



Carrier status and seroprevalence of leptospirosis in cattle of South Andaman

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Received: 11-02-2016

Accepted: 14-12-2016

DOI: 10.18805/ijar.B-3186

ABSTRACT

The present study was conducted with an aim to investigate the seroprevalence of leptospiral antibodies in cattle which act as reservoir host. During the study a total of 427 cattle sera samples were collected from different parts of these islands. The samples were screened for presence of antibodies against different serovars of leptospira by microscopic agglutination test (MAT). The results revealed that out of 427 sera sample 180 (42.15%) showed antibodies against different serovars of leptospira. The serovars which showed positive results are *L. australis*, *L. autumnalis*, *L. canicola*, *L. hardzo*, *L. hebdomadis*, *L. icterohaemorrhagiae*, *L. pomona*, *L. pyrogenes*, *L. grippotyphosa*, *L. lai like*. The percent prevalence rate of leptospira ranged from 0.65 % (*L. autumnalis*) to as high as 19.61% (*L. hebdomadis*). It was also found that seropositivity of *L. grippotyphosa*, *L. icterohaemorrhagiae*, *L. hebdomadis* were higher compared to other serovars as these serovars were commonly detected from human cases also. Based on the present finding and the history of this disease in these islands it was revealed that the prevalence of leptospirosis in animal was high and also an alarming situation as these serovars were commonly prevalent in human being also.

Key words: Cattle, Leptospirosis, MAT, Seroprevalence, South Andaman

INTRODUCTION

Leptospirosis is a zoonotic disease and is commonly prevalent in humid tropic climate. The first confirmed report of leptospirosis is reported from this islands which dates back to 1929 when Taylor and Goyle isolated leptospire from patients with Weils diseases (Taylor and Goyle, 1931). Since then a lot of work has been carried out and different serovars/serogroups have been isolated from human and animals from different places of our country (Srivastava *et al.*, 1983, Srivastava and Kumar, 2003, Srivastava, 2008, Ratnam, 1994, WHO, 2000, Sehgal, *et al.*, 2000, Vijyachari *et al.*, 2008). Among animals, cattle and wild rodents are considered to be the main host which excrete leptospire in their urine but may not exhibit symptoms of active infection. In Andaman & Nicobar Islands leptospirosis is endemic and high prevalence rate has been recorded in animals and human (Sehgal *et al.*, 2000, Sharma *et al.*, 2003, 2006, Jeyakumar *et al.*, 2002, Sunder *et al.*, 2005, 2014). The disease affects wide range of animals viz. cattle, buffalo, goat, sheep, horse, pig etc, which cause heavy economic losses due to reproductive problems, death of foetus and loss of productivity (Srivastava, 2008). Generally, cattle are considered as the maintenance host of leptospira and also a potential source of infection to the other animals and human (Ellis, 1994). Various reports of seroprevalence of leptospirosis among cattle are available from different parts of the India (Srivastava *et al.*, 2003, Patel *et al.*, 2014, Panwala and Mulla, 2015, Balamurgan *et al.*, 2013). In A&N Islands

also the seroprevalence of leptospirosis among cattle and goat has been reported (Jeyakumar *et al.*, 2002, Sunder *et al.*, 2005, 2014, Sharma *et al.*, 2014, 2006). Information on the prevalence of leptospirosis is very important in animals as it is associated with one or more maintenance host and is also very important zoonotic pathogens. The knowledge of incidence and prevalence is very much important to understand the epidemiology of the leptospirosis in the region. Diagnosis of leptospirosis is generally done by microscopic agglutination test (MAT). This test is well proven and accepted by worldwide for detection of antileptosprial antibodies in the sera of human and animals (OIE, 2013). Therefore, the present study is conducted to know the seroprevalence of different serovars of leptospira in cattle of South Andaman.

MATERIALS AND METHODS

A total of 427 cattle sera samples from seven villages of South Andaman were collected. The samples were collected during the month of March to April 2015 at random from crossbred as well as non-descript cattle of South Andaman. The samples were sent to WHO Reference Laboratory for Leptospira, ICMR, Port Blair for sero-screening of leptosprial antibodies. All the samples were screened for presence of antibodies against different serovars of leptospira by microscopic agglutination test (MAT) as per the standard method (Sharma *et al.*, 2003). The panels of leptospira serovaras used are given in Table 1. MAT was

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Table 1 : Panel of leptospira serovars used for MAT test

Serogroup	Serovar	Strain	Genomospecies
Australis	Australis	Ballico	<i>Leptospira interrogans</i>
Autumnalis	Bangkinang	Bangkinang I	<i>Leptospira interrogans</i>
Canicola	Canicola	Hond Uterecht IV	<i>Leptospira interrogans</i>
Grippotyphosa	Grippotyphosa	Moskva V	<i>Leptospira interrogans</i>
Grippotyphosa	Grippotyphosa	CH 31	<i>Leptospira interrogans</i>
Hebdomadis	Hebdomadis	Hebdomadis	<i>Leptospira interrogans</i>
Icterohaemorrhagiae	Icterohaemorrhagiae	RGA	<i>Leptospira interrogans</i>
Icterohaemorrhagiae	Lai Like	AF 61	<i>Leptospira interrogans</i>
Pomona	Pomona	Pomona	<i>Leptospira interrogans</i>
Pyrogenes	Pyrogenes	Salinem	<i>Leptospira interrogans</i>
Sejroe	Hardjo	Hardjoprajitno	<i>Leptospira interrogans</i>

done at doubling dilution starting from 1:20. Positive samples were titrated upto end titres. A titre of 40 or more to any of the serovars is considered as evidence of leptospiral infection. A titre of 40 is used as the cut off because it is the closest dilution to the usual cut off of 50 used in seroepidemiological surveys (Everard *et al.*, 1985). The data were collected and analysed as per the standard statistical methods.

RESULTS AND DISCUSSION

The test result of the sera samples screened by MAT is given in table 2. Out of 427 sera samples screened for presence of leptospiral antibodies by MAT, a total of 180 animals showed seropositive to leptospira with an overall sero-prevalence rate of 42.15%. The serovars which showed positive are *L. australis*, *L. autumnalis*, *L. canicola*, *L. hardzo*, *L. hebdomadis*, *L. icterohaemorrhagiae*, *L. pomona*, *L. pyrogenes*, *L. grippotyphosa*, *L. lai like*. The per cent prevalence rate of leptospira ranged from 0.9 % (*L. autumnalis*) to as high as 15.7% (*L. icterohaemorrhagiae*). Among the serogroup which showed highest prevalence rate were *L. hebdomadis* (14.1 %), followed by *L. icterohaemorrhagiae* (12.9%), *L. lai like* (11.9%), *L. australis* (10.8%), *L. grippotyphosa* (5.6%), *L. pomona* (4.9%), *L. hardjo* (4.7%), *L. canicola* (3.5%), *L. pyrogenes* (2.8%) and *L. autumnalis* (0.5%) respectively.

Of the total 180 positive animals, 103 (57.5%) reacted to one serovar, 47 (26.3%) reacted to two serovars,

18 (10.1%) reacted to three serovars, 8 (4.5%) reacted to four serovars and 4 (2.2%) reacted to five serovars respectively. The common combination observed among the 77 sera that reacted to more than one serovar were *L. grippotyphosa*, *L. icterohaemorrhagiae*, *L. hebdomadis*, *L. lai like*. Out of the total number of animals showed positive to either one or more serovar, the percent prevalence in crossbred cattle (73.8%) is higher than the non-descript cattle.

Leptospira is highly endemic in Andman & Nicobar Islands and has been reported from both animals and human (Sehgal *et al.*, 1995, Sharma *et al.*, 2014, Sunder *et al.*, 2014). Several number of isolates and serovars have been isolated from the animals in this islands (Sharma *et al.*, 2003, Sehgal *et al.*, 2000). The finding of the present study indicated that leptospirosis was highly prevalent among the cattle of South Andaman. The report was also in agreement with the finding of earlier reports, wherein high prevalence rate of leptospirosis was reported from cattle and goat from A&N Islands. (Jeyakumar *et al.*, 2002, Sunder *et al.*, 2005, Sharma *et al.*, 2003). The high prevalence rate was due to the topography of the islands, high rainfall pattern, and stagnation of water in low lying areas. Earlier reports also suggested that there is high prevalence rate among the rat population also which is considered to be the main transmitting host for the leptospirosis. The high rainfall causes stagnation of water in the low lying areas and even

Table 2 : Frequency distribution of leptospria serovars

Serogroup	Number of sample showed positive	Percent positive (%) against the total number of sample tested	% Frequency against the total No. of positives
<i>L. australis</i>	46	10.8	15.03
<i>L. autumnalis</i>	2	0.5	0.65
<i>L. canicola</i>	15	3.5	4.90
<i>L. hardjo</i>	20	4.7	6.54
<i>L. hebdomadis</i>	60	14.1	19.61
<i>L. icterohaemorrhagiae</i>	55	12.9	17.97
<i>L. pomona</i>	21	4.9	6.86
<i>L. pyrogenes</i>	12	2.8	3.92
<i>L. grippotyphosa</i>	24	5.6	7.84
<i>L. lai like</i>	51	11.9	16.67
Total sera screened	427		

after the monsoon, the soil was wet and high moisture contents, thus facilitating the survival of leptospira in the environment which act as the primary source of infection. In the present study almost 42.1 % of the surveyed animals showed positive to leptospirosis. The animals which were affected with the leptospirosis continued to shed the organism through urine for several months. Although cattle act as a reservoir host of the leptospirosis, however, it may act as a continuous threat to the human population also.

Out of the total positive samples, which showed positive to one or more serovars of leptospira, the percentage of animals showed titre of 40 is more (97.7%) followed by titre of 80 (53.3%), 160 (10.5%), 320 (6.1%) and more than titre of 640 (2.2%) respectively. The animals which showed titre of more than 640 and above clearly showed that this might have recent infection in the past or in the clinical state of infection. The animals which showed titre of 40 and 80 were generally considered to be in chronic carrier state. Out of the total positive cases, almost 97.7 % of the samples showed titre of 40, however, 53.3 % of the animals showed titre of more than 80. Animals with low state of infection or showing low titre value were regarded as the carrier state and could become a source of infection to the healthy animals through shedding of organism in their urine. Generally carrier state of animals are apparently healthy without showing any clinical signs, however, they shed the organism in their urine for several months.

High prevalence rate of leptospirosis among the crossbred cattle was reported. The crossbred cattle are mainly Jersey and Holstein Friesian. Generally, the crossbred cattle were more prone to any infection. Reports also suggested that leptospirosis was highly prevalent among the cross bred than the indigenous breeds (Balakrishnan *et al.*, 2011). In contrary, (Agarwal *et al.*, 2005) reported that the leptospirosis was more prevalent in indigenous breeds than the cross bred.

Among the different serovars, frequency of high seroprevalence of *L. hebdomadis* (19.6 %) is reported followed by *L. icterohaemorrhagiae* (17.9%), *L. lai like* (16.7%), *L. australis* (15.1%), *L. grippotyphosa* (7.84 %), *L. pomona* (6.86%), *L. hardjo* (6.54%), *L. canicola* (4.9%), *L. pyrogenes* (3.92%) and *L. autumnalis* (0.5%) respectively. The high prevalence of serogroup other than *L. hardjo* may be a serious concern, as *L. hardjo* is considered to be the maintenance host for cattle (Faine, 1994). In the present

study, highest cases of *L. grippotyphosa*, *L. icterohaemorrhagiae* and *L. australis* have been reported, which were generally reported from the human cases. This serogroup was also very commonly reported from the human cases. Thus the high prevalence rate of leptospirosis may pose a serious threat to the human population. Presently, no vaccination was being practiced in the animals, however, the high seroprevalence rate animals may be clinically treated to free from the carrier state. Seasonal outbreak after the onset of monsoon was usually reported from the coastal areas viz. Tamil Nadu, Andaman & Nicobar Islands, Maharashtra, Kerala, Odisha etc. Usually the antibodies against leptospira remain in the animal's blood for considerable long period of time. Presence of antibodies did not mean that the animal was infected or was recently infected. These animals may act as a reservoir host or source of infection to the other healthy animals and human. Since, MAT is considered to be serovar/serogroup specific test, it was commonly used to study the sero-prevalence of leptospirosis among human and animal.

This finding of the present study suggested that cattle played a role in epidemiology of leptospirosis. Vijayachari *et al.*, 2003, studied the transmission cycle of leptospirosis which involves the maintenance hosts, the carrier hosts, the environment and human beings. Sharma *et al.*, (2006) also found the high sero-prevalence of leptospirosis in cattle (34%) and goats (29%) respectively. They also reported that the most common serovars were *L. icterohaemorrhagiae*, *L. hebdomadis* and *L. grippotyphosa* from the cattle. In the present study also high sero-prevalence rate of leptospira in cattle were reported.

Based on the present finding and the history of this disease in these islands it was revealed that the prevalence of leptospirosis in animal was high and also an alarming situation as these serovars were commonly prevalent in human being also. The possibility of vaccination might be considered for reducing the carrier state among the animals.

ACKNOWLEDGMENTS

The authors wish to thank WHO Reference Laboratory, ICMR, Port Blair for screening for the sera samples. Authors also thanks, Director, ICAR-CIARI for providing financial assistance and support for carrying out the present work.

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