

PERSISTENCE OF HAEMAGGLUTINATION-INHIBITION ANTIBODIES TO JE AND WN VIRUSES IN NATURALLY INFECTED DOMESTIC PIGS IN KARNATAKA STATE, INDIA

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Summary. – Domestic pigs were used as sentinels to monitor the prevalence of Japanese encephalitis (JE) and West Nile (WN) viruses in Kolar District of Karnataka State, India. The study revealed that the pigs once seroconverted to JE and WN viruses, remained immune as long as they were available for observation, up to three years.

Key words: Japanese encephalitis virus; West Nile virus; persistence of antibodies; domestic pigs

Pigs are incriminated as amplifying as well as maintenance hosts of JE virus in nature (Rosen, 1986; Bhat, 1984; Geevarghese *et al.*, 1991). Although there are a number of reports dealing with the use of sentinel pigs for monitoring the JE virus in nature (Scherer *et al.*, 1959; Johnson *et al.*, 1974; Konno *et al.*, 1966; Takahashi *et al.*, 1966; Mani *et al.*, 1991), the information regarding the immunity status of pigs after the natural infection is none or scanty. During the course of our studies on JE in Kolar in 1980 – 1985, sentinel pigs were used to monitor the JE and WN viruses in this area. Pattern of seroconversion in 72 pigs studied during the period has been already reported (Geevarghese *et al.*, 1987). Of these pigs, seven were available for more than three years to study the pattern of antibodies to JE and WN viruses. This communication presents the results of this study.

The studies were conducted in two villages, Arahalli and Madikere, 5 and 32 km, respectively, away from Kolar town in Karnataka State. The study area has been described earlier (Mourya *et al.*, 1989). These localities are known JE endemic areas. In Arahalli, the collection of blood samples commenced in January 1981. Five pigs of the same litter aging 2 months were available from 10 pigs which were used as sentinels. In Madikere, the study was started in July 1981. Two pigs of the same litter aging about 2 to 4 weeks were selected for this purpose. Blood samples from these pigs were collected periodically and tested for antibodies. Methods of blood collection, storage and transport of the sera were similar to those described earlier (Japanese encephalitis in India, 1980). The sera were initially tested against JE, WN and dengue (DEN-2) virus antigens for haemagglutination-inhibition (HI) an-

tibodies (Clark and Casals, 1958). The seroconversion was confirmed by neutralization tests in mice (Shope and Sather, 1979).

The results of HI tests of sera collected from these pigs in certain months are given in Table 1 and 2. Titers of HI antibodies differed in different months in both the localities. In Arahalli, all the five pigs had maternal antibodies at the beginning of the study which persisted for next 2 months (Table 1). These pigs could not be bled from September to November, 1981 from technical reasons. These pigs were bled again in December, 1981, and all of them were found to have seroconverted to JE virus. Subsequently, these pigs continued to show the presence of HI antibodies in varying titers to JE and WN viruses as long as they were studied, i.e. up to August, 1984. HI antibody titers were much higher for JE virus as compared to WN virus in all the pigs, indicating JE virus infection. These pigs showed 2- to 4-fold increase in HI titers at least once, indicating reinfection with JE or WN viruses. This boost of HI antibodies coincided generally with the epidemic months, i.e. October to December.

Both the piglets studied in Madikere were free of maternal antibodies when the blood sample collection commenced in July, 1981. Pig No. 1 seroconverted in November, 1981 but the HI antibody against JE virus disappeared by March, 1982 and it again showed seroconversion in April, 1982 (Table 2) and the HI antibody titer remained very low until the end of November, 1982 when a sudden rise was observed indicating an reinfection. Pig No. 2 showed seroconversion in November, 1981 and the titer of

Table 1. HI antibody response in naturally infected pigs in Arahalli

Date	Pig No.									
	1		2		3		4		5	
	JE	WN	JE	WN	JE	WN	JE	WN	JE	WN
28.01.81	80	20	40	10	40	20	40	20	20	10
14.03.81	20	0	20	0	20	0	10	0	10	0
13.04.81	0	0	0	0	0	0	0	0	0	0
13.08.81	0	0	0	0	0	0	0	0	0	0
11.12.81	160	20	160	40	80	10	160	20	320	40
14.08.82	160	80	80	10	40	40	160	80	80	40
14.09.82	640	80	320	20	160	20	320	80	160	40
04.11.82	320	80	320	40	160	20	320	40	320	40
13.11.82	160	40	160	40	160	40	640	160	320	80
11.04.83	160	20	160	20	80	20	320	40	160	40
18.05.83	640	40	80	10	80	10	160	40	320	40
21.06.83	320	20	80	10	80	20	ND	ND	160	20
23.08.83	640	20	160	20	160	20	320	40	320	40
11.10.83	160	40	320	80	80	20	160	80	320	40
17.10.83	640	160	640	80	160	20	320	80	160	40
31.10.83	640	80	160	40	80	20	160	80	160	160
07.11.83	1280	160	160	40	80	20	160	40	80	40
21.11.83	320	160	160	40	40	0	160	40	80	80
05.12.83	640	20	160	10	160	0	320	20	80	20
30.03.84	320	40	80	20	160	40	ND	ND	160	40
21.04.84	640	40	320	0	160	40	ND	ND	160	20
19.07.84	320	40	160	20	160	40	ND	ND	160	20
10.08.84	320	40	—	—	80	40	ND	ND	160	40

ND – not done.

0 – not detected.

HI antibodies remained more or less stable until February, 1983 when the pig was lost for further observation.

In Kolar area both JE and WN viruses are known to be active in pigs as well as in mosquitoes (Geevarghese *et al.*, 1987). The prevalence of antibodies to JE and WN viruses in pigs may be explained by a multiple infection with these viruses through mosquitoes. Our recent experimental studies in pigs have indicated that JE virus infection had a booster effect on HI antibodies titers in pigs already infected with WN virus (Ilkal *et al.*, 1994).

The occurrence of an outbreak of JE and its extent in an area is determined by the size of the population of the

susceptible vertebrate hosts. Immune individuals in the population are expected to play no role in the epidemic and it is therefore important to know how long the vertebrate hosts once infected can remain. The present study showed that the pigs once infected maintained detectable HI antibodies for more than 3 years. However, it should be noted that the majority pigs in Kolar area are generally slaughtered by the time they are one year-old and thus the number of such old immune pigs remaining for more than a year will be very low.

This is the first report of persistence of HI antibodies to JEV in the naturally infected pigs over a prolonged period.

Table 2. HI antibody response in naturally infected pigs in Madikere

Date	Pig No.			
	1		2	
	JE	WN	JE	WN
10.07.81	<10	<10	<10	<10
28.09.81	<10	<10	0	<10
03.11.81	20	10	320	160
30.11.81	40	40	320	80
30.01.82	10	<10	80	40
26.03.82	<10	10	40	20
24.04.82	20	10	80	40
27.05.82	20	10	ND	ND
29.06.82	10	0	40	40
13.07.82	10	10	80	40
16.09.82	10	0	80	20
08.10.82	10	10	40	10
19.11.82	10	10	80	40
29.11.82	80	40	80	40
20.12.82	80	40	160	80
24.02.83	40	<10	80	40
24.03.83	20	20	ND	ND
13.12.83	20	<10	ND	ND
26.12.83	40	10	ND	ND

ND – not done.

0 – not detected.

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