Research Article

Open Access

Prevalence of Hepatitis A Virus in Libyan Children

Aisha Areaby Sehari¹ and Ashraf M Ayad²

¹Assistant Professor, Tripoli University, Faculty of Medicine, Tripoli, Libya

²Consultant Pediatrician, Damanhur Teaching Hospital, Egypt

ABSTRACT

Hepatitis A virus (HAV) is the most hepatotropic. This virus is responsible for the most forms of acute and benign hepatitis although fulminant hepatic failure can occur in $\cong$ 1% more often in adults. It is a member of Picornaviridae family, it is a heat stable and has limited host range.

The incidence of infection by Hepatitis A virus shows regional variation being highest in developing countries. Determination of age specific Hepatitis A virus (HAV) seroprevalence and the associated risk factors would help better plan for national preventive strategies including vaccination. We carried out a cross-sectional study on 315 children from Tripoli and Gharian cities in Libya during the years 2018-2020. The age range of the patients was 1-18 years and were from different socioeconomic status (SES) families.....attending teaching hospitals casualty seeking medical help and checkup. The indicators of SES included employment status, residence, number of family members, source of drinking water and social status. Serum samples were collected and investigated for HAV antibodies. The data were statistically analyzed. HAV antibodies were positive in 113 patients (36%) Males were 161(53%) while Females were 154 (49%). HAV antibodies was significantly higher among children of low SES, 60 % by the age of 18 years compared to children of high SES, 35% by the same age. Crowded household and parental education were significantly associated with high seropositivity and seronegativity respectively. There is significant rate of seronegativity amongst the studied population especially those from richer backgrounds making them more susceptible to severe infection in future with concomitant complications. We propose that revision of national vaccination program should be considered to include Hepatitis A vaccination.

*Corresponding author

Aisha Areaby Sehari, Tripoli University, Faculty of Medicine, Tripoli, Libya. Tel: 00218913811226; E-mail: aishasehari@yahoo.com

Received: April 21, 2021; **Accepted:** April 28, 2021; **Published:** April 30, 2021

Keywords: Seroprevalence, Hepatitis A, Pediatrics

Introduction

Hepatitis A virus (HAV) is a member of the Hepatovirus genus of the family Picornaviridae, and is a nonenveloped single-stranded RNA virus [1]. HAV replicates in hepatocytes (liver cells) and interferes with liver function, sparking an immune response that causes liver inflammation. Four of the seven genotypes of HAV affect humans (genotypes I and III are the most common), but only one serotype exists. Infection with any of the genotypes usually results in lifelong immunity against all strains of hepatitis A virus [2]. The prevalence of HAV infection closely correlates with the degree of environmental sanitation and the prevailing socioeconomic and hygienic conditions HAV is transmitted via the fecal-oral route either by direct contact with an infectious person or by ingestion of contaminated food or water [3, 4]. For those who develop symptoms, the viral concentration is usually very low by the time jaundice appears. Predictors of past or recent infection with hepatitis A virus include low household socioeconomic status (low income, wealth, and/or educational level), a larger household size and crowding, residence in a rural area, membership in certain ethnic groups, limited access to improved water sources, and limited access sanitation facilities [5]. Several additional high-risk population groups have been identified, including those who travel or immigrate from a non-endemic region to an endemic region and

those who work in certain high-risk occupations (such as some daycare employees [6]. Hepatitis A infection has four clinical phases, although these do not occur in all patients.

The course of HAV infection varies by age. Young children with an acute hepatitis A viral infection are usually asymptomatic or non-specific and not diagnosed as hepatitis A because of the lack of jaundice. Adults with acute infections may have mild disease or may develop serious complications. (An estimated 80 to 95% of children less than 5 years old have asymptomatic infections, compared to 10 to 25% of adults. The risk of disease increases with age [7]. The vast majority of hepatitis A patients make a full recovery, and the case fatality rate is low. The estimated mortality rate is 0.1% for children less than 15 years old, 0.3% for adults ages 15 to 39, and 2.1% for adults ages 40 and old). Several complications may occur. About 15% of patients experience prolonged jaundice and/or relapses over several months. Some develop cholestatic hepatitis. A few suffer from fulminant (acute) liver failure that may require a transplant or cause death. Although liver failure is more likely to occur in patients suffering from chronic liver disease prior to the onset of hepatitis A, it can occur in anyone with HAV infection. Hepatitis A does not cause chronic liver disease. The low mortality associated with hepatitis A does not mean that disease is not severe: infection may require several days or weeks of hospitalization and may cause absenteeism from

work or school for several weeks or months. Thus, infection can be expensive in terms of both direct medical costs and lost productivity. Current or recent infection can be determined by the presence of anti-HAV IgM antibodies in serum, which are detectable soon after infection and can remain detectable for about 6 months (or longer, in some cases). Past infection can be determined by the presence of anti-HAV IgG antibodies in serum, which appear shortly after the onset of symptoms and confer long-term (usually lifelong) immunity. In many parts of the world, the anti-HAV seroprevalence rate is decreasing. Several factors are contributing to the declining infection rate, including increasing socioeconomic status, increasing access to clean water, and (in a few parts of the world) the availability of a hepatitis A vaccine that was developed in the 1990s [8]. In some cases, this reduced force of infection has significantly increased the average age at infection. This delay in viral exposure has created a large population of susceptible adolescents and adults at risk of disease and led to outbreaks of hepatitis A. Because the severity of infection increases with age, it may be appropriate for Hepatitis A Virus populations with a high proportion of susceptible adults to consider implementing vaccination programs targeted to certain populations (often children) [9]. A rational vaccination policy in developing countries therefore requires information about the prevalence of immunity in the population.

Aim

This study was to determine the seroprevalence of HAV antibodies (HAV Abs) among a group of Libyan children aged 1–18 years of different social classes to ascertain if it is better to give hepatitis A vaccine early in life or to leave children to acquire their natural immunity. We also aimed to ascertain what would be the most appropriate age for hepatitis A vaccination.

Patients and Method

The studied group was 315 children aged 1–18 years who attended paediatric clinics at Gharriyan teaching hospital outpatient's clinic and Tripoli University Teaching Hospital outpatients, for minor illnesses from January 2018 to November 2020. A simple random sampling method was used to select the children attending the paediatric clinics and the Data collection. After informed consent was obtained from their parents and direct from children, all patients were subjected to complete history-taking, including age, sex, signs of hepatitis or jaundice or contact with a person of similar signs were included in the study. In addition, information about the occupation and educational qualification of parents were obtained. Social class was classified as high, middle or low depending on level of education of father and mother, jobs of both, area of living and housing plus family size. Children were given a thorough medical examination to exclude the presence of any current liver disease. Children with history of HAV vaccination were excluded from the study.

Previous HAV infection was determined from a history of clinical illness (jaundice, changing colour of urine, isolation in fever hospital, vomiting, previous abnormal liver function tests). About 5mL–10mL of blood were obtained by venesection from each child. Serum samples were separated by centrifugation, coded and stored at –20 °C until testing. Anti-HAV antibodies were detected in serum in a by cobs e 411 analyzer-- ElectrochemiLuminescence (ECL) technology for immunoassay analysis. Although the presence of total anti HAV is a signal of exposure to the virus, it does not distinguish between present and past infection and therefore is mainly useful for epidemiological surveys [9]. Although in some patients we did both IgM and IgG. Statistical analysis was

done. Comparisons between percentages were done using the chi-squared test. A P value < 0.05 was considered statistically significant.

Results

Out of 315 children analyzed, 161 (53 %) were males and 154 (47 %) were females, HAV antibodies were positive in 113 patients (36%) Figure1. HAV Abs significantly increased with decreasing social class level 60 % in the low social class compared with 35% % in the high social class children by the same age. Crowded household and parental education were significantly associated with high seropositivity and seronegativity respectively. No statistically significant difference was found between seropositivity in females (52.27%) and males (47.7%).

Figure 1: Distribution of Seropositive and Seronegative Children

Discussion

In this report, the prevalence of anti-HAV antibodies in serological (blood) samples taken from population-based samples will be the primary measure of population seroprevalence rates in children in my country. These assays measure total anti-HAV and assume that IgM anti-HAV, found only in those with recent infection, and as a result IgG anti-HAV is the only contributor to the total anti-HAV. The laboratory methods used to detect anti-HAV may vary in terms of technique, materials, and quality, and it is possible that some of the inconsistencies in rates reported from the same country or within the same region are a result of the application of different laboratory standards [1].

The overall seropositivity of HAV Ab among all our cases 36%. No previous study report for the prevalence of HAV Abs in Libyan children to compare.

Other studies as Egyptian studies recorded a higher prevalence than ours [10]. Other endemic countries have reported variable results. Aggarwal et al. found that 84% of Indian children aged 6 months to 18 years A study in Saudi Arabia recorded 52.4% prevalence in children aged 1–10 years [11]. Higher prevalence was recorded in Turkish children, with 95% positivity in the age group 1–15 years [12].

There was no statistically significant different regarding patients sex. (161 males, 154 females). And no statistically significant different was found regarding sex seropositivity (52.3% females, 47.7% males). Which correlate [12, 13]. In contrast Duval et al. in a Canadian study reported that HAV Ab seroprevalence was significantly associated with female.

The difference between the other results and ours may be due to variability in sampling from different areas with different sanitation facilities. HAV Ab significantly increased with decreasing social

class level 60 % in the low social class compared with 35% in the high social class children.

This result agrees with authors in different countries, in Saudi Arabia, Turkey, India and Brazil [11-14]. The prevalence of HAV infection closely correlates with environmental sanitation and the prevailing socioeconomic and hygienic condition [15]. In developing countries, inadequate sanitation results in continuous transmission of HAV especially to children and young adults. Our study showed that the seropositivity of HAV Ab increased significantly with decreasing social class from this agrees with Al-Rashed who reported a prevalence of anti-HAV of 35%, 48.5% and 90% among high, middle and low classes respectively [15]. Also Das et al. in India reported a prevalence of 30.8% and 51.2% in persons with higher and lower socioeconomic status respectively [16]. This was also shown by Dhawan et al. and Akbul et al. [17]. The level of education of parents (included in the social class classification) was very important in our study, eyes.

Figure1 Descriptive hepatitis A virus antibodies (HAV Ab) (n =315). Sex Male was (53%) Female (49%).

A Canadian study reported a seroprevalence of 2% of unvaccinated children aged 8–13 years [18]. The low prevalence of HAV reported in Toronto, Canada, has raised concerns about the potential for a large-scale outbreak of HAV infection in these areas. Hepatitis A virus infection in some regions has been changing, mainly in Western Europe but also in India and Korea [19, 20]. This may also be the case in our country in areas with improved sanitation and hygiene. These changes suggest that immunity against HAV has generally decreasing in developing countries and large outbreaks could be expected, particularly in adults. This was happened during year 2020 (April to July) there was many people presented with signs of HAV infection in some parts of (AL-GABEL AL-GHARBI) city due to war in Tripoli and movement of people from Tripoli and war places to mountain cities plus loose control of our borders so many immigrants enter illegally to Libya carrying with them different infectious diseases to our population we report around 17 children (high IgM) only in one private clinic during May-June of that year. The presentation was mainly complain of abdominal pain and yellowish discoloration of their eyes. It was due to drinking contaminated water and unsuitable situation of roughages As a consequence of war in Tripoli and area around. So there is a possibility in the future for older children and young adults to be at high risk for more severe course of the clinical disease [21]. Because of that routine vaccination may be recommended in such areas, eating outside the home was reported to be a risk factor in high social classes in a some studies

Three epidemiologic patterns of HAV infection are found around the world [1]. The 1st is in the developing world where HAV is highly endemic. Most children therefore become infected early in life and by the age of 10 years most of the population is immune [22]. Vaccination has no role in these areas. The 3rd is where HAV has almost been eradicated because of high standards of hygiene and sanitation, as in developed countries. HAV infection is thus uncommon in the young, and is generally only acquired during travel to endemic areas [22]. Here the chance of an epidemic is high and vaccination is recommended. The 2nd pattern is in countries where standards of hygiene have been steadily improving so that prevalence has declined to below 10%. In this case there is an increased proportion of infection occurring later, in adolescence or early adult life [22]. This may be the case in certain areas within developing countries, where the high social classes have

improved sanitation and standards of living. In certain areas within developing countries where the high social classes have improved sanitation and standards of living the prevalence may have declined considerably [11, 23, 24].

In developed countries, good hygiene is likely to be a major factor in controlling hepatitis A. In developing countries, universal vaccination in childhood is the optimal strategy and may become possible when vaccines for hepatitis A are made available in a combined form with other “routine” immunizations.

Acknowledgements

The author is grateful to Khalid Elmontsar and Dr. Fathhi Al fagiand Mahammed Arabi & Rammadan. A.A.....and Document Delivery staff of Gharrian Teaching Hospital for their able and dedicated assistance with this research

Conclusions

The overall seroprevalence of anti-HAV Ab in our sample was 36%. Since less than half (one third) of population are immune to hepatitis A due to subclinical infection, a national vaccination programme may be a priority now. Higher social class is the group at risk for infection occurring later in adolescence or early adult life with more severe symptoms in the case of contact with HAV. While our sample cannot claim to be representative of the Libyan population it may be representative of the Tripoli and part of the mountain area.

Recommendations

Vaccination against HAV in Libya should be a priority for children of high social class at the preschool period without pre-testing for HAV Ab. Children of low social class still acquire their immunity early in life, so there is currently no requirement to give the vaccine. We can also recommend vaccination for high social class children aged 9–18 years but after testing for HAV Ab. Well-planned population based epidemiologic studies in different areas of the country will allow formulation of cost effective strategies for the use of hepatitis A vaccine.

References

1. The global prevalence of hepatitis A virus infection and susceptibility: a systematic review. Geneva, Switzerland: World Health Organization; 2009. Hepatitis A Virus.
2. Lanini S, Ustianowski A, Pisapia R, Zumla A, Ippolito G (2019) Viral Hepatitis: Etiology, Epidemiology, Transmission, Diagnostics, Treatment, and Prevention. Infectious Disease Clinics of North America. 33: 1045-106.
3. Cuthbert JA (2001) Hepatitis A: old and new. Clin Microbiol Rev 14: 36-58.
4. Jacobsen KH, Koopman JS (2005) The effects of socioeconomic development on worldwide hepatitis A virus seroprevalence patterns. Int J Epidemiol 34: 600-609.
5. Vitral CL, Yoshida CFT, Elba RS Lemos, Teixeira CS, Gaspar AMC (1998) Age-specific prevalence of antibodies to hepatitis A in children and adolescents from Rio de Janeiro, Brazil, 1978 and 1995. Relationship of prevalence to environmental factors. Memorias do Instituto Oswaldo Cruz, 93: 1–5.
6. Franco E, Giambi C, Ialacci R, Coppola RC, Zanetti AR (2003) Risk groups for hepatitis A virus infection. Vaccine 21: 2224-2233.
7. Hollinger FB, Ticehurst JR (1996) Hepatitis A virus. In: Fields Virology. 3rd ed. Philadelphia: Lippincott- Raven; 735-782.
8. Jacobsen KH, Koopman JS (2004) Changing hepatitis A seroprevalence: a global review and analysis. Epidemiol Infect 133: 1005-1022.

9. Wasley A, Fiore A, Bell BP (2006) Hepatitis A in the era of vaccination. *Epidemiol Rev* 28: 101-111.
10. Darwish MA, Faris R, Clemens JD, Rao MR, Edelman R (1996) High seroprevalence of hepatitis A, B, C and E viruses in residents in an Egyptian village in the Nile Delta, a pilot study. *American journal of tropical medicine and hygiene*, 54: 554-558.
11. Al Rashed RS (1997) Prevalence of hepatitis A virus among Saudi Arabian children: a community-based study. *Annals of Saudi medicine*, 17: 200-203.
12. Akbul A (1996) The prevalence of hepatitis A in the Elazig region. *Turkish journal of medical science*, 26: 375-378.
13. Aggarwal R (1999) Seroprevalence of antibodies to hepatitis A virus among children in Northern India. *Indian pediatrics*, 36: 1248-1250.
14. Dinelli MI, Fisberg M, Moraes-Pinto MI (2006) Anti-hepatitis A virus frequency in adolescents at an outpatient clinic in Sao Paulo, Brazil. *Revista do Instituto de Medicina Tropical de Sao Paulo* 48: 43-44.
15. Hepatitis weekly [online] (<http://www.newsrx.com/newsletters/hepatitis-weekly>, accessed 28 November 2007).
16. Das K, Kar P, Chakraborty A, Gupta S, Das BC (1998) Is a vaccination program against hepatitis A needed in India? *Indian journal of gastroenterology*, 17: 158.
17. Dhawan PS, Shah SS, Alvares JF, Kher , Shankaran (1998) Seroprevalence of hepatitis A virus in Mumbai and immunogenicity and safety of hepatitis A vaccine. *Indian journal of gastroenterology* 17:16-18.
18. Levy I, Chen D, Sherman M, Smith D, Krajden M (2001) Hepatitis A virus seroprevalence in 1000 university students in Toronto. *Canada communicable disease report*, 27: 93-6.
19. Chitambar SD, Chadha MS, Joshi MS, Arankalle VA (1999) Prevalence of hepatitis A antibodies in western Indian population: changing pattern. *Southeast Asian journal of tropical medicine and public health*, 30: 273-276.
20. Sohn YM, Rho HO, Park MS, Park JH, Choi BY (2000) The changing epidemiology of hepatitis A in children and the consideration of active immunization in Korea. *Yonsei medical journal*, 41: 34-39.
21. Stroffolini T, de Crescenzo L, Giammanco A, Intonazzo V, la Rosa G (1990) Changing pattern of hepatitis A infection in children in Palermo, Italy. *European journal of epidemiology*, 6: 84-87.
22. Junquera S, Mateos M, Lasa E, Chacón J, Baquero F (2004) Estudio seroepidemiológico de la hepatitis A en la comunidad de Madrid durante el año 2002 [Seroepidemiologic study of hepatitis A in the community of Madrid during the year 2002]. *Enfermedades infecciosas y microbiología clínica*, 22: 448-451.
23. Salama I (2004) Is there a change in the epidemiological pattern of hepatitis A in urban Egyptian children? *Egyptian medical journal of the National Research Center*, 15: 163-178.
24. Koff RS (1998) Hepatitis A. *Lancet*. May 30, 341: 1643-1649.