

SEROLOGICAL STUDIES ON LEPTOSPIROSIS IN PAKISTAN

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Abstract

Prevalence of agglutinating antibodies against certain leptospiral serotypes were investigated in man, domestic animals and rodents of Pakistan. In man *L. grippityphosa* (14.2%), in cow *L. pomona* (50.9%), in buffalo *L. pomona* (20.0%), in sheep *L. australis* (51.4%), in goat *L. pyrogenes* (30.7%) in *R. norvegicus* *L. grippityphosa* (65.2%) and in *Suncus murinus* *L. grippityphosa* (20.0%) were found as most prevalent serotype. The overall leptospira prevalence rate in commensal rats (*A. rattus* and *R. norvegicus*) were determined 100%. The result suggested that the rodents and *Suncus murinus* play main role in transmission of leptospiriosis in man and livestock (JPMA 37 : 233, 1987).

INTRODUCTION

Leptospirosis is one of the most wide spread zoonosis. The most important serotype *L. icterohaemorrhagiae* is wide spread and encountered in most parts of the world in man and animals.^{1,8} Leptospirosis, primarily parasites of vertebrates other than human beings, such as rodents, dogs, pigs and cattle, in which the bacteria persist throughout life as asymptomatic infection of the kidney^{9,14}. These infected animals continuously shed leptospira in the urine. Human infection results when a person becomes infected through skin contact with urine from an infected animal or by exposure to urine contaminated water or soil. The organisms enter the blood and then invade various tissues and organs, particularly the kidney, liver, meninges and conjunctiva. The clinical manifestations of human leptospirosis vary considerably. It may be a mild influenza-like illness or a severe or fatal disease characterized by jaundice.

Rodents have been recorded to be carriers of leptospires throughout the world and are important reservoir of infection for man and live stock. The role of the rodents as a source of leptospiral transmission is important yet little attention has been paid in Pakistan. In this serological investigation, leptospiral antibodies were detected in man, domestic animals, rodents and *Suncus murinus* (Insectivora) which suggested the prevalence of leptospiral infection in Pakistan.

MATERIAL AND METHODS

Rodents were trapped from different habitats including residential areas, wheat and rice godowns, agricultural fields and sandy desert areas. These rodents were brought alive in cages and cardiac blood taken in Vertebrate Pest Control Laboratory. Blood of domestic animals were collected from slaughter house and human blood from Karachi hospital.

All blood sera were preserved at 20°C for the serological investigation and tested for the presence of leptospiral antibodies using rapid macroscopic slide agglutination test.¹⁵ All undiluted sera were first screened serologically by using four pools of antigens as indicated below.

Pool 1. *L. ballum*, *L. canicola*, *L. icterohaemorrhagiae*.

Pool 2. *L. bataviae*, *L. Grippityphosa*, *L. pyrogenes*.

Pool 3. *L. autumnalis*, *L. pomona*, *L. woiffli*.

Pool 4. *L. australis*, *L. Hyos*, *L. mini*, Georgia.

Positive reactions with any of these pools were then checked by using the formalized suspensions of individual leptospira serotype antigens, comprising the positive pool. A result was considered positive when 50% agglutination was observed.

RESULTS

Sera of 56 human beings, 55 cows, 60 buffaloes, 35 sheep, 65 goats, 290 rodents and 20 house shrew (*Suncus murinus*) were tested serologically for the presence of leptospiral infection. Prevalence of leptospiral antibodies were found 25%, 92.7%, 81.6%, 94.2%, 81.5%, 68.2% and 20%, respectively (Table-I).

TABLE – I
Prevalence of Leptospiral Antibodies in Man and
Animals of Pakistan.

Species	Number Tested	Number Positive	Percent Positive
Human being	56	14	25.0
Cow	55	51	92.7
Buffalo	60	49	81.7
Sheep	35	33	94.3
Goat	65	53	81.5
Rodent	290	198	68.3
House shrew	20	4	20.0

Rodent species were studied for the presence of leptospiral antibodies. The commensal rats (*R. raus* and *R. norvegicus*) showed 100% infection rate. The rodent species *T indica* 90.0%, *M. hurrianae* 6 1.8%, *B. bengalensis* 20.0% *N. indica* 40.0% and *M. meltada* 24.0% were also found seropositive. These rodents were trapped from agricultural areas and grain godowns, which represents threat to farmers and their live stock (Table-II).

TABLE -II
Prevalence of Leptospiral Antibodies
in Rodents of Pakistan.

Rodent Species	Number Tested	Number Positive	Percent Positive
<i>Rattus norvegicus</i>	35	35	100.0
<i>Rattus rattus</i>	55	55	100.0
<i>Mus. musculus</i>	20	2	10.0
<i>Tatera indica</i>	60	54	90.0
<i>Meriones hurrianae</i>	55	34	61.8
<i>Bendicota bengalensis</i>	20	4	20.0
<i>Nesokia indica</i>	20	8	40.0
<i>Mellardia meltada</i>	25	6	24.0
Total :	290	198	68.2

Seven leptospiral serotypes were investigated in positive sera of man and animals. *L. grippityphosa* was found most prevalent serotype in rodents, house shrew, domestic animals and man. 65.7% *R. norvegicus* and 63.6% *R. rattus* were found seropositive. *L. pomona*, *L. australis* and *L. pyrogens* antibodies were detected from rodents and domestic animals. 50.9% cows were found seropositive to

L. pomona and 45.4% to L. wstralis; 22.8% sheep and 30.7% goats were found seropositive to L. pyrogens . L. canicola and L. ballum were found as least prevalent serotypes and detected only in rodents sera. L. icterohemorrhagiae antibodies were found in rodents, domestic animals and human sera. This serotypes cause Well's disease in man. 10.7% of human sera were found positive to L. icterohaemorrhagiae serotype (Table-III).

TABLE- III
Distribution of Leptospiral Serotypes in Positive Man and Animals.

Species	No. Tested	L. ictero- hemorrhagiae		L. canicola		L. ballum		L. grippo- typhosa		L. Pyrogens		L. pomona		L. australis	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Rattus norvegicus	35	5	14.2	0	0.0	0	0.0	23	65.7	0	0.0	0	0.0	5	14.2
Rattus rattus	55	2	3.6	0	0.0	5	9.0	35	63.6	4	7.2	2	3.6	7	12.7
Mus. musculus	20	0	0.0	0	0.0	2	10.0	2	10.0	0	0.0	0	0.0	0	0.0
Tatera indica	60	9	15.0	3	5.0	0	0.0	21	35.0	2	3.3	9	15.0	10	16.6
M. hurrianae	55	0	0.0	2	3.6	5	9.0	19	34.5	0	0.0	0	0.0	8	14.5
B. bengalensis	20	0	0.0	0	0.0	0	0.0	4	20.0	0	0.0	0	0.0	0	0.0
N. indica	20	3	15.0	5	25.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
M. meltada	25	0	0.0	0	0.0	0	0.0	3	12.0	0	0.0	1	4.0	2	8.0
S. murinus	20	0	0.0	0	0.0	0	0.0	4	20.0	0	0.0	0	0.0	0	0.0
Cow	55	3	5.4	0	0.0	0	0.0	5	9.0	0	0.0	28	50.9	25	45.4
Buffalo	60	12	20.0	0	0.0	0	0.0	7	11.6	0	0.0	12	20.0	0	0.0
Sheep	35	4	11.4	0	0.0	0	0.0	4	11.4	8	22.8	3	8.5	18	51.4
Goat	65	4	6.1	0	0.0	0	0.0	8	12.3	20	30.7	12	18.4	9	13.8
Human beings	56	6	10.7	0	0.0	0	0.0	8	14.2	0	0.0	0	0.0	0	0.0

DISCUSSION

Each leptospiral serotype has its own particular animal host, usually a rodent species.

Domestic animals, dogs and pigs also act as natural reservoirs. In localities where different species of rodents and animals exist together, as in agricultural fields and areas where abundant food supply are available as in grain storage, one serotype of leptospira may be carried by different animal species and one species of animal may be infected with more than one leptospiral serotype. Rodent species R. norvegicus and R. rattus have a cosmopolitan distribution and many different serotypes have been isolated from these species in other countries¹².

The results indicate that the commensal rodents are mainly responsible for the transqission of L. icterohemorrhagiae and L. grippotyphosa infection in man and domestic animals. These commensal rodents commonly act as carriers and transmit the organism to others. Man, when infected, does not ordinarily transmit the organism to other human or animal host. Domestic animals become infected through grazing in fields or from fodder contaminated with rodents urine and infection may then be transmitted from animal to animal. it is observed that rodent's species which are mainly found in agricultural areas and have close contact with domestic animals act as carrier and transmit L. australis, L. pomona and L. pyrogens infection in livestock.

Only few rodent species were found seropositive to *L. canicola* and *L. ballum*. This indicates that when there is a high level of other serotype infection in rodents the prevalence of *L. canicola* or *L. ballum* serotype infection is low.

In this study *Suncus murinus* (Insectivora) commonly found with commensal rats was found seropositive to only *L. grippotyphosa* but it has been reported to be host to a wide range of leptospiral serotype.¹⁶ It is suggested that this may also play a role in transmission of leptospirosis through urine contamination of foodstuff.

It is concluded that workers in sugarcane and rice field, farmers in agricultural area, fishermen, sewer workers and butchers represent high risk group as they are more exposed to infected animal and moist conditions allow the leptospires to survive for a considerable time outside the animal body.

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