

# SEROPREVALENCE OF HEPATITIS A VIRUS AND VARICELLA ZOSTER ANTIBODIES IN A JAVANESE COMMUNITY (YOGYAKARTA, INDONESIA)

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**Abstract.** Hepatitis A virus (HAV) cause an acute inflammation of the liver. Varicella-zoster virus (VZV) cause chickenpox (varicella) and herpes zoster. Effective vaccines against hepatitis A and varicella are available for children, adolescents and adults. In order to implement an appropriate vaccination policy, a baseline to assess the potential benefits and sections of the population who would benefit most are required. We investigated seroprevalence of hepatitis A virus and varicella zoster antibodies in a Javanese community.

A total of 1,103 subjects were studied. The 600 subjects aged 4 to 9 years were sampled between 23 October and 2 November, 1995. The other subjects were sampled between 12 October and 1 November, 1996. The overall prevalence of anti-HAV in cohort was 28.7%. Anti-HAV seroprevalence rates were below 30% until the age of 15 and below 40% until the age of 25. The anti-varicella seroprevalence showed only in two thirds of seropositive population at the age of 15.

The results of the study have implications for vaccination strategies for both hepatitis A and varicella zoster.

## INTRODUCTION

Hepatitis A virus (HAV) causes an acute inflammation of the liver, has a worldwide distribution, and is spread via the fecal-oral route. At least three different endemicity patterns have been described (Hadler, 1991).

Varicella-zoster virus (VZV) causes chickenpox (varicella) and herpes zoster; it is also present worldwide and is spread by the respiratory route. There are differences in its epidemiology between temperate and tropical regions. In temperate regions, varicella causes a comparatively benign childhood disease. Data from tropical regions suggests infections more often occur at older ages (Maretic and Cooray, 1963), causing more severe disease with a greater risk of complications (Sinha, 1976).

Effective vaccines against varicella and hepatitis A are available for children, adolescents and adults (André *et al*, 1992; Asano *et al*, 1994). In order to implement an appropriate vaccination policy, studies are required to establish a baseline upon which to assess the potential benefits and to de-

termine which sections of the population would benefit most. Additionally, Indonesia is a large archipelago with diverse communities and the introduction of a vaccine will need to take into account these differences. There are only limited recent data on population immunity to HAV (Vranckx *et al*, 1997; Sulaiman, 1994; Sulaiman and Julitasari, 1995; Sanjaya *et al*, 1990) and no data for VZV. We conducted a study in an Indonesian urban population representing a typical Javanese community where living conditions have greatly improved over the past 10 to 15 years.

## MATERIAL AND METHODS

This study was conducted in the kecamatan of Gondokusuman, Yogyakarta, Indonesia. Yogyakarta, a city of over 420,000 is the capital of Yogyakarta Province and is located in the central part of the island of Java. Gondokusuman has a stable population that represents a wide range of socio-economic strata, the majority of residents are Javanese. The study cohorts were recruited from the entire population of Gondokusuman with the help of the head of the kecamatan (Camat) and his staff. The study was reviewed and approved

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by both the Gadjah Mada University and NAMRU-2 Committee for the Protection of Human Subjects (CPHS). All participants, or their parents or legal guardians, signed a written consent form. The consent form detailed risks associated with venipuncture, the name, telephone and addresses of the investigators and the chairman of the NAMRU-2 CPHS where questions could be directed concerning scientific or ethical questions.

A total of 1,103 subjects were studied. The 600 subjects, aged 4 to 9 years were sampled between 23 October and 2 November of 1995 in conjunction with a prospective dengue study. The other subjects were sampled between 12 October and 1 November of 1996, pregnant women were excluded. Blood samples were collected in 5-ml Vacutainer tubes (EDTA anticoagulant for children under the age of 9 years and serum tubes for all others) centrifuged and stored at -20°C until tested. Tests for HAV and VZV IgG antibodies were done using commercially available enzyme immunosorbent kits according to the manufacturer's instructions (HAV - HAVAB, Abbott Laboratories, Chicago, IL, USA; VZV - Enzygnost anti-VZV diagnostic kit, Behringwerke, Germany).

RESULTS

Demographics are shown in Table 1. More females were recruited in the older age groups.

The overall prevalence of anti-HAV in the cohort was 28.7%. Anti-HAV seroprevalence rates remain below 30% until the age of 15 and below 40% until the age of 25 (Fig 1). Only after the age of 25 does more than half of the population have natural immunity to hepatitis A virus.

The anti-varicella seroprevalence data show a clear pattern of delayed onset with only two thirds of the population seropositive at the age of 15 (Fig 2). Around 30 years of age, one in four are still susceptible to varicella infection.

For both anti-HAV and anti-VZV there were no significant gender differences in seroprevalence.

DISCUSSION

The anti-HAV seroprevalence is that of an intermediate to low pattern where 90% seroprevalence is only reached in adulthood (Hadler, 1991). This

Table 1  
Demographics of the study cohort. N = number of subjects in each group.

Age group (years)	N	Male (%)	Female (%)
4	100	50.0	50.0
5-9	500	50.0	50.0
10-14	141	50.4	49.6
15-19	119	51.3	48.7
20-24	88	36.4	63.6
25-29	91	30.8	69.2
30-32	64	15.6	84.4
Total	1103	45.5	54.5

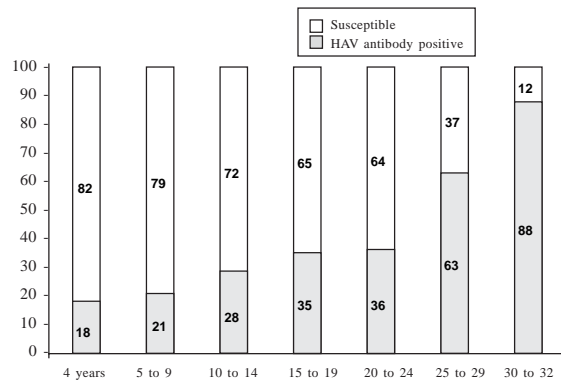


Fig 1—Anti-HAV seroprevalence.

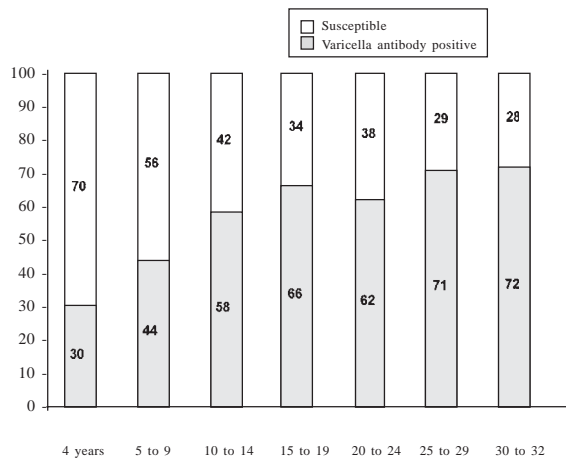


Fig 2—Anti-varicella seroprevalence.

reflects the improvements in standards of living over the past 10-15 years. Because of the age related risk of disease severity, the epidemiological

shift from high endemicity results in a paradoxical shift from a largely asymptomatic infection of younger children to one of clinical disease in older children and adults. Outbreaks due to contaminated food or water are also common. Measures based on hygiene often fail to prevent the spread of infection in outbreaks, vaccine is the best tool available (McMahon *et al*, 1996). Previous data from Indonesia showed an intermediate to high endemicity pattern in Jakarta, Bandung and Ujung Pandang with 50% seroprevalence by age 12 and a high endemicity pattern in Jayapura (Akbar *et al*, 1982). More recent data in patients attending hospitals in Jakarta showed similar results to the present study with 50% seroprevalence by age 20 (Sulaiman and Julitasari, 1995). There also remain areas of very high endemicity; a report from Irian Jaya showed an anti-HAV prevalence rate of 100% in a population aged four (Sanjaya *et al*, 1990).

This is the first report on anti-VZV seroprevalence from Indonesia. The pattern is similar to previous reports from tropical regions where there are markedly lower levels of natural immunity in children, teenagers and young adults. The reasons for the differences between temperate and tropical regions are not known. Some have suggested that varicella transmission may be affected by ambient temperatures, heat and humidity may reduce virus survival in respiratory droplets (Venkitaram and Jacob, 1984). Alternatively, lack of crowding indoors in the winter months, or different social arrangements for childcare may account for the different age distribution; although as most children in Gondokusuman now attend school, opportunities for exposure will have increased with economic improvements. A further hypothesis is that there may be "epidemiologic interference" from other prevalent viruses. Bang suggested in 1975 that wherever intensity of disease transmission is great, there would be competition among different viruses leading to delay in natural transmission and postponement of infection to adulthood (Bang, 1975). The current data from a community with good living conditions is evidence against this hypothesis. Of importance is the impact of the disease in the adult population where varicella causes significant morbidity and mortality through extended delays in healing of skin lesions and involvement of visceral organs. Perinatal varicella has a high mortality rate when maternal disease develops shortly prior to delivery (Preblud *et al*, 1985).

The results of the study have implications for vaccination strategies. For hepatitis A, an afford-

able vaccine would be an important part of a public health strategy to protect schoolchildren, adolescents and young adults. This is especially important to communities in close proximity to regions that may have a high circulation of the viruses (Sulaiman, 1994). Individuals may also wish to protect themselves against the morbidity associated with hepatitis A infection. Varicella represents an important source of childhood and adult morbidity. Indeed, the Advisory Committee on Immunization Practices (ACIP) in the USA has recently recommended vaccination for all children with no reliable history of VZV infection. A complementary strategy, particularly in view of the results of the present study, is to vaccinate adolescents and young adults with no reliable history of varicella. Priority should be given to people at high risk of exposure and for transmitting disease, namely health-care workers, teachers of young children, non-pregnant women of childbearing age and international travelers.

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