# Epidemic Investigations of Enteric and Dengue Fever in an Urban Resettlement Area in Dasmariñas, Cavite II. Dengue Studies

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## ABSTRACT

An epidemic of typhoid fever occurred in the Bagong Bayan resettlement area in Dasmarinas, Cavite in November 1984 to April 1985. Investigators initially suspected a simultaneous outbreak of dengue fever because several persons were hospitalized with dengue infection 3 months earlier. Of 44 specimens tested only 1 had high IgM ELISA titers indicative of recent dengue infection. The rest of the data did not provide sufficient evidence to conclude that a concurrent dengue outbreak was occurring. However, high IgG ELISA titers in the same specimens confirmed past clinical observations that dengue fever is endemic in the area. *[Phil J Microbiol Infect Dis 1986; 15(1):21-23]*

*Key words:* epidemic, dengue fever, IgM ELISA, IgG ELISA

## INTRODUCTION

Detailed discussions of the manner of epidemiologic investigations have been presented in Part I of this report.

## MATERIALS AND METHODS

### *Serology for dengue antibodies*

Fingertip blood specimens were collected on filter paper. Using the ELISA IgG antibodies against JE (Japanese encephalitis) antigen and IgM antibodies against JE and dengue serotypes 1, 2, 3, 4 were determined. Although only JE antigen was used for IgG determinations, previous studies have shown it to be cross-reactive with sera from patients with dengue infection.[1] Antigens used in the ELISA were provided by Dr. A. Igarashi, Nagasaki University, Japan.

Parallel haemagglutination inhibition (HI) tests were done using dengue 1 antigen (Hawaiian strain). Antigen was prepared from infected tissue culture fluid of mosquito clone C6/36 cells[2] on which dengue 1 virus had been grown.[3] Only dengue 1 antigen was used because of its broad cross-reactivity with antibodies against the other serotypes. In all, 44 febrile patients were tested for dengue antibodies. Of this number, only 8 (18%) had paired sera.

### *Isolation of virus*

Attempts to isolate the virus were done by inoculating sera in mosquito clone C6/36 cells. Cell cultures were later screened for the presence of virus by the immunoperoxidase staining method.[4]

## RESULTS

Results of dengue serology in the 8 patients with paired sera showed no increase in HI antibody titers, which might be expected if the patients were ill with dengue fever (Table 1). We interpret this as partial evidence that there was really no simultaneous outbreak of dengue fever as

initially suspected. On the other hand, the IgG ELISA titers showed remarkably high levels in both acute and convalescent sera (Table 1). The authors believe that these IgG titers, which were also found to be high among the other 36 patients with a single serum determination (Table 2), most likely represent residual antibodies against dengue or other related flaviviruses. Twenty-four (55%) patients showed titers > 16,000 which suggests that patients have been exposed to secondary dengue infection in this endemic area.[5]

**Table 1. HI and IgG ELISA Titers of 8 Patients with Paired Sera**

| Code | Age year /Sex | Serum | HI | IgG ELISA |
|---|---|---|---|---|
| D-72 | 31/F | acute | 40 | 62,000 |
| | | convalescent | 20 | 44,000 |
| D-73 | 15/F | acute | 80 | 66,000 |
| | | convalescent | 40 | 50,000 |
| D-74 | 10/M | acute | 40 | 46,000 |
| | | convalescent | 40 | 17,500 |
| D-75 | 9/M | acute | 160 | 18,000 |
| | | convalescent | 160 | 14,000 |
| D-76 | 27/F | acute | 80 | 128,000 |
| | | convalescent | 160 | 83,000 |
| D-77 | 11/M | acute | 160 | 24,000 |
| | | convalescent | 80 | 38,000 |
| D-78 | 12/F | acute | 20 | 1,500 |
| | | convalescent | 20 | 1,950 |
| D-79 | 6/M | acute | 40 | 4,560 |
| | | convalescent | 40 | 3,950 |

Note:
1. There was a 5-week interval between collection of acute and convalescent sera.
2. IgM ELISA titers against dengue types 1, 2, 3, 4, and JE antigens were performed and were all < 100.

**Table 2. Single Serum Determinations of HI and IgG ELISA Antibodies for 36 Febrile Patients According to Age and Timing of Blood Collection**

| | | Duration of Fever when Blood Collected | | | | | |
|---|---|---|---|---|---|---|---|
| | | < 6 days | | 7 - 30 days | | > 30 days Age (yr) | |
| Age (years) | | HI | IgG | HI | IgG | HI | IgG |
| 0 - 4 | No. of Specimens | 1 | | 2 | | - | |
| | GMT | 20 | 250 | 20 | 5,117 | - | - |
| 5 - 14 | No. of Specimens | 1 | | 11 | | 2 | |
| | GMT | 40 | 22,000 | 70 | 17,848 | 57 | 15,099 |
| 15 - 24 | No. of Specimens | 1 | | 5 | | 1 | |
| | GMT | 160 | 52,000 | 70 | 10,826 | 20 | 250 |
| > 25 | No. of Specimens | 1 | | 6 | | 5 | |
| | GMT | 20 | 6,100 | 113 | 35,753 | 70 | 36,300 |
| Total Specimens | | 4 | | 24 | | 8 | |

IgM ELISA titers were all < 100 except for one individual who showed the following IgM titers: D1 12,800; D2, 25,600; D3, 12,800; D4, 12,800; JE < 100. These findings are diagnostically significant and indicate recent dengue infection as far as this individual is concerned. IgM ELISA titers over 200 against any one dengue antigen and 4-fold or more higher than for JE antigen is considered positive for dengue.[1] The patient was a laborer who worked in a lumber yard in a nearby town. His illness began on the 29th of December and blood was collected on the 23rd January. Interestingly, this patient was also blood culture positive for *S. typhi*.

There were 13 other typhoid positive patients among the patients studied for dengue infection. No virus was isolated among these patients.

## DISCUSSION

The findings of these studies indicate that, contrary to initial suspicions, dengue fever and typhoid fever epidemics were not occurring simultaneously. This is consistent with the seasonal pattern of dengue infection, which is high during the rainy season and low during the late and early months of the year when there is less rainfall.

The results of serological studies confirm clinical observations that dengue fever is endemic in the area. It is indeed likely that those patients who were admitted to the hospital 3 months earlier with a clinical diagnosis of dengue were actually suffering from this infection. Moreover, it could also be true that many self-limiting fevers in the resettlement area are undiagnosed dengue infections.

On two occasions, workers from the Ministry of Health did anti-mosquito fogging of selected sites in the resettlement area upon request of the residents. This may have some value in temporarily reducing the numbers of adult mosquitoes. However, the ecological environment, replete with open water containers both inside and outside the houses, makes this area favourable for the breeding of *Aedes aegypti* mosquitoes and therefore highly receptive to dengue. To be effective, control measures against dengue must take the problem of community water supplies into account.


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