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## A POST-EPIZOOTIC SURVEY OF RIFT VALLEY FEVER-LIKE ILLNESS AMONG SHEEP AT VEERAPURAM, CHEENNAI, TAMIL NADU

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### SUMMARY

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An epizootic of febrile illness characterized by diarrhoea, abortion and fulminant neonatal mortality among Madras Red breed of sheep of Veerapuram, Chennai, was investigated in late 1994. The clinical features and histopathological studies on necropsy specimens of sheep were suggestive of a Rift Valley Fever (RVF)-like illness. No virus was isolated from the sheep necropsy specimens and mosquito pools. Haemagglutination inhibition (HI) antibodies to RVF virus antigen were detected in 14 of the 28 convalescent sera, seven of which showed anti-RVF IgG antibodies in the Enzyme Linked Immunosorbent Assay (ELISA). Results of a post-epizootic serosurvey of animals and humans revealed HI and anti-RVF IgG antibodies in the survey sera. Neutralizing antibodies to Ganjam virus were also detected in animal and human sera. Antibodies to RVF and Ganjam viruses do not cross react. The importance of these emerging virus diseases in relation to public health is emphasised.

Rift Valley Fever (RVF) is a mosquito-borne zoonotic viral disease primarily causing epizootics in sheep, goat, and cattle. Occasionally humans are likely to acquire the infection (Arthur *et al.*, 1993). RVF epizootics and presence of RVF antibodies among domestic animals have largely been reported from African countries (Meegan and Bailey, 1989). The occurrence of antibodies to RVF (or a closely related virus) in sheep and goats in India was first reported from Rajasthan state. (Joshi *et al.*, 1995).

An outbreak of febrile illness with high morbidity, mortality and abortion of pregnant ewes in Madras Red breed of sheep was reported at Veerapuram village of Chengai-MGR district, Tamil Nadu state in September 1994. The clinical features, gross and histopathological findings of the necropsy specimens of affected sheep have been described by Murali Manohar *et al.*, (1995). The disease was provisionally diagnosed as an RVF-like illness. During the epizootic investigation specimens of liver, spleen and lymph node of one morbid

sheep were collected in transport medium. Twenty eight convalescent serum samples were also collected from sheep. During the post epizootic serological and entomological survey in March 1995, a total of 144 sheep, 11 goat and 49 human sera (from shepherds, their family members and contacts were collected. All the specimens were transported on wet ice to the National Institute of Virology, Pune and stored at -20°C until tested. A total of 1419 mosquitoes comprising of 16 species and 100-125 Culicoides species were collected from affected and surrounding areas.

Suspensions of sheep organs were processed in suckling (2-3 day old) Swiss albino mice and in Vero and C6/36 cell lines, while 48 pools of mosquitoes and one pool of culicoides were processed in adult mice for virus isolation. Ten to twelve serial blind passages of liver and brain in mice and three passages in tissue culture were made between the 6 and 8 post inoculation (PI) days for virus isolation. Twenty four pooled sera of experimental mice were obtained after 28 PI day at

different passage levels.

No virus was isolated from necropsy specimens of sheep and mosquito as well as culicoides pool processed either in mice or in tissue culture systems. Twenty eight convalescent sheep sera were tested in Haemagglutination Inhibition (HI) test for the presence of antibodies to RVF virus antigen (Clarke and Casals, 1958) and in Enzyme Linked Immunosorbent Assay (ELISA) for anti-RVF IgG antibodies (Ksiazek *et al.*, 1989). Fourteen of the 28 sera had HI antibodies to RVF virus antigen, seven of which had anti-RVF IgG antibodies. The experimental mice sera were tested in ELISA and found to be negative.

All the animal and human survey sera were first tested in the HI test. Due to paucity of antigen, randomly selected RVF HI-positive sheep and human survey sera were further tested in ELISA. All the human and animal sera were also tested for the presence of Complement Fixing (CF) antibodies to Ganjam virus antigen (Sever, 1962). Forty six sheep, six goat and eight human sera having HI antibodies to RVF virus were tested for neutralizing (N) antibodies to Ganjam (G619) virus in adult mice by intracerebral route (Ghalsasi *et al.*, 1981). Results of all the serological tests are presented in the Table 1.

The clinical features, gross and

histopathological findings of necropsy specimens of sheep closely resembled those described in RVF virus infection (Murali Manohar *et al.*, 1995). Detection of HI and anti-RVF IgG antibodies in convalescent and survey sheep sera was suggestive of an RVF-like illness. It is however difficult to pin point the exact source of infection. Probably there was already a silent focus of infection which got reactivated under conducive condition like heavy rainfall and resultant increase in the vector mosquito population. Such a phenomenon is known to occur in African countries (Fenner *et al.*, 1989).

Prevalence of N antibodies to Ganjam virus among animals and human in different states of India have been reported earlier (Banerjee, 1996). In the present study, detection of N antibodies in sheep, goat and human sera is suggestive of Ganjam virus activity in this area. Laboratory tests (cross neutralization test in mice and IgG ELISA) have revealed that antibodies to Ganjam and RVF viruses do not cross react. Since antibodies to both Ganjam and RVF viruses were detected in survey sheep sera, probably the animals might have been exposed to both the viruses independently at sometime or the other. There seems to be a potential threat of a spill over of this infection to humans especially those in close association with animals. RVF and Ganjam viruses appear to be emerging viruses of pub-

Table 1 Results of serological tests

Species	HI	RVF virus				Ganjam Virus		
		HI titre				ELISA*	CF	NT**
	No +ve/ No. tested	10	20	40	80	No +ve/ No. tested	No +ve/ No. tested	No +ve/ No. tested
Sheep <sup>a</sup>	14/28	7	5	2	0	7/14	ND	ND
Sheep <sup>b</sup>	90/144	44	37	8	1	23/38	0/144	45/46
Goat <sup>b</sup>	10/11	5	3	2	0	ND	0/11	6/6
Human <sup>b</sup>	16/49	12	4	0	0	0/16	0/49	4/8

\* All sera were tested at 1:40 dilution.

\*\* The dose of virus was 2.16 dex LD<sub>50</sub>/0.03 ml.

a=convalescent sera ; b= survey sera ; ND = Note done

## RVF-like epizootic among sheep in Chennai

lic health importance in this area and need careful monitoring.

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