Review article

Brucellosis seroprevalence in the normal and high-risk individuals in Iran : A systematic review and meta-analysis

Maryam Ghajar [1], Fatemeh Roozbeh* [1], Sara Abolghasemi [2], Fatemeh Ahmadi [3], Reza Alizadeh-Navaei [1]

1- Mazandaran University of Medical Sciences, Sari, Iran.

2- Infectious Diseases and Tropical Medicine Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran.

3- Health Research Institute, Infectious and Tropical Diseases Research Center, Jundishapur University of Medical Sciences, Ahvaz, Iran.

Corresponding author: Fatemeh Roozbeh Email: fatemehroozbeh@gmail.com

Abstract

Objective: Brucellosis is an zeonotic disease and it is a health and economic problem in many parts of the world, including Iran. The disease is endemic in Iran and the reported cases increased, however, disease outbreaks are not clear. This review aimed to determine the prevalence of brucellosis in normal and high-risk population in Iran.
Methods: This systematic review and meta-analysis was performed in article about Brucellosis in Iran. Systematic search was conducted in the databases, include: Pubmed, Scopus, SID (as a local database) until August 2015. Finally we have 454 article after deleting duplicating material by Endnote software. Data extraction form contains author, publication year, sample size, laboratory test, study population in normal person and high risk person and seroprevalence. Finally, Data were analyzed by STATA 11.1 and random effect.
Results: Finally, we enrolled 11 studies and 7688 person in high risk group and 13858 person in normal group were studied. The seroprevalence of brucellosis in normal population was 0.12 (CI95%: 0.08 - 0.17). The seroprevalence of brucellosis in High-risk population was 13.07(CI95%: 12.3 - 13.7).
Conclusion: The prevalence of brucellosis in high-risk occupations was high in comparison with normal population and it seems that control of livestock diseases should be considered more.
Keywords: *Seroprevalence, Brucellosis, High-risk population*

Introduction

Brucella is a small non-motile without spore and capsule Gram negative facultative intracellular cocco-bacilli. B. abortus, B. melitensis and B. suis are pathogens for human. Brucellosis (Malta fever) is one of the most common and important public health problem diseases among humans and animals [1]. Brucellosis is widespread in the world, but in the Mediterranean region, including Iran, Turkey, the Arabian Peninsula, the Indian subcontinent, Mexico, and parts of Central and South America brucella is more important problem than other land [2]. This infection is commonly seen in cattle, goats, buffalo, camel, horses and causes abortion in these animal and decreased milk production and in this way, is an economic burden for societies [3]. It is reported both direct and indirect transmission. It can be transmitted to humans through close direct contact with infected animals, placentas or aborted fetuses or their products and through the consumptions of raw milk and unpasteurized dairy products [4]. Use of unpasteurized dairy products such as soft cheese, cream and ice cream products is believed to be a main cause of brucellosis in human [5]. Person to person transmission of brucellosis is rarely [6], but it has been reported through sexual intercourse , blood transfusion, bone marrow transplant, shared needles among the intravenous drug abusers [7]. In industrialized countries, brucellosis is mainly an occupational disease [3].

In developing countries, people living in rural are in risk more than other. Diagnose of brucellosis is difficult. The singe and symptoms in people with

[Downloaded from intjmi.com on 2026-11-01]

brucellosis are varied and non-specific. Fever, excessive sweating, weight loss, back pain, artheragia or arthritis are common. Sometimes lymphadenopathy, mild hepatomegaly and splenomegaly are reported in patients [3].

There are some diagnostic method. Diagnose are usually based on detecting specific antibodies in the patient's serum [8]. Brucellosis requires long-term treatment of multi-drug regimens and in most cases due to drug side effects and long-term treatment is difficult for patients. Late diagnosis and lack of patient compliance to treatment causes adverse effects of this disease. This side effects can be long-term or permanent and significant and had impact on the socio-economic situation of families and society [3]. Iran is a endemic country for brucellosis and recently, there was an increase in reported cases of the disease. So, This systematic review aims to evaluate the prevalence of brucellosis in normal and high-risk population in Iran.

Methods

This systematic review and meta-analysis was performed in article about Brucellosis in Iran. Systematic search was conducted in the databases, include: Pubmed, Scopus, SID (as a local database) until August 2015. In Pubmed, we used Brucella OR Brucellosis in [ALL Fields] and Iran in [Affiliation field] and optioned 178 document . In Scopus, we used Brucella OR Brucellosis in [Title, Abstract, Keywords, Fields] and Iran in [Affiliation field] and optioned 397 document. In SID databases, we searched Brucella OR Brucellosis in [Title Field] and optioned 81 document. Finally we have 454 article after deleting duplicating material by Endnote software. For study selection, two independent, blinded investigators reviewed the abstracts and full text, respectively. Disagreements between reviewers were resolved by discussion. Study quality was assessed using Strobe criteria. For data extraction, data were extracted by two independent and Blinded authors and recorded in checklist. Disagreements between authors were resolved by discussion. Data extraction form contains author, publication year, sample size, laboratory test, study population in normal person and high risk person and seroprevalence. Finally, Data were analyzed by STATA 11.1 and random effect. Forest plots were plotted. publication biases was evaluated by Egger and Begg's tests. Heterogeneity was checked by I2 index

Results

Finally, we enrolled 11 studies, characteristics of these studies are shown in Table 1. Generally, 7688 person in high risk group and 13858 person in normal group were studied. As shown in Figure 1, the seroprevalence of brucellosis in normal population was 0.12 (CI95%: 0.08 - 0.17). Figure 2 shows that there was a publication bias in the reviewed studies for seroprevalence of brucellosis in normal population by Egger and Begg's tests. The seroprevalence of brucellosis in High-risk population was 13.07(CI95%: 12.3 - 13.7) (Figure 3). According figure 4. there wasn't publication bias in the reviewed studies for seroprevalence of brucellosis in High-risk population by Egger and Begg's tests.

Discussion

Brucellosis is a public health problem in the Mediterranean countries which affects the health-economic status of societies. Iran is geographically located in the western Mediterranean where 45,000 new cases of the disease are annually reported from [19]. The prevalence of this disease in Iran has not yet reported in detail. The incidence of this disease has been reported in various points. In a study conducted in Iran in 2003, the prevalence of brucellosis was reported to be 1.5-107.5 per 100,000 of population [15]. In the present study, the prevalence of brucellosis was obtained 0.12 per 100,000 of population in normal people. In studies carried out on blood donors in 2007 and 2013, the prevalence of brucellosis was reported to be 0.057 and 0.11 in 100000, respectively. These results are similar to the findings of the present study indicating its low prevalence in the normal population [9, 11].

One of the ways for transmission of this disease is contact with products and secretions of infected livestock. This causes brucellosis to be regarded as an occupational disease [3]. Therefore, ranchers, butchers, veterinarians, and workers of slaughterhouses are considered individuals with high-risk occupations [4]. In the present study, the seroprevalence of brucellosis in this group of people who had no symptom was higher than the general population, as the prevalence of brucellosis in high-risk individuals (13.07 per 100,000 of population) was about 100 times more than the normal population. In a study conducted in Iran in 2015, the prevalence of brucellosis in urban and rural communities was reported to be 37.85 and 172.83 per 100,000 of population, respectively [19]. In addition, in another study carried out in 2013, 82.9% of patients with brucellosis were rural residents and the rest of them were living in urban areas [7]. The results of another study in 2012 showed that the prevalence of brucellosis in urban and rural communities was 4.7 and 48.6 per 100,000 of population, respectively [1]. This can be due to several factors such as occupational conditions, more contact with livestock and poultry, and possibility of consuming unpasteurized dairy products.

[Downloaded from intjmi.com on 2026-11-01]

Table 1. The studies in the present review

study	year	N	Location	Prevalence in 100000	group
Sofian [9]	2013	163	Arak	9.2	high-risk
Sofian [2]	2013	896	Arak	0.11	normal
Shoaei [10]	2012	500	Tehran	0.6	normal
Rabbani [11]	2008	10500	Booshehr	0.057	normal
Esmaeili [12]	2014	250	Kurdestan	6.4	high-risk
Beheshti [3]	2010	141	Kazeroon	7.8	high-risk
Shakurnia [13]	2014	1450	Ahvaz	0.34	normal
Nikokar [14]	2011	478	Gilan	7.1	high-risk
Karimi [15]	2003	205	Shiraz	11.7	high-risk
Karimi [15]	2003	210	Shiraz	0.95	normal
Ghaemi [16]	2010	304	Golestan	3.6	high-risk
Ghaemi [16]	2010	302	Golestan	0/7	normal
Chegeni [17]	2014	5847	Kurdestan	29/5	high-risk
Amini [18]	2010	300	Abhar	1/25	high-risk

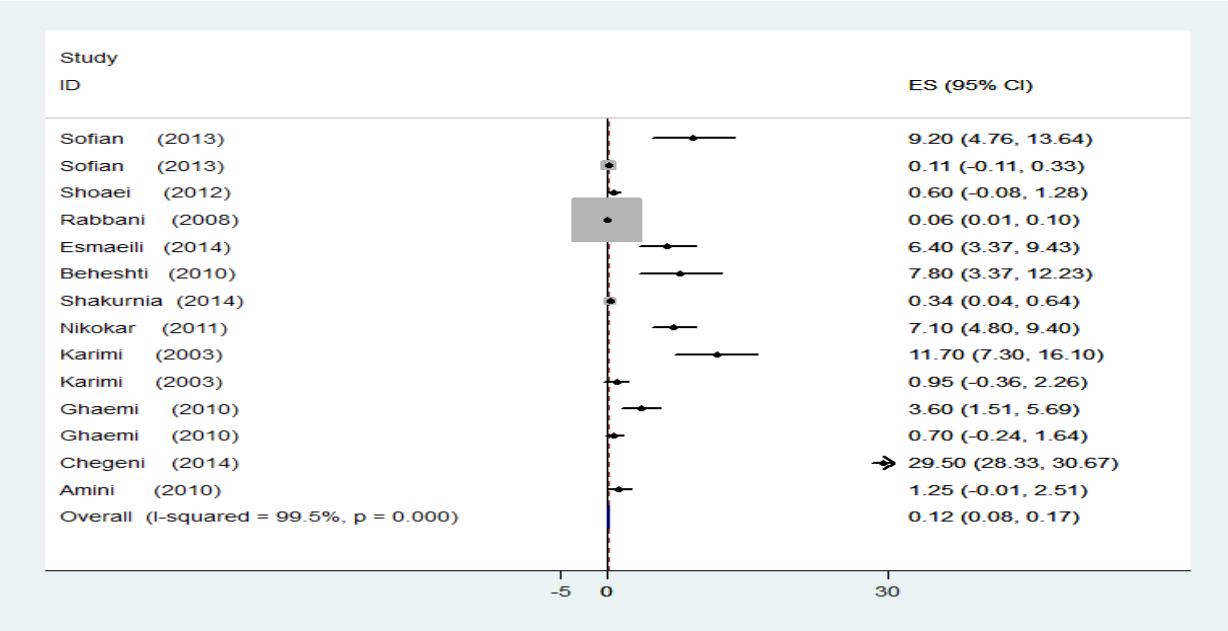


Figure 1. Forest plot for seroprevalence of brucellosis in normal population

[Downloaded from intjmi.com on 2026-11-01]

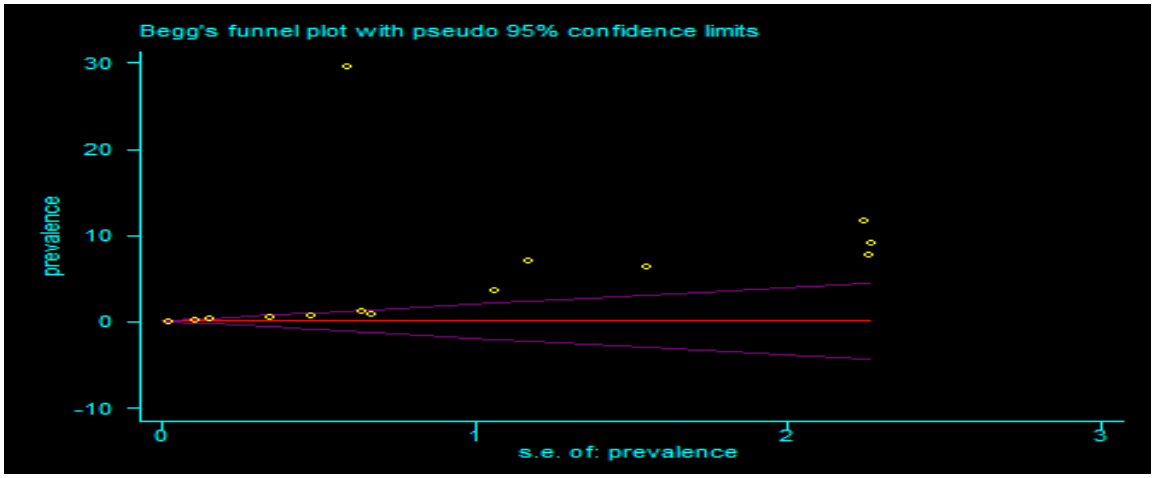


Figure 2. Funnel plot for seroprevalence of brucellosis in normal population

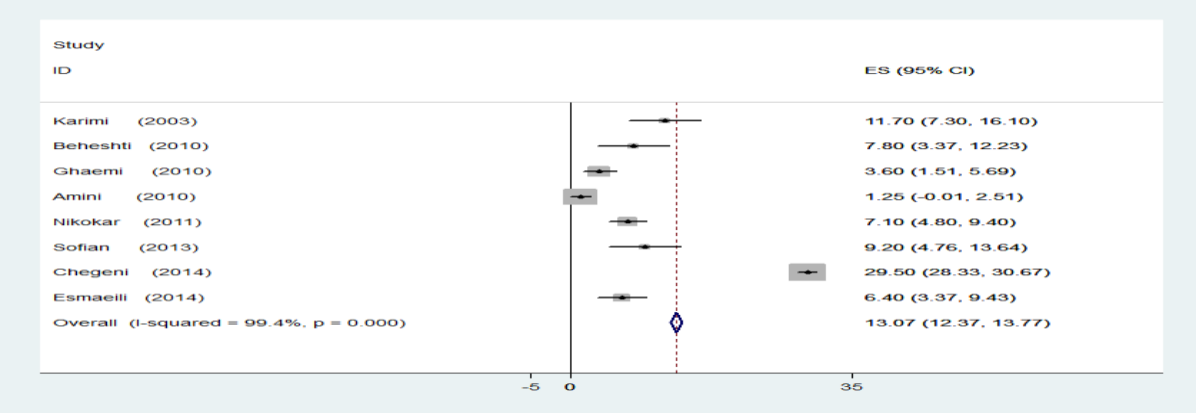


Figure 3. Forest plot for seroprevalence of brucellosis in High-risk population

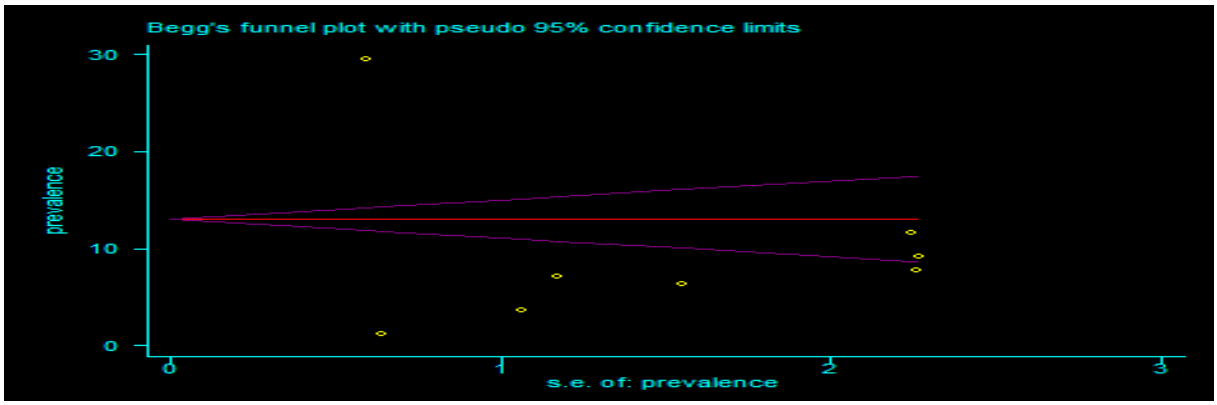


Figure 4. Funnel plot for seroprevalence of brucellosis in High-risk population

[Downloaded from intjmi.com on 2026-11-01]

According to the results which suggest the high prevalence of brucellosis in high-risk people and since brucellosis is considered a zoonotic disease, reducing the incidence of this disease in livestock is one of the most important measures that should be taken for decreasing its prevalence among humans. Hence, vaccination of livestock, identification of transmission ways, and the use of protective equipment at the time of contact with livestock can be useful in preventing human infection.

Conclusion

The prevalence of brucellosis in high-risk occupations was high in comparison with normal population and it seems that control of livestock diseases should be considered more.

References

1. Zeinalian Dastjerdi, M., R. Fadaei Nobari, and J. Ramazanpour, *Epidemiological features of human brucellosis in central Iran, 2006-2011*. Public health, 2012. 126(12): p. 1058-1062.
2. Sofian, M., et al., *Risk factors for human brucellosis in Iran: a case-control study*. International Journal of Infectious Diseases, 2008. 12(2): p. 157-161.
3. Beheshti, S., et al., *Seroprevalence of brucellosis and risk factors related to high risk occupational groups in Kazeroon, South of Iran.* The international journal of occupational and environmental medicine, 2010. 1(2): p. 62-68.
4. Sofian, M., et al., *Screening of family members of patients with acute brucellosis in an endemic area of Iran.* Iranian Journal of Microbiology, 2013. 5(3): p. 215-219.
5. Bikas, C., et al., *Epidemiology of human brucellosis in a rural area of north-western Peloponnese in Greece.* Eur J Epidemiol, 2003. 18(3): p. 267-74.
6. Omer, M.K., et al., *Prevalence of antibodies to Brucella spp. and risk factors related to high-risk occupational groups in Eritrea*. Epidemiol Infect, 2002. 129(1): p. 85-91.
7. Kassiri, H., H. Amani, and M. Lotfi, *Epidemiological, laboratory, diagnostic and public health aspects of human brucellosis in western Iran.* Asian Pacific Journal of Tropical Biomedicine, 2013. 3(8): p. 589-594.
8. Sadeghian, H., et al., *Epidemiology and the agreement rate of serological tests in human brucellosis in North East of Iran.* Archives of Clinical Infectious Diseases, 2015. 10(2).
9. Sofian, M., et al., *Low prevalence of Brucella agglutinins in blood donors in central province of Iran.* Iranian Journal of Microbiology, 2013. 5(1): p. 24-27.
10. Shoaei, S.D. and N. Bidi, *Serologic evaluation of brucellosis in patients with psychiatric disorders.* Caspian Journal of Internal Medicine, 2012. 3(4): p. 557-558.
11. Rabbani Khorasgani, M., et al., *Anti-brucella antibodies in blood donors in Boushehr, Iran.* Comparative Clinical Pathology, 2008. 17(4): p. 267-269.
12. Esmaeili, S., et al., *Seroepidemiological survey of Q fever and brucellosis in kurdistan Province, western Iran.* Vector-Borne and Zoonotic Diseases, 2014. 14(1): p. 41-45.
13. Shakurnia, A., et al., *Sero-prevalence of brucellosis among blood donors in Ahvaz, Southwest Iran.* Asian Pacific Journal of Tropical Disease, 2014. 4(S1): p. S307-S310.
14. Nikokar, I., et al., *Seroprevalence of brucellosis among high risk individuals in Guilan, Iran.* Journal of Research in Medical Sciences, 2011. 16(10): p. 1366-1371.
15. Karimi, A., et al., *Prevalence of antibody to Brucella species in butchers, slaughterers and others.* East Mediterr Health J, 2003. 9(1-2): p. 178-84.
16. Ghaemi, E.O., et al., *Seroprevalence of Streptococcus, Brucella and salmonella infection in mental retarded children in Iran.* Research Journal of Microbiology, 2010. 5(10): p. 1063-1066.
17. Chegeni, A.S., et al., *Seroepidemiology of human brucellosis in nomads in a rural area of Iran.* Asian Pacific Journal of Tropical Disease, 2014. 4(4): p. 333-336.
18. Amini, B., H. Baghchesaraie, and D.T. Jelodar, *Seroprevalence of Brucella antibody titer in rural population of Abhar, Iran.* Iranian Journal of Clinical Infectious Diseases, 2010. 5(3): p. 152-155.
19. Maleki, F., et al., *Epidemiological characteristics of human brucellosis in Shahin Dezh, Western Azarbaijan, Iran, 2008-2012.* Archives of Clinical Infectious Diseases, 2015. 10(1).

[Downloaded from intjmi.com on 2026-11-01]