



## Journal of Human, Environment and Health Promotion

Journal homepage: [www.zums.ac.ir/jhehp](http://www.zums.ac.ir/jhehp)



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### Evaluation of Incidence Rate and some of Epidemiological Indices of Human Brucellosis in Qazvin Province, Iran during 2002 to 2009

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#### ARTICLE INFO

##### Article type:

Short Communication

##### Article history:

Received December 23, 2017

Revised February 3, 2018

Accepted February 12, 2018

DOI: [10.29252/jhehp.3.2.61](https://doi.org/10.29252/jhehp.3.2.61)

##### Keywords:

Brucellosis

Incidence

Qazvin

#### ABSTRACT

**Background:** The socio-economical and geographical conditions of Iran cause most of the people consume dairy products or are in close contact with livestock, that these expose many individuals to *Brucella* spp. Since Qazvin province is considered as a moderate burden of brucellosis, the need for a comprehensive epidemiological study of the disease in this province is quite essential.

**Methods:** This study is a descriptive study (secondary data analyses) that performed on registered data in department of disease control in health centers of Qazvin province from 2002 to 2009. Data were analyzed by SPSS software (Version 16.0).

**Results:** Totally, 4037 confirmed brucellosis cases were recorded, which the annual incidence of the disease was roughly decreasing during 2002-2009. The frequency of the illness in the male population was higher than that of women. Most cases were detected in summer and spring and occupational exposure had no significant impact on occurrence of the disease ( $P < 0.05$ ).

**Conclusion:** The results of this study are greatly in line with the national pattern and other studies. Prohibition of consumption of uncontrolled traditional dairy products along with production of these products under hygienic conditions in modern industrial plants can prevent occurrences of human brucellosis.

## 1. Introduction

Brucellosis is a zoonosis systemic bacterial disease known in many other names, such as Malta fever, undulant fever and Mediterranean fever.

Human may be infected by different species of *Brucella* such as *Brucella abortus*, *Brucella melitensis*, *Brucella canis* and *Brucella suis* (all biotypes) [1,2].

Patients infected with brucellosis have usually nonspecific

symptoms such as fever, headache, weakness, sweating, joint pain, depression, weight loss, and general pain in the body. The fever has no definite pattern and may be persistent, intermittent, or irregular, with different periods.

The onset of the disease's symptoms may be acute or gradual and may even become chronic [3]. The socio-economical and geographical conditions of Iran cause most of the people consume dairy products or are in close contact with livestock, that these expose many individuals to *Brucella* spp. [4,5].

**To cite:** Abbasi J, Samarghandi Z, Akbarein H, Hashemi M, Amani Z, Tayefeh A, Rezaeigolestani M. Evaluation of Incidence Rate and some of Epidemiological Indices of Human Brucellosis in Qazvin Province, Iran during 2002 to 2009. *J Hum Environ Health Promot.* 2018; 4(1):45- 8.

Sheep, goat, cow, pig and dog are important sources of human brucellosis. It is transmitted to human through direct contact with infected animals or via consumption of infected animal products. Brucellosis is one of the most important zoonotic diseases due to the consecutive abortions in livestock, the reduction of milk production and the risk of transmission to human, which it is considered endemic in Iran. Some occupational groups, such as livestock breeders, veterinarians, butchers and other related job titles, are considered as hazardous groups. Since Qazvin province is considered as a moderate burden of brucellosis [6], the need for a comprehensive epidemiological study of the disease in this province is quite necessary.

The main goals of present study were to determine incidence rate of human brucellosis and to evaluate distribution of the disease in different seasons and among different gender, age groups and occupations (occupations related to the sources of *Brucella* infection) between 2002 and 2009 in Qazvin, Iran.

As far as the authors know, this is the first study on this issue in the province.

## 2. Materials and Methods

### 2.1. Determination of Incidence Rate and Distribution of the Disease

The present study is a descriptive study (secondary data analyzes) that was performed on data recorded in the Qazvin Health Center, from the beginning of April 2002 to the end of March 2009, Qazvin, Iran. The data were extracted from the individual registration forms related to brucellosis. Indicators such as incidence rate were calculated in terms of year. Other specific parameters such as distribution of the disease regarding age, gender, occupational exposure and season were also calculated.

### 2.2. Statistical Analysis

SPSS software (version 16, for Windows) was used to analyze the data. Descriptive analysis (absolute and relative frequency) and analytical analysis (Chi square tests) were used to calculate the aforementioned parameters. The significance level was considered to be less than 0.05.

## 3. Results and Discussion

### 3.1. Incidence Rate and Distribution of the Disease

Table 1 and 2 show the distribution of human brucellosis in Qazvin province in terms of gender, age and season. During the seven years of study, a total of 4037 human brucellosis cases were recorded in Qazvin province, where the highest and lowest cases were in 2002 and 2009 respectively (Table 1). From 2002 to 2009, the annual incidence of the illness, with some exceptions, faced a roughly decreasing trend (Figure 1). The negative trend recorded for incidence of the disease during the period is closely in line with the national pattern [7]. This probably shows that brucellosis control and prevention programs in the province could efficiently worked and decreased the incidence of human brucellosis.

Through these years, the frequency of illness in the male population was higher than that of women (Table 1). This is probably due to more men's chances of confronting infectious sources. Similar results were reported in other surveys conducted in different regions of the country, including Neyshabur, Birjand and Khoy [4,8,9].

The highest and the lowest brucellosis cases belonged to 10-19 and 0-9 age groups respectively (Table 1). In fact, the distribution pattern of human brucellosis concerning age groups are in well agreement with the other studies and also the national pattern [4,6].

### 3.2. Distribution of the Disease during Different Seasons

Among different seasons, most cases were recorded in summer and spring (Table 2). This coincides with the peak period of parturitions, abortions and lactation among farm animals. Therefore, during this period the level of exposure risk is the highest for those attending livestock and consuming their milk [10].

### 3.3. Effect of Occupational Exposure on Occurrence of the Disease

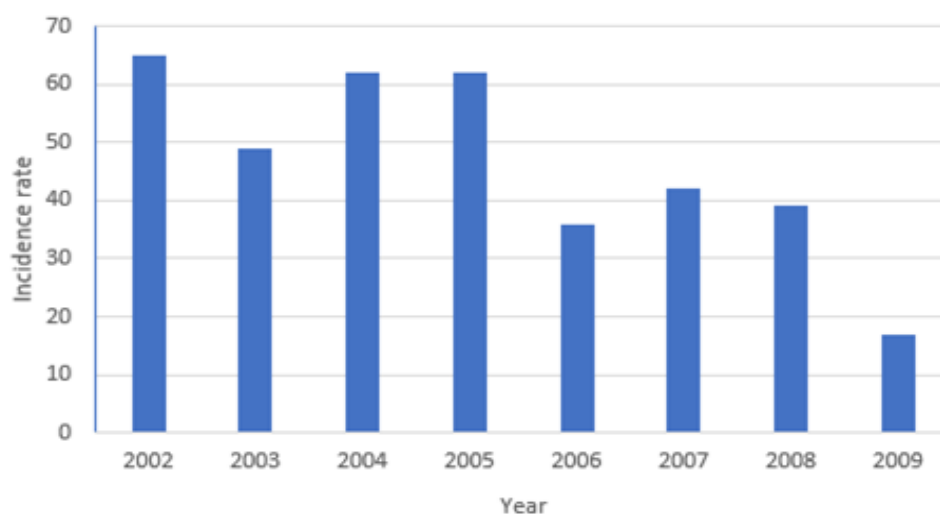
The effect of occupational exposure to *Brucella* spp. on occurrence of human brucellosis is shown in table 3. As it can be seen, except 2008, occupational exposure to the infection sources was not the key factor in occurrence of brucellosis. ( $P < 0.05$ ).

**Table 1:** Distribution of human brucellosis in Qazvin province regarding gender and age during 2002-2009

Year	Gender		Age groups							Total (n)
	Male n (%)	Female n (%)	0-9 n (%)	10-19 % (%)	20-29 n (%)	30-39 n (%)	40-49 n (%)	50-59 % (%)	> 60 n (%)	
2002	354 (53)	319 (47)	34 (5)	162 (24)	105 (16)	119 (18)	104 (15)	57 (8)	92 (14)	673
2003	290 (57)	222 (43)	23 (5.4)	141(27)	100 (20)	87 (17)	55 (11)	43 (8)	63 (5.1)	512
2004	415(64)	238 (26)	32 (5)	157 (24)	147 (5.22)	98 (15)	82 (5.12)	70 (11)	65 (10)	651
2005	400 (62)	246(38)	37 (5.5)	154 (24)	127 (5.19)	90 (14)	89 (14)	68 (5.1)	81 (5.12)	646
2006	213(52)	197 (48)	13 (3)	78 (19)	62 (15)	63 (15.5)	71 (5.17)	62 (15)	61 (15)	410
2007	266 (55)	218 (45)	15 (3)	92 (19)	104 (21)	82 (13)	82 (17)	63 (13)	46 (10)	484
2008	244 (54)	211(46)	6 (1.3)	59 (13.3)	105 (23)	93 (20)	68 (15)	63 (14)	61 (13.4)	455
2009	113 (55)	93 (45)	4(2)	20 (10)	34 (16.5)	35 (17)	51 (25)	30 (14.5)	32 (15.5)	206

Likewise, Raul et al. (1999) in Spain, Taravati et al. (2007) in Urmia, Maliji et al. (2009) in Babol, Bokaei et al. (2008 and 2009) in Birjand and Khoy and Vahdat et al.

(2006) in Bushehr reported similar results [8,9,11–14]. On the contrary, some researchers have been mentioned brucellosis as an occupational disease [15,16].



**Figure 1:** Incidence rates (per 100,000 population) of human brucellosis in Qazvin province during 2002-2009

**Table 2:** Distribution of human brucellosis in Qazvin province regarding season during 2002-2009

Year	Season			
	Spring n (%)	Summer n (%)	Autumn n (%)	Winter n (%)
2002	209 (31)	222 (33)	135 (20)	108 (16)
2003	146 (28.5)	200 (39)	84 (16.5)	82 (16)
2004	202 (31)	221 (34)	124 (19)	104 (16)
2005	200 (31)	223 (34.5)	116 (18)	107 (16.5)
2006	137 (33.5)	94 (23)	111 (27)	68 (16.5)
2007	145 (30)	155 (32)	102 (21)	82 (17)
2008	148 (32.5)	150 (33)	82 (18)	75 (16.5)
2009	84 (41)	47 (23)	41 (20)	33 (16)

**Table 3:** Distribution of human brucellosis in Qazvin province regarding occupational exposure to *Brucella* spp. during 2002-2009

Exposure to <i>Brucella</i> spp.	Year							
	2002 n (%)	2003 n (%)	2004 n (%)	2005 n (%)	2006 n (%)	2007 n (%)	2008 n (%)	2009 n (%)
Occupational	205 (30)	133 (126)	202 (31)	205 (32)	133 (32)	114 (25)	295(61)	98 (47.5)
Non-occupational	468 (70)	379 (74)	449 (69)	441 (68)	277 (68)	341 (75)	189 (39)	108 (52.5)

## 4. Conclusion

Brucellosis has a global spread and its incidence and prevalence varies in developed and developing countries due to the variety of clinical signs, the lack of referral of the patients with mild symptoms, lack of accurate and timely reporting, which cause about 4 to 10 percent of real cases are reported in developed countries. Brucellosis is endemic in Iran, and the recorded incidence of the disease in present study regarding gender, age, season and occupational exposure to *Brucella* spp. are greatly in line with the other country reports and also national pattern. Prohibition of uncontrolled traditional dairy products consumption along with production of these products under hygienic conditions in modern industrial plants can prevent human brucellosis.

Besides, identification of livestock population and

vaccination can be helpful in preventing occurrence of the disease.

## Authors' Contributions

This paper was carried out by all the authors. J. A. and M. R., designed and wrote the manuscript. H. A., Z. S., Z. A., A. T., and M. H. contributed to carry out statistical analysis and data collection. All authors approved the final manuscript.

## Conflict of Interest

The authors declare that there are no conflicts of interest.

## Acknowledgments

The authors would like to thank Dr. Hamid Tavanayi-manesh for his technical support.

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