

Full Length Research Paper

Brucellosis: Prevalence and retrospective evaluation of risk factors in western cities of Tehran province, Iran

Abas Bahador¹, Noormohamad Mansoori¹, Davood Esmaeili^{2*}, Reza Amini Sabri²

¹Department of Medical Microbiology, Faculty of Medicine, Tehran University of Medical Sciences, Tehran, Iran.

²Bacteriology Department, Applied Microbiology Research Center, Baqiyatallah University.

Accepted 20 June, 2012

Brucellosis is the commonest zoonotic disease that is spread worldwide. In this study, we aimed to compare 40 brucellosis cases with other big series in the literature in view of epidemiological and laboratory findings. A total of 40 brucellosis cases referred to Shahriar Health Center over a 3-year period were included in our study and patient files were reviewed for history and laboratory findings. Of the 40 patients, 19 (47.5%) were females and 21 (52.5%) were males. The mean age of patients was 40 ± 32 years, and 22.5% of cases were aged 24 to 32 years. 19 cases (47.5%) had a history of raising livestock and 52.5% of the cases were found to have no occupational risk for brucellosis. All cases had a history of raw milk and dairy products consumption. The standard tube agglutination (STA) test, Coombs STA test and 2-mercaptoethanol (2ME) test was positive in all cases (100%). Brucellosis is a major health problem in Iran and the world. Pasteurization of milk and dairy products and education on eating habits must be pursued for eradication of human brucellosis; thus, detection of precise brucella and report to WHO is essential.

Key words: Brucellosis, Iran, risk factor.

INTRODUCTION

Brucellosis is the commonest zoonotic disease with worldwide expansion, representing a serious public health problem in many countries, especially those around the Mediterranean Sea, Middle East and South America (Karagiannis and Mellou, 2008; Al-Majali and Shorman, 2009). In these areas, poor diagnosis and treatment may result in serious complications (Boschirol et al., 2001). Most common symptoms of brucellosis include undulant fever, weakness, night sweats with peculiar odor and chills (Acha and Szyfres 2003).

Each year, more than 500,000 new cases are reported, and this figure underestimates the magnitude of the problem. It is also a disease of considerable economic and social importance (Agasthya et al., 2011). This disease causes high clinical morbidity and various clinical

manifestations in humans, and any organ can be affected include encephalitis, meningitis, spondylitis, orchitis, prostatitis, arthritis and endocarditis (Skendros and Pappas, 2011).

Although brucellosis in domestic animals has been controlled in most developed countries, it remains an important public and animal health problem in the developing countries. Brucellosis is endemic in Iran (Al-Majali and Shorman, 2009).

Brucellosis is transmittable disease from animals to humans through consumption of contaminated Dairy products and infected meat from domestic livestock or through the aerosol route and through direct contact with infected animals (Buzgan and Karahocagil, 2010).

The incubation period of brucellosis normally is 1 to 3 weeks, but it can be more to several months before showing signs of infection (Seleem and Boyle, 2010). The diagnosis of brucellosis must be confirmed by laboratory tests. Accurate and fast diagnosis of human brucellosis is very important as delay or misdiagnosis usually results in

*Corresponding author. E-mail: esm114@gmail.com. Tel: 098-22289941. Fax: 098-21-26127258.

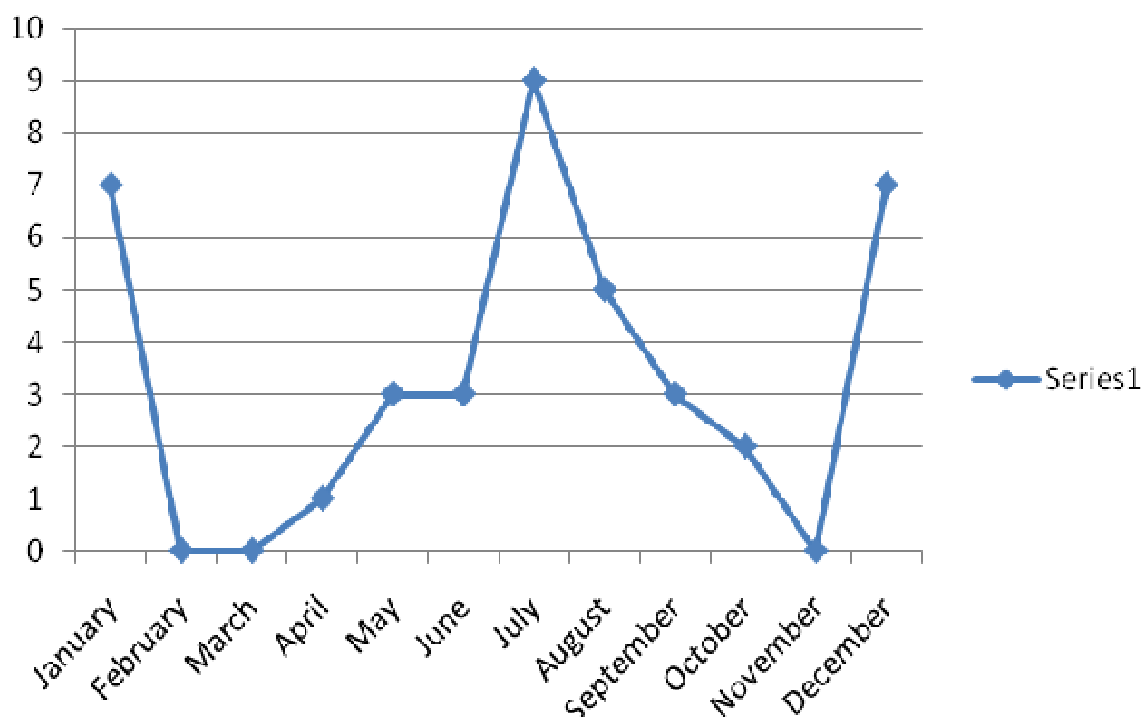


Figure 1. Seasonal distribution of patients over the study period.

treatment failures, chronic courses, focal complications, relapses and increase of mortality rate (Seleem and Boyle, 2010).

Serological tests for antibody detection that measure the ability of serum to agglutinate a standardized amount of killed *Brucella abortus* reflect the presence of antibody against O-side chain. Brucella specific IgM appeared at the end of the first week of the disease followed by IgG. This test is still the most common and useful method for the laboratory diagnosis of brucellosis (Seleem and Boyle, 2010).

Epidemiological studies on brucellosis have suggested that adults have more commonly become seropositive than younger people (Al-Majali and Shorman, 2009).

The objectives of this study were to investigate the prevalence of brucellosis in patients with symptoms and investigate risk factors associated with brucellosis in western cities of Tehran province.

MATERIALS AND METHODS

A total of 40 brucellosis cases referred to Shahriar Health Center over a 3-year period from March 2008 to March 2012 were included in our study. The patients' files were studied retrospective for their history and laboratory findings.

Brucellosis was diagnosed on by a compatible clinical signs, such as undulant fever, night sweats, chills and weakness, supported by the detection of specific antibodies against brucella, at

significant titers.

Significant titers were $\geq 1/80$ in the standard tube agglutination test (STA) and in the presence of 2-mercaptoethanol (2ME) agglutination $\geq 1/20$ (Buzgan and Karahocagil, 2010; Sofian and Aghakhani, 2008). *Brucella abortus* s19 (Pasteur Institute, Iran) used for the STA.

RESULTS

The majority of brucellosis cases occurred during January, July and December (Figure 1). Of the 40 patients that were studied, 19 (47.5%) were females and 21 (52.5%) were males. The mean patient age was 40 ± 32 years, ranging from 8 to 72 years; 6 (15%) were aged 8 to 16 years, while 8 (20%) were aged 16 to 24 years, 9 (22.5%) were aged 24 to 32 years, 7 (17.5%) were aged 32 to 40 years, 4 (10%) were aged 40 to 48 years, 3 (7.5%) were aged 48 to 56 years, 2 (5%) were aged 56 to 64 years, and 1 (2.5%) were over 64 years of age.

In studied patients, 19 (47.5%) had a history of raising livestock (4 housewives, 4 self-employed persons, 3 students, 3 workers, 2 farmers, 1 butcher, 1 goat sales and 1 unemployed (Figure 2).

In this study, 78.9% of cases were found to have no occupational risk for brucellosis. All cases had a history of raw milk and dairy products consumption. Education level, ranged from illiterate to graduate (Figure 3). The STA test was positive in all (100%) cases, with titers

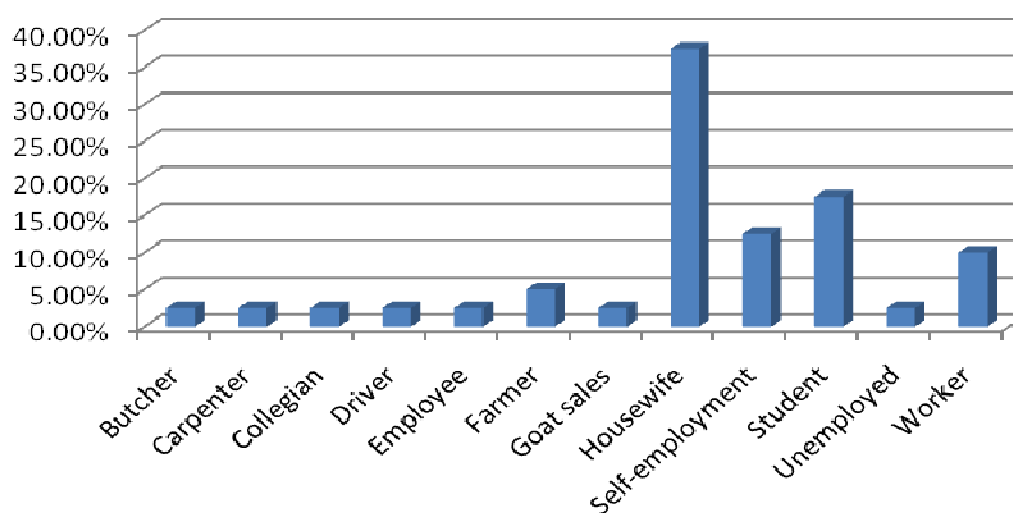


Figure 2. Occupational characteristics of cases.

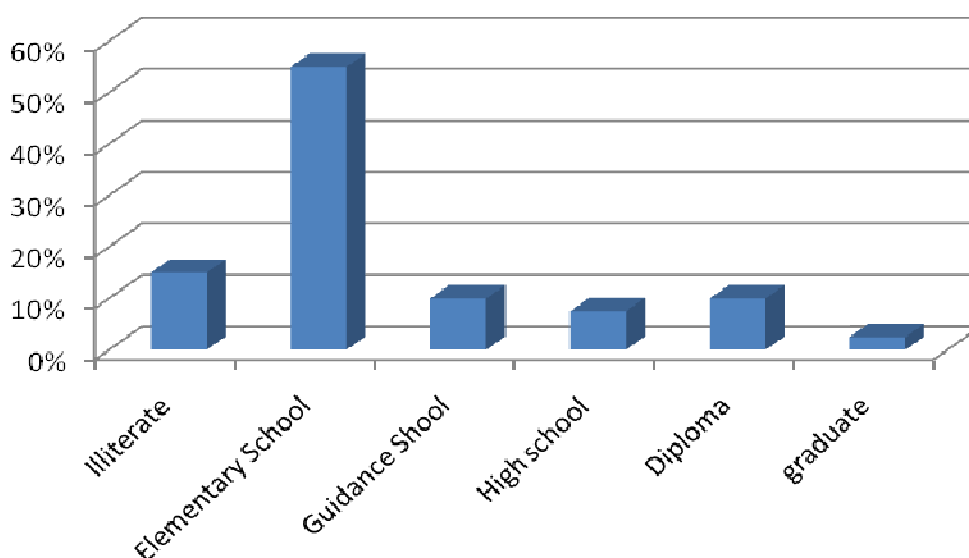


Figure 3. Educational characteristics of case.

ranging from 1/80 to 1/20480.

DISCUSSION

Brucellosis is the commonest zoonotic bacterial disease in the world; transmissions to human were reported by direct and indirect routes, affecting more than 500,000 people each year. Alballa reported that consumption of dairy products and direct contact with domestic animals was the main risk factors for this disease (Alballa, 1995). In a study in Iran, the incidence of brucellosis in Tehran

province was 17.5/100 000 (data published in Iranian journals).

Brucellosis is more prevalent in age 15 to 35 years groups, in endemic countries (Young et al., 2005; Dog̃anay and Mese Alp, 2008). In this study, 75% of patients were between 8 to 40 years of age. This research indicates that unhealthy dairy products consumption have important role in spreading of pollution.

In a study in Iran by Hasanjani Roushan et al., 469 cases were studied and mean age of 36.97 ± 15 years was reported in a population which includes 56.9% male and 43.1% female (Hasanjani et al., 2004) (Table 1).

Table 1. Comparison of gender and age of patients in various studies

Author [ref.]	Year	Country	No. of cases	Male (%)	Female (%)	Mean age (years)
Sofian and Aghakhani	2008	Iran	150	55.3	44.7	33.37 ± 21.3
Buzgan and Karahocagil	2010	Turkey	1028	47.6	52.4	33.7 ± 16.34
Earhart and Vafakolov	2009	Uzbekistan	144	83.3	16.7	42 ± 32
Mantur et al.	2006	India	495	78.8	21.2	31
This study	2012	Iran	40	52.5	47.5	40 ± 32

In endemic countries, the primary transmission route of brucellosis is by the ingestion of unpasteurized milk and dairy products, but in developed countries, occupational exposure is important (Young et al., 2005). History of raw dairy product consumption was present in all cases in our study. The consumption of raw dairy products in other studies has been reported as occurring in 23.6% of cases in Spain (Colmenero et al., 1996), 69% in Kuwait (Mousa et al., 1988), 34.7% in the Balkan Peninsula (Bosilkovski et al., 2007) and 22.4% in Iran (Hasanjani et al., 2004). In developed countries, most of the brucellosis cases occur due to occupational exposure. High-risk occupations for the disease are the raising of livestock, butchery, farming, and veterinary medicine, laboratory transmission has also been reported (Dog'anay and Mese Alp, 2008).

History of livestock raising in countries has been reported in 11.1% from Kuwait (Mousa et al., 1988), 9% also from Kuwait (Lulu et al., 1988), 11.3% from Iran (Hasanjani et al., 2004) and 20% from Greece (Andriopoulos et al., 2007). In this study, 19 cases (47.5%) have history of livestock raising. However in Iran, most of the families, particularly housewives, deal with the raising of livestock, which increases the contact rate in this study. Occupational contact was found in 4 patients in our study (10%; 2 farmers, 1 butcher and 1 goat seller). No contact history was identified in 52.5% of patients. In our study, all patients had risk factor for brucellosis. Risk factors in other studies have been found for between 10.9 and 28.7% of cases (Gur et al., 2003; Tasova et al., 1998) and even higher rates 41.8 and 56.7% have been reported (Yu'ce et al., 2006; Hasanjani et al., 2004). Our data showed that occupation levels were not important risk factors for brucellosis, but educational levels were important risk factors.

Serology is the preferred method for the diagnosis of brucellosis when bacterial isolation is not possible, and serologic testing is widely used in the diagnosis of brucellosis (Gotuzzo and Celillo, 1992). STA test positivity was reported in 95 and 87% (Akdeniz et al., 1998; Tasova et al., 1998).

The STA test was positive in 100% of our study population. Coombs STA test is preferred when the STA test is found negative. In endemic regions for brucellosis such as Iran, serological test results should only be interpreted

as significant in the presence of clinical findings compatible with brucellosis.

Findings of this study suggest that brucellosis is an important health problem in Iran. The disease has a significant morbidity and mortality. Additionally, since the disease primarily affects persons in their productive age, it causes important work-power losses. Pasteurization of milk and dairy products and education for eating habits must be pursued for eradication of human brucellosis. Eradication of the disease in humans can be achieved by the control of the disease in animals; this necessitates a multidisciplinary approach involving both humans and animals. On the other hand, development of detection methods and prevention of brucellosis is important.

REFERENCES

- Acha NP, Szyfres B (2003). Zoonoses and Communicable Diseases Common to Man and Animals. PAHO 3:132-137.
- Agasthya AS, Isloor S (2012). Seroprevalence study of human brucellosis by conventional tests and indigenous indirect enzyme-linked immunosorbent assay. J. Sci. Work 201: 86-91.
- Akdeniz H, Irmak H, Demiroz AP (1998). Evaluation of brucellosis cases in Van region of Eastern Anatolia: a 3 year experience. Nagoya Med. J. 42:101-110.
- Albala SR (1995). Epidemiology of human brucellosis in southern Saudi Arabia. J. Trop. Med. Hyg. 98:185-189.
- Al-Majali AM, Shorman M (2009). Childhood brucellosis in Jordan: prevalence and analysis of risk factors. Int. J. Infect. Dis. 13:196-200.
- Andriopoulos P, Tsironi M, Deftereos S, Aessopos A, Assimakopoulos G (2007). Acute brucellosis: presentation, diagnosis and treatment of 144 cases. Int. J. Infect. Dis. 11:52-7.
- Boschiroli ML, Foulongne V (2001). Brucellosis: a worldwide zoonosis. Curr. Opin. Microbiol. 4: 58-64.
- Bosilkovski M, Krteva L, Dimzova M, Kondova I (2007). Brucellosis in 418 patients from the Balkan Peninsula: exposure-related differences in clinical manifestations, laboratory test results, and therapy outcome. Int. J. Infect. Dis. 11: 342-347.
- Buzgan T, Karahocagil MK (2010). Clinical manifestations and complications in 1028 cases of brucellosis: a retrospective evaluation and review of the literature. Int. J. Infect. Dis. 14:469-478.
- Colmenero JD, Reguera JM, Martos F, Sanchez De Mora D, Delgado M, Causse M (1996). Complications associated with *Brucella melitensis* infection: a study of 530 cases. Medicine 75:195-211.
- Dog'anay M, Mese Alp E (2008). Infeksiyon hastalıkları ve mikrobiyolojisi. Nobel Tıp Kitabevleri 3: 897-909.
- Earhart K, Vafakolov S (2009). Risk factors for brucellosis in Samarqand Oblast, Uzbekistan. Int. J. Infect. Dis. 13:749-753.
- Gotuzzo E, Celillo E (1992). *Brucella*. Philadelphia. Harcourt Brace Jovanovich Inc. 24:1513-1518.

- Gu'r A, Geyik MF, Dikici B, Nas K, Cevik R, Sarac J (2003). Complications of brucellosis in different age groups: a study of 283 cases in Southeastern Anatolia of Turkey. *Yonsei Med. J.* 44:33-44.
- Hasanjani Roushan MR, Mohrez M, Smailnejad Gangi SM, Solemani Amiri MJ, Hajiahmadi M (2004). Epidemiological features and clinical manifestations in 469 adult patients with brucellosis in Babol, Northern Iran. *Epidemiol Infect.* 132:1109-1114.
- Karagiannis I, Mellou K (2008). Outbreak investigation of brucellosis in Thassos, Greece, 2008. *Euro Surveill.* 17: 34-37.
- Lulu AR, Araj GF, Khateeb MI, Mustafa MY, Yusuf AR, Fenech FF (1988). Human brucellosis in Kuwait: a prospective study of 400 cases. *Q. J. Med.* 66:39-54.
- Manture BG, Amarnath SK, Shinde RS (2006). Review of Clinical and laboratory features of human Brucellosis. *Indian Journal of Medical Microbiology.* 25(3):188-202
- Mousa AR, Elhag KM, Khagali M, Marafie AA (1988). A nature of human brucellosis in Kuwait: study of 379 cases. *Rev. Infect. Dis.* 10:211-217.
- Seleem MN, Boyle SM (2010). Brucellosis: a re-emerging zoonosis. *Vet Microbiol.* 140: 392-398.
- Skendros P, Pappas G (2011). Cell-mediated immunity in human brucellosis. *Microbes Infect.* 13:134-42.
- Sofian M, Aghakhani A (2008). Risk factors for human brucellosis in Iran: a case-control study. *Int J Infect Dis.* 12: 157-61.
- Tasova Y, Saltog'lu N, Yilmaz G, Inal S, Aksu HS (1988). Bruselloz: 238 eris, kin olgunun klinik, laboratuvar ve tedavi o' zelliklerinin deg' erlendirilmesi. *Turk. J Infect.* 12:307-312.
- Young EJ, Mandell GL, Bennett JE, Dolin R (2005). Principles and practice of infectious diseases. Churchill Livingstone 2: 2669-2672.
- Yu' ce A, Alp-C' avus S, Yapar N, C' akır N (2006). Bruselloz: 55 olgunun deg' erlendirilmesi. *Klimik Derg.* 19:13-17.