Incidence of Leptospirosis in Mazandaran Province, North of Iran: A One Year Survey

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Abstract: The aim of this study was to provide the first report of incidence of leptospirosis and to determine the epidemiology of this zoonotic disease in Mazandaran Province, North of Iran. In the period of one year, from April 2007 to April 2008, forty seven confirmed reports of human cases of leptospirosis was received by Mazandaran Health Centre from local hospitals and leptospirosis laboratory. The annual incidence rate for the total population was 1.6 per 100,000 person-year. The majority of cases were males (84.1%). The maximum number of cases was seen to occur between 40 and 59 years of age. Seasonal outbreak of leptospirosis was seen in summer (70.3%). Farmers (57.4%) more frequently affected by disease than other occupations. In conclusion, it is necessary for medical practitioner to pay attention to leptospirosis in farmers during summer season.

Key words: Leptospirosis, incidence, zoonosis

INTRODUCTION

Leptospirosis is presumed to be the most widespread zoonosis in the world; it is caused by pathogenic spirochaetes of the genus leptospira (Kanade et al., 2003). The spirochaetes are transmitted to humans from a variety of chronically infected peri-domestic mammalian reservoir hosts such as rodents, cattle, pig and dogs as well as potentially from wild mammals such as marsupials and bats (Kevin et al., 2003; Perrocheau and Perolat, 1997). One notable characteristic of this zoonosis is its highly variable prevalence in a limited geographical area due to differences in land topography, soil pH, moisture and vegetative cover (Kuriakose et al., 1997). Leptospirosis occurs in tropical, subtropical and temperate zones (Vijayachari et al., 2008; Narita et al., 2005). Human infection typically results from exposure to infected animal urine, by direct contact or indirect exposure through water or soil (Trevejo et al., 1998). Risk factors for leptospirosis include living in rural and tropical settings with exposure to leptospire-contaminated fresh water and agriculture, sewer and sanitation work; military personnel are also regarded at risk because of field activities that bring them into close contact with zoonotic reservoirs (Kevin et al., 2003; Coursin et al., 2000). The incidence of disease appears to be increasing in developing countries; the South East Asia region is endemic to leptospirosis. The first case of leptospirosis reported in 1960 in Iran and the first outbreak of the disease recorded in 1990s in Rasht, North of Iran. Leptospirosis is prevalent in coastal region of Northern part of Iran especially in Gilan and Mazandaran (Rahimi et al., 2007). Increasingly awareness of the disease among the public and clearer understanding of clinical spectrum and typical changes in simple routine laboratory tests by medical practitioners have led to early diagnosis of leptospirosis (Kuriakose et al., 1997).

Few studies on leptospirosis have been made in Mazandaran. Lack of information on the disease incidence entails investigating the epidemiological trend of human leptospirosis in the region.

MATERIALS AND METHODS

The present study is a descriptive retrospective study of all cases of leptospirosis that diagnosed and confirmed to have the disease between April 2007 and April 2008. Hospitalized cases with clinical symptoms...
including fever, severe headache, myalgia, conjunctival
suffusion, jaundice, general malaise and joint pain as well
as having positive history of working in farm or contact
with animals were regarded as suspected patients of
leptospirosis by a physician in all hospitals of
Mazandaran Province. The mentioned symptoms are
consistent with the World Health Organization (2003)
criteria. Blood sample was obtained from all suspected
cases to measure anti-leptospira antibody by Immuno-
Fluorescence Antibody (IFA) method with a kit
manufactured with Institute Pasteur, Branch of Iran. All
blood samples were sent to Pasteur Leptospirosa Laboratory
in Amol. Confirmed cases had clinically compatible illness
and one of the following criteria: a single anti-leptospira
antibody titer greater than 1:100, a four-fold or higher
increase in anti-leptospira antibody titer between the first
and the second sera specimen (with at least 15 days
interval), or conversion from negative titer to positive in
the second versus the first serum specimen. For each
confirmed cases epidemiological data were obtained using
a form filled out by the physician requesting the
laboratory test. The questionnaire included personal data
(age, sex, profession and place of residence), source of
drinking water, date of symptoms development and date
of admission to the hospital. All completed forms were
sent to, Mazandaran and Babol Health Centers, the two
major health centers in Mazandaran. Only confirmed cases
were included in final analysis.

A total of 47 confirmed leptospirosis reports were
registered by Mazandaran and Babol health centers.
Epidemiological factors including locality, age, sex,
occupation and seasonal variation were studied.
Incidence of leptospirosis according to age, sex and place
of residence presented.

RESULTS

Forty seven cases of leptospirosis were confirmed
between April 2007 and April 2008. The annual incidence
rate for total population of Mazandaran Province was
1.6 per 100,000 with corresponding mortality rate of 2.1%
(one person). Of the total 47 cases, men accounted for
40 cases (85.1%). The mean age of the patients was
49.3±13.3 years. The maximum number of cases was seen
to occur between 40 and 59 years of age. The incidence
rate increases with age, from 0.98 per 100,000 for subjects
between 20 and 39 years of age to 5.13 for patients over
age 60 (Table 1). The incidence rate in rural area 2.55 per
100,000 was higher than urban areas: 0.77 per 100,000.
Seasonal incidence of leptospirosis was with a peak in
summer months (70.8%). Patients were admitted in
hospitals 8.3±5 days after the beginning of symptoms.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>No. (%)</th>
<th>Population*</th>
<th>Incidence rates (per 100,000)</th>
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</thead>
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<td>20-39</td>
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<td>23.4</td>
<td>1113423</td>
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<td>25</td>
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<td>596986</td>
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<tr>
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<tr>
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</tr>
<tr>
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</tr>
<tr>
<td>Female</td>
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<td>14.9</td>
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<td>Place of residence</td>
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<td>25.5</td>
<td>1554413</td>
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<tr>
<td>Rural</td>
<td>35</td>
<td>74.5</td>
<td>1368233</td>
</tr>
</tbody>
</table>

*According to the Territorial census in 2005

Out of 47 patients, 27 subjects (57.4%) were farmers,
7 patients (14.9%) housewife and 13 persons (37.7%) had
other occupations (clerk, worker etc.). Exposure to
contaminated water was reported in 29.8% of the subjects
(2.1% to rivulets and 27.7% to water of wells).

DISCUSSION

This study reflects all of the reported leptospirosis
cases within Mazandaran Province from 2007 to 2008 and
it is the first report of leptospirosis incidence from this
area. Incidence of leptospirosis was 1.6/100,000 person in
Mazandaran. The annual incidence of leptospirosis has
protein nature in different geographical territories. The
study of Ciceroni et al. (2000), indicates that the incidence
of leptospirosis was 74.0 (0.13/100,000) cases in average
annually in the three year period 1994-1996 in Italy. On the
contrary, According to Vijayachari et al. (2008), the
annual incidence of leptospirosis recorded 3.5/100,000
persons between 1997 and 1998 in Thailand. The infection
is more frequently diagnosed in men. Leptospirosis is
primarily an infection of adult males, which is a universal
trend and has been ascribed to occupational and
environment factors (Vijayachari et al., 2008). Many
Studies pointed out that number of male patients is more
than females (Karande et al., 2003; Perrocheau and
Perolat, 1997; Kuriakose et al., 1997; Ciceroni et al., 2000;
Bishara et al., 2002; Mansour-Ghanai et al., 2005;
Kobayashi, 2001; Babamohammoudi et al., 2006;
Golska et al., 2007; Honarmand et al., 2005; Aliyan et al.,
2006). In the North of Iran most of patients are males who
live in rural area and work in rice farms and due to
different tasks in farming, men are more vulnerable to skin
scratches and infection than women (Honarmand et al.,
2005). The incidence increases with age. In groups over
20 years of age the level of transmission is high which
could be related with more intensive practice of hunting
and fishing over age 50 (Perrocheau and Perolat, 1997).
More than half of the subjects' number (57.4%) was
farmers. In most researches this profession reported
an occupation commonly associated with leptospirosis
(Perrocheau and Perolat, 1997; Babamahmoudi et al., 2006; Honarmand et al., 2005; Aliyan et al., 2006). Leptospirosis is a known health hazard of rice farmers (Vijayachari et al., 2008; Ciceroni et al., 2000; Kobayashi, 2001). Farmers and agricultural laborers are involved in rice planting and harvesting which contributes to the exposure to contaminated water and soil (Kuriakose et al., 1997). The average length of time between symptoms to admission was 8.3±5 days. This period is comparable with period (6-7 and 5 days) mentioned in other studies (Bishara et al., 2002; Aliyan et al., 2006). The incidence rate in rural area was higher than in urban region. Several investigations confirmed that leptospirosis is a rural disease (Perrocheau and Perolat, 1997; Ciceroni et al., 2000; Honarmand et al., 2005; Aliyan et al., 2006). Contaminated water was the source disease in 29.8% of subjects. Ingesting or being submersed in river water and contact with contaminated ground water reported in many studies to be major determinants of being affected to leptospirosis (Perrocheau and Perolat, 1997; Trevejo et al., 1998; Ciceroni et al., 2000; Mansour-Ghanaei et al., 2005; Honarmand et al., 2005). Cases had maximum peaking in summer months (July to September) that demonstrated in some researches (Mansour-Ghanaei et al., 2005; Kobayashi, 2001; Honarmand et al., 2005). Summer is a working season for farmers in Mazandaran that increases the chance of exposure to risk factors. The mortality rate was 2.1%. The low mortality rate in recent year may indicate earlier diagnosis and treatment, diagnosing milder cases, the local population developing immunity or decreasing virulence of organisms (Kuriakose et al., 1997).

CONCLUSION

Mazandaran Province has mild wet climate that facilitates the prevalence of leptospirosis in the region. Our study suggested that medical practitioner need to pay attention to leptospirosis in farmers during summer season.

ACKNOWLEDGMENTS

We sincerely thank Mazandaran and Babol Health Centers for their collaboration in this research and Deputy of Research and Technology of The University of Mazandaran Medical Sciences for providing financial support to this study (Grant No. 88-75).

REFERENCES


