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Frequency and characteristics of Brucellosis in Golestan Province, Iran

Abdollah Abbasi[1,2], Hamed Jafarpour[3], Arash Rezaei Shahmirzadi[4], Alireza Razavi[3], Behnaz Khodabakhsh[5,6], Sama Sadat Jeddi Hosseini[4]

1 Department of Infectious Diseases, School of Medicine, Golestan University of Medical Sciences, Gorgan, Iran
2 Infectious Diseases Research Center, Sayyad Shirazi Hospital, Golestan University of Medical Sciences, Gorgan, Iran
3 Student Research Committee, School of Medicine, Mazandaran University of Medical Sciences, Sari, Iran
4 Student Research Committee, School of Medicine, Golestan University of Medical Sciences, Gorgan, Iran
5 Department of Infectious Diseases, School of Medicine, Golestan University of Medical Sciences, Gorgan, Iran
6 Research Center of Gastroenterology and Hepatology, Golestan University of Medical Sciences, Gorgan, Iran

Original Article

Abstract

BACKGROUND: Brucellosis is a common widespread zoonotic disease between humans and livestock with significant economic and health problems caused by various species of Brucella. The disease is a significant public health issue throughout the world and one of the most socioeconomic problems in many developing countries. This study aimed to report the information available at the Provincial Health Center about the frequency and characteristics of patients with Brucellosis in Golestan Province, Iran.

METHODS: This study was analytic-descriptive cross-sectional. The study population included all patients with Brucellosis diagnosed from 2011 to 2015 in the health center of Golestan Province, based on the serological method. The data gathering tool was a questionnaire that included demographic information, clinical presentation and examinations, history of exposure, laboratory findings, and treatment protocols. Descriptive statistics were reported as frequency and mean ± standard deviation (SD) and analyzed by SPSS software.

RESULTS: In this study, a total of 1788 cases of Brucellosis were reported. The number of male cases was 1163 (65.04%) and female cases were 625 (34.95%). People who had a history of contact with infected animals were younger than the others. Musculoskeletal pain (79.69%) and fever (76.45%) were the most commonly reported clinical symptoms.

CONCLUSION: Overall, the results indicate that Brucellosis is still a health problem in the province. The high incidence of Brucellosis in villages, the lack of full coverage of animal vaccination, and the link between the disease and livestock businesses are significant.

KEYWORDS: Brucellosis; Brucella Infection; Iran

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Introduction

Brucellosis is a common widespread zoonotic disease between humans and livestock with significant economic and health problems caused by various species of Brucella.[1,2] All cases of Brucellosis infection in humans are directly or indirectly contaminated with animal or animal products, and the incidence of disease is directly related to the prevalence of animal disease, socioeconomic status, food habits, poor health, and occupations that cause exposure to humans or infected animals.[3] Person-to-person transmission of Brucellosis is infrequent, and animals and their products are the primary sources of human Brucellosis.[4] The Brucellosis

Corresponding Author:
Behnaz Khodabakhsh; 5 Department of Infectious Diseases, School of Medicine, Golestan University of Medical Sciences, Gorgan, Iran
6 Research Center of Gastroenterology and Hepatology, Golestan University of Medical Sciences, Gorgan, Iran
Email: behkhoda@yahoo.com

disease in humans is followed by consuming raw milk, its products, and cooked meat.[5]

The disease is a significant public health issue throughout the world and one of the most socioeconomic problems in many developing countries, especially in the Mediterranean Basin, North and East Africa, the Middle East, the Arabian Peninsula, the Indian Subcontinent, and parts of South America and Central Asia.[6] According to the World Health Organization (WHO) reports, annually, more than 500000 new cases are found in different parts of the world.[7,8] About 50000 cases of Brucellosis are reported annually. In different countries, contamination varies from 3.5 to 10.5 per thousand varieties.[9] Human Brucellosis is endemic in Iran and is continuously reported from different parts of the country.[10] In a study conducted in Gonbad-e Kavus County in Golestan Province, Iran, 13.2% of the studied population were infected with Brucellosis.[11] In another study, patients referred to the 5th Azar Hospital in Gorgan, Golestan Province, Iran, had the highest Brucellosis in these areas in men and residents of villages.[5]

This disease is a multi-system disease and clinical signs generally include fever, weight loss, arthritis, spondylitis, hepatosplenomegaly, and neurological symptoms.[12] The most common clinical manifestation is fever (83.1%), followed by arthralgia and back pain, and the most common complication of this disease is spondylitis (10.4%).[5] Clinical signs of human Brucellosis are non-specific and very different.[13] Since the symptoms of human Brucellosis are not specific, it can be clinically confused with the febrile disease, especially malaria.[4] Endocarditis and aortic valve infection as well as other valves are reported with Brucellosis, which can be up to 5% of mortality in humans.[14]

Despite extensive studies on zoonotic diseases, few studies have been done on Brucellosis.[15-17] According to the prevalence of Brucellosis and the importance of diagnosing and treating the disease, the study of the condition of Brucellosis in the Golestan Province can provide valuable information about the condition and its risk factors as a febrile illness and a major zoonotic disease. Employees of the health system will be able to benefit from the results of our study in preventing, controlling, and treating illnesses. This study aimed to report the information available at the Provincial Health Center about the frequency and characteristics of patients with Brucellosis in Golestan Province.

Materials and Methods

This was an analytic-descriptive cross-sectional study. The study population included all patients with Brucellosis diagnosed from April 2011 to March 2015 in the Provincial Health Center of Golestan based on the serological method. The serum of patients was examined by Standard Agglutination Test (SAT) and 2-Mercaptoethanol (2-ME) method. The titers of SAT over 1/80 and 2-ME over 1/40 were considered as the definitive diagnosis of Brucellosis.

The data gathering tool was a questionnaire that included demographic information, clinical presentation and examinations, history of exposure, laboratory findings, and treatment protocols. The infectious disease specialist and epidemiologist evaluated the content validity of the questionnaire. Sampling was started after taking the required permission for the research from the Ethics Committee in the Research and Technology Deputy of Golestan University of Medical Sciences, Gorgan. Since the information was recorded with the code, and the name of the patients was excluded in the research, the confidentiality of the data was fully respected. No one had the right to access information other than study performers. Data extracted from the records of patients who were admitted with Brucellosis diagnosis in Golestan Province Health Center during 2011-2015 were collected. Finally, descriptive statistics were reported as frequency and mean ± standard deviation (SD)

and analyzed by SPSS software (version 22, IBM Corporation, Armonk, NY, USA).

Results

A total of 1788 cases were evaluated. The lowest rate of Brucellosis was reported in 2011 with 11.12% and the highest rate in 2014 with 29.97% (Figure 1). A total of 1788 cases of Brucellosis were detected, and the mean ± SD of subjects' age was 34.17 ± 17.10 years. The age range of patients was from 1 to 20 years, and the last age range was 87-61 years. The highest number of patients was in the age group of 21-40 years (40.65%).

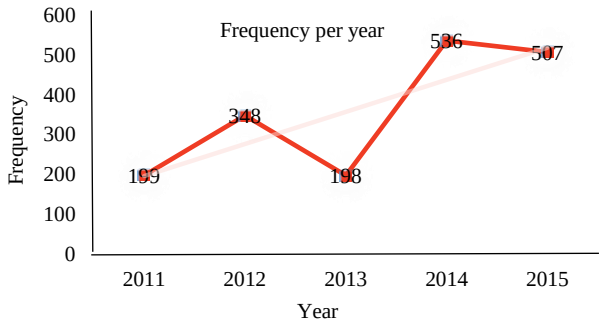

Figure 1. Frequency distribution of Brucellosis during 2011-2015

The youngest patient was 1 year old, and the oldest was 87 years old (Figure 2). Among the patients with Brucellosis, 547 (30.59%) were Turkmen.

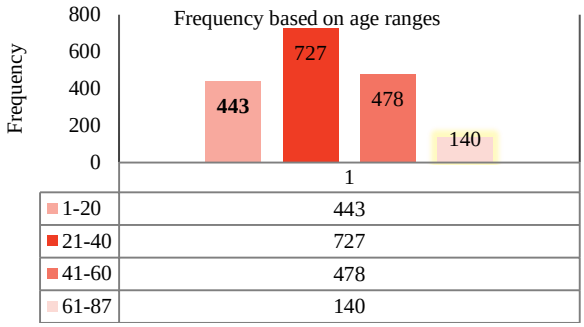

Figure 2. Frequency distribution of Brucellosis based on the age ranges

The frequency of cases was 1163 (65.04%) in men and 625 (34.95%) in women. Of these, 1473 (82.38%) lived in the village and 293 (16.38%) lived in the city. The two cities of Marwa Tappeh with 213 cases (11.91%) and Agh Qala with 55 cases (3.07%) had the highest and lowest incidence, respectively. Stockbreeder (35.91%) included the most among different occupations (Table 1).

Table 1. Demographic characteristics of patients with Brucellosis

Variables	n (%)
Gender	
Male	1163 (65.05)
Female	625 (34.95)
Living place	
Village	1473 (82.38)
City	293 (16.38)
Nomads	22 (1.24)
Job	
Stockbreeder	642 (35.91)
Housekeeper	505 (28.24)
Butcher	6 (0.33)
Farmer	56 (3.13)
Workman	119 (6.65)
Others	460 (25.71)

In 2014 and 2015, two and four pregnant women were reported with Brucellosis, respectively. The mean age of men with Brucellosis was significantly lower than that of women. Villagers with Brucellosis also had a significantly lower age than urban residents. Those who had a history of contact with infected animals were significantly younger than the others (Table 2).

The frequency of clinical features in patients was very different, but muscle pain and fever were the most common ones (Figure 3). Considering that, in most cases, a patient with multiple clinical manifestations has been contacted simultaneously, the total percentages were reported to be higher than 100%. Contact with infected animals was reported in 1426 people (79.75%). Vaccination of livestock was registered in 833 (46.58%) cases. In 1521 (85.66%) cases, consumption of non-pasteurized dairy products was reported, and 271 (15.15%) cases had a positive family history.

Table 2. Comparison of the mean and standard deviation (SD) of age of people with Brucellosis in terms of gender, location, and history of contact with infected animals

Variables		Age (year) (mean ± SD)	n (%)
Gender	Male	31.76 ± 16.55	0.004
	Female	37.50 ± 16.70	
Location	Village	33.08 ± 16.71	< 0.001
	City	37.15 ± 17.01	
The history of contact with an infected animal	Yes	33.08 ± 16.54	0.001
	No	37.16 ± 17.75	

SD: Standard deviation

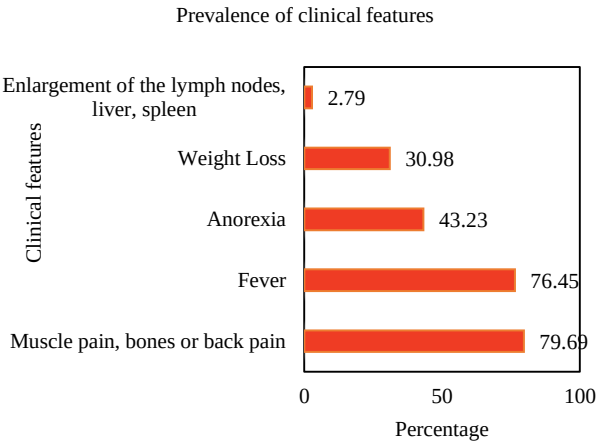

Figure 3. Frequency of clinical manifestations

As shown in table 3, 26 patients (1.45%) complained of complications. Arthritis was the most common complication of the disease, which was observed in 20 cases (1.11%) and spondylitis and orchitis occurred in 4 (0.22%) and 2 (0.11%) cases, respectively.

Table 3. Frequency distribution of complications

Complication	n (%)
Arthritis	20 (1.12)
Spondylitis	4 (0.22)
Orchitis	2 (0.11)
Total	26 (1.45)

Totally, 1313 (73.44%) cases were treated with two drugs, and 475 (26.56%) were treated with three drugs. In patients treated with three drugs, in almost all cases, streptomycin or gentamicin was prescribed in the first 7-10 days, and the continued treatment of patients was two drugs (Table 4).

Table 4. Frequency of patients with Brucellosis based on the type of treatment performed

Type of treatment	n (%)
Double drugs*	1313 (73.44)
Triple drugs**	475 (26.56)

* Double drugs include: Tetracycline + rifampin/streptomycin + rifampin/streptomycin + doxycycline/cotrimoxazole + rifampin/doxycycline + rifampin/cotrimoxazole + doxycycline/streptomycin + cotrimoxazole

** Triple drugs include: Rifampin + streptomycin + doxycycline/streptomycin + cotrimoxazole + rifampin/cotrimoxazole + streptomycin + doxycycline/doxycycline + rifampin + gentamicin

Discussion

In our study, with the review of records of patients with a definite diagnosis of Brucellosis in Golestan Province during the years 2011 to 2015, the prevalence of Brucellosis was 1788 cases. In a study by Ebrahimpour et al. in Babol, Iran, 377 patients with Brucellosis were reported during 2010.[18] According to the WHO, the incidence of the disease is half of a million every year, and the prevalence in our region varies from 0.5 per 100 to 10.9 per 100 people in different provinces.[19] In this study, in terms of age distribution, the mean age of the cases was 34.17 years, and the SD of the age was 17.17. The youngest person was 1 year old, and the oldest was 87 years old. The highest number of patients was in the age group of 21-40 years (40.65%).

According to a study done in Gonbad-e Kavus by Poorhajibagher et al. between 2009 and 2011, the highest prevalence of Brucellosis in the patients referred to the Gonbad-e Kavus Health Center belonged to the age group of 20-29 years (26.20%), and the highest prevalence

of the disease was in the age group under 40 years old.[11] In a study by Hasanjani Roushan et al. in Babol, the mean age of patients was 34.0 ± 16.9 years, 44.10% of patients were between 21-40 years old, and 24.90% of them were < 20 years old.[20]

Brucellosis has been observed at all ages, but it is more prevalent in younger age groups than in the older ones, as in the study by Zeinalian et al. in 2012. The mean age of the infected patients was 31.30 years, which is probably due to the high chance of dealing with infected animals and their products.[19] In terms of the gender of the patients, 67.20% of men and 32.80% of women were ill. As a result, in our study, the outbreak in men was more than women. According to a study by Hosseini et al. between 2011 and 2013 in Amol, Iran, 104 cases (60.12%) were men, and 69 (39.88%) cases were women.[21] Also, in Hasanjani Roushan et al.'s study in Babol, 957 patients with Brucellosis were observed, of whom, 55.9% were men,[20] which is matched with our study. This increase in the men prevalence can be due to several factors, such as the slaughtering job of these individuals.

In this study, the prevalence of Brucellosis in rural areas (82.38%) was significantly higher than in urban areas (16.38%). Also, in a study by Hosseini et al., 68.21% of people with Brucellosis lived in village and 31.79% of them lived in city.[21] This can be due to job and direct contact with livestock and non-pasteurized dairy products in villagers, and less access to pasteurized dairy products in villages.

In our study, the mean age of men (31.76 years) with Brucellosis was lower than women (37.50 years). The villagers (33.08 years) with Brucellosis also had a higher incidence of Brucellosis than urban residents (37.18 years). Those who had a history of contact with infected animals (33.08 years) were younger than the others (37.16 years). However, in other studies that we examined, the relationship between these variables and age was not studied. In terms of job, livestock jobs (35.99%) had the highest incidence among different occupations in our study. A study by Mosavi et al. showed that the most prevalent disease was in livestock, agriculture, and housekeeping occupations.[22] The similar study conducted by Earhart et al. also showed that most of the patients had livestock jobs,[23] but a study by Ebrahimpour et al. showed that the most frequent illness was in homemakers.[24]

In our study, muscle, bone, and back pain (79.69%) and fever (76.45%) were the most common clinical manifestations of the disease. The enlargement of lymph nodes, liver, and spleen had the lowest incidence (2.79%). In a study by Hasanjani Roushan et al. in Babol, the most common clinical manifestations were arthralgia (71.00%), sweating (66.70%), fever (57.20%), and backache (39.30%).[20] As a result, Brucellosis disease can occur as unusual clinical manifestations and the simultaneous involvement of various organs. For this reason, endemic areas should be considered.

Also, 547 (30.55%) Turkmen were among the patients with Brucellosis. In this study, 1313 people (73.44%) were treated with two drugs, and 475 people (26.56%) were treated with three drugs. However, in other studies that we reviewed, these were not mentioned. In this study, in general, 26 patients (1.45%) had complications that arthritis was the most common complication of the disease, which was observed in 1.11% of patients and orchitis (0.11%) had lowest outbreak. In the study of Hasanjani Roushan et al., the most common complication was arthralgia (71.00%).[20] A study by Taheri Soodejani et al. also showed that fever was the most frequent clinical symptom among patients.[25]

Contact with infected animals was found in 75.79% of cases. In this study, non-pasteurized dairy products were present in 85.06% of cases. The results of the study by Mosavi et al. showed that more than 85.00% of patients had a history of non-pasteurized milk consumption

and 90.00% of them reported a history of contact with an infected animal.[22] The study by Taheri Soodejani et al. also found that contact with infected animals had the highest frequency of risk factors among patients.[25] Ebrahimpour et al. also found that the consumption of cheese and non-pasteurized milk was the most common among risk factors.[24] Vaccination of livestock in the area of Brucellosis residence was recorded in 46.58%. However, in other studies we reviewed, these were not mentioned. The family history of Brucellosis was 15.15% in our study.

Although spondylitis was reported in only four cases in our study (2011-2015), Ghasemian et al.[26] in Mazandaran Province (2013-2017) reported 14 cases. As the duration of both studies is similar (5 years), the higher frequency can be resulted that their study has been performed in Infectious Diseases Center of Mazandaran Province.

Conclusion

In general, the results indicate that Brucellosis is still a health problem in the province. The high incidence of Brucellosis in villages, the lack of animal vaccine coverage, and the link between disease and occupations associated with livestock are significant.

Conflict of Interests

Authors have no conflict of interests.

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