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RESEARCH ARTICLE

A STUDY ON THE SEQUELAE CASES OF JAPANESE ENCEPHALITIS IN PERAMBALUR DISTRICT, TAMILNADU

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ABSTRACT

The Japanese encephalitis virus (JEV) infection leaves a considerable proportion of children with life long sequelae of one or other form. Besides high case fatality rate, the Japanese encephalitis - epidemics, result in variable frequency of sequelae like mental impairment, severe emotional instability, personality changes and paralysis. A retrospective study had been undertaken to analyse different forms of sequelae among 49 partly recovered JE- cases in Perambalur, a Japanese encephalitis - prone district of Tamilnadu from 1990 through 1999. Motor sequelae, behavioural sequelae, intellectual sequelae and other neurological sequelae were the major forms of sequelae observed. Speech disorder was a striking clinical sequelae (69.4%) recorded in this study. Ataxia was found in 40.8% of cases. Attention deficit (36.7%) and memory deficit (36.7%) were the other two major types of sequelae among the study subjects. Limb paralysis was found among 34.7% of the sequelae patients. This study gives an approximate sequelae rates and stresses the need for regular follow up and due attention to the Japanese encephalitis sequelae cases, as the morbidity exists over a considerable period, though the recovery of sequelae progresses with time.

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INTRODUCTION

The Japanese encephalitis (JE) virus is a flavivirus found in most parts of Asia ranging from Japan, Taiwan and the West coast of India at its Western limit of distribution (Umenai *et al*., 1985). The disease has epidemic potential, high case fatality and neurological sequelae are common. The disease is linked with a substantial mortality and often results in mental and/or neurological sequelae (Tran, 1991). According to WHO, mental retardation is a major health problem in many countries. In recent years, this condition has been reported in people having suffered from Japanese B encephalitis (Le Duc, 1988). Japanese encephalitis is a disease of major public health importance in India. The clinical entity was first recognized in 1955 when encephalitis cases from North Arcot and adjacent districts of Tamilnadu were admitted to Christian Medical college hospital, Vellore. It was only after that the importance of the public health emergency was fully realized.

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In 1977 and 1978, an extensive outbreak of encephalitis occurred in the state of Tamilnadu, South India, mainly in Tirunelveli district (Prasad Rao *et al*., 1982). Since then sporadic cases of JE have been reported from few districts of Tamilnadu. Among those few districts, Perambalur district contributes the major incidence of JE, with a case fatality rate of 61.7% for 10 years period from 1990 through 1999. The survived cases of Japanese encephalitis infection either recover completely or partially with sequelae. But we still lack reliable assessment concerning the sequelae rates. An attempt has been made in this study to document the diverse clinical sequelae among the Japanese encephalitis survivors, who survive with a lifelong and permanent disability due to Japanese encephalitis infection, and to study the progress in term of recovery of clinical sequelae over a period of time.

MATERIALS AND METHODS

Study area: Analysis of 10 years morbidity data of Japanese encephalitis in Perambalur district showed that out of 10 Blocks in the District, Perambalur, Veppur, Alathur and Veppanthattai blocks reported more incidence of Japanese

encephalitis than the remaining six blocks. 61.2% of the total Japanese encephalitis cases had been reported from these four blocks in the last ten years. A total of 104 Japanese encephalitis - survivors in all four blocks were selected for this study.

Selection of study samples

The study subjects were selected from the medical records of Government hospital and Primary health centers of Perambalur district from 1990 through 1999. The addresses of all discharged Japanese encephalitis patients and patients who left the hospital against medical advice during this period, from all the villages of the four selected blocks were collected and contacted. Among the 104 survived 29 could not be traced and a total of 75 families only were contacted for interview among which 49 had sequelae of one or other form. Out of 75, twelve persons were normal and 14 died of Japanese encephalitis infection after being discharged or left the hospital against medical advice. All patients were enquired according to a pre-designed protocol. The parents of the patients with sequelae were interviewed and the period of the presence of different types of sequelae were ascertained and recorded. The type of sequelae, period, age and sex were tabulated and discussed.

RESULTS AND DISCUSSION

Over a period of ten years, 61 Japanese encephalitis survivors in Perambalur district were contacted for this study. High incidence of JE was recorded in four blocks of Perambalur district. Among the JE survivors in the selected blocks, 49 (80.3%) had one or other form of sequelae. All the sequelae cases were distributed in 46 villages of the four blocks. The sex distribution shows that 59.2% of the sequelae were female and 40.8% were male. Among the male subjects 11 (22.4%) were in 1-5 years of age group, 5 (10.25%) were in 6-10 years of age group and 4 (8.1%) in 11- 14 years of age group. Among the female subjects 7(14.2%) were in 1 – 5 age group, 19(38.7%) were in 6 – 10 years of age group, 2 (4%) were in 11-14 years of age group and 1(2%) was in 15 and above age group. Speech disorder was found among 69.4% of the sequelae cases contributing a major proportion among sequelae cases. Next to speech disorder ataxia was observed in 40.8% patients. Followed by ataxia, attention deficit and memory deficit formed the third major sequelae (36.7%) (Table 1).

Limb paralysis was recorded in 17 patients (34.7%) Among those who had limb paralysis, the analysis revealed that 8.2% had paralysis of upper right limb 8.2% had paralysis of left limb 10.2% were with paralysis of lower right limb 14.3% suffered from paralysis of lower left limb. Paralysis of both upper limbs was found among 4.1% and 6.1% had paralysis of both lower limbs. Paralysis of all limbs (both upper & lower) was also found among 4.1%. A total of 13 (26.5%) had Intellectual sequelae. Periodic convulsions were observed in 9 cases (18.4%) unexplicable laughing (10.2%)and hearing loss (8.2%) have also been found among the study subjects. Uncontrolled emotion & impulsiveness were found in small proportion of patients (6.1%). Fine motor deficit (4.1%) and depressions (4.1%) were also recorded. Only one patient (2%) had aggressiveness as sequelae. Invariably, majority of the patients had headache, which has been classified as other, which accounts to 73.5% of the sequelae patients. (Table 2) The clinical sequelae recorded at the time of discharge from hospitals were compared with the clinical sequelae existed during this study.

The above comparison gives an indication of gradual recovery of sequelae cases over a period of time. However in sequelae like fine motor deficit, aggressiveness and memory deficit no recovery could be observed and were in the same state without any progress compared to their state at the time of discharge. But a total of all 18 patients who had memory deficit presently were said to be healthy otherwise. But as far as the memory deficit is concerned they didn't show any recovery and the number suffering from this sequelae remain static even after 10 years.

Table 1. Age group of Sequelae cases

Age group	Male		Female		Total	
	No.	%	No.	%	No.	%
1-5	11	22.4	7	14.3	18	36.7
6-10	5	10.2	19	38.8	24	48.9
11-14	4	8.2	2	4.1	6	12.2
15 &above	0	0	1	2	1	2
Total	20	40.8	29	59.2	49	100

Japanese encephalitis is one of the leading causes of acute encephalopathy affecting children and adolescents in the tropics. Nearly 50,000 cases of Japanese encephalitis occur worldwide and 15,000 of them die.(Baruah *et al*., 2002 and Kumar *et al*., 1998) considerable information on epidemiology and clinical features of this dreaded disease is available. Yet much more keeps being understood in terms of pathophysiology, clinical management and prognostication (Tiroumourougane, 2002). Due to unaffordable prolonged tertiary care in developing countries. Japanese encephalitis patients are usually discharged from the hospital after recovering from acute phase. Usually the cases are lost after discharge from the Hospital. Hence the severity of sequelae and its progress cannot be fully understood (Baruah *et al*., 2002) through hospital records.

This study comprises 49 sequelae cases studied during three months. All the sequelae recovered in this study were classified into motor sequelae, behavioural sequelae, Intellectual sequelae and other neurological sequelae. Limb paralysis and fine motor deficit were included under motor sequelae. Aggressiveness, depression, attention deficit, uncontrolled emotion and impressiveness and unexplicable laughing were classified in behavioural sequelae other neurological sequelae consisted of convulsion memory deficit, hearing loss, ataxia and speech disorder.

Intellectual sequelae was graded as mild, moderate and severe based on the scores. Headache has been included under a separate heading as others which accounts to a considerable percentage of sequelae (46%). Though limb paralysis has been included under motor sequelae the proportion of it has also been analysed as a separate entity as it cripples children and posing a significant risk. The sequelae were compared to ascertain whether the sequelae progresses or declines over a period of time. For comparison the time of discharge and study period were taken as cut off points. The comparison reveals that there is considerable amount of reduction in numbers of individuals as far as some sequelae are concerned.

Table 2. Distribution of different types of sequlae

S.No	Types of Sequelae	Total Number of Patient's affected with Sequelae at the Time of discharge	Total Number of Patients with sequelae during Study Period	Overall Difference observed In terms of Recovery (%)
1.	Motor Sequelae	17 (34.69)	14 (28.6)	6.09
2.	Behavioural sequelae	23 (46.93)	9(18.4)	28.53
3.	Other neurologic sequelae	40 (81.63)	28 (57.1)	24.53
4.	Intellectual Sequelae	13 (26.53)	10 (20.4)	6.13
5.	Others	36 (73.46)	24 (49)	24.46

The figures within the parenthesis denote percentage

In the remaining where there is no progress in terms of recovery, the memory deficit was recorded as the most disturbing sequelae as all the 18 of them remain in the same state. Tiroumourougane *et al.* (2002) observed that children who survive slowly regain neurological functions over several week. But In the present study out of 9 who suffered with convulsions only one recovered and 8 have convulsions even after years. However considering the different types of sequelae discussed, except few invariably all other sequelae tends to decline gradually. The analysis of different sequelae shows that the sequelae are varied in terms of period of recovery, severity, and even among the same sequelae the period of recovery and severity differed from one individual to another. Out of 34 suffered with speech disorder, 20 recovered completely and in the remaining 14, though there is little progress, they have not yet been recovered completely and still have certain degree of stammering which was concurred by Barruah *et al.* (2002) who reported that the speech abnormality present in many cases at the initial phase recovered with time. Bui Vu Huy *et al.* (1994) reported that 16% of Ataxia cases in the initial phase of the study increased to 24% at the time of last examination. But in the present study there was a tremendous recovery among those who suffered from ataxia. It existed for months in most of the patients. Only four had ataxia for a longer period (1 year to 2 years). Others those who are still suffering with this sequelae also show a positive sign and progresses towards complete recovery.

Attention deficit and memory deficit were identified as sequelae with a slightly lesser proportion to speech disorder and ataxia. No recovery has been observed among the sequelae patients who had memory deficit. Memory deficit remains in the same state in all the 18 patients as stated by their parents. On the other hand recovery of attention deficit progresses with time, since 50% of the patients who suffered from this sequelae recovered completely. The period of sequelae ranges from 1 year to 9 years in this study. In patients with intellectual sequelae, which is about one fourth of the total sequelae (26.5%) there were only few with complete recovery. But the patients those who still have this sequelae also seems to be mild and they are progressing fastly as observed by their parents. This sequelae also exists in most of the patients right from the day of infection to date. However some have been shifted from severe to moderate and moderate to mild. Among all sequelae limb paralysis is considered to be the most disturbing as it restricts the movement of the young children and making their life miserable. The period of severity ranged from 4 months to 9 years among the study subjects and among the 17 suffered with this sequelae only 3 recovered completely. Others remained in the same state as they don't have any access to the physiotherapy facilities and also they are not in a position to incur expenditure on physiotherapy for which the parents have to spent time regularly which hinders their earning and are also unable to spare money as majority of the victims are from the low socio economic group.

Convulsion, a sequelae which shatters frequently the patients was about 9% in this study. Among the children who had convulsions there was not much progress in terms of recovery. The period of suffering ranges from 1 year 6 months to 10 years. But 2 children, aged 6 years and 12 years who had the infections during 1993 and 1991 respectively had convulsions for 1 month and for 18 months. But Baruah *et al.* (2002) observed that none of the sequelae cases reported convulsive episode during the study period of 4 Months. Among the patients who had unexplicable laughing, some had this sequelae for a minimum of 45 days and to a maximum of 9 years. Out of 5 patients (10.2%) who suffered from this sequelae earlier, only 2 have not yet been recovered. Hearing loss, which existed for 15 days in some ranged to 4 years in some others. Among the 4 affected only one is still with this sequelae, who had the infection in 1996. There is a fair amount of progress among 2 out of 3 who suffered from uncontrolled emotions and impulsiveness. One patient is yet to be recovered who developed this sequelae 7 years back. The period of this sequelae ranges from 8 months to 7 years in this study. Fine motor deficit (4.1%) and aggressiveness (2%) seems to be static sequelae without any progress. Depression was observed among very few study subjects. Totally only 2 (4.1%) were suffering from this sequelae out of which one recovered completely after a period of 4 months, while the other is still suffering. The parents stated that the patient is experiencing depression and seems to be disturbed often.

Conclusion

Even though the exact period for satisfactory recovery for every sequelae could not be studied it is evident that the severity of sequelae diminishes over a period of time for majority of the sequelae. In addition to the time factor a good quality of treatment, regular physiotherapy, and also the economic status of the patient altogether play a key role in determining the period of recovery. The rural conditions that exist in India where the economic status of the poor may not be so sufficient to fight the sequelae of JE, accounts for prolonged sequelae among Japanese encephalitis survivors The physiotherapy facilities are also not accessible to a patient in a rural set up. So it is possible to speed up the recovery of sequelae among JE-survivors if physiotherapy and other required treatment are given regularly as the above-mentioned factors always regulate the recovery of sequelae. Though several studies have established that the recovery of sequelae progresses with time the recovery will be faster than expected when due attention is given to them.

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