

Original Article

## Investigation of Pediatric Brucellosis

Zahra Babaei<sup>1</sup>, Fatemeh Azizi Abi<sup>2</sup>, Sousan Rostampur<sup>3</sup>, Iman Pouladi<sup>1\*</sup>, Faranak Rezaei<sup>1\*</sup>

1. Department of Medical Microbiology, Faculty of Medicine, Lorestan University of Medical Sciences, Khorramabad, Iran.
2. Department of Health Promotion and Education, Faculty of Health, Lorestan University of Medical Sciences, Khorramabad, Iran.
3. Department of Medical Biotechnology, Iran University of Medical Sciences, Tehran, Iran.

Received: October 21, 2020, Accepted: December 9, 2020

### Abstract

**Background and Aim:** Brucellosis (also known as undulant fever, Mediterranean fever, or Malta fever) is a zoonotic infection transmitted to humans from infected animals (sheep, cattle, goats, pigs, camels, or other animals) by ingestion of food products (such as unpasteurized dairy products) or by contact with tissue or fluids. This disease occurs on average in 11 to 56 percent of children in endemic regions. Despite being long recognized and controllable, the disease still causes substantial morbidity, affecting especially the young population. The objective of this research was to examine the clinical, laboratory results of childhood brucellosis and brucellosis epidemiological features in patients up to 15 years in the province in Pol-e Dokhtar city, Iran.

**Methods** The diagnosis of brucellosis was established on the basis of clinical features, and positive results from Serologic evaluation included Wright test and the 2-mercaptoethanol (2ME) test. This information includes medical records of brucellosis patients in the years 2016 to 2019. SPSS software (version 22.0) was used for the data analysis.

**Results:** Among the patients infected with *Brucella*, 19 males (70.37%) and 8 females (29.63%) were diagnosed and 11 patients (40.74%) were 5-9 years of age, 10 patients (37%) were 10-15 years of age, and 6 patients (22.26%) were <5 year of age. Also 27 (100%) patients were from rural regions (the total of affected children) that confirmed direct contact with infected animals in all of them was already established. The most frequent seasons of disease occurrence were summer (33.38%) and winter (29.6%).

**Conclusion:** Considering that 100% of the infection of children has been seen in those who lived in the village, it requires regular vaccination of livestock and proper training in the field of disease prevention.

**Keywords:** Brucellosis; Children; Pol-e Dokhtar; Iran.

\*Corresponding Authors: Faranak Rezaei, Email: rezaei.f@lums.ac.ir; Iman Pouladi, Email: imanpouladi96a@gmail.com

Please cite this article as: Babaei Z, Azizi abi F, Pouladi I, Rezaei F. Investigation of Pediatric Brucellosis. Arch Med Lab Sci. 2020;6:1-4 (e15). <https://doi.org/10.22037/amls.v6.30546>

### Introduction

*Brucella* species are small, Gram-negative, non-motile, non-spore forming, and encapsulated coccobacilli (1).

Although human brucellosis is endemic in region areas of the world (500,000 cases/year), the number of reported cases has noticeably decreased in some countries as a result of enforced milk pasteurization, slaughter of infected animals, and confrontational vaccination. (2, 3). Among the Middle Eastern region, countries such as Saudi Arabia, Syria, and

Iran have reported higher prevalence of brucellosis (4).

Brucellosis occurs in all regions of Iran but there has been a higher incidence of brucellosis in the provinces of Khorasan, East Azarbaijan, Hamedan, Lorestan, Fars, West Azarbaijan, Kermanshah, and Chaharmahal and Bakhtiari (5, 6). Children can account for 11% to 56% percent of all cases of brucellosis worldwide, especially in endemic regions (7).

Clinical symptoms in children are not substantially different from those in adults (8). there are also

little data on the seroprevalence of brucellosis in the infant population (9).

We collected information on the age, gender, season of disease, place of residence (urban or rural area), and contact with animals in the patients up to 15 years of age were referred in Pol-e Dokhtar Health Centers (years 2016 to 2019).

## Methods

This descriptive study investigated 166 children  $\leq 15$  years of age who were admitted to Pol-e-Dokhtar Health Centre's.

This information includes medical records of brucellosis patients in the years 2016 to 2019.

From medical records we collected information on age, gender, history of unpasteurized milk or milk-product ingestion, disease season, place of residence (urban or rural area), contact with animals.

The diagnosis of brucellosis was established on the basis of positive results from serologic evaluation included tube agglutination test and the 2-mercaptoethanol (2ME) test. 2-ME, was used to differentiate between IgG and IgM in a mixture by disrupting the disulfide bonds of IgM so that only IgG is measurable (1).

The data was analyzed with statistical method using SPSS software (version 22.0).

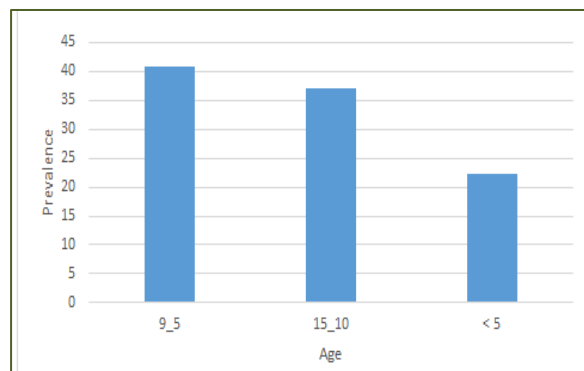
## Results

From April 2016 to April 2019, among 166 children  $\leq 15$  years of age who were admitted to Pol-e-Dokhtar Health Centre's, 27 patients (16.3%) were diagnosed with brucellosis.

All were non-bacteremia cases and were diagnosed on the basis of symptoms suggestive of brucellosis and a serological titer of 1:160 or greater.

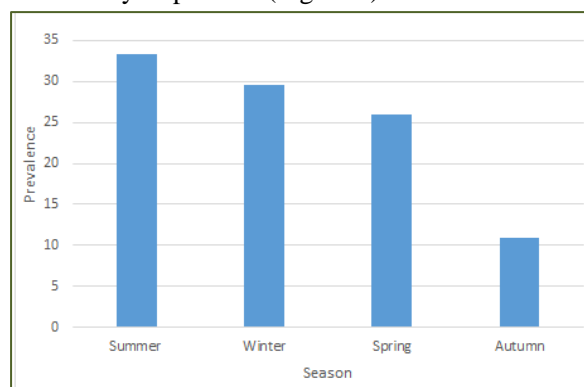
Among the 27 patients with brucellosis, 70.37 % were male and 29.63% were female.

Highest number of patients was seen in the age group of 5-9 years old with 11 cases (40.74%) and 10-15 years old with 10 cases (37 %) and 6 patients (22.26%) were  $< 5$  year of age (Figure 1).



**Figure 1.** Distribution of pediatric brucellosis according to age group.

Most cases of brucellosis infection were seen in the season of summer (33.38%) and winter (29.6) in the community of patients (Figure 2).



**Figure 2.** Distribution of pediatric brucellosis according to disease season.

## Discussion

Human brucellosis is a systemic infection with a wide extending clinical spectrum and hardness, from asymptomatic disease presentation to severe and/or deadly illness. This nonspecific clinical profile detected in human brucellosis is due to varying pathogenicity of no identical strains. It is often laborious to differentiate clinically from a number of other infections, particularly the infections caused by *Mycobacterium tuberculosis* and typhoid bacilli, and the infective endocarditis (10).

Children and adults can be preserved against foodborne infection with *Brucella* by verifying pasteurization of milk, avoiding raw milk products, and thorough cooking of meat from at risk of animals. Avoidance of other risk factors such as contact with infected animals and their products,

producing knowledge between animal owners relating to the prevalence of this infection among animals and advancing regular veterinary visits for their animals and ensuring planned screening of animals, and adoption of vaccination programs can decrease the prevalence to a vast extent (11).

Among children, it could present either as acute or sub-acute presentation (fevered disease and a variety of sign) lasting from 2 to 4 weeks (12). Pediatric brucellosis remains a significant community health problem in Iran, despite a movement toward and generally decrease in the disease (13).

This study aimed to evaluate the prevalence of brucellosis in children  $\leq 15$  years old in Pol-e-Dokhtar city. The results showed that, in the areas, brucellosis occurs in children with the incidence of 16.3%. Aghaali and colleagues from Iran showed that 4.3% of pediatric population affected with brucellosis in endemic areas were asymptomatic and many of these children may have been symptomatic for short period (14).

In this study, there was a clear predominance of males with brucellosis, consistent with other studies in Iran and other countries (11, 15).

Few subjects were younger than 5 year of age (6 cases in the present study), consistent with previous studies (16). Brucellosis occurred mainly in school-aged children and was highest in summer, which is compatible with other studies (17, 18).

This could be because of animals reproducing in these seasons just as the movement of farmers from the south areas of Iran to this area to vending their unpasteurized dairy items to the native individuals, which thus spread the infection in the place. 100% of the patients were from rural regions that had a history of close animal contact, as previously reported (19-22).

## Conclusion

Considering that 100% of the infection of children has been seen in those who lived in the village, it requires aggressive preventive measurements, including elimination of infected animals, vaccination of newborn animals, education, and enforcement of control program.

## Conflict of Interest

The authors declared that they have no conflict of interest.

## Acknowledgment

We would like to thank the staff of Pol-e Dokhtar Health Centers.

## Funding/Support

The authors declared that there is no financial support for this work.

## References

1. Ulug M, Yaman Y, Yapici F, Can-Ulug N. Clinical and laboratory features, complications and treatment outcome of brucellosis in childhood and review of the literature. *Turk J Pediatr.* 2011;53(4):413-24.
2. Troy SB, Rickman LS, Davis CE. Brucellosis in San Diego: epidemiology and species-related differences in acute clinical presentations. *Medicine.* 2005;84(3):174-87.
3. Alavi SM, Motlagh ME. A review of epidemiology, diagnosis and management of brucellosis for general physicians working in the Iranian health network. 2012.
4. Refai M. Incidence and control of brucellosis in the Near East region. *Veterinary microbiology.* 2002;90(1-4):81-110.
5. Zeynali M, Shirzadi M. National guideline for brucellosis control. Ministry of Health and Medical Education. Center for diseases control. 2007.
6. RH Roushan M, JS Amiri M. Update on childhood brucellosis. Recent patents on anti-infective drug discovery. 2013;8(1):42-6.
7. Bosilkovski M, Krteva L, Caparoska S, Labacevski N, Petrovski M. Childhood brucellosis: review of 317 cases. *Asian Pacific journal of tropical medicine.* 2015;8(12):1027-32.
8. Young EJ. *Brucella* species (brucellosis). Long SS, Pickering LK, Prober CG Principles and Practice of Pediatric Infectious Diseases. 2012:861-4.
9. Gül S, Satılmış ÖK, Ozturk B, Gökçe Mİ, Kuscu F. Seroprevalence of brucellosis among children in the Middle Anatolia Region of Turkey. *Journal of Health, Population, and Nutrition.* 2014;32(4):577.
10. Al Barraq AA, Makeen HA, Menachery SJ. Pediatric brucellosis: A short review. *Saudi Journal for Health Sciences.* 2018;7(1):1.
11. Al Shaalan M, Memish ZA, Al Mahmoud S, Alomari A, Khan MY, Almuneef M, et al. Brucellosis in children: clinical observations in 115 cases. *International journal of infectious diseases.* 2002;6(3):182-6.

12. Roushan MRH, Ahmadi SAA, Gangi SMS, Janmohammadi N, Amiri MJS. Childhood brucellosis in Babol, Iran. *Tropical doctor*. 2005;35(4):229-31.
13. Rubach MP, Halliday JE, Cleaveland S, Crump JA. Brucellosis in low-income and middle-income countries. *Current opinion in infectious diseases*. 2013;26(5):404.
14. Aghaali M, Mohebi S, Heydari H. Prevalence of asymptomatic brucellosis in children 7 to 12 years old. *Interdisciplinary perspectives on infectious diseases*. 2015.
15. Almuneef M, Memish Z, Shaalan MA, Banyan EA, Al-Alola S, Balkhy H. *Brucella melitensis* bacteremia in children: review of 62 cases. *Journal of chemotherapy*. 2003;15(1):76-80.
16. Feiz J, Sabbaghian H, Miralai M. Brucellosis due to *B. melitensis* in children: clinical and epidemiologic observations on 95 patients studied in central Iran. *Clinical pediatrics*. 1978;17(12):904-7.
17. Salari M, Khalili M, Hassanpour G. Selected epidemiological features of human brucellosis in Yazd, Islamic Republic of Iran: 1993-1998. *EMHJ-Eastern Mediterranean Health Journal*,2003;9 (5-6):1054-60.
18. Awad R. Human brucellosis in Gaza Strip, Palestine. *EMHJ-Eastern Mediterranean Health Journal*, 1998;4 (2), 225-33.
19. Azizi F, Hatami H, Janghorbani M. *Epidemiology and control of common diseases in Iran*. 3 th. Research Institute for endocrine sciences, shahid beheshti university of medical sciences: khosravy. 2010.
20. Kassiri H, Amani H, Lotfi M. Epidemiological, laboratory, diagnostic and public health aspects of human brucellosis in western Iran. *Asian Pacific journal of tropical biomedicine*. 2013;3(8):589-94.
21. Khazaei S, Shojaeian M, Zamani R, Mansori K, Mohammadian-Hafshejani A, Rezaeian-Langroodi R, et al. Epidemiology and risk factors of childhood brucellosis in West of Iran. *International journal of pediatrics*. 2016;4(7):2099-104.
22. Farahani S, Shah Mohamadi S, Navidi I, Sofian M. An investigation of the epidemiology of brucellosis in Arak City, Iran,(2001-2010). *Journal of Arak University of Medical Sciences*. 2012;14(7):49-54.