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Epidemiologic, Clinical and Laboratory Findings of Patients with Brucellosis in Hamadan, West of Iran

Peyman Eini (MD)^a, Fariba Keramat (MD)^{a*}, Mehdi Hasanzadehhoseinabadi (MD)^b

^a Department of Infectious Diseases, Faculty of Medicine, Hamadan University of Medical Sciences, Hamadan, Iran

^b Department of Infectious Diseases, Farshchian (Sina) Hospital, Hamadan University of Medical Sciences, Hamadan, Iran

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* Correspondence

Fariba Keramat (MD)

Tel: +98 811 8262173

Fax: +98 811 8269808

E-mail: faribakeramat@yahoo.com

ABSTRACT

Background: Brucellosis is one of the most common infectious diseases in some areas of Iran. Brucellosis has various clinical manifestations and should be considered in the differential diagnosis of many infectious and non-infectious diseases. The aims of this study were to determine the epidemiological, clinical and laboratory findings of the disease in patients with brucellosis in Hamadan, west of Iran.

Methods: In this cross-sectional study, 230 brucellosis patients admitted in Farshchian Hospital in Hamadan from March 2005 to March 2010 were studied for epidemiological, clinical and laboratory characteristics of brucellosis. The patients who had manifestations compatible with brucellosis and standard tube agglutination test or Coombs test $\geq 1/80$ plus 2ME $\geq 1/40$ were enrolled. Data were analyzed using SPSS statistical package, version 15.

Results: About 43.5% of patients were female with mean age of 40.84 yr old. 27.8% of cases were living in urban and 72.2% in rural areas. The most contagious seasons were spring and summer. The most common transmission way was consuming of contaminated dairy products (60.3%); however, 39.7% of patients had a history of animal contacts. The most common symptoms were fever (77.4%), arthralgia (70%), sweating (47%), malaise and fatigue (46.5%). The most common clinical signs were fever and peripheral arthritis. Leukocytosis and elevated ESR (>20 mm/h) were reported in 20.8% and 59.5% of cases, respectively. Elevated CRP was detected in 52.9% of patients.

Conclusion: Brucellosis should be considered in the differential diagnosis of patients with prolonged fever, spondylitis or peripheral arthritis in endemic areas.

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Introduction

Brucellosis or undulant fever is the most common zoonotic disease caused by Gram-negative bacteria, *Brucella* spp. transmitted from infected animals to humans from various ways such as consumption of contaminated dairy products or direct contact with animals. Fever, arthralgia and sweating are the most common clinical manifestations of the disease¹⁻³. It is a major public health issue throughout the world and one of the most socioeconomic problems in many developing countries^{4,5}. Brucellosis is a systemic disease with wide spectrum of clinical manifestations; moreover, it may involve various organ systems including the liver, GI, nervous system, lungs, blood vessels, heart, skin, eyes and joints^{1,2,6}. The most common local involvement of the disease is seen in the musculoskeletal system^{1,7,8}.

It is a very serious and destroying complication, so early diagnosis and proper treatment of brucellosis may be prevented from the following disabilities^{9,10}.

The real prevalence of brucellosis in the world is unknown because of inadequate reportable systems and inaccessible to

valid diagnostic tests in some developing countries. Annually, 500,000 cases with brucellosis are reported to the WHO in the world; the most of them are from the developing countries¹¹. According to the annual report of Center for Disease Control in Iran, the incidence rate of brucellosis was 39 per 100,000 and 30 per 100,000 populations in 2005 and 2007, respectively¹². In addition, the incidence rate of brucellosis has increased to 130 per 100,000 populations in west of Iran in last years¹³. The incidence rate of brucellosis was 45 per 100,000 populations in Hamadan in 2008¹⁴.

One of the important reasons of increasing rate of brucellosis is disability in control of brucellosis in animals¹⁵. In addition, different clinical manifestations of brucellosis in humans and difficulty in definite diagnosis of the disease caused the incidence rate to be under estimated^{16,17}. Indeed, brucellosis is prevalent in rural populations because of living near cattle places and direct or indirect contact with infected animals or animals' products³.

The disease is diagnosed by doing blood culture in Castaneda media or serologic laboratory tests such as Wright, Coombs Wright and 2ME or PCR¹⁸.

The aims of this study were to determine epidemiological, clinical manifestations, complicated and non-complicated brucellosis and laboratory findings of patients with brucellosis in Hamadan, west of Iran.

Methods

In this cross-sectional study, all patients with brucellosis who had Wright (standard tube agglutination test) $\geq 1/80$ or Coombs test $\geq 1/80$ with 2ME $\geq 1/40$ ¹⁹ admitted in Farshchian Hospital in Hamadan from March 2005 to March 2010 were enrolled.

All demographic characteristics such as age, sex, education, region of living, potential risk factors, clinical manifestations and laboratory findings of all admitted patients with brucellosis were extracted from their files and recorded in the questionnaires.

Acute brucellosis is defined as a patient who has clinical manifestations compatible with brucellosis for at least three months and in the chronic form of brucellosis, the symptoms and signs lasting more than one year¹¹. In addition, laboratory data of all patients including complete blood count, C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR) were recorded.

The patients with clinical features compatible with brucellosis and positive serologic tests, Wright (standard tube agglutination test) $\geq 1/80$ or Coombs wright test $\geq 1/80$ with 2ME $\geq 1/40$ ¹⁹, or positive blood culture for brucellosis were included, and patients with incomplete data in their files were excluded. Data were analyzed using SPSS statistical package, version 15.

Results

Totally, 230 patients with brucellosis, 130 (56.5%) males and 100 (43.5%) females with the mean age of 40.84 ± 20.29 years ranged from 9 to 88 years were enrolled. Seventy five (39.7%) of patients had a history of contact with infected animals, and 114 (49.5%) had a history of consuming of unpasteurized dairy products (Table 1).

The distribution of brucellosis in the spring, summer, autumn and winter was 33.6%, 29.6%, 18.8% and 17.9%, respectively.

Fifty five (24%) of the patients had acute brucellosis, and the duration of their disease was less than three months. The most patients, 163 cases (70.8%), were in sub-acute stages of brucellosis and 12 patients (5.2%) had chronic brucellosis.

Complicated brucellosis was seen in 146 (63.4%) of patients in which spondylitis was the most common complication of brucellosis in this study (Table 1).

The most common clinical manifestations were fever (77.4%) and arthralgia (70%) in patients with brucellosis. Moreover, the most patients, 170 (76.9%), had normal white blood cell counts and five (2.3%) had leukopenia. Elevated ESR (>20 mm/h) and elevated CRP were seen in 59.5% and 52.9% of patients, respectively (Table 2).

Table 1: Distribution of demographic characteristics and potential risk factors in the patients with brucellosis

Variables	Patients (%)
Sex	
Male	130 (56.5)
Female	100 (43.5)
Age (yr)	
0-20	50 (21.7)
21-40	69 (30.0)
41-60	62 (27.0)
60-80	45 (19.6)
>80	4 (1.7)
Region	
Urban	64 (23.8)
Rural	166 (72.2)
Contact with infected animals	
Yes	75 (39.7)
No	155 (60.3)
Using unpasteurized dairy products	
Yes	114 (49.6)
No	116 (50.4)
Education	
Illiterate	82 (35.9)
Middle school	117 (50.7)
High school	24 (10.5)
Academic	7 (2.9)
Complications	
Arthritis	57 (24.8)
Spondylitis	61 (26.5)
Epididymo orchitis	21 (9.2)
Meningitis	7 (3.0)
No complication	84 (36.5)

Table 2: Distribution of clinical manifestations and laboratory findings of 230 patients with brucellosis

Variable	Patients (%)
Signs and symptoms	
Fever	178 (77.4)
Arthralgia	161 (70.0)
Sweating	108 (46.9)
Malaise	107 (46.5)
Back pain	105 (45.7)
Headache	63 (27.4)
Testicular pain	23 (10.0)
Constipation	18 (7.8)
Diarrhea	3 (1.3)
Laboratory Findings	
Elevated ESR (>20 mm/h)	137 (59.5)
Elevated CRP	122 (52.9)
Leukocytosis (WBC >10000 /mm ³)	48 (20.8)
Anemia (Hemoglobin <12 g/dl)	34 (14.8)
Lymphocytosis (Lymphocyte $>40\%$)	31 (13.5)
Neutrophilia (PMN $>75\%$)	26 (11.3)

PMN: polymorphonuclear; ESR: erythrocyte sedimentation rate; WBC: white blood cell

Discussion

Brucellosis is one of the most common zoonotic diseases worldwide and still an important public health problem in many developing countries¹. In the present study, 56.5% of the patients were male and 43.5% female with a mean age of 40.84 ± 20.29 years which is similar to some studies²⁰⁻²³. Brucellosis can occur in both sexes and any age group²⁴. The most common age group was between 21-40 yr (30%) which was similar to other studies^{21,25,26}.

About 60.3% of patients had a history of consuming of unpasteurized dairy products that was the same as some researches with 67.9% and 66.7% cases^{26,27}. However, in some studies, a consumption of unpasteurized dairy products was reported in 76.4% or 88.3% of patients^{21,22}. 39.7% of the patients had a history of contact with infected animals, but in

three studies from Iran, it was reported between 17.1% to 34.25%^{22,27,28}. However, in some studies in our neighborhood countries, a history of contact with animals was showed from 32% to 71%^{20,21,26}.

Brucellosis is a common disease in the spring and summer seasons^{28,29} and the results of our study showed the same pattern. 72.2% of patients were from rural areas; however, Haj Abdolbaghi et al.²² and Haddadi et al.²⁷ reported 15.67% and 40.5% of patients from rural areas, respectively, which were less than our result. In Hamadan, the percentage of population who live in rural areas is more than urban areas; in contrast, their studies^{22,27} were done in Tehran where the most population live in urban areas. Hashemi et al. reported that 190 (77.6%) of 245 patients were from rural areas and 152 (62%) were male which were similar to our study³⁰.

35.9% of patients were illiterate and 50.7% of patients had middle school or lower education, so low education can be a predisposing factor of catching the disease. The most common signs and symptoms of the patients were fever, arthralgia, sweating, and malaise which were similar to a study by Haddadi et al.²⁷. In a study sweating, fever and arthralgia were the most common manifestations of brucellosis²⁷. However, Malic et al. reported fever, sweating, bone pain; back pain and headache were the most common clinical features in brucellosis²³. In another study in Hamadan by Keramat et al., 178 patients with acute brucellosis with a mean age 40.69 yr and 58.9 % male were studied. The most common symptoms and signs included malaise (88.5%), arthralgia (79.7%), sweating (78.6%) and headache (72%)³¹. The results are similar to our findings. Hashemi et al. reported arthralgia (78.4%) and fever (76.7%) as the predominant clinical manifestations in patients with brucellosis and 70(28.6%) of them had osteoarticular involvements included sacroiliitis (75.7%), spondylitis (21.4%) and peripheral arthritis (8.6%)³⁰. Unilateral epididymorchitis is one of the most common genitourinary tract complications in brucellosis¹. In our study, it was observed in 9.2% of male patients. This complication was reported 7.4% to 10.9% in other studies in Iran^{27,28,31}. In this study, 61(26.5%) of the patients had spondylitis which is higher than that reported in some studies as 13.8%, 6.8% and 21.4% respectively^{27,28,30}. That might be because of the patients who had severe or complicated brucellosis been admitted and selected. In the present study, leukocytosis, lymphocytosis and anemia were observed in 20.8%, 13.6% and 14.7% of cases, respectively and also elevated ESR and positive CRP were reported in 59.5% and 52.9% of cases, respectively. However, Haddadi et al. reported normal CBC in the most patients²⁷. In a study by Roshan et al., 84.5% of cases had normal WBC and 60.4% had elevated CRP which was similar to our findings²⁸.

As we mentioned, in our study some of the results were similar to other studies and some of them were different because the most patients who were referred and admitted at the hospital may had severe or complicated brucellosis; therefore, it was the limitation of our study. The other limitation was the incomplete data of some patients with suspected brucellosis omitted from the study. However, the strength of our study is that 230 patients with brucellosis were evaluated for complicated 146 (63.5%) and non-complicated brucellosis, 84 (36.5%), which are not reported in the other studies.

Conclusion

Brucellosis is a common zoonotic disease which can involve different organs of humans with various clinical manifestations in infected patients, and early diagnosis and treatment of brucellosis may help to prevent from early complications and relapse of disease. As regards different manifestations of brucellosis, it should be considered in the differential diagnosis of prolonged fever, spondylitis or peripheral arthritis, especially in endemic areas in Iran.

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Conflict of interest statement

There was no conflict of interest to be stated.

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