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Unrecognized pediatric and adult family members of children with acute brucellosis



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ABSTRACT

Background and aim: Brucellosis is an infectious, contagious and zoonotic disease that occurs worldwide. The family members of an index case of brucellosis may be especially susceptible, due to sharing the same source of infection and similar risk factors for brucellosis. In this study, we propose to screen pediatric and adult family members of brucellosis index cases for detecting additional unrecognized infected family members.

Materials and methods: 114 family members of 41 pediatric patients with brucellosis were evaluated. All family members completed a brief questionnaire and were tested by a standard tube agglutination test (STA).

Results: The majority of family members ($n = 96$, 84.2%) were children. Among the 114 family members, 42 (36.8%) were seropositive, and 15 (35.7%) were symptomatic. The majority of the symptomatic seropositive family members ($n = 12$, 80%) had STA titers ($\geq 1:640$) higher than asymptomatic seropositive family members ($n = 9$, 33%; $p = 0.004$).

Conclusion: The routine screening of both pediatric and adult family members of index cases is a priority in endemic areas. Using this screening approach, unrecognized family members who are seropositive for brucellosis will be identified earlier and be able to receive prompt treatment.

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Introduction

Brucellosis is thought to be the most common zoonosis worldwide¹; while it is an important public health issue throughout the world, it is of especial concern in the Mediterranean region, including Turkey.¹⁻³ The incidence of this zoonotic disease in Turkey is 23 per 100,000 yearly.³ Brucellosis

is especially common in the rural areas of the middle and south-eastern Anatolian regions. *Brucella melitensis* is the most prevalent strain.⁴

Brucellosis is a contagious disease of animals that is transmissible to humans, who are accidental hosts. It is transmitted to humans by contact with infected animals, their carcasses, excretions, or through derived food products like unpasteurized milk and cheese.^{5,6} Therefore, individuals recognized to

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be at increased risk include farmers, veterinarians, abattoir workers, and laboratory personnel. Transmission from human to human is rare, as are transplacental, breast-feeding, and venereal transmissions.⁵ It is a systemic infection which may involve any organ or system of the body.

In endemic areas with a potentially high rate of population exposure, brucellosis should be considered one of the differential diagnoses for any patient suffering from indefinite involvement of miscellaneous organs, because early diagnosis and early treatment of infected cases can reduce the rate of complications.⁷ Unrecognized seropositive individuals may include family members of the index case, who share the same source of brucellosis and similar genetic and environmental risk factors for the disease.^{8,7,9}

In this study, we screened pediatric and adult family members of index cases with brucellosis to detect unrecognized infected family members. In addition, we evaluated the demographic, epidemiologic, clinical, and serological features of family members and compared seropositive and seronegative family members.

Materials and methods

A total of 114 family members of 41 pediatric patients (index cases) who had been diagnosed with acute brucellosis at the Gaziantep State Children Hospital's Department of Pediatric Infectious Diseases were evaluated during the period from September 2012 to August 2013. The diagnosis of acute brucellosis was based on the US Centers for Disease Control definition, which includes the presence of clinical signs and symptoms with evidence of *Brucella* spp. invasion in positive culture or a single standard tube agglutination test (STA) against *Brucella* spp. of $\geq 1:160$.¹⁰ Pediatric and adult family members screening was initiated after diagnosis of the index case; all family members completed a brief questionnaire. The questions included demographic data of the index case and family members, such as age, sex, and epidemiological family data like living area, animal ownership, handling of animals or their excretions, and previous history of brucellosis. Any history of drinking unpasteurized milk and consumption of unpasteurized dairy products such as cream and cheese were also recorded.

Family members of the pediatric index case were evaluated by a pediatric infectious diseases specialist and adult family members were evaluated by an infectious diseases specialist. Family members of index cases were tested by slide agglutination tests (Rose Bengal test). Family members who had positive results were further tested by STA. A seropositive family member was defined as an individual with STA titer $\geq 1:160$, while a seronegative family member was defined as an individual with STA titer $\leq 1:80$. Blood samples were not cultured for *Brucella* sp. routinely, although some were cultured. Physical signs and symptoms of index cases and symptomatic seropositive family members were recorded.

Data analysis was performed using SPSS 19.0 (SPSS Inc., Chicago, IL, USA). Continuous variables were expressed as median and mean \pm S.D. (standard deviation); Chi-square test was used to compare proportions. Fisher's exact test was used

Table 1 – Physical signs and symptoms of Brucellosis index cases and symptomatic seropositive family members.

Physical signs and symptoms	Index cases n = 41 (%)	Symptomatic seropositive family members n = 15 (%)
Fever	38 (92.7)	10 (66.7)
Malaise	32 (78.1)	12 (80)
Arthralgia	28 (68.3)	11 (73.3)
Fatigue	26 (63.4)	7 (46.7)
Myalgia	18 (43.9)	10 (66.7)
Weight loss	16 (39)	4 (26.7)
Back pain	2 (4.9)	3 (20)
Headache	6 (14.6)	3 (20)
Night sweating	5 (12.2)	2 (13.3)
Hepatomegaly	12 (29.3)	5 (33.3)
Splenomegaly	9 (21.9)	4 (26.7)
Arthritis	7 (17)	3 (20)

for expected frequencies below five in contingency tables. *p*-Values < 0.05 were considered statistically significant.

Results

Forty-one pediatric index cases and 114 family members were included in this study. The age distribution of the index cases was 1–18 years, with a median age of 8.1 years; 26 (63.4%) were boys and 15 (36.6%) girls. The most frequent symptoms were fever, malaise and arthralgia. The physical signs and symptoms of index cases are reported in Table 1. Their STA titers ranged from 1:160 to $>1:1280$; the titers were 1:160 in three (7.3%) cases, 1:320 in eight (19.5%), 1:640 in 19 (46.3%), 1:1280 in seven (17%), and ≥ 1280 in the remaining four (9.7%) index cases (Table 2).

Out of the 114 family members, 96 (84.2%) were children and 18 (15.8%) were adults, age range 2–54 years, median 13.4 years; there were 60 (52.6%) males and 54 (47.4%) females ($p = 0.66$). Seventy two family members (63.2%) lived in rural areas and 42 in urban areas (36.8%) ($p = 0.01$). Thirty family members (26.3%) owned animals: 23 (20.2%) had sheeps, two (1.7%) had cows, and five (4.4%) had cows and sheeps. Eight family members (7%) had a history of handling animals or animal excretions. None of them admitted drinking unpasteurized milk, but 75 (65.7%) family members had a history of ingesting unpasteurized dairy products: 61 (53.5%) eating

Table 2 – The distribution of standard tube agglutination test (STA) titers of Brucellosis index cases and seropositive family members.

STA titer	Index case n = 41 (%)	Seropositive family members n = 42 (%)
1:160	3 (7.3)	11 (26.2)
1:320	8 (19.5)	10 (23.8)
1:640	19 (46.3)	14 (33.3)
1:1280	7 (17)	4 (9.5)
$>1:1280$	4 (9.7)	3 (7.1)

STA, standard tube agglutination test.

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