



Faecal excretion of rotavirus by naturally infected pregnant sows in organized pig farms- a potent source of infection to newborns*

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Rotavirus, an important etiological agent associated with piglet diarrhoea, accounts for about 20% mortality in newborn piglets (Rao and Rao 1981). Faecal oral route is the principal route of entry of RV into susceptible host. The role of adult animals in the epidemiology of RV, however, is poorly understood. There is no apparent age resistance to RV, as infections are reported in adult cattle (Woode and Bridger 1975), swine (McNulty 1978), and humans (Wenman *et al.* 1979). In Asom, prevalence of RV specific antibodies among pig populations was reported earlier (Barman *et al.* 1998) and group A rotavirus was also isolated from diarrhoeic piglets (Bora *et al.* 2007). Several factors have been identified to play role in occurrence of RV diarrhoea in animals. In pigs, pregnant sows have been reported to excrete the RV antigen in their faeces both pre- and post- farrowing days (Benfield *et al.* 1982). Therefore the present study was designed to investigate the role of pregnant animals in disseminating the infection to their newborns.

The study was carried out in All India Co-ordinated Research Project on pigs, College of Veterinary Science, Khanapara, Guwahati. Rotavirus-seropositive pregnant animals (6) consisting of 3 sows and 3 gilts were housed individually in isolated farrowing crate. Faecal samples from pregnant sows and gilts were collected daily 1 month prior and after farrowing. Thereafter, samples were collected weekly up to 2 months post farrowing. Samples were transferred immediately to the laboratory in an icebox and preserved at -20°C till further use. Faecal samples from the piglets born to these sows were also collected following the same schedule starting from the date of farrowing up to 56 days of their age.

Approximately 1 g of the fecal sample was homogenized

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and suspended in four volumes of 0.06 M PBS (pH 7.2). The homogenized samples were centrifuged at 12000 g for 20 min. The supernatant was collected and preserved at -20°C till further use as test antigen for detection of RV. Preliminary detection of rotavirus in faecal samples was done by sandwich ELISA following the method of van Nieuwstadt *et al.* (1988). Further confirmation of RV in faecal samples was done by demonstration of rotavirus RNA by polyacrylamide gel electrophoresis (PAGE) as per Herring *et al.* (1982).

Throughout the period of study, diarrhoea was not observed in sows and they remained healthy. However, all pregnant sows and gilts excreted group A rotavirus for a brief period pre- and post-farrowing in their faeces as indicated by their migration pattern in PAGE (figure not shown). Excretion pattern of RV in faeces of pregnant sows and gilts at pre- and post- farrowing period is shown in Table 1. In sows, average duration of excretion at pre- and post-farrowing was 5.66±0.33 and 5.33±0.33 days, respectively. While in gilts, average duration of excretion in pre- and post-farrowing was 7.33±0.67 days. In gilts, 2 out of 3 animals excreted RV up to eighth day post farrowing period. The role of adult animals in the epidemiology of RV infection was not thoroughly investigated (Benfield *et al.* 1982). Many workers reported that there was no apparent age resistance to RV, as infection had been reported in adult cattle and swine (Woode and Bridger 1975, McNulty 1978). In the present study, both sows and gilts shed RV antigen before and after farrowing. Similar observations were also made by Benfield *et al.* (1982) and Gelberg *et al.* (1991). Benfield *et al.* (1982) reported that sows shed RV in their faeces as early as 5 days before to 14 days after farrowing. Several workers reported that clinically normal sows might be the potent source of infection to their litters in endemic areas (Lecce *et al.* 1978, Lecce and King 1980, Benfield *et al.* 1982). However, Debouck and Pensaert (1983) and Fu and Hampson (1987, 1989) were unable to detect RV antigen in sows nearing farrowing time. Exact cause of shedding RV by pregnant animals is not known but pregnancy hormones might

Table 1. Excretion patterns of rotavirus in naturally infected pregnant sows and gilts at different pre and post farrowing days as detected by sandwich ELISA

Type of animal		Pre-farrowing days (30–1)						Post farrowing days (1–60)					Average duration±SE	
		30–9	8	7	6	5	4–1	1–5	6	7	8	9–60	Pre-farrowing	Post-farrowing
Sow	S ₁	-	-	-	+	+	+	+	-	-	-	-	5.67±0.33	5.33±0.33
	S ₂	-	-	-	+	+	+	+	-	-	-	-		
	S ₃	-	-	-	-	+	+	+	+	-	-	-		
Total sows		0/3	0/3	0/3	2/3	3/3	3/3	3/3	1/3	0/3	0/3	0/3		
Total gilt	G ₁	-	-	+	+	+	+	+	+	+	+	-	7.33±0.67	7.33±0.67
	G ₂	-	+	+	+	+	+	+	+	-	-	-		
	G ₃	-	-	+	+	+	+	+	+	+	+	-		
Total gilt		0/3	1/3	3/3	3/3	3/3	3/3	3/3	3/3	2/3	2/3	0/3		

Table 2. Shedding of RV antigen by piglets of infected sows and gilts at different days of age as detected by sandwich ELISA

Litters born to	No. followed	No. of piglets excreting virus in faeces in different days of life							
		1–7	8–14	15–21	22–28	29–35	36–42	43–49	50–56
S ₁	4	0	3	4	2	0	0	0	0
S ₂	4	0	3	3	2	0	0	0	0
S ₃	4	0	2	4	3	0	0	0	0
Total sow	12	0	8 (66.66)	11 (91.66)	7 (58.33)	0	0	0	0
G ₁	4	0	3	4	2	1	0	0	0
G ₂	4	0	4	4	3	2	0	0	0
G ₃	4	0	3	4	3	1	0	0	0
Total gilt	12	0	10 (83.33)	12 (100)	7 (66.66)	4 (33.33)	0	0	0

Figures in parentheses indicate percentages.

influence in excretion of RV in expected pregnant sows and gilts. Present findings reflect longer duration of excretion of RV in gilts (Table 2.) than sows might be due to the less acquired immunity persist in gilts.

Piglets born to these animals developed diarrhoea from eighth day onwards. Excretion continued in their faeces up to 28th day of their age in case of litters from sows while 35th day of their age in case of litters born to gilts (Table 2). Fu and Hampson (1987, 1989) were also failed to detect RV antigen in piglets below one week of age. It might be due to the passive immunity acquired by the piglets from the dam in the form of colostrums, which prevented the infection and subsequent excretion. At 14 days of age faecal excretion of RV was detected in 66.66% and 83.33% piglets born to sows and gilts, respectively. Almost all the piglets were positive for RV on 21st day. Faecal excretion of RV was not detected in piglets born to sows from 28 days onwards and 36 days onwards in piglets born to gilts. These findings are in agreement with that of Nath (2003). It was important to note that the piglets born to gilts started excretion of RV in faeces earlier as compared to the piglets born to sows and continued up to longer duration. Askaa *et al.* (1983) observed a lower colostral antibody titre to RV in gilts as compared to sow, which might be the possible explanation for early infection

and shedding of antigen for long period by gilts' litter in the present study. Transmission of RV from infected mother to their litter has been studied extensively. Expected pregnant sows and gilts excreted the virus in their faeces prior and after farrowing as observed in the present study and might serve as a potent source of infection to the susceptible piglets (Lecce and King 1980, Benfield *et al.* 1982). Piglets are born agammaglobulinaemic and hence they are readily susceptible to a wide range of infections (Kim *et al.* 1966). RV infection of susceptible humans or animals occurs through contact either with individuals shedding RV in their faeces or with a contaminated environment. Present findings infer that the adult pigs could be the possible source of RV infection in an organized pig farms.

SUMMARY

A longitudinal study was carried out to find out excretion pattern of rotaviruses by the pregnant sows before and after farrowing and their role in disseminating the infection to their newborns. For this purpose 6 pregnant sows (3 sows and 3 gilts) farrowing on the same day and tested for presence of RV antigen by sandwich ELISA and PAGE. In sows, average duration of excretion at pre- and post-farrowing was 5.66±0.33 and 5.33±0.33 days, respectively. While in gilts,

average duration of excretion in pre- and post-farrowing was 7.33 ± 0.67 days. From the litters farrowed by these sows, faecal samples were collected following the same schedule up to 2 months of age from the date of farrowing and piglets excreted RV from eighth day onwards and continued up to sixth week of their life. Our results can provide some baseline data to formulate managerial tactics to combat RV infection in piglets.

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