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# Age-Specific Prevalence of Antibody to Rotavirus, *Escherichia coli* Heat-Labile Enterotoxin, Norwalk Virus, and Hepatitis A Virus in a Rural Community in Thailand

PETER ECHEVERRIA,[1]†* DONALD S. BURKE,[1] NEIL R. BLACKLOW,[2] GEORGE CUKOR,[2] CHANIN CHAROENKUL,[3] AND SAMREONG YANGGRATOKE[4]

*U.S. Component, Armed Forces Research Institute of Medical Sciences,[1] and Soongnern Training and Research Center, Faculty of Public Health, Mahidol University,[3] Bangkok 10400, Soongnern Hospital, Amphur Soongnern, Nakornrajsima,[4] Thailand, and Division of Infectious Diseases, University of Massachusetts Medical Center, Worcester, Massachusetts 01605[2]*

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A serological survey in rural Thailand demonstrated that inhabitants acquired antibody to rotavirus between the ages of 6 months and 6 years, to Norwalk virus between the ages of 4 and 5 years, and to hepatitis A between the ages of 6 and 35 years. Antibody to *Escherichia coli* heat-labile toxin was most prevalent between 1 and 4 years and 18 and 25 years of age.

In the few developing countries in which the acquisition of antibodies to gastrointestinal pathogens has been studied, lifelong inhabitants became infected with both Norwalk virus (NV) (5, 7, 10) and hepatitis A virus (HAV) (14) throughout their childhood. In contrast, antibodies to rotavirus (RV) (6, 8, 11) and *Escherichia coli* heat-labile toxin (LT) (2, 13) were acquired early in life. As part of an ongoing longitudinal study of the etiology and epidemiology of gastrointestinal disease in the Soongnern district of rural Thailand, we examined the age-related acquisition of antibodies to RV, LT, NV, and HAV. Determining the age-related prevalence of antibody to gastrointestinal pathogens provides information important for assessing the potential value of immunization in different populations for the control of enteric disease (1).

Amphur Soongnern, Nakornrajsima, is a rural farming district of 57,000 inhabitants located 240 km northeast of Bangkok, Thailand. In March 1980, 25 to 31 serum specimens were obtained from approximately 15 males and 15 females in each of several different age groups. Sera were collected from patients in each of the 11 tambons within the Amphur at either schools or health centers. In addition, 30 cord sera were collected from infants born consecutively at Soongnern Hospital in the spring of 1980. Sera were frozen at −70°C until tested.

Sera diluted 1:200 in phosphate-buffered saline–azide–Tween–bovine serum albumin were tested for antibody for RV by radioimmunoassay (3). Sera tested for antibody to NV were diluted 1:50 in phosphate-buffered saline with 0.1% sodium azide and examined with a radioimmunoassay blocking test (5). A commercial solid-phase radioimmunoassay kit (HAVAB; Abbott Laboratories, North Chicago, Ill.) was used to determine antibody to HAV. In accordance with the recommendations of the manufacturers, sera (diluted in phosphate-buffered saline) showing ≥50% blocking activity at a dilution of 1:20 were considered positive for anti-HAV. Antibody titers to LT were determined with a GM1 ganglioside enzyme-linked immunosorbent assay as previously described (12), and sera with a titer of ≥6 U/ml were considered positive when Swiss Institute cholera antitoxin was used as a standard (13). Antisera of known titers were included as standard controls in each serological assay.

The age-related acquisition of antibody to RV, LT, NV, and HAV is shown in Fig. 1. Antibodies to RV, LT, NV, and HAV were present in 97, 13, 47, and 100% of cord sera, respectively. The prevalence of antibody to all three viruses decreased in the first year of life, presumably reflecting the loss of maternal antibody. Antibody to RV was then acquired during the first 6 years of life, to NV between 2 and 5 years of age, and to HAV between 6 and 35 years of age. The highest prevalence of antibody to LT was present in children between 1 and 4 years of age and increased again in individuals between 18 and 25 years of age, most of whom were parents of young children.

Although systemic antibody may not reflect local intestinal immunity (9) and it is unknown how long detectable antibody persists after in-

† Address reprint requests to P. Echeverria, AFRIMS, APO San Francisco, CA 96346, or Rajvithi Road, Bangkok 10400, Thailand.

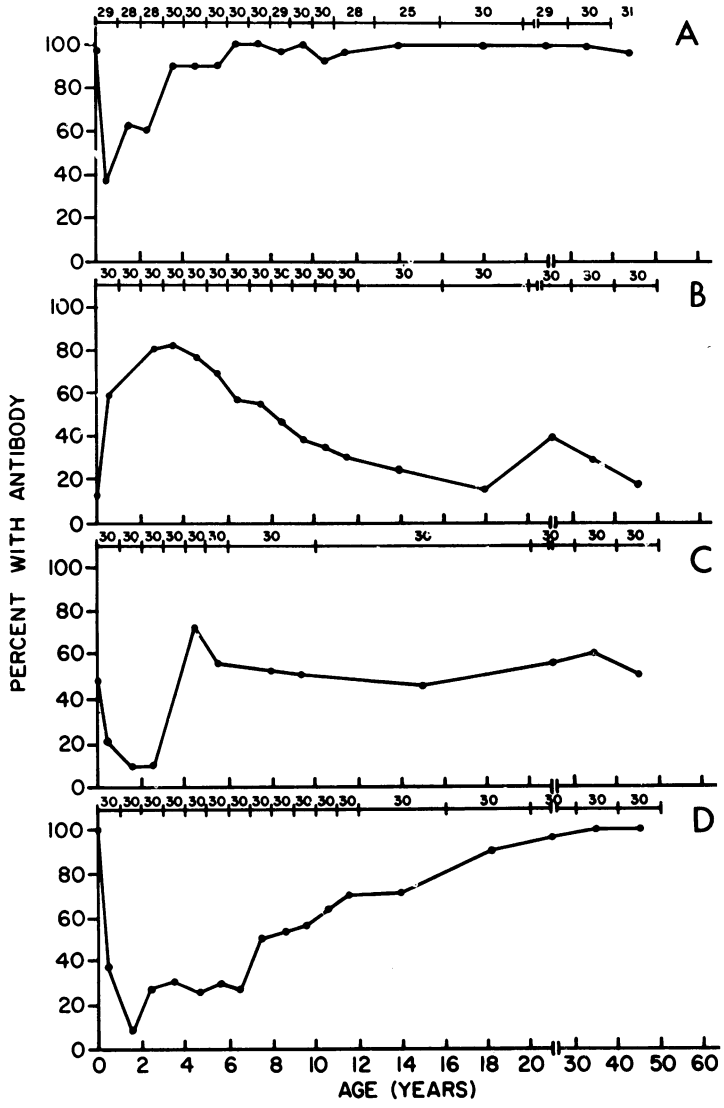


FIG. 1. Age-specific prevalence of antibody to RV (A), LT (B), NV (C), and HAV (D) in Soongnern, Thailand. Numbers above the graphs indicate the number of sera tested in each age group.

fections, this serological survey was helpful in further defining the epidemiology of these enteric pathogens in rural Thailand. A study of the etiology of diarrhea seen at Soongnern Hospital during 1981 demonstrated that children between 6 months and 2 years of age suffer the highest incidence of RV gastroenteritis, and children under 9 years of age are infected with LT-producing *E. coli* more often than are older inhabitants. Parents of young children with enterotoxigenic *E. coli* infections are also frequently infected (P. Echeverria, C. Tirapat, C. Charoenkul, and W. Chaicumpa, *in* Y. Takeda, ed., *International Symposium on Bacterial Diarrheal Diseases*, in press). The prevalence of antibody to LT was highest in age groups which had the highest incidence of infection, an observation similar to that of Black et al. (2) in Bangladesh. Further studies are in progress to determine whether NV clinical illness occurs frequently in children less than 5 years of age in this population, as would be predicted by the serological data presented. A review of the Soongnern Hospital records in 1981 indicated that the majority of patients treated for undifferentiated hepatitis were between 10 and 20 years of age. Further studies would be required to prove that the majority of this hepatitis was due to HAV.

For the most part, children in Soongnern acquired antibody to NV before the age of 5

years; however, antibody to HAV was not acquired until the age of 20 years. This observation suggests that the epidemiology of infections with these two viral pathogens is different. Evidence that does exist indicates that both are transmitted by the fecal-oral route (4), and NV infection can be transmitted by a waterborne route (15).

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