PRESENT EPIDEMIOLOGICAL PATTERN OF ANTIBODY TO HEPATITIS A VIRUS AMONG CHIANG MAI CHILDREN, NORTHERN THAILAND

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Abstract. Hepatitis A virus (HAV) infection is common in Southeast Asia, and most of the inhabitants acquire a lifelong immunity as a result of natural infection during childhood. However, the age-specific seroprevalence is changing with development of socioeconomic and hygiene status in this area and the infection is predicted to shift to adulthood with more severe clinical manifestations in the future. In this study, we report the present epidemiological pattern of antibody to HAV (anti-HAV) among schoolchildren in Chiang Mai, Northern Thailand. The overall prevalence rate of anti-HAV was 9.6% (11.4% in female and 7.5% in male children, and 10.8% in urban and 8.9% in rural schoolchildren, respectively). Our study, comparing with previous reports from other parts in Thailand, indicates a steady decline of anti-HAV prevalence among schoolchildren in Chiang Mai area, and discussed a possibility of an outbreak of HAV infection among urban schoolchildren.

INTRODUCTION

Hepatitis A virus (HAV) infection is highly endemic in Southeast Asian countries, including Thailand; however, it is not regarded as an important public health problem. HAV infection, which universally occurs during childhood in these developing countries, is often asymptomatic or mildly symptomatic and yields a lifelong immunity before adulthood (Burke *et al*, 1981; Echeverria *et al*, 1983). Over the past one or two decades, many countries in this area have experienced dramatic changes in age-specific seroprevalence of anti-HAV antibodies. With improvements in socioeconomic conditions, this infection has been shifting from childhood to adulthood.

HAV infection becomes more symptomatic and severity of the illness increases with advancing age. A review of the age-related seroprevalence of HAV in Southeast Asian countries showed HAV infection pattern has changed over recent years; Singapore, Thailand and Malaysia have all shown a marked decline in childhood and adolescent HAV seroprevalence (Kunasol *et al*, 1998). Although the data from previous studies in Thailand showed a significant decline in anti-HAV prevalence in children (Burke *et al*, 1981; Echeverria *et al*, 1983; Innis *et al*, 1991; Kosuwan *et al*, 1996; Poovorawan *et al*, 1991; 1993), there is little information concerning the seroprevalence of anti-HAV antibodies in the northern region of Thailand.

In this study we report the age-specific seroprevalence of anti-HAV antibodies among children aged 4-16 years in urban and rural schools in Chiang Mai Province, Northern Thailand. We compare these data with previous reports from various parts of Thailand and also discuss a possible outbreak of HAV in an urban school in this area.

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MATERIALS AND METHODS

Study population

During the period of July 1998 to August 2000, a total of 1,145 serum samples were randomly collected from children aged 4-16 years in Chiang Mai Province, Northern Thailand. These children attended one of 7 rural schools (720 children, with 340 males and 380 females) or one of 3 urban schools (425 children with 192 males and 233 females). All subjects or parents were previously informed about the goals of the project, and written consent was obtained from the parents and headmasters of the specific schools. Serum samples were stored at 4ºC not more than 3 days or at -20ºC until tested.

Serologic study

Sera were tested for the presence of anti-HAV antibodies by an ELISA method using a commercial kit HAV Total from Sanofi Diagnostic Pasteur (Manes la Coquette, France). Positive samples were retested; only repeatedly reactive sera were considered positive.

RESULTS

Among the 1,145 schoolchildren, 110 (9.6%) were positive for anti-HAV antibodies. Female children showed a higher rate of seropositivity (11.4%) than male children (7.5%). The prevalence rate of anti-HAV antibody positivity increased with age (Fig 1).

The average prevalence rate of anti-HAV seropositivity was 10.8% in urban schoolchildren, compared with 8.9% in rural children. The age-specific seroprevalence of anti-HAV antibodies showed a linear increase among rural children, while urban children revealed an irregular pattern of age-specific seroprevalence (Fig 2).

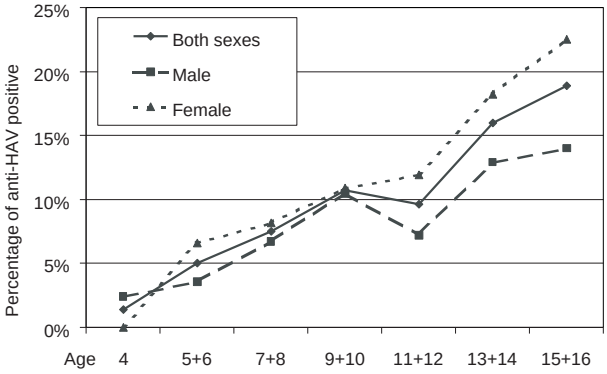

Fig 1–Age-specific seroprevalence of anti-HAV antibodies in Chiang Mai children.

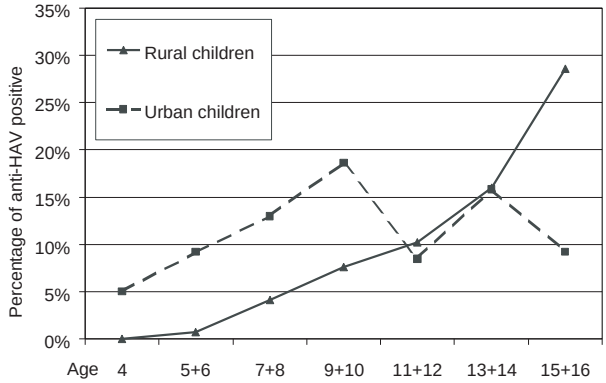

Fig 2–Age-specific seroprevalence of anti-HAV antibodies among rural and urban schoolchildren in Chiang Mai.

DISCUSSION

Hepatitis A virus (HAV) is present in most parts of the world and is responsible for both epidemic and sporadic infections. Serological surveys in the 1970s demonstrated that hepatitis A was very common in Thailand. A nearly 50% prevalence rate was found in 8-9 year old rural children and 10-11 year old children in Bangkok, while almost all (97%) of those older than 16 years were positive for anti-HAV antibodies (Burke *et al*, 1981). For the last ten years, the seroprevalence of anti-HAV antibodies has been decreasing and the pattern of age-specific seroprevalence has changed. These changes have been brought about mainly by improvement in the socioeconomic situation, including living standards, education and personal hygiene (Innis *et al*, 1991; Kosuwan *et al*, 1996; Poovorawan *et al*, 1993, 1997). Several

reports have shown significant reductions in seroprevalence of anti-HAV antibodies among children and adolescents in Thailand over the last two decades (Kunasol *et al*, 1998; Poovorawan *et al*, 1993). In the early 1980s, there was a reported 65.7% seroprevalence in Bangkok children aged 2 months to 5 years (Viranuvatti *et al*, 1982) and 50% in children aged 6-7 years in an isolated rural community in Northern Thailand (Echeverria *et al*, 1983). By around 1990, these values had dropped to 46.7% in children aged 11 years of middle socioeconomic classes in Bangkok (Poovorawan *et al*, 1989) and 33.3% in children aged 11-12 years in a rural area of eastern Thailand (Poovorawan *et al*, 1991). A further decrease was reported more recently with a seroprevalence of only 1.1% in children under 5 years of age (Kalayanarooj *et al*, 1995) and 5.6-22.7% for children aged 15-18 years in Bangkok (Poovorawan *et al*, 1997; 2000). The level of ~50% seroprevalence, previously reached around age 5, is now reached closer to age 30 (Pramoolsinsap *et al*, 1999). These results parallel those obtained by us in the present study; we found the seroprevalence rate of anti-HAV antibodies to be 18.9% for children aged 15-16 years in Chiang Mai.

We noted a difference between the results obtained for children of rural and urban settings. Not only was there a lower seroprevalance for anti-HAV antibodies amongst rural children (8.95% *vs* 10.8% for urban schoolchildren) but also age-specific differences. In our study, the age-specific seroprevalence of anti-HAV antibodies in rural schoolchildren showed a linear increase with advancing age, in keeping with natural infection as the source. In contrast, there was an irregular pattern of age-specific seroprevalence observed in urban schoolchildren. Initially, there was a more rapid rise than that seen in rural children with 5% positive at age 4 years, 9.2% at 5-6 years, 13.0% at 7-8 years and 18.6% at 9-10 years. Following this, the prevalence declined at age 11-12 years (8.5%), increased again at age 13-14 years (15.8%) and declined again at age 15-16 years (9.2%). This phenomenon suggests the possibility of an outbreak of HAV infection among the group younger than 10 years in the urban school environment. Similar patterns of age-specific seroprevalence of anti-HAV antibodies among schoolchildren were demonstrated from Nakhon Si Thammarat, Southern region (Sinlaparatsamee *et al*, 1995) and Khon Kaen, northeastern region of Thailand (Kosuwan *et al*, 1996). Intermittent contamination of drinking water or food, not a particular behavior, was suspected to be responsible for such outbreaks (Poonawagul *et al*, 1995).

Over the past 30 years, HAV prevalence has shifted from hyperendemic to intermediate endemicity in Thailand, and could theoretically become a public health problem in the future. Recent studies still report the presence of HAV in canal water in urban environments such as Bangkok (Kittigul *et al*, 2000). The declining prevalence of naturally acquired immunity to HAV before adulthood may result in a greater number of cases of clinical infection and increased susceptibility to HAV outbreaks. The occurrence of HAV infection in an older population has practical implications, because the morbidity and mortality increases significantly with advancing age of the patient. HAV infection can now be prevented by active immunization with hepatitis A vaccine (Innis *et al*, 1994; Kuramoto *et al*, 1993; Loutan *et al*, 1994). Antibody levels remain detectable for 20-25 years (Van Herck and Van Damme, 2001). The availability of an effective hepatitis A vaccine, together with the changing epidemiology of HAV infection call for a re-evaluation of the costs and benefits, economic and social factors, associated with the various preventive strategies available for countries with endemic HAV, such as Thailand.

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