hepatitis A outbreaks-methods of intervention in South-East Asian countries. Int. J. Infect. Dis., 8: 201-209.

De Alencar Ximenes, R.A., C.M.T. Martelli, E. Merchan-Hamann, U.R. Montarroyos and M.C. Braga *et al*., 2008. Multilevel analysis of hepatitis A infection in children and adolescents: A household survey in the Northeast and Central-west regions of Brazil. Int. J. Epidemiol., 37: 852-861.

Gupta, A. and Y. Chawla, 2008. Changing epidemiology of hepatitis A infection. Indian J. Med. Res., 128: 7-9.

Hussain, Z., B.C. Das, S.A. Husain, N.S. Murthy and P. Kar, 2006. Increasing trend of acute hepatitis A in North India: Need for identification of high-risk population for vaccination. J. Gastroenterol. Hepatol., 21: 689-693.

KCDCP., 2012. Guidelines of vaccination for adult (Report No.: 11-1352159-000081-14). Korea Centers for Disease Control and Prevention, Osong, South Korea, pp: 52.

Kim, J.H., 2008. Recent epidemiological status and vaccination of hepatitis A in Korea. J. Korean Med. Assoc., 51: 110-118.

Kumar, V., A.K. Abbas, N. Fausto and J.C. Aster, 2009. Robbins and Cotran Pathologic Basis of Disease. 8th Edn., Saunders Elsevier, Philadeldhia, PA., ISBN-13: 9781416031215.

Previsani, N., D. Lavanchy and A. Hepatitis, 2000. World Health Organization. Department of communicable Disease Surveillance and Response, Rome, Italy, pp: 1-39.

Sac, R.U., I. Bostanci, Y. Dallar, G. Cihan and O. Atli, 2009. Hepatitis A seroprevalence and demographics in Turkish children in Ankara. Pediatrics Int., 51: 5-8.

Silva, P.C., C.L. Vitral, C. Barcellos, H. Kawa, R. Gracie and M.L. Rosa, 2007. Hepatitis A in the city of Rio de Janeiro, Brazil: Epidemiological pattern and socio-environmental variables. Cross-analysis of SINAN and population census data. Cadernos Saude Publica, 23: 1553-1564.

Velasco-Mondragon, E., I. Lindong and F. Kamangar, 2012. Determinants of anti-hepatitis A antibody seroprevalence in 2-to 19-year-olds in the USA using NHANES 2007-2008. Epidemiol. Infect., 140: 417-425.

Wasley, A., A. Fiore and B.P. Bell, 2006. Hepatitis A in the era of vaccination. Epidemiol. Rev., 28: 101-111.

Yassin, K., R. Awad, A. Tebi, A. Queder and U. Laaser, 2001. The epidemiology of hepatitis A infection in Palestine: A universal vaccination programme is not yet needed. Epidemiol. Infect., 127: 335-339.