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Original article

Frequency of Seropositive People for Brucellosis in Yazd

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Background: Brucellosis is one of the most prevalent infectious diseases in Iran, which is shared between humans and animals. Brucellosis is caused by *Brucella* species and transmitted via unpasteurized milk or dairy products, which has been reported at least in 80 countries. The present study aimed to evaluate the prevalence rate of seropositive cases of brucellosis in Yazd, Iran.
Materials and Methods: In this retrospective cross sectional study, seropositivity rate of brucellosis was examined for 12258 patients. The Wright test (1.80 or higher) was used for diagnosing brucellosis. The obtained results were statistically evaluated by chi-square which is a trend analysis method.
Results: The seropositivity rate of Wright test was reported to be 178 (1.5%), which was significantly higher in the summer (43.3%) and spring (29.7%) than other seasons (P = .000). It was also significantly higher in men (53.9%) (P = .000) than in women, and in people over 40 years (41%) (P = .000) than in other age groups.
Conclusion: Brucellosis seropositive studies provide very good information in order to help us in investigating the impact of brucellosis.

*Keywords***:** Brucellosis, Prevalence, Infectious diseases

1. Background

Human brucellosis is a zoonotic infectious disease caused by the *Brucella* species. *Brucella melitensis* is the most common species causing human disease (1-3).

Brucellosis, as an infectious bacterial disease, can cause long-lasting or chronic signs and symptoms that include recurrent fevers, joint pain, and fatigue (3). This disease, however, is more common in countries that do not have effective public health and domestic animal health programs (4). Human brucellosis is one of the world wide zoonotic infectious diseases that are transmitted from farm animals such as cattle, sheep, and goat to human (5-7). It is also transmitted via unpasteurized milk or dairy products. Brucellosis has been reported at least in 80 countries (8). Despite eradication programs, the disease has remained endemic in many regions of the world, with predominance in the Mediterranean Basin, especially in the Maghreb (Algeria, Morocco and Tunisia), Middle East, Africa, western Asia, central and South America (9-13). Brucellosis has constituted a major health and economic problem around the world, including Iran (14). This disease is a major health challenge in Iran. During 2001-2005, the incidence of human brucellosis has been reported to be between 120-400 per 100,000 people. Furthermore, a survey conducted in 2013 showed that nearly 7.4% of the cows in Iran were infected with brucellosis (15).

The global burden of human brucellosis remains important: the World Health Organization (WHO) estimates that brucellosis causes more than 500,000 infections per year worldwide, with an important travel-association (16). The occurrence of human brucellosis depends largely on the animal reservoir (16).

The clinical diagnosis should always be confirmed by bacteriological or serological tests because of the lack of any pathognomonic signs and symptoms of the disease (17). *Brucella* culture is the golden standard of diagnosis. *Brucella* is isolated from blood, bone marrow, or other tissue and cultured on Castaneda's medium (17). However, at least two serological tests should be combined to confirm active infection. Typically, the standard tube agglutination test (Wright Test) is carried out, and then the 2-Mercaptoethanole (2ME) test confirms the results (with 97.1% sensitivity and 100% specificity) (16). Molecular typing methods can be used for trace-back and trace-forward analysis, which may contribute to the identification of the infection origin and spreading route (17-18).

Chronicity, complications, and relapses can occur when the disease is not treated in a timely and effective manner (18). Brucella-related central nervous system involvement and epididymo-orchitis are rare findings, especially in children (18).

2. Objective

The purpose of our study was to evaluate the prevalence rate of seropositive cases of brucellosis in Yazd, the central part of Iran. The prevalence rate of brucellosis in Iran and the prolonged treatment of the disease and lack of response to therapy in some cases were the main reasons for undertaking the present study.

3. Materials and Methods

In this retrospective cross sectional study, seropositivity rate of brucellosis was examined for 12258 patients who referred to the hospital laboratories of Shahid Sadooghi, Shahid Rahnemoon, and Afshar, and Central laboratory from February to December of the year 2014. These patients were those who had contact with domestic animals and their products including shepherds, farmers, and butchers. From a total of 12258 cases, 4495 cases (36.7%) were men and 7757 cases (63.3%) were women. The average age range of patients

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that their Wright test was positive (according to the national guideline) was 37.5 ± 19.6. The existence of brucellosis antibody was investigated in serum samples taken from patients by Standard Tube Agglutination Test method (STA, Wright's Agglutination Test). The sera samples were diluted up to 1.1280 dilution in microplates, and then the brucella antigen was added to the wells. The microplates were incubated in oven at 37°C. The wells, in which agglutination was seen, were accepted as positive. The inclusion criteria for samples to be included in the study were positive Wright test (⩾ 1.80 in Iranian population) and 2-mercaptoethanol test (⩾1.20) or isolation of brucella from sterile body fluids. Patient exclusion criteria were pregnancy and nursing, known or suspected hypersensitivity to tetracyclines or aminoglycosides, or other contradictions (15).

3.1. Statistical Analysis

Statistical analysis was performed using the Statistical Package for the Social Sciences ver. 16.0 (SPSS Inc., Chicago, IL, USA). $P< .05$ was accepted as significant. The present research protocol was approved by the research ethics committee of Yazd Shahid Sadoughi University of Medical Sciences with the ethic code as ir.ssu.rec.1395.157.

4. Results

From a total of 12258 cases, 4495 cases (36.7%) were men, and 7757 cases (63.3%) were women. All cases were tested for brucellosis, Wright test was positive for 178 (1.5%) cases and negative for 11616 (94.8%) cases.

The seropositivity rate of Wright test was significantly higher in men (53.9%) ($P = .000$) than in women (Table1). This rate was also significantly higher in people over 40 years (41%) ($P = .000$) than in other age groups (Table 2).

Table 1. Result of Wright test based on sex.

Sex	Result of Wright test No. (%)		*P*-value
	Negative	Positive	
Men	4281 (36.9)	96 (53.9)	.000
Women	7799 (63.1)	82 (46.1)	
Total	12080 (100)	178 (100)	

Table 2. Result of Wright test based on age range.

Age Range	Result of Wright test No. (%)		*P*-value
	Negative	Positive	
Under 15 years	1024 (8.7)	26 (14.6)	.000
15- 39 years	4373 (37.3)	67 (37.7)	
Above 40 years	6695 (46.2)	73 (41)	
Total	12092 (100)	166 (100)	

In this study, the average age range of those whose Wright test was positive, was 37.5 ± 19.6 years.

The seropositivity rate of Wright test was significantly higher in the summer (43.3%) and spring (29.7%) than in other seasons ($P = .000$) (Table 3).

Table 3. Result of Wright test based on season.

Season	Results of Wright test No. (%)		*P*-value
	Negative	Positive	
Spring	3237 (26.5)	53 (29.7)	.000
Summer	3441 (28.8)	77 (43.3)	
Autumn	2870 (23.7)	30 (16.9)	
Winter	2532 (21)	18 (10.1)	
Total	12080 (100)	178 (100)	

5. Discussion

Brucella is considered primarily as an animal pathogen. Brucellosis affectes a wide range of domestic and wild mammals. Human brucellosis is one of the world wide zoonotic diseases that are transmitted from farm animals such as cattle, sheep, and goat to human (5-7). It is also transmitted via unpasteurized milk or dairy products. Brucellosis is still one of the infectious diseases which are widespread in the Middle East (19). This study investigated the prevalence rate of seropositive cases of brucellosis in the central area of Iran.

In a study conducted in Turkey, 889 cases were men, and 2024 cases were women. At the end of the survey, it was reported that from a total of 525 (18%) patients sera, high level (1.40 dilution) of specific antibodies was detected in 380 (18.8 %) women and 145 (16.3 %) men. There was no significant difference between the positivity distribution, and general positivity rates between men and women (19), but in the present study, the seropositivity rate of Wright test was significantly higher in men (53.9%) than in women.

In another study conducted in Iran, the frequency distribution of age, sex, seasons, and clinical signs were studied. From a total of 12816 patients examined for serological tube tests, Wright test was positive in 559 cases (4.4%). The seropositivity rate of Wright test was higher in men (57.1%), summer (24.5%), and the age group of 20-40 years (20). Therefore, these findings are similar to the present study because of higher prevalence rate of brucellosis seropositivity in men (53.9%) and summer season (43.3%).

In another study conducted in Iran, from a total of 318 cases, Wright test was positive in 42 (13.2%) cases, among whom 20 (47.6%) cases were women, and 22 (52.4%) cases were men. By conducting Wright test (1.80 ≤), 42 cases (13.2%), and by conducting 2ME test (1.80 ≤), 34 cases (7.10%) were proved to be positive. The seropositivity rate of Wright test was higher in the age group of 20-29 years (26.2%) (21). The findings of this study was also similar to our study because of the higher prevalence rate of seropositivity in men.

6. Conclusion

Seropositivity investigation for brucellosis provides useful information to aid us in understanding its epidemiological patterns, assessing its impact, paving the way to define the most suitable approaches for confining the disease within acceptable limits.

Conflict of Interests

The authors declare there is no conflict of interest regarding the publication of this paper.

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Authors' Contribution

Dr. Ayatollahi designed the study, Shahcheraghi wrote the manuscript, Dehghanpour Farashah performed the experiments and Dr. Vakili analyzed data.

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