

## Japanese Encephalitis in Bach Mai Hospital, Hanoi, 1980-1989

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### Abstract

This is a clinical review of Japanese encephalitis (JE) in the Bach Mai Hospital, Hanoi. For the years 1980-1989, 913 cases of viral encephalitis (VE) were admitted into the Neurology Department of the Hospital. This represented 10.9% of all neurological admissions. 428 of the cases (46.9%) were due to JE, based on a four fold rise in HI titres. JE occurred throughout the year, but outbreaks were seen in summer with high peaks in June and July. The disease was more common in Hanoi and the outskirts provinces. Both sexes were equally affected. 88.3% of the cases were below 15 years with the peak age at 4-6 years. When compared with other VE, JE has more motor, extrapyramidal, psychiatric, respiratory and sphincter involvement. Thus VE in general and JE in particular remains an important clinical problem in Vietnamese neurological practice.

*Key words:* Viral encephalitis, Japanese encephalitis, Vietnam

### INTRODUCTION

Viral encephalitis (VE) has been known to be the most frequently encountered central nervous system infection and Japanese encephalitis (JE) the most common etiological cause of VE in Vietnam. JE was reported to occur in both sporadic and epidemic forms with high mortality and morbidity.<sup>1-5</sup> This is a review of the JE cases seen in the Neurology Department of Bach Mai Hospital, Hanoi from 1980 to 1989, over a ten-year period, as an update of the current status of the illness.

### MATERIALS AND METHODS

This study is based on the in-patient records of the Bach Mai Hospital, Hanoi. The case notes of all patients with probable VE and JE admitted to the Neurology Department of the Hospital for the years 1980-1989 were reviewed. The data abstracted include the age, sex, residence, clinical features and the laboratory findings. The serological diagnostic criteria for JE was, as in our previous report<sup>4,6,7</sup>, based on a minimum four fold rise in haemagglutination-inhibition titres with blood specimens from acute and convalescent phase. The serology test was done in the Medical Microbiology Department of the Hospital using the JE NAKAYAMA and H.N-60 antigens.

### RESULTS

#### *Sex and age*

For the 10-year period from 1980 to 1989, there were a total of 8,349 admissions to the Neurological Department of the Bach Mai Hospital. 913 patients (10.9%) of the admissions had VE. 428 patients (46.9%) of these patients were males and 485 were females. Over the same period, there were 428 patients with JE confirmed by serological test mentioned above. This represented 46.8% of the VE patients. 226 of the JE patients (52.8%) were males and 202 were females (47.2%).

For the patients with VE, there was a wide distribution in the age of involvement. 505 patients (55.3%) were 15 years or below. The disease was rare at both extreme ends of life. Only 1.5% of the patients were infants below one year and 0.3% were adults above 55 years of age.

As for JE, it was a disease that affect predominantly the young children. 378 patients (88.3%) were below 15 years. The peak age of involvement was 4-6 years. The distribution of cases within childhood was: 1-3 years (24.7%), 4-6 years (33.6%) and 7-15 years (28.0%). The disease was again rare in both the very young and the older age group, being 1.8% for infants below 1 year and 0.2% for adults above 56

**TABLE 1: Distribution of patients by age**

Age group (years)	No. of JE	Percent n: 428	No. of non-JE viral encephalitis	Percent n: 485
Under 1	8	1.9	6	1.2
1 – 3	106	24.8	35	7.1
4 – 6	144	33.6	40	8.2
7 – 15	120	28.0	46	9.5
16 – 25	15	3.5	117	24.1
26 – 35	17	4.0	149	30.7
36 – 45	13	3.0	61	12.5
46 – 55	4	0.9	29	5.9
56 – 65	1	0.2	2	0.4

years. The peak age of the non-JE viral encephalitis was older, its distribution according to age was: 16-25 years (24.1%), 26-35 years (30.7%), 36-45 years (12.5%). Table 1 lists the distribution of both the VE and JE cases according to different age-groups presented in figure 1.

*Geographical distribution*

The area of residence of the VE and JE patients was as follows: over 50 cases in Ha Son Binh, Hanoi and outskirts, Hai Hung, Ha Bac; 11 to 50 cases in Ha Nam Ninh, Vinh Phu, Bac Thai;

6 to 10 cases in Hoang Lien Son, Thai Binh, Thanh Hoa; less than 5 cases in Ha Tuyen, Son La, Quang Ninh, Hai Phong, Lai Chau, Lang Son, Nghe Tinh, Nghia Binh and Dak Lak. Most of these provinces are located in North Vietnam. Figure 2 is a map of Vietnam.

*Seasonal variation*

The admissions according to time of the year is shown in figure 3. VE admissions occurred throughout the year with a larger number of cases registered during the summer months from May to August. As for JE, a seasonal variation

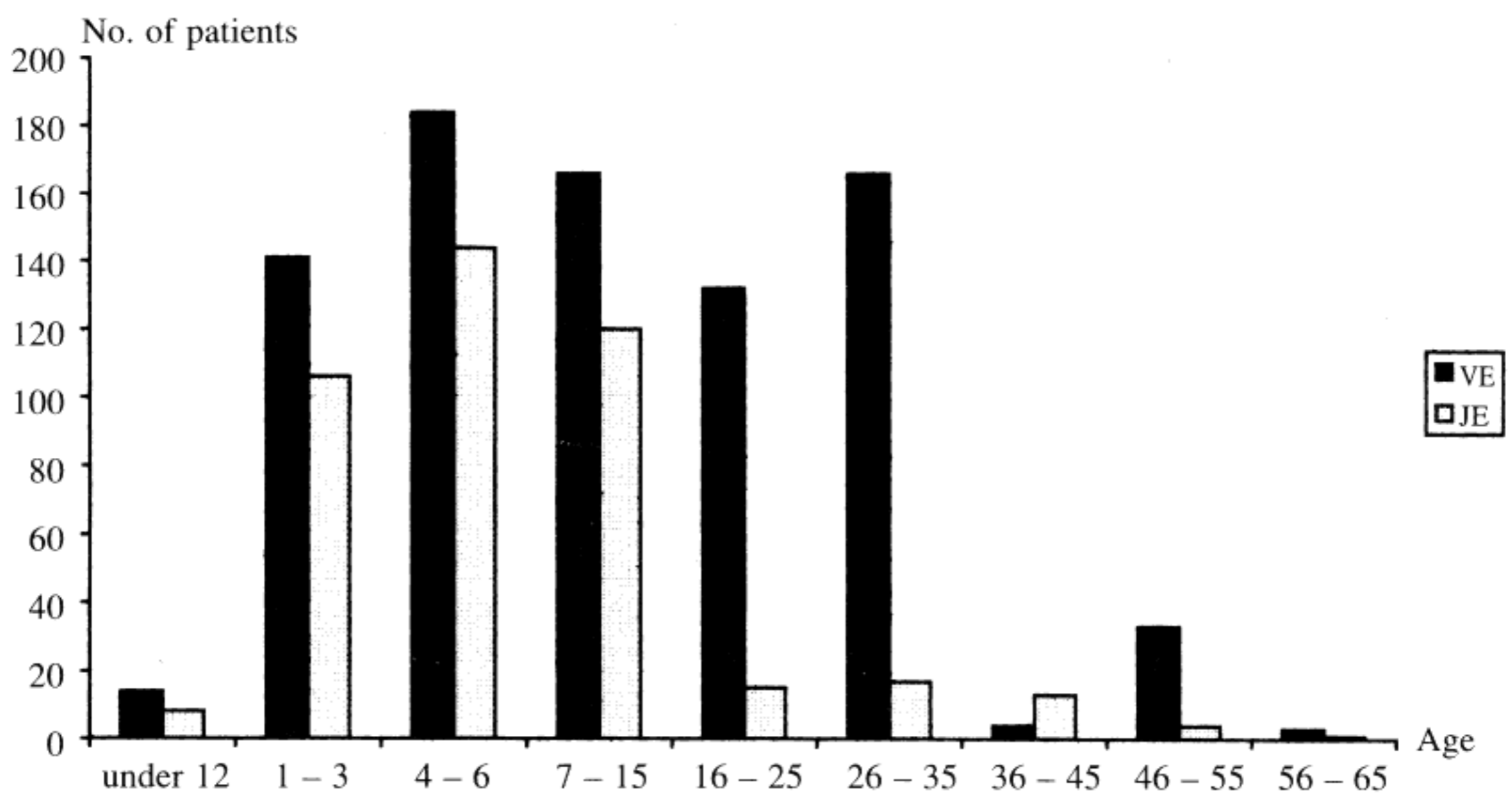


FIG. 1: Distribution of patients by age

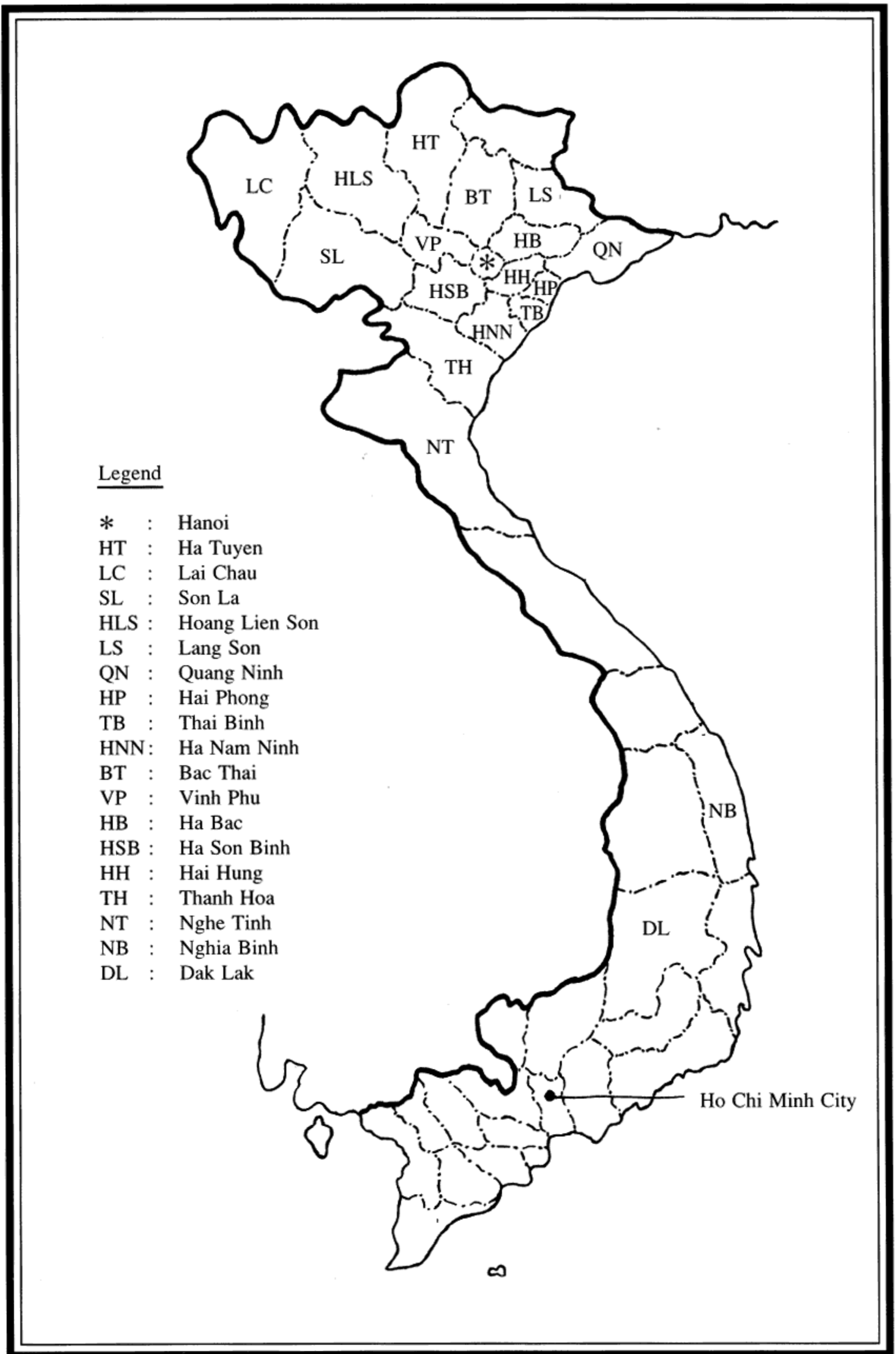


FIG. 2: Map of Vietnam showing provincial location of Japanese encephalitis

**TABLE 2: Clinical features of encephalitis**

Clinical features	Japanese Encephalitis (n: 428)	Viral Encephalitis (n: 485)
Meningism	60.9	62.4
Motor dysfunction	96.7*	49.2
Convulsions/Epilepsy	29.2	42.2*
Extrapyramidal signs	41.5*	24.1
Sphincter disorders	89.2*	16.0
Respiratory disturbances	51.8*	25.1
Elevated temperature	70.5	67.8
Impaired sensorium and psychiatric symptoms	100.0*	62.8

\* P < 0.05

is more obvious with a peak occurring in the months of June and July.

*Clinical manifestations*

Table 2 lists the salient signs and symptoms of JE as compared to VE. As shown, when subjected to chi-square analysis, JE has significantly more impaired sensorium and psychiatric symptom (100%), motor dysfunction (96.7), sphincter disorder (89.2%), respiratory disturbances (51.8%) and extrapyramidal signs (41.5%) as compared with other VE.

**DISCUSSION**

The Neurology Department of Bach Mai Hospital was founded in the fifties. It was the first department of neurology in Vietnam. It is still an important neurological referral and training centre in Vietnam to-date. This clinical review based on patients admitted to the neurology department, Bach Mai Hospital demonstrated that VE continued to be an important neurological illness in the practice of neurology in Vietnam, accounting for 10.9% of all neurological admissions in the Bach Mai Hospital. JE in

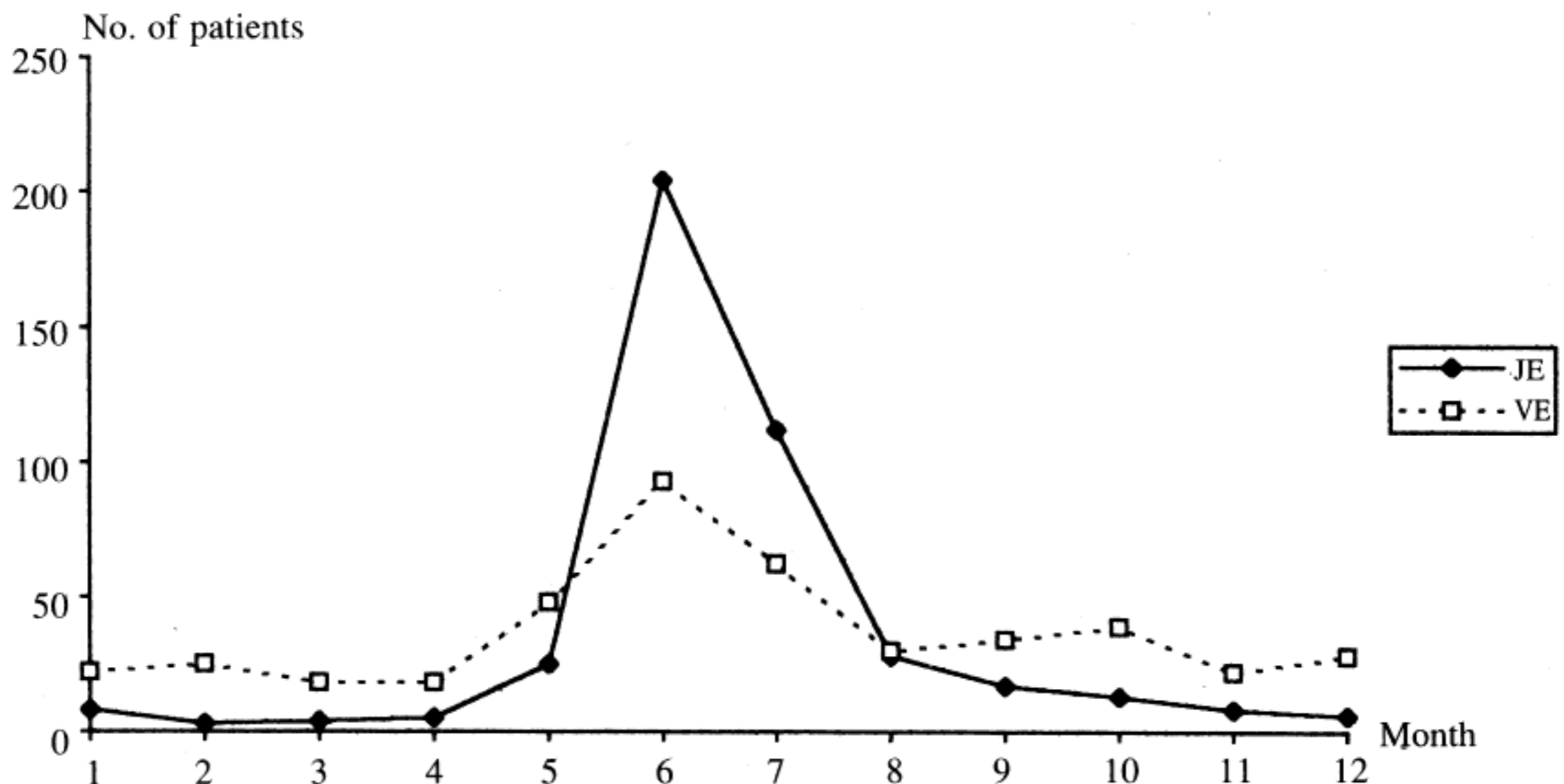


FIG. 3: Seasonal variation in admission of VE/JE cases for 1980-1989

particular, is still the most important etiologic disease accounting for 46.9% of all cases of VE. Although not strictly comparable, similar results were reported in an earlier report based on the period 1978-1980, also from the Neurology Department of Bach Mai Hospital, where 51.9% of the 304 children with acute encephalitis syndrome had positive serology test for JE.<sup>4</sup>

The common occurrence of JE in clinical neurology practice is consistent with the high prevalence rate of JE virus exposure in the community. According to previous investigations carried out between 1964 and 1978, 30.35 to 82.94% of Vietnamese had specific antibodies against JE.<sup>8</sup> Only a small minority of people exposed to the JE virus developed clinically overt disease. According to the WHO report, the ratio of overt disease to asymptomatic infection varies from 1:20 to 1:1,000 and may exceed 1:300 in tropical regions.<sup>9</sup>

The predominance of children among the JE sufferers, particularly among those of 4-6 years of age, and the common occurrence of the illness in Hanoi and its outskirts area is also similar to the earlier reports.<sup>4,7</sup> 88.3% of the patients in the present study were 15 years old or below and 60.3% of the JE cases were 6 years old or below. In the previous report, 83.6% of the JE patients were 2 to 7 years of age.<sup>4</sup> As reported in this clinical series, disturbance in the higher function is common in JE. During the JE outbreak in 1988, 25.6% of the patients were reported to have permanent sequelae by the Institute for the Protection of Children's Health.<sup>10</sup> JE is thus likely to be an important cause of learning disorders and difficulties in social integration among Vietnamese children.<sup>11</sup>

JE occurs in two patterns, sporadic as in Japan, Korea, Taiwan and seasonal as in Thailand, parts of India, Sri Lanka and Nepal.<sup>12</sup> The present study based in the northern part of Vietnam, showed an epidemic form of the disease with spurts of cases occurring in the summer month. The sporadic form of JE also occurs in Vietnam but is mainly seen in the South.<sup>4</sup> The difference in disease pattern between the northern and southern parts of Vietnam is probably mainly due to climatic factor. South Vietnam is a tropical region where there is no important variation of temperature while in North Vietnam, summer is a hot season which is favourable for vector development.

The most common clinical features among our patients were: impaired sensorium and psychiatric symptom (100%), motor dysfunction (96.7%), sphincter disorder (89.2%) and pyrexia

(70.5%). When compared to other causes of VE, there were more motor dysfunction, extrapyramidal signs, impaired sensorium and psychiatric symptoms, sphincter and respiratory disturbances. In general, JE appears to cause more central nervous system disturbances as compared to other VE.

The serological diagnosis of the present study is based on a four-fold rise in haemagglutination-inhibition titres. However, a more rapid diagnosis can be obtained by the demonstration of specific IgM in serum or cerebrospinal fluid.<sup>13-15</sup> Although the IgM antibody capture ELISA test has been used for some years in Vietnam, during the period of study, the classical technique for sero-diagnosis was still the test of choice.<sup>16</sup>

There is at present no effective anti-viral agent for JE. Prophylactic measures are the most effective means in reducing the burden of the disease<sup>12,17</sup>, the most effective being the use of vaccines in susceptible population. Measures aimed at reducing the mosquito load, vaccination of the intermediary host (swine) and personal protective measures against mosquito bites are also useful.

## REFERENCES

1. Mollaret P, Schneider J. Classification epidemiologique et virologique des encephalites humaines. In: Les encephalites a virus. Paris: Masson et Cie 1963; 7-48.
2. Phan TN et al. Contribution a l'etude de l'encephalite japonaise B au Vietnam. In: Travaux scientifiques Fac Med Hanoi 1965; 67-75.
3. Umenai T et al. Japanese encephalitis: current worldwide status. Bull WHO 1985; 63(4): 625-31.
4. Le Duc Hinh. Clinical aspects of Japanese B encephalitis in North Vietnam. Clin Neurol Neurosurg 1986; 88-3: 189-192.
5. Lowry PW, Truong H, Le Duc Hinh, Ladinsky JL, Karabatsos N, Cropp CB, Martin D, Gubler DJ. Japanese encephalitis among hospitalized pediatric and adult patients with acute encephalitis syndrome in Hanoi, Vietnam 1995. Am J Trop Med Hyg 1998; 58: 324-9
6. Le Duc Hinh. Encephalite japonaise B. In: Epidemiologie tropicale. Paris: ACCT 1988; 395-412.
7. Le Duc Hinh. Some clinical characteristics of Japanese B encephalitis in children of North Vietnam. Fac Med Hanoi 1989: Thesis (in Vietnamese).
8. Ha DQ. Infection due to Japanese B encephalitis virus in Vietnam from 1964 to 1978. Fac Med Hanoi 1978: Dissertation (in Vietnamese).
9. Memorandum from WHO Meeting. Arthropod and rodent-borne viral and rickettsial diseases in the WHO South-East Asia and Western Pacific Regions. Bull WHO 1983; 61(3): 435-46.

10. Luan TV, Nhuan CP. Japanese encephalitis in Vietnamese children. *J Trop Dis* 1990; 1: 39-47 (in Vietnamese).
11. Le Duc Hinh. Some neurological aetiologies of mental retardation. *Ann Neurol Psychiat Neurosurg* 1988 (Special volume on mental retardation); 42-7 (in Vietnamese).
12. WHO Technical information on Japanese encephalitis. Guidelines for diagnosis, surveillance and control. WHO South-East Asia Region: New-Delhi 1988.
13. Grandien M, Olding Stenkvis E. Rapid diagnosis of viral infections in the central nervous system *Swe-Scand J Infect Dis* 1984; 16/1: 1-8.
14. Bundo K et al. IgM Capture ELISA for serodiagnosis on Japanese encephalitis and its differentiation from Dengue virus infection. *JEHF Bull* 1986; 1: 27-35.
15. Zhang Libi et al. Rapid diagnosis of Japanese encephalitis by Capture ELISA for specific IgM antibody. *Chinese J Vir* 1989; 5(4): 378-82.
16. Clarke DH, Casals J. Techniques for hemagglutination and hemagglutination-inhibition with arthropod-borne virus. *Am J Trop Med Hyg* 1958; 7: 561-73.
17. Halstead SB. Arboviruses of the Pacific and Southeast Asia. In: Feigin RD, Cherry JE (eds) *Pediatric Infectious diseases*. WB Saunders Co. 3<sup>rd</sup> Ed, 1992, Vol II: 1468-75