

Seroepidemiological Study of Canine Visceral Leishmaniasis in Meshkin Shahr, Northwest of Iran

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Summary

Human visceral Leishmaniasis (VL) is endemic in Meshkin Shahr, Northwest of Iran and domestic dogs have been identified as the main animal reservoir. In order to determine the prevalence of infection in dogs, 303 serum samples were taken randomly from more than 6000 dogs in 1992. Sera were examined by two methods i.e. direct agglutination test (DA) and indirect immunofluorescent antibody test (IFA). The prevalence of infection by DA was 148 per 1000 (C.I.108-188) and by IFA, 201 per 1000 (C.I.159-246). Meanwhile, only 13.6% of DA seropositive dogs and 8.3% of IFA seropositive ones had clinical manifestation of the disease. This study shows that human VL can not be controlled in this area unless canine VL is controlled.

Key words: Visceral Leishmaniasis, dog, zoonoses, Iran.

Introduction

Human visceral Leishmaniasis (VL) of mediterranean type reported for the first time in Iran by Pouya in 1950, has become endemic in Meshkin Shahr area (Soleimanzadeh *et al.* 1993). Meanwhile, we found infection among domestic and shepherd dogs in the same area in 1988, 1989 and 1990 (more than 15 heavily infected dogs diagnosed in autopsy of the animals).

A study was started in 1990 supported by World Health Organization/TDR for control of VL in this area. We decided to do a seroepidemiological study of canine VL in the same area to find the exact incidence of infection in this focus. The present paper shows the results of this study.

Materials & Methods

Studies on human infection with VL had shown that direct agglutination (DA) and indirect immunofluorescence (IFA) tests are both quite sensitive and specific for sero-epidemiological surveys therefore we decided to use the same methods in our study on dogs. The method was a cross-sectional one and we used the method of cluster random sampling to take the samples for our study. Out of 80 infected villages, we selected 20 clusters (village) and in each cluster we took serum samples from 15 dogs. These were selected according to the method used for immunization coverage of children, recommended by WHO. We took serum samples from dogs above one year of age to make sure that they have been exposed to at least one transmission season. After injection of a tranquilizer to the animal at least 2 ml of blood was taken, then the serum was separated and transferred to another tube. These sera were kept at -20°C until the time of examination. Serological tests (DA and IFA) were carried out at the Protozoology Laboratory of the Institute of Public Health Research. In 5 cases of seropositive dogs enlarged popliteal lymph nodes were aspirated. Smears were prepared and examined after staining with Giemsa.

Results

Altogether, 303 serum samples were prepared from dogs, five of them lost during the transfer to the laboratory in Tehran. Seventy percent of the dogs were male and 30% were female. Age distribution was as follows: 1-3 years 39.6%, 4-6 years 33%, 7-9 years 14.9% and 10 years or more 12.5%. Table 1 shows the results of DAT by sex of the dogs. The dilutions of 1/320 or more were considered positive. There appeared no statistical differences between male and female dogs. The prevalence is 148 per thousand (CI:108-188 per thousand). Table 2 shows the result of IFA test. In this test, the dilutions of 1/640 or more was considered positive. This test showed no statistical difference of prevalence between male and female dogs. Total prevalence is 201 per thousand (CI:156-146 per thousand). We also compared the prevalences by hair color, however did not find any association between the two. Fig. 1 and 2 shows the percentage of infection by age in the two methods. Both of them depict that the highest prevalence is seen in middle aged dogs and the differences are statistically significant ($P < 0.05$). Tables 3 and 4 show the percentage of dogs with clinical signs in seropositive and seronegative dogs. Both tables show that almost 90% of seropositive dogs do not have any clear clinical sign of the disease. All five lymph node punctures from seropositive dogs were positive for amastigotes in microscopic examination.

Table 1: Results of DAT for canine VL in Meshkin shahr, by sex of the dogs, 1992.

Sex \ DAT	Pos		Neg		Total	
	No	%	No	%	No	%
Male	33	15.8	176	84.2	209	100
Female	11	12.7	76	87.3	87	100
Not known	0	-	2	100	2	100
Total	44	14.8	254	85.2	298	100

Table 2: Results of IFAT for canine VL in Meshkin shahr, by sex of the dogs, 1992.

Sex \ IFAT	Pos		Neg		Total	
	No	%	No	%	No	%
Male	46	22	163	78	209	100
Female	14	16.1	73	83.9	87	100
Not known	0	-	2	100	2	100
Total	60	20.1	238	79.9	298	100

Table 3: Distribution of dogs examined by results of DAT and presence of clinical signs. Meshkin Shahr - 1992.

Clinical signs \ DAT	Pos		Neg		Total	
	No	%	No	%	No	%
Present	6	13.6	2	0.8	8	3
Suspect or absent	38	86.4	252	99.2	290	97
Total	44	100	254	100	298	100

Table 4: Distribution of dogs examined by results of IFAT and presence of clinical signs.

Clinical signs \ IFAT	Pos		Neg		Total	
	No	%	No	%	No	%
Present	5	8.7	3	1.3	8	2.7
Suspect or absent	55	91.7	235	98.7	290	97.3
Total	60	100	238	100	298	100

Discussion

The present study is the first seroepidemiological study of canine VL in which the samples were taken on probability bases and the results can be taken as valid for the dog population in the area. Previous studies in the same area have shown that parasites infecting human and dogs are the same zynodeme of *Leishmania infantum*, therefore, this study shows that dogs are the main reservoirs of infection in this area. In a previous study (Nadim and Bokai, unpublished data) it was shown that 90% of dogs are fed only by bread. No veterinary preventive measure is taken for dogs, not even for rabies. The villages are full of dried cow dungs kept for fuel in colder seasons of the year, and the population of vectors (i.e sandflies) is very high.

The results of all these is that out of around 6000 dogs in the 80 villages, 900 to 1200 are infected with canine VL. Lower prevalence in younger dogs may be due to less exposure both in the village and also in the fields (middle aged dogs are preferred for protection of sheep out of villages). Lower infection rate in older dogs may be related to selective mortality as many infected dogs may not reach very old ages.

The study shows that 90% of seropositive dogs have no clinical sign, therefore, even if we prove that they are infected the owners do not agree with their extermination. On the other hand, at the present time there is no effective treatment available for canine VL (WHO 1990). The only hope is to find an effective vaccine for prevention of the infection in dogs. Some studies are conducted in various parts of the world including Iran to find an effective vaccine against canine VL.

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