

## Epidemiologic assessment of *Leptospira* serotypes in Caspian littoral

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### ABSTRACT

**Background:** Leptospirosis is a widespread zoonosis in the world with more prevalence in tropical and subtropical regions. The disease is very common in flat area of Gilan, northern Iran, where the climate is humid and temperate and rice farming is main agricultural activity in rural areas.

**Patients and methods:** We performed this study in 2004 by taking blood samples from 465 hospitalized patients who were suspected of leptospirosis based on their clinical presentation, to find positive cases and analysis their signs, symptoms, and epidemiological data, and also to determine the most common clinical features of the disease in the area. All sera were examined by microscopic agglutination test.

**Results:** Renal failure was most common symptoms (4.5%). Icterohaemorrhagia had highest titers in 57.0% of patients

**Conclusion:** In Gilan province, some of the farmers get leptospirosis each year near the end of spring and summer at the time of rice harvesting. Better recognition of the disease and diagnosing it at proper time can improve the quality of life and health state of the farmers.

**Keywords:** *Leptospira*, serotype, Caspian.

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### INTRODUCTION

Leptospirosis is an important zoonotic spirochetal disease which is distributed worldwide (1-3). *Leptospira* is a unique genus of Spirochetes and includes the saprophyte *Leptospira biflexa* and the pathogen *Leptospira interrogans* which contains about 240 serotypes arranged in 23 serogroups (ictero-haemorrhagiae, canicola, pomona, etc.) (4). The "gold standard" serodiagnostic method is the microscopic agglutination test (MAT) (5). Human leptospirosis is prevalent in many countries in the tropical and subtropical zones with high rainfall

(6). The epidemics tend to follow natural disasters such as cyclones and floods (7,8). Leptospirosis is a treatable disease; hence early diagnosis and prompt treatment are important for the improvement of prognosis (9). In Gilan province, which is an agricultural and fishery area in the Caspian littoral, because of humid temperate climate and plenty of annual rainfalls, leptospirosis is prevalent sporadically or as outbreaks (10,11). So we performed this study to describe the epidemiological and clinical feature of disease in this area, and serotype the strains.

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### PATIENTS and METHODS

From May to October 2004, all patients with acute febrile illness, headache, myalgia, weakness

associated with conjunctiva suffusion, meningeal irritation, anuria, oliguria, proteinuria, jaundice, hemorrhage, cardiac arrhythmia or failure, and skin rash, with a history of exposure to infected animals or an environment contaminated with animal urine (suspected leptospirosis), hospitalized in Razi, referral hospital in Rasht, Gilan, were recruited into the study. For all patients a questionnaire about demographic, epidemiologic, clinical manifestations and laboratory findings was filled out through an interview. The place of exposure to contaminated water was recorded according to the patients expressing. In the first day of admission, 5ml of venous blood was obtained. Second sample was obtained at least 15 days later. Cases who did not come at the defined time were followed up by phone calls. All blood serum samples preserved in -20°C and then were sent to the Razi referral laboratory to perform microagglutination test (MAT) for the purpose of detecting anti leptospira antibody and leptospira serotyping. MAT test was performed in reference leptospira laboratory in Tehran University. Single sera with titers  $\geq 1.800$  against at least one pathogenic standard serotype and all paired sera with rising titers in second one (seroconversion) were regarded as positive cases (177 out of 463). SPSS version 11.5 software was used for analysis of data.

## RESULTS

Totally 465 patients with suspected leptospirosis hospitalized in Razi referral hospital were studied and followed up.

The first serum samples of 463 patients (99.6%), were taken at the first day of admittance. The second serum samples were taken from 304 cases (65.4%) at least 15-day later.

Among all, only 177 admitted patients (38.1%) had diagnostic criteria with at least one *Leptospira* serotype which placed in positive group, 137 cases (29.5%) were negative and 151 patients (32.5%) were in undetermined group because they had not

the second serum sample and diagnostic criteria in the first serum sample.

A total of 119 cases (67.2%) with definite leptospirosis diagnosis were male, 92 (52.0%) cases were farmer and 164 patients (92.6%) had contact with stagnant water. The mean age of the confirmed leptospirosis patients was  $41.35 \pm 15.08$  years old and 50% of patients were between 29 and 53 years old. One hundred and seventy five patients with definite leptospirosis were cured and discharged from the hospital but 2 (1.1%) of them died. Among 14 expired patients, 12 cases had not the second serum sample, so were placed in undetermined group.

From all confirmed leptospirosis patients admitted in Rasht Razi hospital, 8 cases (4.5%) had renal, 1 case (0.6%) had pulmonary and 1 case (0.6%) had both renal and pulmonary complications. Three patients had bleeding but 164 (92.6%) patients had no complication.

The most frequent serotype was *Icterohemorrhagiae* which was positive in 101 cases 57.0% (table 1).

**Table 1.** Frequency of *Leptospira* serotype among patients

Serotype	Percent
<i>Icterohemorrhagiae</i>	57.06
<i>Gripotymphosa</i>	44.63
<i>Hardjo</i>	36.7
<i>Pomona</i>	12.49
<i>Canicola</i>	3.38
<i>Ballum</i>	0.56

## DISCUSSION

Gilan Province has a history of leptospira epidemic during the 1990s and thereafter an increase in sporadic cases has been observed in Mazandaran and Qom provinces (12). The disease flares up in Gilan in rice farmers each year from the end of spring to the end of summer.

The economic burden imposed by this disease is unknown yet. It is widely recognized that the

incidence of leptospirosis is remarkably underestimated and the disease is under diagnosed in endemic regions. Leptospirosis is estimated to affect tens of millions of humans annually with case fatality rates ranging from 5 to 25% (7,8,10). Annual incidence reports of leptospirosis vary from 0.53 per 100 000 population in tropical areas to 0.04 per 100 000 population in developed countries (8,10). Most commonly, human infection with pathogenic *Leptospira* results in asymptomatic seroconversion (8). Less commonly, *Leptospira* infection results in symptomatic illness. When symptomatic, leptospirosis most often manifests as an undifferentiated febrile illness. In perhaps less than 5-10% of infections, severe disease occurs which is manifested by any combination of jaundice, renal failure, hemorrhage, refractory shock, and myocarditis (6).

In our study, the most prevalent serotypes were Icterohemorrhagiae and Griptophosa (table 1). These results were similar to other studies done in Gilan (13,14), while were different from the study performed after flood in Thailand (15).

In this study two third of patients were diagnosed definitely and among this group, more than 50% of cases had diagnostic criteria with at least one serotype. Most of the positive patients were men and farmers and had previous contact with infected water in agricultural seasons (16,17). In positive group, mortality rate was 1.1%. The mortality rate of the disease in other countries varied between 1-13.9% (18). Renal complications were the most prevalent complication in the patients (16,17).

In conclusion, In Gilan province, some of the farmers get leptospirosis each year near the end of spring and summer at the time of rice harvesting. Better recognition of the disease and diagnosing it at proper time can improve the quality of life and health state of the farmers. Precise studies in this area and alerting the health staff about it, seems really necessary.

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