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ORIGINAL ARTICLE

Age-specific prevalence of antibodies to Hepatitis A virus among Bangladeshi children

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Abstract

Background: *High rates of sero-positivity among children by Hepatitis A virus sub-clinical infection are shown in different studies. Therefore mass vaccination against HAV has not been recommended in endemic countries.*

Objective: *To determine the age-specific prevalence of antibody (IgM & IgG) to HAV in children attending two tertiary care hospitals of Bangladesh.*

Materials and methods: *A cross sectional observational study was carried out during the period of July 2008 to June 2009 at Bangabandhu Sheikh Mujib Medical University (BSMMU) Hospital & Dhaka Shishu (Children) Hospital (DSH) of Dhaka, Bangladesh. A total of 254 children aged 1-15 year, who had no history of jaundice or hepatitis or hepatitis A vaccination attending OPD of these two hospitals for other illnesses were included in the study. Their serum were tested for anti HAV IgM & IgG by ELISA kits.*

Results: *Hepatitis A virus antibody was positive in 141 (55.5%) of 254 children. Age-specific sero-prevalence was 13 (23.2%) of 56 in 1-3 year, 64(55.2%) of 116 in 3-5 year, 39 (70.9%) of 55 in 5-10 year & 25 (92.6%) of 27 in 10-15 year age group.*

Conclusion: *Majority of the children were found sero-positive against HAV around 15 year of age. Therefore mass vaccination against HAV is not required in the studied Bangladeshi children.*

Keywords: *Hepatitis A virus (HAV) infection, HAV seroprevalence, HAV vaccine.*

Introduction

Hepatitis A virus (HAV) infection occur throughout the world but most common in developing countries.[1] In these countries with high endemicity, 90% of the population is infected by 10 years of age.[2] Here children are continuously exposed to the virus, which confers lifelong immunity.[3] In many developing countries like India, Pakistan, Nepal several sero-prevalence studies have shown high rates of sero-positivity among child by sub-clinical infection.[4-9]

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Therefore, mass vaccination against HAV has not been recommended in endemic countries.[10] Furthermore, hepatitis A vaccine is expensive. In Bangladeshi children, limited data are available regarding the sero-prevalence of HAV antibody.[11] In this context, the present study was designed to see the prevalence of HAV antibody (IgG & IgM) among children of different age group attending two tertiary care hospitals of Bangladesh and to know whether routine Hepatitis A vaccination was really indicated in Bangladeshi children.

Materials and methods

A cross sectional observational study was conducted from July 2008 to June 2009. Blood was collected at blood collection centers of Bangabandhu Sheikh Mujib Medical University (BSMMU) Hospital & Dhaka Shishu (Children) Hospital (DSH). A total of 254 children aged 1-15 years (boys=139 & girls=115), who had no previous history of jaundice or Hepatitis A vaccination but attended OPD of these two hospitals for other illnesses were included in this study. The sample size was determined by the prevalence rates of neighbouring countries with a similar socio-economic condition (e.g., India & Pakistan) as there are no previous data on HAV prevalence particularly children of Bangladesh. With prior written consent, clinical history and relevant data were recorded & 2 ml of blood was collected from the study cases. Serum was separated, stored at -20°C and were tested for HAV antibody (IgG & IgM) by ELISA technique using the ELISA kit (DiaSorin Italy, ETI-AB-HAVK PLUS, no136, 01/2009) at the department of Virology laboratory of BSMMU, Dhaka. 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) version 11.5 program. P value of <0.05 is considered as statistically significant.

Results

Hepatitis A virus antibody (total) was found positive in 141 (55.5%) of 254 children (Fig 1).

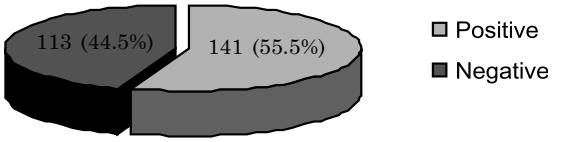

Fig 1 *Anti-HAV positivity among all children*

Among 254 studied children 172 children were from 1-5 year age group, 55 children from 5-10 year age group and 27 children from 10-15 year age group. Male to female ratio was 1.2:1. Age distribution of the children positive for HAV antibody shows that with the advancement of age, anti-HAV positivity increases. Anti-HAV of 1-5 year age group was found to be 44.7%, it gradually increased to 70.9% in 5-10 year age group and finally to 92.6% in 10-15 year age group. Anti-HAV positivity of 5-10 year age group was significantly higher than that of 1-5 year age group (p=0.001) and antibody positivity of 10-15 year age group was significantly higher than that of 5-10 year age group (p=0.026). (Table I).

Table I
Anti-HAV positivity with age

Age (yrs)	n	HAV antibody		χ^2	p* value
		Positive	Negative		
1-5	172	77 (44.7)	95 (55.3)		
				11.397	0.001
5-10	55	39 (70.9)	16 (29.1)		
				4.970	0.026
10-15	27	25 (92.6)	2 (7.4)		

#Data were analysed using Chi-square (χ^2) test
Figures in the parentheses denote corresponding percentage

Table II shows anti-HAV positivity in children aged 1-5 year. Anti-HAV was found 18.9% in 1-2 year age group, 31.6% in 2-3 year age group, 53.1% in 3-4 year age group & 56.7% in 4-5 year age group.

Table II
Seroprevalence of antibodies in children aged 1-5 year

Age (yrs)	n	HAV antibody		χ^2	p* value
		Positive	Negative		
1-2	37	7 (18.9)	30 (81.1)		
				1.129	0.467
2-3	19	6 (31.6)	13 (68.4)		
				2.536	0.111
3-4	49	26 (53.1)	23 (46.9)		
				0.153	0.696
4-5	67	38 (56.7)	29 (43.3)		

Data were analysed using Chi-square (χ^2) test;
Figures in the parentheses denote corresponding percentage

Discussion

Acute viral hepatitis caused by HAV is an acute, self-limiting infection.[12] Hepatitis A virus infection is very common in early childhood and most of the infections are asymptomatic or mildly symptomatic.[13] Immunity that develops following natural infection is stronger and persists longer than that develops following vaccination.[14]

Three epidemiological patterns of endemicity (low, intermediate and high) are observed worldwide. Each pattern has a different rate of infection, prevailing age of infection, and transmission model. HAV epidemiological pattern are highly dependent on age and level of hygiene. The distribution of HAV seroprevalence by age group may reflect current hepatitis A endemicity in countries and regions. The countries with low endemicity include Japan, Singapore, Hongkong and Taiwan whereas those with moderate endemicity include Thailand, Malaysia and Sri Lanka. Countries with high endemicity for HAV infections include India, China, Nepal, Bangladesh, Pakistan, Myanmar and Philippines.[15] In many developing countries of Africa, Asia and Latin America, most infections occur by 5 years of age where seroprevalence approach 90-100% by 10-15 years of age.[1] In Africa, Hendricks et al.[16] showed anti-HAV positivity of >90% among the 5-10 year age group among lower class black children.

India, China, Nepal, Pakistan and Bangladesh are included in high endemic zone[15] and a large number of populations acquire immunity through subclinical infections in early life.[17] During the last 5 years several reports from countries in southern Asia, Latin America and Europe showed a decreasing seroprevalence of protective antibody against hepatitis A virus.[18]

In the present study the average prevalence of anti-HAV was 55.5%. Only 44.7% individuals were positive at the age range of 1-5 years. Anti-HAV seroprevalence increased with age from 44.7% in 1-5 year age group to 92.6% in the 10-15 year age group. It was also observed that in 1-5 year age group (younger children), about one third of children were anti-HAV positive by 2-3 year of age and more than half by 3 years of age. Similar results were also observed in other studies in Bangladesh. Ahmed et al.[19] 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.[11] also reported anti-HAV positivity of 40.4% 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. These findings are similar to the findings of our neighbouring countries. Mall et al[2] from India (Calcutta) reported 40% anti-HAV positivity in 1-5 year age group and through gradual increase in age the prevalence reached to 97% in the >16 year age group.

A recent study by Kamath et al[5] reported anti-HAV positivity of 61.6% in 5-10 year age group and 97% in 11-15 year age group in Chennai, India. Agboatwalla et al[8] & Sawayama et al.[21] also reported similar results from Pakistan (94.1% seropositive by the age of 5 years) and Nepal (91.1% seropositive) respectively. Anti-HAV positivity was found 94.1% in 1-5 year age group at Rawalpindi and 99% in two rural villages in Nepal. In Africa, Raharimanga et al.[14] reported that the overall seroprevalence of anti-HAV was 92.2%. In 8-10 year age group it was 83.7% and in 10-24 year age group it was 95.5%.

Conclusion

In the studied children anti-HAV positivity was more than 50% after 3 years of age and finally increased to more than 90% after 10 years of age. So, high proportion of children in the present study acquired HAV antibody since early childhood and anti HAV positivity increased with increase in age. Therefore mass vaccination against HAV was not indicated in the studied Bangladeshi children.

Recommendations

Based on the present study, it may be recommended that in children less than 3 years of age vaccination without prior screening can be done. However in children of > 3 years of age, pre-vaccination screening should be done prior to vaccination as this is safe and more rational.

Further community based studies with larger sample size are required before giving a final recommendation for routine HAV vaccine to children of Bangladesh.

Limitations of study

Small sample size, selection biasness and absence of socio-economic status are the three limitations of this study.

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