SEROEPIDEMIOLOGICAL RESEARCH ON VIRAL ENCEPHALITIS IN KARACHI PAKISTAN - PRELIMINARY REPORT

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Abstract

Seroepidemiological investigations were done during the study of viral encephalitis in and around Karachi, Pakistan. Serum and /or cerebrospinaF fluid (CSF) from 352 persons (72 patients with encephalitis, 199 patients without neurological disease and 81 healthy volunteers) were collected during the period from June, 1983 to March, 1984. Of 72 encephalitis patients, serum antibody positivity rates were over 45 percent against Herpes simplex type I virus (HSV), measles and rubella virus, and less than 33 percent against entero-70 virus consistently through the investigation period. In contrast, the antibody positivity rate against Japanese encephalitis (JE) virus increased from pre-rainy to post-rainy seasons in both encephalitis patients and controls. Positive antibody in CSF was detected in nine cases against HSV, in five cases each against measles and JE virus, and in four cases against rubella. (JPMA36:177, 1986).

INTRODUCTION

Many cases of subacute scierosing pan encephalitis (SSPE) have been clinically recognized in Karachi[1]. In addition it has been clinically observed by the same author (A.A) that many kinds of encephalitides occur in Karachi. However, virological diagnosis of the encephalitides occurring in Karachi has not yet been explored systematically. Therefore, virological and seroepidemiological investigations were undertaken as part of a multidisciplinary research Project to identify the causative agents and to clarify the status of the occurrence of encephalitides in Karachi area.
This report, summarizes the results of seroepidemiological investigations in Karachi.

MATERIALS AND METhODS

SUBJECTS. Groups of subjects are summarized in Table I.

TABLE - I
Research Subjects.

Objects		Date of sampling	Cases	Total
Encephalitis patients*	I	June to July 1983	11	
	II	July to Sept, 1983	8	72
	III	Sept. to Dec. 1983	20	
	IV	Dec. 1983 to Mar., 1984	33	
Patients without neurological disease	I	June to July 1983	38	
	II	July to Sept. 1983	161	199
Healthy volunteers	I	June to July 1983	33	81
	II	July to Sept. 1983	48	

*: The diagnosis of encephalitis cases is only tentative. some of them may finally be exclucial from this project.

SAMPLES; Sera were collected from all the individuals of each group and Cerebrospinal fluid (CSF) samples only from patients with encephalitis at Department of Neurology, Dow Medical College and Civil Hospital, Karachi. SAMPLING PERIOD. All the samples pertaining to this report were collected from the beginning of June, 1983 to the middle of March, 1984.

Test methods for detecting viral antibody are shown in Table II.

TABLE - II

Species of Viruses and Methods for detecting Viral Antibodies.

Viruses		Methods
A-1. Japanes encephalitis virus	(JEV)	HI[1)]
2. Tick born encephalitis virus	(TBEV)	HI
3. West Nile virus	(WNV)	HI
4. Dengue virus	(DV)	HI
B. Measles virus	(MV)	HI
C. Rubella virus	(RV)	HI
D. Herpes simplex-I virus	(HSV)	ELISA(IgM, IgG)[2)]
E. Entero-70 virus	(EV-70)	NT[3)]

1): haemagglutination inhibition test.
2): Enzyme linked immunosorbent assay.
3): Neutralization test.

Infection with west nile virus (WNV) has been reported both in men and animals in Punjab[2]. In general WNV does not cause encephalitis, but a large part of the antigen structure of the virus is common to that of JEY, tickborne encephalitis virus (TBEV) or Dengue virus (DV) therefore antibody titers against TBEV, against WNV, against 1TW were also measured: Animals breeding around Karachi were also for viral (JEV, WNV, D-2) antibodies the months of August and September,tested during1983.

RESULTS

1. ANTIBODY POSITIVITY RATE:

(A) Encephalitis Patients; a) Serum: The seasonal transition of antibody positivity rate seems to be divided into two types (Table III).

TABLE - III
Viral Antibody Positive rate in Encephalitis Patients.

Date of Sampling	Viruses							
	JEV	TBEV	WNV	DV	MV	RV	HSV	EV-70
I	1/11 (9%)	1/11 (9%)	1/11 (9%)	1/11 (9%)	8/11 (73%)	10/11 (91%)	6/9 (67%)	2/9 (22%)
II	3/8 (38%)	2/8 (25%)	4/8 (50%)	2/8 (25%)	5/8 (63%)	6/8 (75%)	5/8 (63%)	1/8 (13%)
III	11/20 (55%)	6/20 (30%)	11/20 (55%)	11/20 (55%)	9/20 (45%)	12/20 (60%)	9/20 (45%)	6/20 (30%)
IV	25/33 (76%)	ND –	25/33 (76%)	24/33 (73%)	25/33 (76%)	17/33 (52%)	25/33 (76%)	11/33 (33%)
Total (I– IV)	40/72 (56%)	9/39 (23%)	41/72 (57%)	38/72 (53%)	47/72 (65%)	45/72 (63%)	45/70 (64%)	20/70 (29%)

JEV: JaGAr-01, TBEV: langat, WNV: Eg-101, MV: Toshima. DV: D–2

One type covers JEV, TBEV, WNV and DV, the rates against them being subject to the seasonal variation. In contrast, in the other, the rates are consistently high (MV, RV and HSV), or low (EV-70) through the entire sampling period. b) CSF: CSF was available in 42 encephalitis patients. Cases with positive antibody titers are shown in Table IV.

TABLE - IV
CSF Antibody of Encephalitis Patients.

Case No.	Age	Sex	Viral antibody titer JEV	MV	RV	HSV IgM	HSV IgG	TBEV	EV-70
14	8 y	F	< 10	X 16	<8	–	+	< 10	< 1
41	40 y	M	< 10	X 8	X32	–	+	< 10	< 1
86	10 y	F	< 10	X 8	<8	–	–	< 10	< 1
90	9 y	F	< 10	X 16	<8	–	–	< 10	< 1
98	13 m	F	< 10	< 8	X 8	–	–	< 10	< 1
103	2.5y	F	X10	< 8	<8	–	–	< 10	< 1
105	21 y	M	< 10	< 8	X32	–	–	< 10	< 1
109	6 y	F	< 10	< 8	X16	–	–	< 10	< 1
111	?	?	X80	< 8	<8	–	–	< 10	< 1
113	17 y	F	X40	< 1	<8	–	–	< 10	< 1
115	7 y	F	< 10	< 1	<8	–	+	ND	< 1
117	2.5y	F	< 10	< 1	<8	–	4+	ND	< 1
119	26 y	M	< 10	< 1	<8	–	+	ND	< 1
126	5 y	F	X40	< 1024	<8	–	4+	ND	< 1
128	?	?	X40	< 1	<8	–	–	ND	< 1
132	8 y	F	< 10	< 16	<8	–	+	ND	< 1
133	52 y	M	< 10	< 1	<8	–	2+	ND	< 1
134	10 y	M	< 10	< 32	<8	–	+	ND	< 1
Total (%)			5/42* (12%)	5/42 (12%)	4/42 (10%)	0/40 (0%)	9/40 (23%)	0/42 (0%)	0/40 (0%)

*: No. of antibody positive/No. of tested.

The highest positivity rate was observed against HSV. None of the cases showed positive antibodies against TBEV or EV-70.

(B) Persons without encephalitis:

a) Serum antibody against arboviruses: Serum antibody positivity rate in patients without neurological disease and healthy volunteers are shown in Table V.

TABLE - V

Serum antibody Positive Rate against Arboviruses with Date of Sampling.

Objects	Date of sampling	Viruses			
		JEV	WNV	DV	TBEV
Patients without neurological disease	I	55%(38)*	68%(38)	71%(38)	45%(38)
	II	89%(161)	88%(161)	88%(161)	ND
	Total	82%(199)	84%(199)	(199)	
Healthy volunteers	I	48%(33)	55%(33)	55%(33)	36%(33)
	II	68%(48)	60%(48)	62%(48)	ND
	Total	58%(81)	60%(81)	62%(81)	

*: No. of tested.

Increase of antibody positivity rate after rainy season was observed, and this trend was similar to that observed in the patients with encephalitis.

II. ANTIBODY TITER AGAINST ABROVIRUSES:

In all three groups of subjects, serum antibody titers against arboviruses were elevated from July to September. The titers in patients without neurological disease taken as a representative sample are shown in Figure 1.

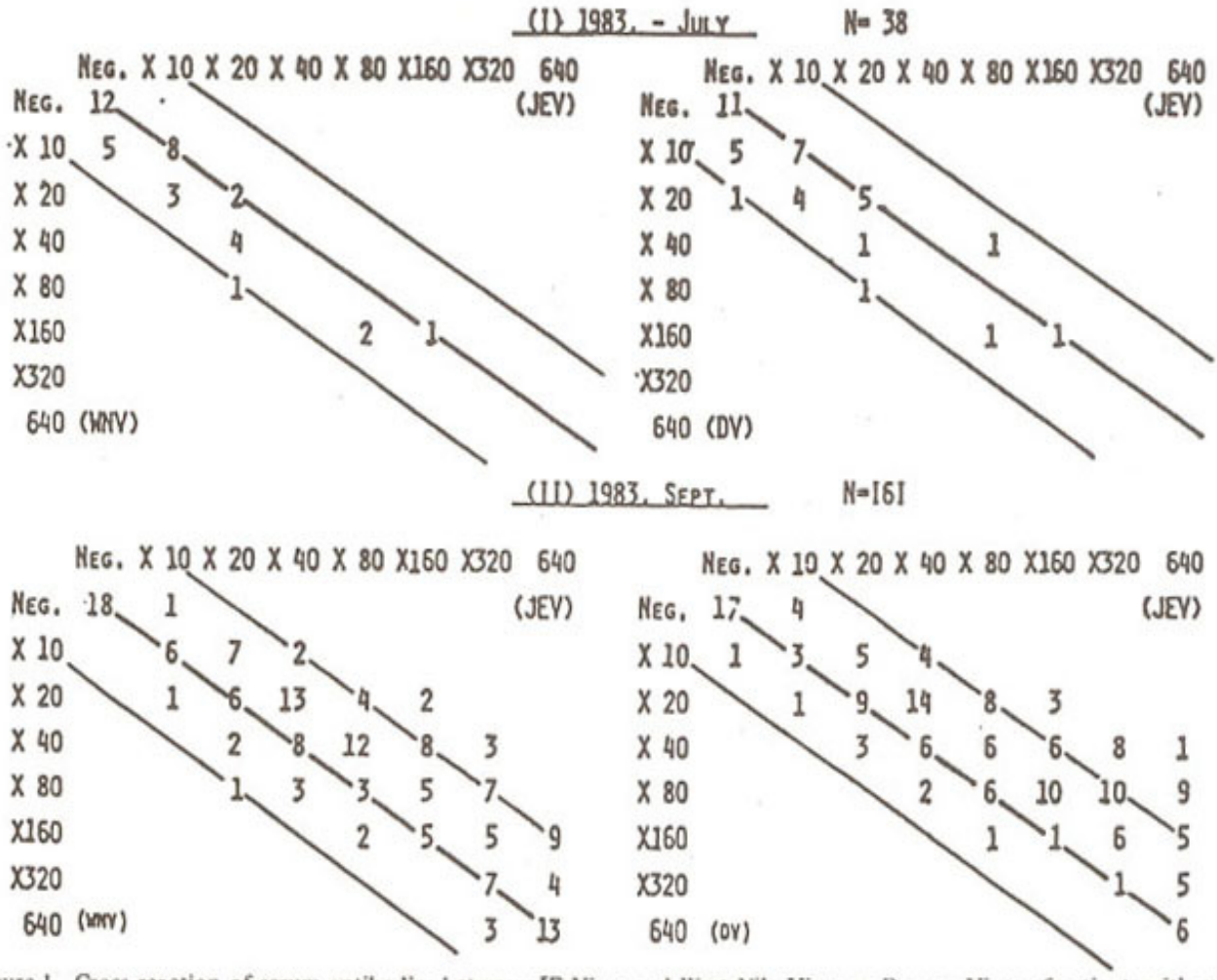

Figure 1. Cross reaction of serum antibodies between JE Virus and West Nile Virus or Dengue Virus of patients without neurological disease.

Reciprocal cross reactions were recognized between JEV, WNV, TBEV and EN. The proportion of cases showing JEV antibody titer over 2^3 times higher than that of WNV antibody titer was three percent (five cases), and that of DV antibodywas 13 percent (21 cases).

DISCUSSION

The results of this serological investigations indicate that (Table VI)

TABLE - VI

Cases considered to be possibly Japanese Encephalitis.

Case	Age	Sex	Sample	Viral antibody titer						HSV		
				JEV	WNV	TBEV	DV	MV	RV	IgM	IgG	EV-70
89	30	y M	Serum	⩾ 640	X 320	X 20	X 160	< 8	X 32	–	2+	< 4
			CSF	< 10	< 10	< 10	< 10	< 8	< 8	–	–	< 1
95	45	y F	Serum	⩾ 640	X 80	X 20	X 160	X 8	X128	–	2+	< 4
98	13	m F	Serum	⩾ 640	X 80	X 10	X 40	X 32	X 32	+	–	< 4
			CSF	< 10	< 10	< 10	< 10	< 8	X 8	–	–	< 1
103	2.5	y F	Serum	⩾ 640	⩾ 640	⩾ 640	⩾ 640	< 8	X 8	–	–	< 4
			CSF	X 10	X 10	< 10	< 10	< 8	< 8	–	–	< 1
111	?		?	X 80	X 20	< 10	X 20	< 8	< 8	–	–	< 1
113	17	y F	Serum	⩾ 640	⩾ 640	ND	⩾ 640	X 8	X 16	+	3+	< 4
			CSF	X 40	X 40	ND	X 10	< 1	< 8	–	–	< 1
124	13	m M	Serum	X 40	X 40	ND	X 10	< 8	< 8	+	–	< 4
			Serum	X 160	X 160	ND	X 80	X 8	X 64	–	+	X 16
128	?	?	CSF	X 40	X 20	ND	X 10	< 1	< 1	–	–	< 1

1EV, HSV, MV, RV and EV-70 may be the causative agents of the encephalitides occurring in and around Karachi. JAPANESE ENCEPHALITIS: The cases with serological evidence of JEV infection are shown in Table VII. The evidence includes an increase of serum antibody titer in paired samples, or a high titer of serum and CSF positive antibody. All of these cases considered to be JE were observed during the period from September, 1983 to March, 1984.

HERPES ENCEPHALITIS: In 40 encephalitis patients only IgG antibody against HSV was detected while in one case antibodies against both JEV and HSV were found.

MEASLES ENCEPHALITIS. To date, an appreciable incidence of SSPE in Karachi was suggested by Ahmed in 1980[1], but only based on clinical features. In 1982, Takasu found a case of SSPE with clinical and serological evidence during the preparatory investigation of this Project. In the present study, five cases showed positive CSF antibody against M,V and one of the five cases showed a high titer.

ENCEPHALITIS CAUSED BY TBEV, RV AND EV70: of encephalitis patients, none were considered to be due to TBEV, RV or EV-70.

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