

Short Communication

Sero-epidemiological Pattern of Salmonellosis in Animals of Rohilkhand Region, Uttar Pradesh, India

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ABSTRACT

During the period understudy (2008-10), a total of 1500 serum samples of cattle, buffalo, goats and dogs from five districts of Rohilkhand region, Uttar Pradesh, India were screened for presence of *Salmonella* agglutinins employing slide micro-agglutination test using two coloured antigens of *Salmonella Typhimurium* (O-4,5,12) and *S. Enteritidis* (O-9,12). An overall sero-prevalence of *Salmonella* agglutinin against O-4,5,12 and O-9,12 antigens in animals was 15.53% and 13.6%, respectively, while overall sero-prevalence of *Salmonella* agglutinins against both the antigen was 11.4%. Species wise distribution of positive agglutinins against both antigens was highest in dogs (25.2%), followed by cattle (11%), buffalo (9.2%) and goats (2.8%). The prevalence of agglutinins in sera of animals was highest in animals of district Bareilly (13%). In all the animal species, seropositivity was highest during winter season. Sex of animal had no significant effect on sero-prevalence of agglutinins against both *Salmonella* antigens. Age wise prevalence of positive agglutinins was found to decrease with age in buffalo and goats, while it showed an increasing trend in dogs.

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INTRODUCTION

More than 60% diseases of human beings are zoonotic in nature and animals are important source of these diseases including campylobacteriosis, salmonellosis, colibacillosis etc (Verma et al., 2007; Kumar et al., 2012a and 2012b; Dhama et al., 2013). Among these, salmonellosis is one of the most common zoonotic diseases affecting man, animals (Verma et al., 2011a and 2011b) and wide variety of other hosts including reptiles, insects, birds etc. *Salmonella* may cause a wide spectrum of disease occurrence ranging from sub-clinical, impaired productivity, clinical manifestations that may become often fatal. The infection spreads through contaminated feed and water (Verma et al., 2007) and infected animals tend to shed the organisms in their faeces and secretions (Verma et al., 2008). The isolation of *Salmonella* from the faecal sample is quite difficult and takes approximately 4-7 days (Verma et al., 2011b). Animal owners, handlers, veterinary health professionals, abattoir workers etc may have chances to get the infection. Salmonellosis, is endemic in India affecting man and animals alike (Raichowdhuri, et al., 1983) but the actual magnitude of disease is not well documented (Niyogi et al., 1999). Therefore, it is necessary to keep watch on prevalence of salmonellosis in animals. As the isolation of *Salmonella* is tedious and time consuming, use of simple, rapid serological tests like slide micro-agglutination test is convenient method for detecting the prevalence of *Salmonella* infection in animals.

During the period of 2008-10, a total of 1500 blood samples of cattle (725), buffalo (393), goats (180) and dogs (202) attending

veterinary hospitals in different districts of Rohilkhand region viz., Moradabad, Rampur, Bareilly, Shahjahanpur and Pilibhit were collected with the help of field veterinarians and their supporting staff. About 5.0ml of blood was collected aseptically using hypodermic syringe and allowed to clot by keeping at room temperature for 3 hours. Serum was separated and kept at -20°C till use. During sampling, epidemiological data like age, sex of animal and season were also collected.

Slide micro agglutination test was employed to assess the sero-prevalence of *Salmonella* agglutinins in different animals. For this purpose, two coloured *Salmonella* antigens O-4,5,12 and O-9,12 were used. Antigen O-4,5,12 belonged to *S. Typhimurium* group O:4(B) whereas antigen O-9,12 belonged to *S. Enteritidis* group O: 9(D1). The test was performed as per the method described by Muktaruzzaman et al. (2010). For performance of the test, about 2-3 drops of coloured antigen were placed on a clean grease free glass slide. Then 2-3 drops of test serum were placed adjacent to the antigen. By using a match stick or toothpick, antigens and sera were mixed and observed for 2-3minutes. Appearance of thick clump (agglutination) was taken as a positive result whereas absence of clump formation was indicative of negative test.

The epidemiological data obtained from the study were statistically analyzed by the methods described by Snedecor and Cochran, 1980.

A total of 1500 serum samples from different species of animals were screened for presence of *Salmonella* agglutinin against *Salmonella* antigen O-4,5,12 and O-9,12. Species wise sero-

prevalence of *Salmonella* agglutinin against *Salmonella* antigens (O-4,5,12 and O-4,12) were shown in table 1. From the table 1, it can be seen that the overall sero-prevalence of *Salmonella* agglutinin against O-4,5,12 and O-9,12 antigens in animals were 15.53% and 13.6%, respectively, while an overall sero-prevalence of *Salmonella* agglutinins against both the antigens was 11.4%. The higher sero-prevalence of *Salmonella* agglutinin against *Salmonella* antigen O-4,5,12, which belongs to *Salmonella* Typhimurium group showed the higher circulation of this

serovar in Rohilkhand region, Uttar Pradesh, India. In a sixteen year study, Basu et al. (1975) also reported that *S. Typhimurium* was the most common serotype in animals in India. Verma et al., 2007 also reported the isolation of *Salmonella* Typhimurium from apparently healthy dogs of district Bareilly, which is under Rohilkhand region. Since *S. Typhimurium* can infect man and animals equally, interspecies sharing of this serovar have also been observed (Singh et al., 2010).

Species	Total Samples	Samples positive against O-4,5,12 antigen	Samples positive against O-9,12 antigen	Samples positive by both of the antigens
Cattle	725	104 (14.3)	93 (12.8)	80 (11.0)
Buffalo	393	52 (13.2)	44 (11.1)	36 (9.2)
Goat	180	11 (6.1)	9 (5.0)	5 (2.8)
Dog	202	66 (32.6)	59 (29.2)	51* (25.2)
Total	1500	233 (15.5)	205 (13.6)	172 (11.4)

Table 1: Species wise sero-prevalence of *Salmonella* agglutinins against *Salmonella* antigen in animals

Table 2: Age-wise distribution of *Salmonella* agglutinins against *Salmonella* antigen in animals

District	Cattle				Buffalo				Goats				Dogs			
	< 3 yrs		>3yrs		< 3 yrs		>3yrs		< 1 yrs		>1yrs		< 6 months		> 6 months	
	n	+ve	n	+ve	n	+ve	n	+ve	n	+ve	n	+ve	n	+ve	n	+ve
Bareilly	45	4	205	23	12	2	140	16	11	1	39	1	35	8	65	17
Pilibhit	7	1	93	8	5	1	51	4	6	0	19	1	5	2	17	5
Shahjahanpur	10	2	140	16	8	1	57	3	8	0	32	1	10	2	25	7
Badaun	8	2	87	8	9	1	52	3	7	1	22	0	10	1	15	5
Rampur	2	0	73	11	3	1	34	2	3	0	15	0	4	1	6	1
Moradabad	2	0	53	8	2	0	20	2	3	0	15	0	3	1	7	1
Total	74	9 (12.1)	651	74 (11.3)	39	6 (15.3)	354	30 (8.4)	38	2 (5.2)	142	3 (2.1)	67	15 (22.3)	135	36 (26.6)

*Values written in parentheses are value in percentage

Species wise distribution of positive agglutinin against both the antigen were significantly higher in dogs (25.2%) in comparison to that of other species viz., cattle (11%), buffalo (9.2%) and goats (2.8%). The possible reasons for higher seroprevalence of *Salmonella* agglutinins in dogs was there habit of roaming here and there and preferably outside; close association with human beings; and thus increased chances of interspecies transmission (Verma et al., 2008). The effect of species on *Salmonella* infection has also been reported earlier in various studies. Singh et al. (2010) have also reported higher seroprevalence of salmonellosis in pet dogs than other animals. Contrary to our findings, Chandra et al. (2007) reported 40% seroprevalence of *Salmonella* antibodies among goats in Bareilly district using MAT 'O' test. But the reason for higher seroprevalence could be attributed to higher sensitivity of MAT.

Place wise distribution of *Salmonella* agglutinins against *Salmonella* antigen in animals is given in figure 1. The overall sero-prevalence of agglutinins in animal sera were highest in district Bareilly (13.0%), followed by Rampur (11.4%), Shahjahanpur (11%), Pilibhit and Badaun (10% each), and Moradabad (8.6%). From the figure 1, it can also be seen that

percentage positive in different animals varied with districts. The possible reason for this variation in different animals might be due to difference in the number of samples in different areas and prevalence of different serotypes in different areas. Verma et al. (2008) have also reported that place wise difference was very much expected as different serovars are prevalent in different areas.

Seasonal distribution of *Salmonella* agglutinins in different animal species was compared as depicted in figure 2. Results showed that seroprevalence of salmonellosis were significantly higher during winter season in all the animal species in comparison to that of other seasons. Similar pattern was seen in all the species of animals but highest seroprevalence was recorded in dogs (34.2%) during winter season. During winters, animals have low immunity and overcrowding of the animals facilitates the spread of infection.

Sex wise sero-prevalence of *Salmonella* agglutinins was almost similar in both the sexes of all animal species with minor differences. In agreement to our findings Verma et al. (2008) also reported non-significant difference in sero-prevalence of *Salmonella* agglutinins between male and females dogs.

Age wise distribution of seroprevalence of *Salmonella* agglutinins is shown in table 2. Data obtained in the study showed that in cattle, young (below 3 yrs) as well as adult cattle (>3 yrs) had almost similar sero-prevalence. Young buffaloes had higher

sero-prevalence (15.3%) in comparison to that of adult buffaloes (8.4%). Similarly, young goats also had higher seroprevalence (5.2%) in comparison to that of adult (>1 yrs) goats (2.1%).

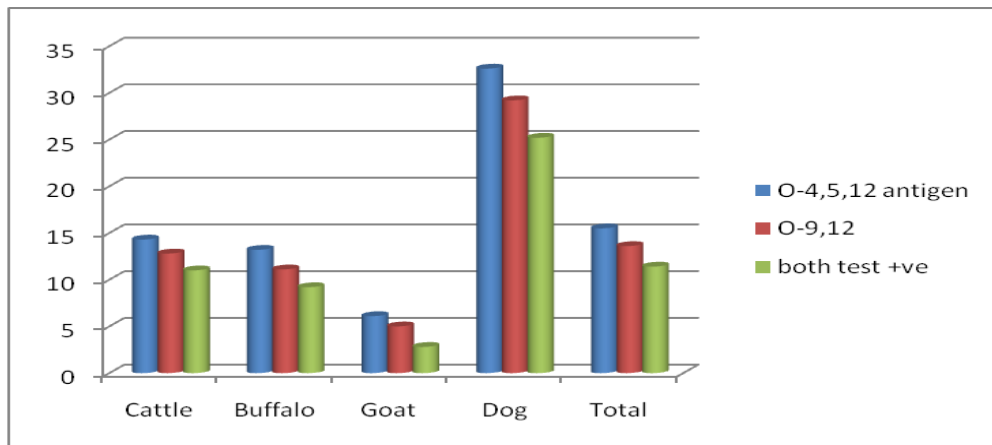
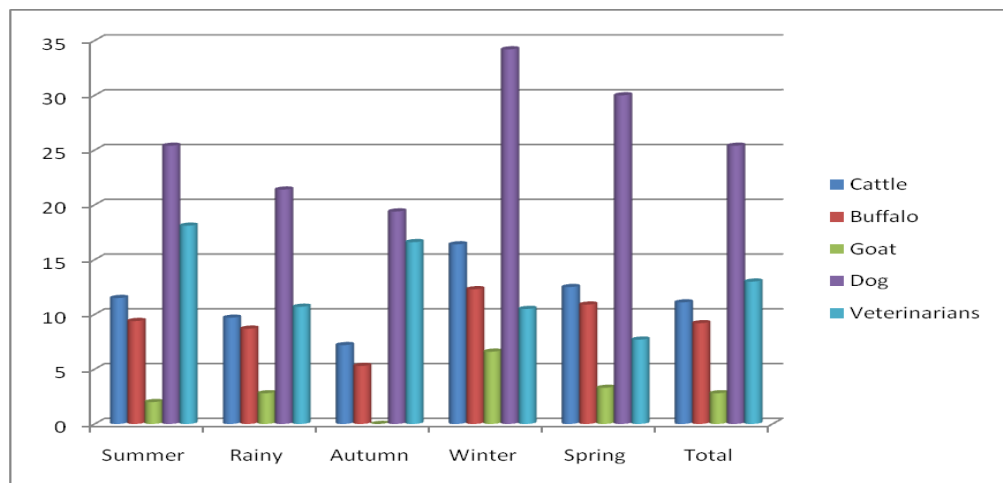


Figure 1: Percent sero-positivity for *Salmonella* infection in animals using slide micro agglutination test

Figure 2: Seasonal distribution of *Salmonella* agglutinins in different host species



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that of adult buffaloes (8.4%). Similarly, young goats also had higher seroprevalence (5.2%) in comparison to that of adult (>1 yrs) goats (2.1%).

The reason for this may be that young ones acquire the infection more easily due to their low immunity. In contrast, adult dogs had higher sero-prevalence (26.6%) in comparison to that of young dogs (22.3%). In agreement to our findings, Verma et al. (2008) have also reported high seroprevalence of *Salmonella* agglutinins in dogs with the increasing age, which might be either due to increase in susceptibility of dogs with age as in humans (Wray and Wray, 2000; Deborah et al., 2001) or repeated subclinical infection increased the antibodies detected by the test.

CONCLUSION

Present study has indicated the presence of *Salmonella* agglutinins in all the animal species tested. Dogs have shown the highest rate of seroprevalence of salmonellosis which further necessitates the control of disease among pets because of its zoonotic potential. Further studies employing large number of antigens and more specific tests would help in understanding the distribution pattern of *Salmonella* agglutinins in different regions of the country.

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