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Research Article

EPIDEMIOLOGY OF LEPTOSPIROSIS IN HUMAN BEINGS IN AND AROUND NAMAKKAL DISTRICT, TAMIL NADU

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ABSTRCT
The present study was undertaken to know the incidences and status of leptospirosis in human beings in and around Namakkal district, Tamil Nadu. A total of 126 sera from humans with the history of pyrexia of unknown origin and febrile illness were collected and subjected to microscopic agglutination test (MAT) using pooled *Leptospira* antigen (*canicola, pomona, icterohaemorrhagiae, grippotyphosa, hardjo, hebdamadis, javanica, australis, autumnalis* and *patoc I*). Among different categories of human population, no significant differences (P>0.05) in seroprevalence of leptospirosis were found between male (51.2 per cent) and female (57.1 per cent), and among different age group people (53.9 per cent in adults and 50.0 per cent in young less than 15 years of age). But, significant differences (P<0.05) in seroprevalence were found among different categories of people based on their occupation and locality (60.6 per cent among people associated with agricultural activities and 31.3 per cent in office goers); with total seropositivity of 53.2 per cent. Serovar-specific seroprevalece among positive cases was carried out and highest seropositivity found to be *autumnalis* (41.8 per cent) and lowest was *hardjo* (3.0 per cent). Eventhough the prevalence of leptospirosis is more among humans associated with agricultural activities, it is inevitable that indirect exposure by the human population to the environment contaminated with urine of cattle, sheep, goats, dogs, pigs, rodents and wild animals infected clinically and sub clinically by leptospirosis may also contribute to the cause. Hence, personal hygiene and protective measures like contact with stagnant water, barefoot walking, drinking contaminated water without boiling etc., have to be avoided.

Keywords: *Leptospirosis, Human Beings, Epidemiological Risk Factors, Serovar-Specific Seroprevalence*

INTRODUCTION

Leptospirosis has much greater incidence in tropical regions and has now been identified as one of the emerging zoonotic diseases in human beings. Humans are accidental hosts and become infected through occupational exposures. In India, leptospirosis has gained extreme public health importance because of huge livestock, rodents and wildlife populations, poor sanitary conditions and animal managemental practices, and association between man and animals, providing a favourable environment for the spread of the disease (Venkatesha and Ramadass, 2001). Animals with subclinical leptospirosis are carriers and potential danger of spreading the infection to healthy animals and human beings (Ramani and Punya, 2005). Hence, there is a need for etiological diagnosis of leptospirosis in all hospitals as this would increase public awareness and help to deal with situations of outbreaks (Velineni *et al.,* 2007).

Recent globalization and worsening social inequality have changed the epidemiology of leptospirosis and it is now an important cause of disease among urban slum dwellers as well as poor subsistence farmers (McBride *et al.,* 2005). Epidemiological studies will provide necessary knowledge regarding the factors which facilitate the introduction, perpetuation and transmission of leptospires. Immunosuppressive diseases like AIDS and tuberculosis are also widely prevalent in and around Namakkal district and these factors should be recognized in order to avoid multiple organ failure. In addition to these immunosuppressive diseases, leptospirosis is also frequently reported in Tamil Nadu. Hence, this work

has been carried out to know the incidences and status of leptospirosis in human beings in and around Namakkal district, Tamil Nadu in order to control the disease.

MATERIALS AND METHODS

Sample Collection and Serological Testing

Sera from humans with the history of pyrexia of unknown origin (PUO) and febrile illness were obtained from medical practitioners and government hospitals in and around Namakkal district, Tamil Nadu and stored at -20°C until use. Epidemiological data such as age, sex and occupation of the patients were also collected, collated and interpreted.

All the serum samples were subjected to dark-field microscopical examination for initial screening and then to microscopic agglutination test (MAT) using pooled antigen (antigen with multiple serovars *viz., canicola, pomona, icterohaemorrhagiae, grippotyphosa, hardjo, hebdamadis, javanica, australis, autumnalis* and *patoc I*) as per the procedure suggested by Cole *et al.,* (1973).

Statistical Analysis

Per cent positivity and prevalence rate were calculated as per the method described in Veterinary Clinical Epidemiology, A Problem - Oriented Approach (Smith, 1995). Chi-square test is used for the comparison of different categories of human population in respect to the frequency of occurrence of leptospirosis (Mahajan, 1999).

RESULTS AND DISCUSSION

Incidences of Leptospirosis in Humans

In the present study, out of 126 human sera screened, 67 samples were positive by MAT with the seropositivity of 53.2 per cent. This is in accordance with the findings of Natarajaseenivasan and Ratnam (1997), who reported 68.3 per cent in rice mill workers of Salem, South India and concluded that the rice mills in Salem, having large rodent populations, various animals living in close proximity, a wet environment and unprotected exposure of the workers to the environment, constitute an ideal setting for transmission of leptospirosis and could be an epidemiological niche of leptospirosis; and Koteeswaran (2006), who reported 57.6 per cent seropositivity.

Age-Wise, Sex-Wise and Occupation-Wise Seropositivity

Suspected human cases in this study were categorised into different groups and seropositivity is correlated with various risk factors like age, sex and occupation (Table 1). The per cent seropositivity of leptopsirosis among male and female was 51.2 and 57.1 per cent, respectively; among adults and young (<15 years of age) was 53.9 and 50.0 per cent, respectively; and among people associated with agricultural activities and office goers was 60.6 and 31.3 per cent, respectively (Figure 1).

In this study, no significant differences ($p>0.05$) in seroprevalence of leptospirosis were found between male and female, and among different age group people. However, significant differences ($p<0.05$) in seroprevalence of leptospirosis were found among different categories of people based on their occupation and locality.

Irrespective of age and sex, human beings are equally susceptible to leptospirosis. But, people associated with agricultural activities are more frequently exposed to the contaminated environment thereby contracting the infection.

It is agreeable with the findings of Aslantas and Ozdemir (2005), who reported that the seroprevalence of leptospirosis in different locations varied significantly, but no significant differences on the frequency of leptospirosis with respect to the age or sex of the animals. However, Patel *et al.,* (2006) reported leptospirosis is seen more in age of 26-45 probably because it is the age group of the working people that is more exposed to rains and stagnant water.

Table 1: Sex, age and occupation-wise seropositivity in humans in and around Namakkal district, Tamil Nadu

Categories	MAT result		
	Number of samples tested	Number positive	Per cent positive
Male	84	43	51.2
Female	42	24	57.1
Adult	102	55	53.9
Young (<15 years of age)	24	12	50.0
People associated with agriculture activities	94	57	60.6
Office goers	32	10	31.3
Total	**126**	**67**	**53.2**

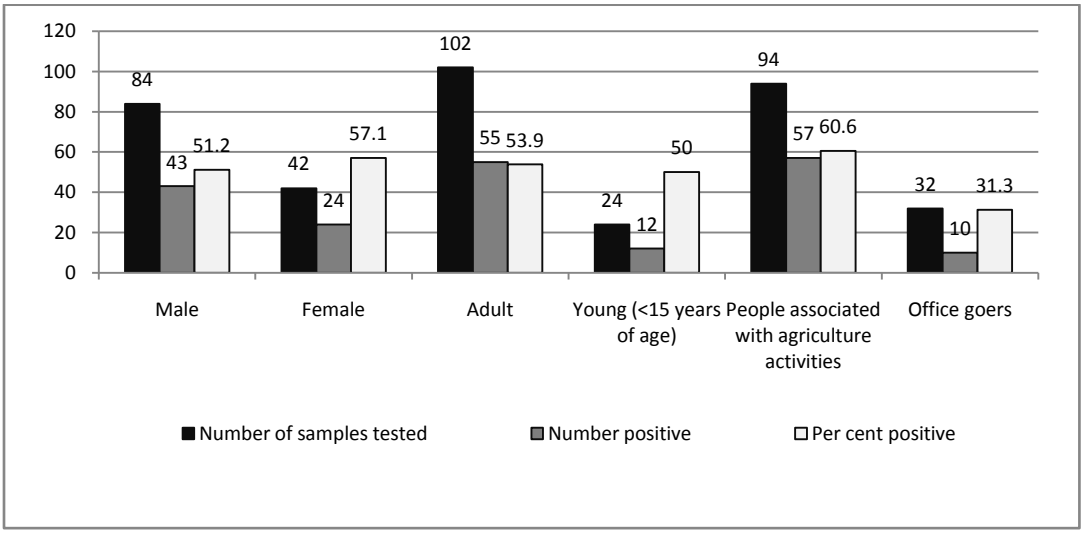

Figure 1: Sex, age and occupation-wise seropositivity to leptospirosis

Serovar-Specific Seroprevalence

Among 67 positive cases, 28 (41.8 per cent), 13 (19.4 per cent), 14 (20.9 per cent), 5 (7.5 per cent), 5 (7.5 per cent) and 2 (3.0 per cent) samples were positive for serovars *autumnalis*, *icterohaemorrhagiae*, *pomona*, *grippotyphosa*, *canicola* and *hardjo* respectively (Table 2, Figure 2). It is in agreement with the findings of Ratnam *et al.*, (1983), who found the presence of antibodies against *autumnalis*, *grippotyphosa*, *pomona*, *hebdomadis*, *canicola*, *tarassovi*, *icterohaemorrhagiae* and *bataviae* in human population. In this study, serovar *autumnalis* was found to be the predominant *Leptospira* serovar followed by *icterohaemorrhagiae*, *pomona*, *grippotyphosa*, *canicola* and *hardjo*. It is in accordance with the findings of Kathiravan *et al.*, (1987); Natarajaseenivasan and Ratnam (1997), who observed *autumnalis* as a predominant serovar. The distribution of leptospiral antibodies against other several serogroups was also identified by Agunloye *et al.*, (2001), who found antibodies against *Leptospira icterohaemorrhagiae*, *L.hardjo*, *L.grippotyphosa* and *L.pomona;* Koteeswaran (2006), who found antibodies against serogroup Australis among human and animals in Tamil Nadu; Velineni *et al.*, (2007) found antibodies against serogroup Icterohaemorrhagiae (68 per cent) followed by Australis (22 per cent), Autumnalis (8 per cent) and Javainica (2 per cent).

Table 2: Serovar-specific seroprevalence in humans in and around Namakkal district, Tamil Nadu

Serovars	MAT result Number of samples tested	Number positive	Per cent positive
autumnalis	67	28	41.8
icterohaemorrhagiae	67	13	19.4
pomona	67	14	20.9
grippotyphosa	67	5	7.5
canicola	67	5	7.5
hardjo	67	2	3.0
australis	67	0	0
hebdomadis	67	0	0
javainica	67	0	0
patoc-I	67	0	0

Thus from the work, it is concluded that leptospirosis is an emerging anthrapozoonotic disease, now being increasingly reported in all parts of India; causing multiple-organ failure and mortality. The results from this study indicated that neither age nor sex had a significant effect on the frequency of leptospirosis, whereas it varies in different categories of human population based on their occupation and geographical location. Even though the prevalence of leptospirosis is more among humans associated with agricultural activities, it is inevitable that indirect exposure by the human population to the environment contaminated with urine of cattle, sheep, goats, dogs, pigs, rodents and wild animals infected clinically and subclinically by leptospirosis may also contribute to the cause. Hence, personal hygiene and protective measures like contact with stagnant water, barefoot walking, drinking contaminated water without boiling etc., have to be avoided to prevent contracting of leptospirosis from the contaminated environment.

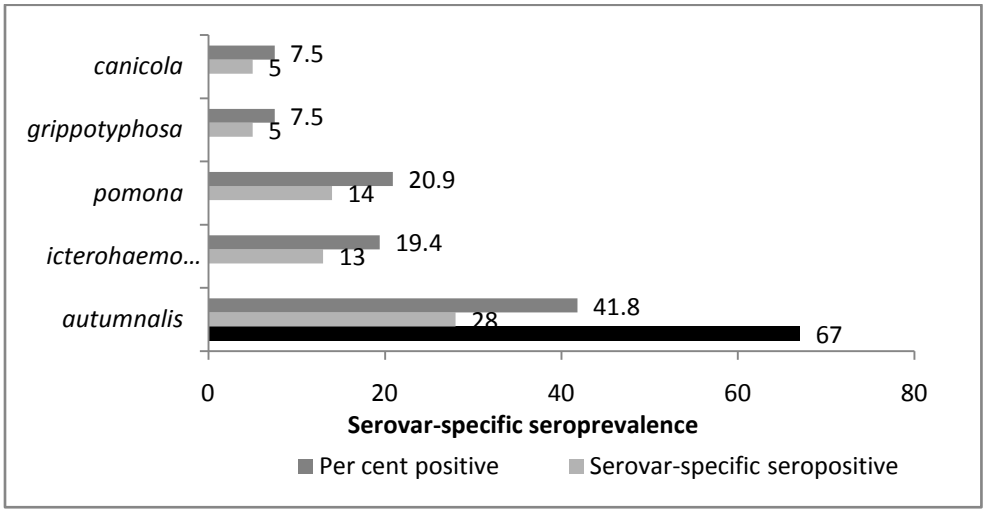

Figure 2: Srovar-specific seroprevalence in positive cases of leptospirosis

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