



Original Article

Epidemiological evaluation of brucellosis in Isfahan Province-Iran in 2016



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ABSTRACT

Introduction: Brucellosis is one of the most common zoonosis diseases that can be seen in many developing countries, including Iran. The aim of this study was to determine the prevalence of brucellosis in Isfahan province.

Methods: This is a cross-sectional study in which all newly reported cases of brucellosis in Isfahan city in 2016 were studied. Sampling was done through numerical method. The statistical tests used in this study were one-way ANOVA and two-sample T-test.

Results: The incidence rate of brucellosis in Isfahan province in 2016 was 19.78 per 100,000. Majority of cases (590, 67.8%) were men with a mean age of 31.62 ± 20.04 years old and 32.2% (280 cases) were women with a mean age of 33.35 ± 20.26 years old. Friedan had the highest incidence rate of brucellosis (204.47 per 100,000) while Isfahan had the lowest incidence rate (1.81 per 100,000). There was a significant relationship between occupational variables ($P = 0.001$), history of contact with the livestock ($P = 0.0001$), non-pasteurized dairy consumption ($P = 0.0001$), and the incidence of the disease ($P = 0.003$) in urban and rural areas.

Conclusion: The incidence rate of brucellosis in Isfahan is classified as a very low. The disease is more common in rural areas than in urban areas. Therefore, educational, preventive and therapeutic measures in rural areas, particularly in those involved with animal husbandry and homemaking, have priority over urban areas.

Introduction

Brucellosis also known as waxy fever, Mediterranean fever or Malta fever is the most common zoonosis infectious disease. Human outbreak take place in close contact with domestic animals and transmission is occurred directly or indirectly from animals or their products to humans (1, 2). The disease is characterized by abortion in animals and by fever, perspiration, weakness, boredom and weight loss in humans (3). According to the World Health Organization the disease is present in many parts of the world, but most cases are found in the Mediterranean, Arabian Peninsula, Indian subcontinent, and parts of the central and southern regions of the United States (4, 5). In our country, various

strains of the *B. melitensis* and *B. abortus* species are the main causes of most human cases (6). This disease is more common in the spring and summer seasons, which is the birth season of livestock (7). At-risk occupations include animal husbandry, veterinary matters, work in slaughterhouses, health quality monitoring of meat products and working in bacteriological laboratories. In Iran, brucellosis was separated from a patient's blood for the first time in 1912, at the Pasteur Institute. According to available statistics, the outbreak varies in different regions of Iran (8). Based on the findings of previous studies, the disease is mainly seen in rural regions, and mostly in male gender. Brucellosis is more common in younger people who are more socially active (9). Brucellosis species can survive in frozen

meat for three weeks, in raw milk for ten days, in fresh cheese for up to three months, and may survive in salted meat for a while. Though, smoking, salting, and freezing contaminated meat significantly reduces the pathogen load. Considering the prevalence of brucellosis in the country and its economic burden and complications, it is important to consider different aspects and especially the epidemiology of different parts of the country. This study was conducted to evaluate epidemiology of brucellosis in Isfahan province in 2016.

Methods

The present study is a cross sectional study which recruited all patient with clinical symptoms compatible with brucellosis in 95 cities of Isfahan Province-Iran. The epidemiological data of suspected and definite cases (having all diagnostic criteria for brucellosis) cases were recorded. Suspicious brucellosis was defined as having positive history of contact with animals or animal products or positive Wright test titration (equal or greater than 1.80). All patients, in addition to having clinical symptoms, had a positive serology (Burning 1.8 and 2ME more than 1.4) for brucellosis. Since brucellosis is not considered as urgently reported illnesses, diagnosis is documented by a specialist and through laboratory examination each month. Therefore, all data for brucellosis cases are saved in the provincial health care center archive. In this study, the information regarding all reported cases of brucellosis during the year 2016 was collected and categorized. Data analysis was performed using the statistical package for social sciences (SPSS) software version 16. Com-

parison of the demographic data of the patients and the incidence of the disease in different age groups as well as the incidence of the disease according to the population of counties in 2016 were analyzed. The incidence rate was calculated by dividing the number of new cases of disease by 100,000 populations at risk. The normal distribution of data was assessed using Kolmogorov-Smirnov test and the Mann-Whitney and Kruskal-Wallis tests were used for the comparison of non-parametric data while independent t-test and one-way analysis of variance (ANOVA) were used for comparison of parametric data. The significance level was considered as $P < 0.05$.

Results

A total of 870 new cases or recurrent febrile illnesses were reported in Isfahan Province in 2016. Majority of cases (590, 67.8%) were male and 32.2% (280 cases) were female. Majority of cases were in the age group of 20-30 years (Figure 1). Most of the cases (462, 53.1%) were rural residents while 37.1% (323 cases) were urban residents while 1.3% (11 cases) had nomadic lifestyle and the residency status of 8.5% (74 cases) was unspecified. The distribution of new cases of brucellosis in Isfahan province as per demographic and habitat categories in year 2016 is presented in table 1. This study showed that the number of cases of brucellosis in the winter and summer seasons were more than autumn and spring. One-way ANOVA showed that the disease level was significantly different in different seasons ($P = 0.003$). There was a significant relationship between occupational variables, age, histo-

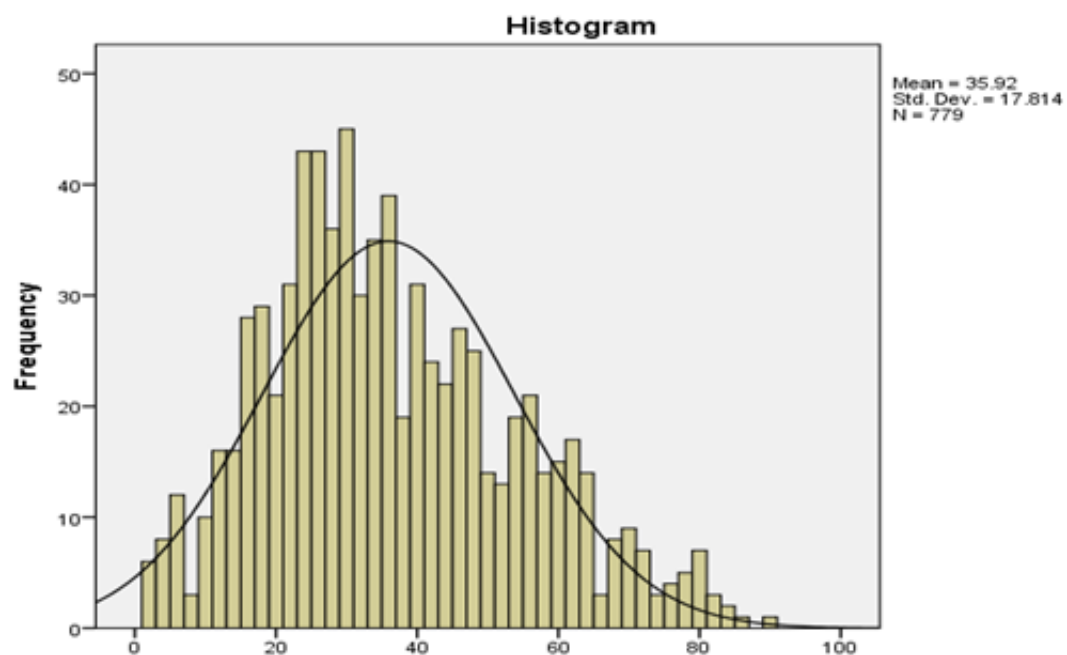


Figure 1. Age distribution of brucellosis cases in Isfahan Province in 2016

ry of contact with livestock, history of non-pasteurized dairy consumption, and seasonal incidence in urban and rural areas ($P < 0.05$). The incidence rate of brucellosis in Isfahan province in 2016 was 1.81 per 100,000. The highest incidence rate was observed in Friedan city (204.47 per 100,000) and Boeing and Miandasht (185.52 per 100,000) (Table 2). Figure 2 presents incidence rate of brucellosis in cities of Isfahan province. The maximum number of reported cases were reported in Faryad (170 cases) and Najafabad (148 cases). The number of cases of brucellosis in months of the year is presented in Figure 2. The maximum number of brucellosis cases was reported in March (180 cases) and the minimum number of cases was reported in December (39 cases).

Discussion

According to findings of this study, the annual incidence of brucellosis in Isfahan province in 2016, was 19.78

per 100,000. In the study by Farahani et al. (10) in Arak, the incidence of the disease was 60 per 100,000, which was higher than the observed incidence in our study. In general, and based on a global standard, the prevalence of brucellosis in each country depends very closely on the incidence of disease in its livestock (2). One of the important reasons for the geographical difference in the incidence of brucellosis is likely to be the variation in the prevalence of the disease in the livestock in different regions. Majority of cases (67.8%) were men and 32.2% were women. This finding was consistent with the results of a number of other studies in this regard. The study by Elbeltagy in Saudi Arabia and Farahani in Arak, Iran also reported higher incidence rates of the illness among men (10, 11). In contrast to the findings of our study in a study by Haddadi et al. in Imam Khomeini and Tehran Sina Hospitals, brucellosis was more prevalent in women compared to men (7). However, in some regions women also work alongside men in animal farms. The higher rate of disease in men in Isfahan

Table 1. Distribution of brucellosis cases in Isfahan province based on demographic variables in 2016

Variable		Urban Prevalence (%)	Rural Prevalence (%)	Total Prevalence (%)	P value
Number of individuals diagnosed with brucellosis		323 (37.1)	462 (53.1)	870	0.001
Age		33.37±13.24	36.12±14.23	32.3±17.46	0.04
Gender	Male	219 (67.8)	313 (67.7)	590 (67.8)	0.11
	Female	104 (32.2)	149 (32.3)	280 (32.2)	
Occupation	Animal farmer	63 (19.5)	123 (26.6)	192 (22.1)	0.001
	Plant famer	28 (8.7)	85 (18.4)	103 (13)	
	Homemaking	76 (23.5)	118 (25.5)	197 (22.6)	
	Student	36 (11.1)	47 (10.1)	84 (9.6)	
	Worker	53 (16.3)	45 (11.9)	122 (14.1)	
	Employee	9 (2.8)	0	10 (1.1)	
History of contact with livestock	Yes	196 (60.7)	401 (86.8)	597 (76.05)	0.0001
	No	127 (39.3)	61 (13.2)	188 (23.95)	
History of non-pasteurized dairy products consumption	Yes	190 (58.8)	270 (58.5)	471 (54.1)	0.0001
	No	133 (41.2)	192 (41.5)	399 (45.8)	
Season of disease onset	Spring	77 (24.3)	116 (25.1)	201 (23.1)	0.003
	Summer	89 (27.6)	185 (40)	277 (31.8)	
	Fall	71 (13)	76 (16.5)	147 (16.9)	
	Winter	86 (26.6)	85 (18.4)	245 (28.2)	

province reflects the occupation-associated nature of the disease. Occupational distribution of the disease is also important. A largest number of patients were farmers and livestock producers (35.1%). The second most common occupation among patients, were housewives (22.6%). Needless to say, it should be borne in mind that although rural women may participate in livestock activities, they did not participate in animal farming. Brucellosis is one of the most important zoonotic diseases, many of which remain unidentified. Distribution of the disease among different age groups in the province shows that the disease is mostly present in the age group of 20-30 years (the active group of the society in terms of job). The lowest incidence of the disease in this study was related to the age group of 60 and above. In the study conducted by Moniri in Kashan, Iran in 1982 (12), Lopez in Mexico (13), and Ghasemi et al. the maximum number of patients were reported in the age group of 15 to 19 years old (9). According to our result, the incidence of brucellosis in individuals who

have contact with livestock was higher than those who did not have contact with livestock. The results of this study showed that the highest incidence of brucellosis was in summer, which was in line with the findings of the study by Hamzavi et al. (14). Since spring and summer are breeding seasons of livestock, contact with remains of abortion, and consumption of the dairy products, may result in the increased number of brucellosis cases. This study found that the most common way of transmission was to consumption of local raw milk, non-pasteurized cheese and contact with the livestock. In the study by Hajari et al. in Isfahan from 1994 to 2013, it was found that 82.87% of the cases were in urban areas and 85.44% in rural areas, both with a history of non-pasteurized dairy consumption (15). Furthermore, a study in Mazandaran revealed that more than 85% of brucellosis cases had a history of non-pasteurized dairy consumption (16). Furthermore, in another study in Maneh and Semelghan in the southern Khorasan province, Iran, 57.4% of brucellosis cases

Table 2. Brucellosis incidence per 100,000 at risk population in Isfahan province in 2016

	City	Numbers in 2016	Population in 2016	Incidence in 100,000
1	Ardestan	13	41465	31.35
2	Barkhar	8	108174	7.39
3	Chadagan	48	35267	136.10
4	Dehaghan	18	35896	50.14
5	Isfahan	39	2146978	1.81
6	Falavarjan	63	230206	27.36
7	Frieden	170	83140	204.47
8	Fereydoun Shahr	37	39279	94.19
9	Golpayegan	70	81610	85.77
10	Khansar	12	30720	39.06
11	Khomeini shahr	11	303720	3.62
12	Najaf Abad	148	307007	48.20
13	Lenjan	6	245035	2.44
14	Mobarake	12	133373	9
15	Niene	6	36876	16.27
16	Natanz	15	40631	36.91
17	Semirom	52	69544	74.98
18	Shahreza	45	143051	31.45
19	Shahin Shahr and Meymeh	33	188103	17.54
20	Tiran and Crown	44	68768	63.98
21	Khor and Biannak	1	17927	5.57
22	Boeing and Miandasht	19	10256	185.52
23	Entire province	870	4396826	19.78

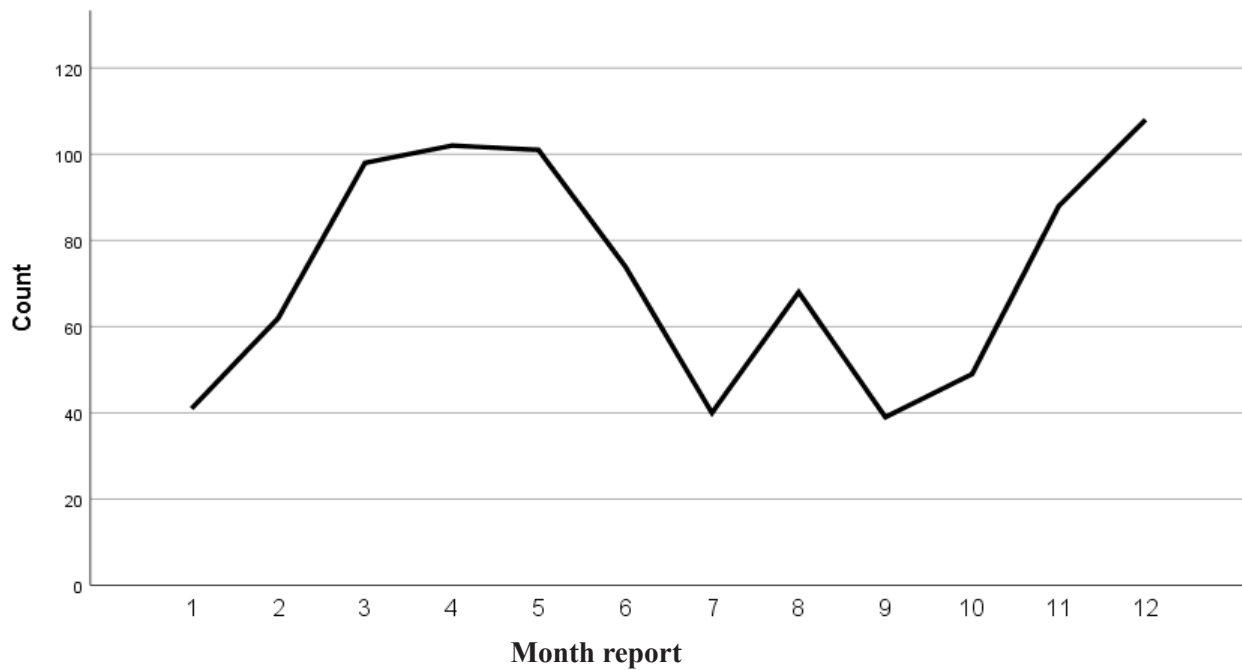


Figure 2. The number of brucellosis cases in Isfahan province as per months of the year in 2016

had a history of unpasteurized milk consumption (17).

Conclusion

The results of this study showed that the annual incidence of brucellosis in the province of Isfahan was below the national average, and the incidence rate in Isfahan is categorized as low incidence. Brucellosis was more prevalent in rural compared to urban regions. Therefore, educational, preventive and therapeutic measures must be taken in rural regions, particularly in people involved with animal husbandry and home-making.

Ethical disclosure

Not applicable.

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Author contributions

All the authors have worked equally and verified responsibility for this article.

Conflict of interest

There is no conflict of interest.

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