Serological Investigation on Leptospirosis in Clinically Ailing Goats

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Abstract

Serum samples from 126 clinically ailing goats showing signs like anorexia, fever, oligolactia, mastitis, icteric mucous membranes and abortion from different villages of Navsari, Surat, Tapi and Valsad districts of South Gujarat were examined for antileptospiral antibodies by microscopic agglutination test (MAT) using 17 serovars. Among screened goats, seropositivity was found to be 14.29%. Seroreactivity was noted against serovars Hardjo, Canicola, Pomona, Pyrogenes, Bankinang, Grippotyphosa, Patoc1 and Australis. Female goats showed comparatively higher seropositivity than male goats. Age wise leptospiral seropositivity was found to be higher in goats above 3 years of age. Present result suggests leptospirosis in goats and also indicates circulation of reported serovars in south Gujarat.

Keywords
Goats, Leptospirosis, Serovars, South Gujarat.

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Introduction

Leptospirosis is worldwide zoonotic disease affecting domestic animals, wild animal and human beings. The disease causes economical losses in terms of decreased production performances and reproduction related problems in livestock. In India, leptospirosis in goats has been reported by many earlier workers (Verma et al., 2001; Sivaseelan et al., 2003; Balakrishnan et al., 2008; Meenakshisundaram and Chellapandian, 2010, Vihol et al., 2016). The disease occurs subclinically in goats and most often goes undiagnosed in field. It causes impaired fertility, neonatal deaths, abortions and decreased milk production in goats (Ellis, 1994). Infected goats develop chronic renal infection, become carrier of leptospires and disseminate bacteria through urine and contaminates the surroundings (Lilenbaum et al., 2009). In India, studies on leptospirosis in clinically ailing goats are limited. So the present study was undertaken to know the
leptospiral seroprevalence and serovars distribution among clinically ailing goats in south Gujarat.

Materials and Methods

A total of 126 serum samples were collected from clinically ailing goats from different villages of Navsari, Surat, Tapi and Valsad districts of South Gujarat. These animals showed clinical signs like anorexia, fever, agalactia/oligolactia, mastitis, icteric mucous membranes and abortion. At the same visit of sample collection, age and sex of animals were also noted.

Whole blood samples were collected from individual animal by jugular vein puncture directly in sterile 9.0 ml plain vacutainers. Samples were transported under cold chain system to our pathology laboratory. To obtain serum whole blood was kept in slanting position in 9.0 ml plain vacutainers until serum was extracted out. The 9.0 ml plain vacutainers were centrifuged at 7000 rpm for 10 minutes, if needed. The straw coloured serum was collected into 1.5 ml sterile cryo vials and stored at –20 °C for MAT.

Microscopic Agglutination Test (MAT)

Serum samples were tested for antibodies against live antigens of *Leptospira* sp. (serovars Pyrogenes, Australis, Bankinang, Grippotyphosa, Patoc-1, Pomona, Icterohaemorrhagiae, Hebdomadis, Canicola, Hardjo, Bellum, Bataviae, Tarassovi, Shermani, Kaup, Hurstbridge and Javanica) by MAT at Leptospirosis Reference Laboratory, Government Medical College, Surat (Vijayachari *et al.*, 2001) and/or National Institute of Veterinary Epidemiology and Disease Informatics (NIVEDI), Indian Council of Agricultural Research, formerly Project Directorate on Animal Disease Monitoring and Surveillance (PD-ADMAS), Hebbal, Bengaluru using standard procedure (Faine, 1982; WHO, 2013).

Statistical analysis

For statistical analysis, Chi-square test was used and considered to be significant at <0.05. Data were analysed using Web Argi Stat Package (WASP) software developed by Jangam and Wadekar, Indian Council of Agricultural Research (ICAR), Goa, India (Jangam and Wadekar, 2012).

Results and Discussion

Out of total 126 serum samples screened from clinically ailing goats, antileptospiral antibodies were detected in 18 samples indicating 14.29 % seropositivity. Among seropositive goats history of abortion was recorded in maximum number of cases (23.08 %) followed by icteric mucous membranes (21.05 %), oligolactia/agalactia (14.29 %), fever (13.33 %), mastitis (10.00 %) and anorexia (3.57 %) in different combinations (Table 1). Our findings were in agreement with the earlier observations made in goats (Faine *et al.*, 2000; Lilenbaum *et al.*, 2007; Lilenbaum *et al.*, 2008). Balakrishnan (2012) reported higher seropositivity in clinically ailing goats. Reproductive problems seen in goats might be due to the localization of leptospires in reproductive tract/uterus (Dehkordi *et al.*, 2011) which impairs fertility. In an endemic scenario as observed in this study subclinical expressions are common and play an important role in the epidemiology of the disease. In addition further, the variations in clinical expression might be due to the stage of the infection, various contributing factors and susceptibility index of individual animals to the infection.

Serovars reported from clinically ailing goats were Hardjo, Canicola, Pomona, Pyrogenes, Bankinang, Grippotyphosa, Patoc1 and...
Australis (Table 2). Serovars Pomona, Hardjo and Canicola were reported with abortion cases and serovars Pyrogenes and Hardjo were reported from mastitis and oligolactia cases respectively. Serovars Pyrogenes, Pomona, Canicola, Bankinang, Grippotyphosa, Patoc1 and Australis were reported in animals with icteric mucous membranes. The study revealed presence of more than one serovars in goats with abortion, fever or icteric mucous membranes. The present findings were in agreement with the observations made in clinically ailing goats from India in past (Tripathy et al., 1985; Balakrishnan, 2012). Balakrishnan (2012) reported 5 serovars namely Hardjo, Hebdomadis, Australis, Icterohaemorrhagiae and Pomona in seropositive goats with clinical symptoms. On the same line Tripathy et al., (1985) reported involvement of serovars Pomona and Hardjo in seropositive goats with mild clinical signs like pyrexia and reduction in milk yield. Many workers have reported involvement of serovar Hardjo (Ellis et al., 1986; Faine et al., 2000), serovar Pomona (Leon-Vizcaino et al., 1987) in abortion cases. It is noteworthy report involvement of serovar Pomona as predominant one in goats with abortion. Age-wise highest prevalence was noted in goats above 3 years of age (7/47, 14.90 %) followed by 1-3 years of age (10/68, 14.71 %) and below 1 year age (1/11, 9.09 %) (Table 3). Thus it may be noted that higher age (3 years and above) in goats favors the occurrence of leptospiral expressions. Beside this it indicates that among clinically ailing seropositive animals the prevalence of leptospirosis was directly proportional to the age of animals signifying higher chances of frequent exposure as the animal ages might be responsible and supported the views of Talebkhan et al., (2003), Hassanpour et al., (2008) and Balakrishnan (2012).

In present study, clinical expressions were seen in more number of female goats (18.31 %) in comparison to male goats (9.09 %) (Table 4) and supported the observation of earlier workers (Agunloye et al., 1997; Faine et al., 2000 and Lilenbaum et al., 2007; Abiayi et al., 2011). Contrary to this, Agunloye (2002) and Balakrishnan (2012) reported higher prevalence in male goats (bucks) than female goats does. Agunloye (2002) reported that there is no reliable evidence that the gender of animals can influence the prevalence rate of the disease.

**Table.1** Details Leptospiral seropositivity in clinically ailing goats

| Sr. No. | Clinical signs          | Total no. of cases | No. of seropositive animals |
|--------|------------------------|--------------------|-----------------------------|
| 1.     | Abortion               | 13                 | 3 (23.08 %)                 |
| 2.     | Anorexia               | 28                 | 1 (3.57 %)                  |
| 3.     | Fever                  | 30                 | 4 (13.33 %)                 |
| 4.     | Oligolactia            | 7                  | 1 (14.29 %)                 |
| 5.     | Mastitis               | 10                 | 1 (10.00 %)                 |
| 6.     | Icteric mucous membranes | 38               | 8 (21.05 %)                 |
| Total  |                        | 126                | 18 (14.29 %)                |
Table.2 Details of serovars reported in clinically ailing goats

| Sr. No. | Clinical signs                  | No. of cases (Per cent) | Serovars reacted                  |
|---------|--------------------------------|-------------------------|-----------------------------------|
| 1.      | Abortion                       | 1 (5.56 %)              | Hardjo and Canicola               |
|         |                                | 2 (11.11 %)             | Pomona                            |
| 2.      | Anorexia                       | 1 (5.56 %)              | Hardjo                            |
| 3.      | Fever                          | 3 (16.67 %)             | Pyrogenes                         |
|         |                                | 1 (5.56 %)              | Bankinang, Grippotyphosa and Patoc1 |
| 4.      | Oligolactia                    | 1 (5.56 %)              | Pyrogenes                         |
| 5.      | Mastitis                       | 1 (5.56 %)              | Hardjo                            |
| 6.      | Icteric mucous membranes       | 2 (11.11 %)             | Pyrogenes                         |
|         |                                | 1 (5.56 %)              | Australis                         |
|         |                                | 2 (11.11 %)             | Pomona                            |
|         |                                | 1 (5.56 %)              | Pyrogenes and Bankinang           |
|         |                                | 1 (5.56 %)              | Bankinang, Patoc1 and Pomona      |
|         |                                | 1 (5.56 %)              | Grippotyphosa, Patoc1 and Canicola |

Table.3 Agewise details of seropositivity in clinically ailing goats

| Sr. No. | Particulars | Total no. of cases | No. of seropositive animals |
|---------|-------------|--------------------|-----------------------------|
| 1.      | <1 year     | 11                 | 1 (9.09 %)                  |
| 2.      | 1-3 years   | 68                 | 10 (14.71 %)                |
| 3.      | >3 years    | 47                 | 7 (14.90 %)                 |
|         | Total       | 126                | 18 (14.29 %)                |

χ² = 0.264 NS

Note: "NS" - Non significant at P < 0.05

Table.4 Sexwise details of seropositivity in clinically ailing goats

| Sr. No. | Particulars | Total no. of cases | No. of seropositive animals |
|---------|-------------|--------------------|-----------------------------|
| 1.      | Male        | 55                 | 5 (9.09 %)                  |
| 2.      | Female      | 71                 | 13 (18.31 %)                |
|         | Total       | 126                | 18 (14.29 %)                |

χ² = 2.150 NS

Note: "NS" - Non significant at P < 0.05

In conclusion, seropositivity in screened goats in south Gujarat indicates contaminated environment of the region and threat to other animals and humans. The study indicated circulation of various serovars. Leptospirosis is reported as cause of reproductive losses in animals and it should be considered when investigating any reproductive problems where infection is suspected. Further epidemiological studies including different...
animals and humans should be carried out in the south Gujarat, to combat this zoonotic disease.

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