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Report of the clinical features of patients with leptospirosis in Golestan, Iran, 2011-2015: Based on information available at the provincial health center

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Original Article

Abstract

BACKGROUND: Leptospirosis is a zoonotic disease with a global distribution that is caused by pathogenic spirochetes of Leptospira. It has a global spread, but it is more common in warm and tropical regions. In developing countries such as Iran, it is considered as a work-related illness and occurs mostly in farmers, ranchers, slaughterhouse workers, butchers, and fishermen in the warm seasons of the year. The aim of this study was to report the information available at the provincial health center about the clinical features of patients with leptospirosis in Golestan province, Iran, from 2011 to 2015.

METHODS: This cross-sectional descriptive study surveyed all patients with leptospirosis in Golestan provincial health center from 2011 to 2015. All information was collected by a self-designed checklist that its reliability was approved by three infectious specialists. In case of defective files, patients were contacted. The collected data were analyzed by an epidemiologist via SPSS software.

RESULTS: In this study, during the years of 2011 to 2015, 75 cases of leptospirosis were recorded. 50 cases (66.6%) were men and 25 (33.3%) were women. The most common complaint of patients at referral was fever (70 cases, 93.33%). The most complained problem after fever (93.33%) was musculoskeletal pain and jaundice reported 57.33% and 54.66%, respectively.

CONCLUSION: It is important to pay attention to this disease in farmers and villagers, especially in agricultural seasons. Due to the high prevalence, morbidity, and mortality of leptospirosis, early diagnosis based on common symptoms is important. Healthcare centers in each area are required to recognize common diseases to reduce irreversible complications.

KEYWORDS: Leptospirosis, Zoonotic Disease, Iran

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Introduction

Leptospirosis is a zoonotic disease with a global distribution that is caused by pathogenic spirochetes of Leptospira.[1] Leptospira are spiral, slender, and moving organisms that have 2 flagella and hook-like endpoints which are responsible for the movement of these organisms. Currently, 22 species of leptospira including 10 pathogenic species, 7 non-

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pathogenic species, and 5 intermediate species have been discovered. Leptospira require culture medium and specific conditions for growth, and they can be seen using a microscope with a dark background. The disease has a global spread, but it is more common in warm and tropical regions.[2] In developing countries such as Iran, it is considered as a work-related illness and occurs mostly in farmers, ranchers, slaughterhouse workers, butchers, and fishermen in the warm seasons of the year. No detailed information is available on the incidence of disease. However, according to a recent World Health Organization (WHO) report, the annual incidence of the disease in temperate regions varies from 0.1 to 100 in 100000 in tropical and humid areas and occurs sporadically in industrialized countries.[3] Infection is transmitted through direct or indirect contact (damaged skin or mucus) with water or soil contaminated with urine of wild and domestic mammals, especially sheep, horses, and rodents.[1,4] The incubation period usually lasts from 1 to 2 weeks, but it can vary from 1 to 30 days. In mild cases, most patients are asymptomatic or only mildly ill. In mild-symptomatic patients, symptoms often consist of fever, sudden onset of fever and chills, headache, nausea and vomiting, abdominal pain, redness of the conjunctiva, and muscle pain, especially in the legs. Symptoms may disappear within a few days but may persist for a few weeks.[5] Clinical diagnosis of leptospirosis is based on the history of the exposure, along with one of the variable manifestations of the disease. Blood and urine biochemical findings in acute leptospirosis are not specific. Evidence of bacterial infection includes leukocytosis with left shift, increased inflammatory markers, thrombocytopenia, as well as increased amylase, aminotransferase, alkaline phosphatase, and bilirubin. In severe form of the disease, there may be signs of coagulation activation and diffused alveolar bleeding. A definite diagnosis is based on the extraction of the organism from the patient.[2] Ghanaie et al. in Guilan province, Iran, obtained 177 confirmed cases by serological tests from 465 suspected cases of leptospirosis.[6] By obtaining information about the prevalence of the disease in that region and informing the treatment centers to consider it as one of the most important differential diagnoses in patients with fever, especially in the farming seasons, the prevalence can be reduced with the timely treatment that makes its complications under control. The aim of this study was to report the information available at the provincial health center about the clinical features of patients with leptospirosis in Golestan province, Iran, from 2011 to 2015.

Materials and Methods

This cross-sectional descriptive study surveyed all patients with leptospirosis in Golestan provincial health center from 2011 to 2015. Demographic data, clinical examinations, laboratory results, and history of exposure to the risk factors were extracted from patients' records. After approval by the Research and Technology Deputy and receiving the code of ethics from the Ethics Committee, the sampling began with the introduction letter for the center. All information was collected by a self-designed checklist and its reliability was approved by three infectious specialists. In case of defective files, patients were contacted. The collected data were analyzed by an epidemiologist using SPSS software (version 16, SPSS Inc., Chicago, IL, USA).

Results

In this study, after collecting data during the years of 2011 to 2015, using descriptive statistics [frequency, percentage, mean ± standard deviation (SD)], 75 cases of leptospirosis were recorded in Golestan province, of which 50 cases (66.6%) were men and 25 (33.3%) were women. The mean and SD of the men and women's age were 43.82 ± 14.40 and 47.38 ± 11.72 years, respectively (Table 1).

Table 1. Distribution of leptospirosis by gender and age

Sex	Number	Percentage (%)	Mean age (year)	Standard deviation
Male	50	66.7	43.82	14.40
Female	25	33.3	47.38	11.72
Total	75	100		

According to this study, the highest incidence (42.2%) was in the age range of 45-60 years. The youngest person in this study was 14 years old and the oldest was 75 years old. The number of positive cases in urban areas was 22 cases (29.33%), and in rural areas it was 53 cases (70.66%). The two cities of Gorgan with 53.3% (40 people) and Aqqala with 1.33% (1 person) had the highest and lowest incidence, respectively. In terms of occupation, most cases of leptospirosis were observed in farmers and ruminants (51.4%). 5.5% of staff and ranchers had a 2.8% risk. The highest number of visits was in summer (52.6%), with the highest rate of 32% in August. In autumn, 18.6%, in spring 13.3%, and in winter 1.33% of the patients were identified (Table 2).

Table 2. Distribution of patients' referral time

Time of visiting	Number	Percentage
March	2	2.66
April	3	4.00
May	5	6.66
June	18	24.00
July	24	32.00
August	8	10.66
September	11	14.66
October	1	1.33
November	2	2.66
December	0	0
January	0	0
February	1	1.33

According to the results of this study, the highest incidence of this disease was in those who had a farming history in the field (56 cases, 74.66%). Contact with contaminated water was the second most common cause (40%) of the disease (Table 3). 5 cases (6.66%) used non-plumbing water (fountains/wells), and in the remaining cases (93.33%), plumbing water was consumed. The most common complaint of patients at referral was fever (70 cases, 93.33%).

Table 3. Distribution of the disease

Way of Contamination	Number	Percentage
History of farming on the field	56	74.66
Contact with contaminated water	30	40.00
Contact with animals	34	32.00
Contact with contaminated person	1	1.33
Overall	75	100

Musculoskeletal pain (57.33%) and jaundice (54.66%) were also the most common complaints after fever (Table 4).

Table 4. Distribution of frequency of patients' clinical complaints

Complaints	Number	Percentage
Fever	56	74.66
Musculoskeletal pain	30	40.00
Jaundice	41	54.66
Others (bleeding from the nose, subcutaneous bleeding, stomachache, and cough)	42	56.00
Headache	21	28.00
Skin rash	12	16.00
Red eye	7	9.33

Because some patients referred with more than one complaints, the overall number and overall percentages seem to be higher than the real amount.

In terms of laboratory findings, 53.3% (40 cases) had thrombocytopenia, of which 25.3% had platelet counts below 20000 in mm^3 (Table 5).

Table 5. Distribution of blood platelet level

Platelet	Number	Percentage
< 20000	19	25.3
20000-50000	13	17.3
50000-100000	8	10.6
> 100000	35	46.6

In 3 patients (4%), the creatine phosphokinase (CPK) was twice more than

normal. In 38 patients (50.6%), the total bilirubin value was higher than 1.5 mg/dl. Serum glutamic oxaloacetic transaminase (SGOT) was 2-3 times more than normal in 28% (21 people) and serum glutamic-pyruvic transaminase (SGPT) was also 2-3 times more than normal in 28% of cases. In terms of complications of the disease, hepatitis occurred in 3 (4%) patients, kidney failure in 2 (2.66%), and hepatitis along with kidney failure was observed in 2 (2.66%) patients. In treatment, 45.3% of patients were treated with ceftriaxone, 22.01% with ampicillin, and 23.85% with ceftriaxone and ampicillin. One case (1.33%) was treated with gentamicin (Table 6). In terms of response to treatment, 94.66% had complete recovery in follow-up, and in 4 cases (5.33%) death occured due to illness.

Table 6. Distribution of the treatment performed for patients

Treatment	Number	Percentage
Ceftriaxone	34	45.30
Ampicillin	19	25.30
Ceftriaxone + Ampicillin	21	28.00
Gentamicin	1	1.33

Discussion

Leptospirosis is one of the most common diseases of humans and animals with a global spread, caused by a pathogen called leptospira. It is more prevalent in regions with temperate and humid climates and can trap people as an occupational and non-occupational illness. In our study, the overall prevalence of leptospirosis in Golestan province during 2011 to 2015 was 75%. In a study carried out by Ghanaie et al., 177 cases were reported in Guilan province.[6] Moreover, in the study by Shojaee et al., 80 cases were reported in Mazandaran province, Iran, from 2011 to 2015.[7] While the incidence of leptospirosis in a study by Alavi and Khoshkho in Khuzestan, Iran, in 2014 was 45%.[8] This indicates that Golestan is also the most prevalent region of the disease like other northern provinces of Iran (Mazandaran and Guilan) compared with other parts of the country. In our study, the two cities of Gorgan and Aqqala had the highest (53.30%) and lowest (1.33%) rates of disease, respectively. In the study of Javid et al. in 2013, Minoodasht and Bandar-e Gaz had the highest (21.3%) and lowest (0) rates of the disease, respectively.[9] In our study, 49.33% of patients were between the ages of 45 and 60 years old, and in the study conducted by Esmaeili et al. in Mazandaran, the most cases were in the age range of 40 to 59 years.[10] While in the study of Babamahmodi et al., the age range was 15 to 34 years,[11] and in the study of Sethi et al., the highest incidence was in the age range of 21 to 30 years.[12] In Golestan province, farming rice is prevalent and mainly men are occupied in this job. In our reports, mostly men were sick compared to women (66.6% compared to 33.3%), which is due to the greater role of men in farming rice. In the report of Zakeri et al., in Mazandaran, 82.8% of cases were men,[13] and in the study of Ghanaie et al. in Guilan, 67.2% were men.[6] In our data results, 56 patients (74.66 %) had a short period of time from the work experience in farms to the onset of symptoms , which is consistent with the study of Babamahmodi et al.[11] There was a history of contact with contaminated water in 30 people (40%). In a study conducted by Esmaeili et al. in Mazandaran, the rate of this contact was 9.8%,[10] in Zakeri et al study was 53.3%,[13] and in Sethi et al. study it was 44.2%.[12] The history of exposure to animals (cattle, sheep, and goats) was reported in 24 patients (32%), in Zakeri et al.[13] study it was 45%, and in Sethi et al. study in India it was 62.1%.[12] Our studies have shown that the prevalence in rural areas is more than urban areas (70.66% vs. 29.33%), which is consistent with the results of other studies.[11,12] Animal keeping at home, agricultural lands, and working with naked hands and feet on farming fields provide the skin for scratches and infection transmission.

In this study, the prevalence of disease in farmers was significantly higher than other occupations (51.4%), which is similar to other studies.[1,6,11,13,14] Our study emphasized that leptospirosis was an occupational disease and that the agricultural occupation was more prevalent in the summer. The results of this study showed that 52.6% of the disease incidence was in summer, which is consistent with other studies based on the seasonality of the disease.[14,15] Fever has been the most common clinical symptom (91.33%). In the study by Golsha et al. in 100% of cases,[15] in the study by Sethi et al. also in 100%,[12] and in Davoodi et al. study in 98.13% of cases,[1] fever was the most common symptom, that is consistent with our study. Headache was found in 28% of our patients, and in Sethi et al. study it was observed in 37% (15 cases);[12] while in Babamahmodi et al. study it was found in 93.1%,[11] and in Golsha et al. study in 83.3%,[15] which were significantly higher than that of our study. Jaundice was present in 41 patients (54.66%), while in the study of Golsha et al. it was observed in 3 patients (25%),[15] in the study of Davoodi et al. in 2 patients (1.86%),[1] and in the study by Najafi et al. it was reported in 6.5% of patients,[16] which was significantly higher in our patients. Conjunctival hyperemia was found in 7 of our patients (9.33%), which was less than other studies.[12,15] Musculoskeletal pain was found in 57.33% of patients, which is consistent with the statistics obtained from other studies.[1,13,15] In terms of complications of the disease, in our study, kidney failure was present in 2 patients (2.66%). In the study by Ghanaie et al., it was 4.5%,[6] while it was 60.5% in Sethi et al. study;[12] in comparison with that, the rate of kidney complications in our patients was significantly lower. In our study, 5.33% of patients had death due to the disease and 94.6% had complete recovery. In the study of Ghanaie et al., death occurred in 1.1% of patients.[6]

Conclusion

In general, the results indicate that leptospirosis in Golestan province is high and the same as in other northern provinces of the country. It is important to pay attention to it in farmers and villagers, especially in agricultural seasons. Due to the high prevalence, and morbidity and mortality of leptospirosis, early diagnosis based on common symptoms is important. Healthcare centers in each area are required to recognize common diseases to reduce irreversible complications.

Conflict of Interests

Authors have no conflict of interests.

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