

Incidence of *Leptospira* infection due to heavy rains: A study in Gujarat state

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Incidence of leptospirosis in animals and human are particularly high following heavy rains all over the world (Branding *et al.* 1996). In India, states of Gujarat, Maharashtra, Tamil Nadu, Kerala and Andaman and Nicobar Islands are particularly endemic and incidences in human are perennially reported from these states during the monsoon season (Maskey *et al.* 2006)

Gujarat state had unprecedented heavy rains during August–September 2006. Suspecting incidences of *Leptospira* infection in livestock, this study was undertaken in areas predominantly affected by heavy rains in villages like Paldi, Motived, Daboli, Kosad, Varizar, Aastodia, Raipur, Sarengpur, Vastrapur, Makarua, Khanpura, Chandlodia, Amraiwadi, Khadiya, Nava vadai, Maninagar, Baherampura and Jashodanagar. These villages had also reported instances of human leptospirosis.

Blood samples from randomly selected animals in these areas were collected and screened under dark field microscope and also a drop of blood sample each was inoculated into liquid EMJH medium. The samples that showed the evidence of *Leptospira* under the dark field microscope but were found to be contaminated, were filtered through 0.22 µm nitro cellulose membrane syringe filters and inoculated into Ellinghausen McCullough Johnson Harris

(EMJH) medium. The tubes were incubated at 30°C in a biological oxygen demand incubator (BOD) for 1 week at the end of which the cultures were screened under dark field microscope. Then onwards, the samples were screened at 15 days interval. The details of the samples analyzed and the results of screening at the end of 5 weeks of incubation are indicated in Table 1.

The organisms were subjected to pathogenicity tests (Gangadhar *et al.* 2000) and were found to be pathogenic. The isolates are yet to be bio-typed. Typing of *Leptospira* isolates is a big limitation in *Leptospira* research in the country as typing facilities are almost non-existent within the country and there are policy restrictions to send the culture out of the country.

Leptospire were isolated from 34 out of 184 blood samples from Surat area (isolation rate 18.47%), 5 out of 15 samples from Mehasana area and 14 out of 539 from Ahmedabad area (isolation rate 2.59%). *Leptospira* isolated from a buffalo from Surat area, stained by the ADMAS *Leptospira* staining kit (Gangadhar and Rajasekhar 1998) is presented in Fig.1.

The ground reality of the prevailing environmental situations in Surat and Ahmedabad areas support the findings, in that, Surat was worst hit with floods. More than 75% of

Table 1. Details of clinical samples processed for detection of *Leptospira* infection in animals in rain affected Gujarat state

Source of samples	Cattle and buffaloes		Dog		Goat		Pig		Total	
	No.of samples	Isola-tions	No.of samples	Isola-tions	No.of samples	Isola-tions	No.of samples	Isola-tions	No.of samples	Isola-tions
PD_ADMAS unit, Ahmedabad	513	11	7	1	111	-	8	2	539	14
Disease investigation laboratory, Surat	184	34							184	34
Disease investigation unit, Mehsana	15	5							15	5

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the city was reportedly marooned with rain water standing up to roof level and beyond, which explains the higher

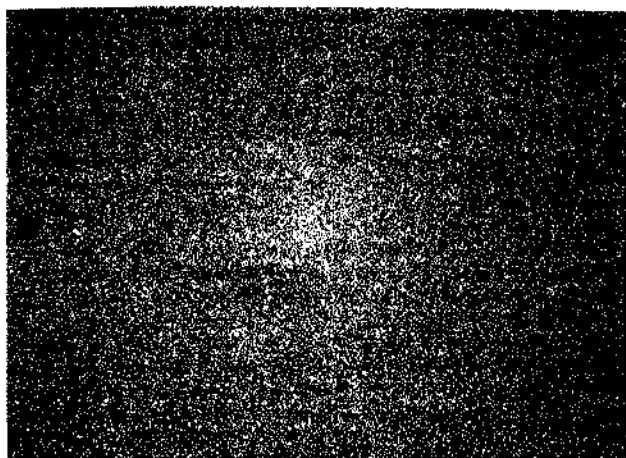


Fig. 1. Leptospire isolated from a buffalo from Surat area stained by ADMAS *Leptospira* staining kit (100x)

Leptospira isolation rate in this area. The areas around Ahmedabad were comparatively less inundated, therefore less number of affected animals, even though the number of sample screened is larger. The state having predominantly higher buffalo population, more number of infected animals were buffaloes. Statistical significance of the data was tested using chi square test for independence, which revealed a low probability of $P \leq 0.001$. This means occurrence of *Leptospira* infection was highly dependent on rains.

An upsurge of *Leptospira* cases following heavy rains and floods is common all over the world (WHO 1995, Fuortes and Nettleman 1994, Ko *et al.* 1999). Heavy rains and flooding was responsible for an outbreak of leptospirosis and considerable human panic in Mumbai during July-August 2005 (Maskey *et al.* 2006). Flooding and stagnation of water helps dissemination of leptospirosis often bringing up all the contaminating material including the dead rats from under the ground. Garbage heaps in urban areas and manure pits in villages particularly act as the major sources of *Leptospira* infection during rains posing great public health risks (Gangadhar *et al.* 2006).

Therefore, it is necessary that an anticipated contingent plan should be implemented in every vulnerable area before monsoon.

SUMMARY

The study was conducted to estimate the incidence of *Leptospira* infection due to heavy rains in Gujarat state. Blood samples were collected from randomly selected animals from heavy rain-affected areas. *Leptospira* were isolated from 34 out of 184 blood samples from Surat area, which was worst hit with floods. Results revealed that occurrence of *Leptospira* infection was highly dependent on rains.

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