



Analysis of Prevalent *Leptospira* Serovars in Different Animals of South Gujarat Region during Year of 2020

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Abstract

Background & Aims: Leptospirosis is a bacterial zoonotic disease transmitted through contact among animals that are harboring leptospira. Knowledge of prevalent leptospira in a particular animal of a particular geographical area is essential to understand the epizootiology of disease as well as the linkage between circulation of serovars in animals and humans, and to apply appropriate control measures.

Materials & Methods: For this retrospective analytic study, animal samples from different districts of south Gujarat region, India received in Microbiology department of Government Medical College (GMC), Surat, Gujarat region, India, during the year of 2020 for Microscopic Agglutination Test (MAT) of leptospira serovars included in the study. Results of MAT which was already performed using 12 different serovars were analysed to know prevalent serovars in a particular animal. Qualitative data was analysed using frequency and percentage.

Results: Out of 1406 animal's samples, 151 (11%) were positive from animals like cow, buffalo, bullock, and goat. More prevalent serovars in cows were Ictrohemorrhagiae (22%), hardjo (19%), patoc (17%), and pyrogen (16%). In buffalos, patoc (58%) and hardjo (27%) were found. In bullocks, hardjo (50%) and in goats, automonalis (50%), australis (22%) and patoc (14%) were found as prevalent serovars.

Conclusion: Different prevalent serovars have been observed in different animals from different districts of south Gujarat region, which will be helpful to trace the source of infection in human, to apply control measures, to know epizootiology of disease, and for developing strategies in future during vaccine development with emphasizing more on the prevalent serovars.

Keywords: Leptospirosis, Animal Samples, Serovars, Prevalence

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Introduction

Leptospirosis is a bacterial zoonotic disease, transmitted by spirochetes of genus leptospira, which

has more than 20 species and more than 200 serovars (1, 2). It circulates in the body of wide range of animals like rodents, cattle, buffalos, sheep, goats, pigs, deer, dogs,

camels, horses, raccoons, etc. Infection to human is usually transmitted by direct or indirect exposure to the skin (cuts/abrasions), mucous membranes (intact), contaminated urine, placental fluids, etc of these animals.

Knowledge of prevalent leptospira serovars in a particular animal of a particular geographical area is essential to understand the epizootiology of disease. It would be helpful to understand the linkage between circulating serovars in animals and humans. Moreover, these would help us to apply appropriate control measures as well as to apply strategies to control the burden of leptospirosis (3, 4).

Material & Methods

It was a retrospective analytic study which was started after ethical approval by Human Research Ethical Committee of Government Medical College (GMC), Surat, Gujarat region, India. Department of Microbiology of GMC is a state Reference laboratory for leptospirosis for whole South Gujarat region. Every year samples for Microscopic Agglutination Test (MAT), and for PCR, rapid test, and ELISA test samples come from different districts of south Gujarat region for suspected leptospirosis cases in human and samples for surveillance purpose from health animals with their owner's consent.

As we have approval to use the data of year 2020, in present study only animal's samples received during year 2020 were included. Human samples for suspected leptospirosis during this period were not included in study. MAT test which was already performed using faine 1999 method (5) for these samples as a routine

laboratory protocol was accomplished. In MAT test, antigens of serovars which were included in the panel were *L. australis* (*Australis*), *L. autumnalis* (*Bangkinang*) *L. ballum* (*Ballum*), *L. sejroei* (*Hardjo*), *L. grippityphosa* (*Grippityphosa*), *L. canicola* (*Canicola*), *L. hebdomadis* (*Hebdomadis*), *L. pomona* (*Pomona*), *L. semeranga* (*patoc*), *L. pyrogen* (*Pyrogen*), *L. icterohaemorrhagiae* (*Icterohaemorrhagiae*), and *L. bataviae* (*Batavia*). All the strains were obtained from the National Leptospirosis Reference Centre, Regional Medical Research Centre (World Health Organization collaborating center for diagnosis of leptospirosis, Indian Council of Medical Research (ICMR)) in Port Blair, and Andaman and Nicobar Islands. Data were entered in Excel sheet and quantitative data were analysed and reported as frequency and percentage.

Results

District wise analysis is shown in table 1. Total 1406 samples which were received were from 4 major district of south Gujarat region that were Navsari, Surat, Tapi, and valsad. These are the areas from where majority of cases of leptospirosis in human during the monsoon season were observed, and majority of harbor animals were at their home or came in contact with animals. Moreover, animals which they frequently come in contact are cow, buffalo, bullock, and Goat, and so, majority of samples which were received were from these animals only. Out of 1406 samples, 11% (151) samples were positive by MAT, out of which 7% (64) samples were from cows, 9% (24) were from buffalos, 15% (4) were from bullocks, and 25% (59) were from goats.

Table 1: District wise analysis of total samples received and positive samples.

District	Total No of samples	Positive by MAT Number (percentage)	Positive samples/ total samples in different animals			
			Cow	Buffalo	Bullock	Goat
Navsari	546	76(14%)	18(7%)	2(3%)	0	56(27%)
			270	68	2	206
Surat	105	14(4%)	8(11%)	5(45%)	0	1(4%)
			70	11	0	24

Tapi	330	13(12%)	2(1%) 213	5(5%) 107	2(20%) 10	2(100%) 2
Valsad	425	50(12%)	36(11%) 325	12(14%) 85	2(13%) 15	0 0
Total samples	1406	151(11%)	64/878 (7%)	24/271 (9%)	4/27 (15%)	59/232 (25%)

Table 2. Percentage of different serovars found in different animals

Animal	Total No of samples	Positive by MAT No(percentage)	Different Leptospira Serovars positive by MAT.No(percentage)									
			Australis	Automonalis	Canicola	Hardjo	Hebdomadis	Ictrohemorrhahiae	Patoc	Pyrogen	Pomona	Griphotyphosa
Cow	878	64 (7%)	3 (5%)	6 (9%)	3 (5%)	12 (19%)	5 (8%)	14 (22%)	11 (17%)	10 (16%)	0	0
Buffalow	271	26 (10%)	0	1 (4%)	1 (4%)	7 (27%)	0	0	15 (58%)	0	0	2 (8%)
Bullock	27	4 (15%)	0	1 (25%)	0	2 (50%)	0	0	1 (25%)	0	0	0
Goat	232	59 (26%)	13 (22%)	29 (50%)	0	0	0	1 (2%)	8 (14%)	0	3 (5%)	5 (8%)

As shown in table 2, in the cow, the more prevalent serovars which were observed by MAT test were *Ictrohemorrhahiae* (22%) followed by *hardjo* (19%), *patoc* (16%) and *pyrogen* (16%). In buffalos, *patoc* (58%) is more prevalent followed by *hardjo* (27%). In bullocks, *hardjo* serovar was observed with 50% prevalence. In goats, *automonalis* (50%) followed by *australis* (22%) and *patoc* (14%) were observed.

Discussion

During the year of 2020, 1406 animal samples were tested for MAT from the districts villages of the district of Surat, Navsari, Tapi, and Valsad, which had shown seropositivity for MAT test is 11%, 14%, 4%, and 12%, respectively. This suggests that Navsari and Valsad areas have higher seropositivity in animals for Leptospirosis. Animal wise analysis had shown that goat in Navsari, Bullock and buffalo in Valsad, buffalo in Surat, and bullock in Tapi are more potential animals of

that area for Leptospirosis transmission between animals and also in humans.

Serovars wise analysis showed that *Ictrohemorrhahiae*, *hardjo*, *patoc*, and *pyrogen* in cows, *patoc* and *hardjo* in buffalo, *hardjo* in bullock, and *automonalis* and *australis* in goats were the predominant serovars. Predominant serovars pattern is similar to the studies conducted earlier by Balakrishnan et al. (6), Prameela et al. (7), Anusha et al. (8), and Gaurav et al. (9).

Limitations

Still there is a scope of test in other domestic and wild animals like pig, dog, etc, which may be harboring the leptospirosis and causing zoonosis. Although there have been studies conducted in different parts of India, it is difficult to assess the true nature of the disease in epizootiological point, due to inadequate sample size. Continuous every year observations from the same areas

were not analyzed, which can be future scope of more observation and improvement.

Conclusions

The seroprevalence of leptospirosis among different animals in different districts of South Gujarat was significantly high. These prevent serovars analysis will be helpful to know the epizootiology of leptospirosis. It is also helpful to trace the source of infection in leptospirosis infected human subjects. Moreover, need for control measures can be strategies based on these data. Development of vaccines against leptospirosis which is a challenging thing can be developed or prioritized for these areas on these prevalent serovars first, compared to focusing on all 20 serogroup or 200 serovars.

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Conflict of interest

The authors have no conflict of interest in this study.

Ethical Statement

The study protocol was approved by the Human Research Ethical Committee of Government Medical College (GMC), Surat, Gujarat region, India.

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