Research Recherche

Bulletin of the World Health Organization, **57** (3): 437-439 (1979)

An epidemic of Rift Valley fever in Egypt

1. Diagnosis of Rift Valley fever in man

IMAM Z. E. IMAM,[1] MEDHAT A. DARWISH,[2] & R. EL-KARAMANY[3]

Rift Valley fever (RVF) virus was isolated from 53 of 56 sera collected from patients with a clinical picture of dengue-like illness during the peak of the epidemic of RVF in Egypt in the autumn of 1977. RVF virus was also isolated from the throat washings of two patients and the faeces of four, all of whom were positive for virus isolation from the serum. All the isolates were identified by the complement fixation (CF) test. Serological diagnosis of RVF, using paired sera from 16 patients, was made by both the haemagglutination-inhibition (HI) and CF tests. HI antibodies were demonstrated in all the acute sera, whereas CF antibodies, which seem to appear later, were detected in only seven acute and twelve convalescent sera. A longer period than the 12 days in this study must be allowed to elapse between the taking of the paired sera for a definite serological diagnosis to be obtained, especially when CF antibodies are taken into account.

In previous communications (*1, 2*) we reported on the epidemic of Rift Valley fever (RVF) that occurred in Egypt in October 1977. The outbreak, which started in the Belbeis and Zagazig areas of Sharqiya Governorate, first appeared as an acute, febrile, dengue-like illness in man. A virus isolated from man at the Virus Research Centre, Agouza, Cairo, and tentatively characterized as an arbovirus, was finally identified (isolate No. 41) as RVF virus at the WHO Collaborating Centre for Reference and Research on Arbovirus Diseases at Yale Arbovirus Research Unit (YARU), New Haven, CT, USA. Serological evidence for RVF infection was also established at YARU in sera from acute cases as well as six seroconversions. In this paper we report further studies on the serodiagnosis of RVF in man.

[1] President, Egyptian Organisation for Biological Products and Vaccines, Agouza, Cairo, Egypt.

[2] Virology Laboratory, Egyptian Organisation for Biological Products and Vaccines.

[3] Professor of Microbiology, Faculty of Medicine, Ain Shams University.

MATERIALS AND METHODS

All the persons from whom the virus was isolated were hospital patients in whom RVF had been diagnosed. Their ages ranged from 6 to 40 years. Samples were collected during the fever phase of the disease. For most of the cases only blood samples were taken but throat washings and faeces were also obtained from a few patients. When the specimens were received at the Virus Research Centre they were treated and inoculated into suckling mice by the intracerebral route. Brains of sick mice were harvested after 36–48 h and a sucrose–acetone-extracted antigen was prepared according to the procedure of Clarke & Casals (*3*).

Paired sera were obtained from 16 patients. Two blood samples were taken 12 days apart — one on admission and one on discharge from hospital. The prepared sera were stored at −10°C and all 32 were sent together to the virus laboratory.

Identification of viral isolates was carried out by the complement fixation (CF) test, sucrose–acetone

extractions of infected suckling mouse brains being used as antigen (*3*). Antigens were prepared for all the isolates and were simultaneously tested against specific antisera (*4, 5*). Two specific antisera were available: one was provided by Dr R. Shope of YARU (RVF antiserum, batch No. 3028) and the other was prepared in our laboratories in adult mice, using for immunization the local isolate 41. The two antisera were comparable in the CF test when tested against isolate 41 antigen. The viral isolates were identified at the beginning with both types of antiserum, but later characterization was carried out by using only the locally prepared serum.

Serological diagnosis of RVF virus infection was performed by both the CF and haemagglutination–inhibition (HI) tests on the 16 paired sera. No attempt was made to isolate virus from the acute sera. The CF antigen used was prepared by sucrose–acetone extraction of infected suckling mouse liver (RVF virus, isolate 41) according to the technique of Clarke & Casals (*3*). The haemagglutination (HA) antigen was prepared by acetone extraction of infected suckling mouse serum according to the method of Shope (personal communication, 1977). The HI test was performed with 4 HA units at pH 6.2 and room temperature, using goose erythrocytes.

RESULTS AND DISCUSSION

Fifty-six virus isolates were obtained from sera of patients admitted to hospital with a clinical diagnosis of dengue-like illness. By the CF test, 53 of the 56 isolates were identified as RVF virus. No further characterization was carried out for the remaining three serum isolates.

RVF virus was isolated from four out of five tested faecal specimens and also from two out of three tested throat washings. As may be seen from Table 1, the virus was isolated from the sera of all five of these patients. One patient (M.F.A.) furnished the virus from serum, throat washings, and faeces. The faecal and pharyngeal isolates were identified as RVF virus by the CF test.

Table 1. Isolation of RVF virus from patients with a clinical diagnosis of Rift Valley fever

Patient	Virus isolated from:		
	serum	throat washings	faeces
A.I.M.	+	ND[a]	+
N.A.	+	ND	+
H.R.	+	–	+
M.F.A.	+	+	+
B.R.M.	+	+	–

[a] ND = not done.

Although recovery of RVF virus from pharyngeal washings has previously been reported by Francis & Magill (*6*), this is probably the first time that the virus has been isolated from the faeces of patients. RVF virus was successfully reisolated from two of the stool specimens. However, since all the isolates were obtained from patients with internal haemorrhage, including intestinal bleeding, the virus probably originated from the blood. RVF virus was isolated simultaneously from the faeces and serum of four patients and from the serum and throat of two patients.

The serological reactions of the tested paired acute and convalescent sera from the 16 patients (Table 2) demonstrated the following:

Table 2. Antibody titres against RVF virus in sera of patients with a clinical diagnosis of Rift Valley fever

Patient	Age (years)	HI antibodies		CF antibodies	
		Acute phase	Convalescent	Acute phase	Convalescent
B.M.B.	25	40[a]	2560	4[a]	64
M.A.A.	24	40	640	8	64
M.A.M.	27	20	40	–	4
M.F.I.	26	20	2560	4	128
F.S.H.	28	40	40	–	4
A.A.A.	23	20	40	–	4
H.I.H.	29	40	160	8	128
S.A.R.	26	40	160	4	128
S.S.I.	28	20	80	4	64
S.A.M.	24	20	20	–	–
S.F.I.	27	20	2560	4	64
H.H.A.	30	40	80	–	4
S.A.A.	27	40	40	–	–
A.I.G.	24	20	40	–	–
R.M.A.	29	20	80	–	4
S.S.M.	28	20	40	–	–

[a] Reciprocal of serum end point dilution.

1. All the acute sera exhibited HI antibodies, whereas only seven had CF antibodies, which reflects the later appearance of the latter.

2. Twelve of the convalescent sera showed CF antibodies and the seven positive acute sera exhib-

ited at least an eight-fold rise in CF titre. For the HI antibodies, although titres as high as 1:2560 were recorded, certain sera did not show a rise in titre and others demonstrated only a two-fold increase. This may be explained by the short period (12 days) that elapsed between the taking of the two blood samples.

3. From the available serological picture, one may be hesitant to accept a diagnosis of RVF for some of the patients, particularly S.A.M. In fact, a convalescent serum taken somewhat later would have been more valuable in serological diagnosis. However, at least eight patients with a four-fold or greater rise in HI titre fulfilled the known criteria of serological positivity, and seven of these were also confirmed by the CF test.

ACKNOWLEDGEMENTS

The technical assistance of Dr Sabry Ghanem, Mrs F. Omar, and Mrs T. Amer is gratefully acknowledged.

RÉSUMÉ

ÉPIDÉMIE DE FIÈVRE DE LA VALLÉE DU RIFT EN ÉGYPTE
1. DIAGNOSTIC DE LA FIÈVRE DE LA VALLÉE DU RIFT CHEZ L'HOMME

Le virus de la fièvre de la Vallée du Rift (FVR) a été isolé dans 53 échantillons de sérum sur les 56 prélevés chez des malades présentant un tableau clinique semblable à celui de la dengue au plus fort de l'épidémie de FVR qui a frappé l'Egypte en automne 1977. Le virus FVR a aussi été isolé dans des rinçages de gorge provenant de 2 malades et des matières fécales de 4 malades dont tous avaient fourni des échantillons de sérum positifs lors des épreuves d'isolement du virus. Pour l'ensemble des isolements, on a eu recours à l'épreuve de fixation du complément (FC). En outre, des échantillons de sérum appariés ont été prélevés sur 16 malades (au stade aigu de la maladie et 12 jours plus tard), et le diagnostic sérologique de la FVR a été fait en soumettant ces échantillons à deux types d'épreuve — inhibition de l'hémagglutination (IH) et FC. Les anticorps IH ont été décelés dans tous les échantillons prélevés au stade aigu alors que les anticorps FC — sans doute plus lents à apparaître — n'ont été décelés que dans 7 échantillons du stade aigu et 12 du stade convalescent. Pour être en mesure d'établir un diagnostic sérologique précis, en particulier par la détection des anticorps FC, il faudrait donc qu'un intervalle de temps plus long que celui de 12 jours adopté dans l'enquête soit ménagé entre les deux séries de prélèvement de sérum.

REFERENCES

1. IMAM, I. Z. E. & DARWISH, M. A. A preliminary report on an epidemic of Rift Valley fever (RVF) in Egypt. *Journal of the Egyptian Public Health Association,* **52**: 417-418 (1977).
2. *Weekly epidemiological record,* **53**: 197-198 (1978).
3. CLARKE, D. H. & CASALS, J. Techniques of hemagglutination and hemagglutination-inhibition with arthropod-borne viruses. *American journal of tropical medicine and hygiene,* **7**: 561-573 (1958).
4. DARWISH, M. A. ET AL. Antibodies to Dhori and Wanowrie viruses in Egyptian sera. *Journal of the Egyptian Public Health Association,* **49**: 362-368 (1974).
5. HAMMON, W. McD. & SATHER, G. E. Arboviruses. In: Lennette, E. H. & Schmidt, N. J., ed. *Diagnostic procedures for viral and rickettsial infections,* 4th edition. American Public Health Association, 1969, pp. 227-280.
6. FRANCIS, T. & MAGILL, T. P. Rift Valley fever: a report of three cases of laboratory infection and experimental transmission of the disease to ferrets. *Journal of experimental medicine,* **62**: 433-448 (1935).