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Epidemiological features of brucellosis in the Republic of Azerbaijan at the present stage

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Abstract

Modern brucellosis is characterized by high variability of clinical symptoms. The evolution of brucellosis in modern conditions is heading in the direction of acute brucellosis increasing in its frequency with the early development of focal metastatic and infectious-allergic lesions, which increase the severity of the disease. The purpose of our study was to analyze the epidemiological features of acute brucellosis in the Republic of Azerbaijan. Of the 178 patients surveyed, only 120 persons fully met the criteria, which formed the main group. Statistical analysis of the results of the study was performed using the programs "SPSS 20.0", "STATISTICA 6.0". Acute brucellosis was found to be 7.5 times more frequent in women aged 40 to 49 years ($p < 0.05$), whereas no cases of brucellosis were recorded in the group of women that are under 19 years of age. The highest infection rate was recorded among farm workers and veterinarians, namely 64.17±4.38%. When the sources of infection were identified, it was found that in the vast majority of 57.5±4.51% of persons, the source of infection could not be established or was mixed.

Keywords: acute brucellosis; epidemiology; source of infection.

Urgency of the problem: Brucellosis remains a major problem for many countries in the Mediterranean, the eastern part of the European region, including the Balkans and Central Asia. According to WHO, in 2014, 347 confirmed cases of brucellosis were reported in the European Union countries. However, insufficient data on Eastern Europe and Central Asia significantly limits the ability to analyze the true prevalence of brucellosis in the world [1, 2].

According to FERG (Foodborne Epidemiology Reference Group), in 2010, there were approximately 400,000 food-borne brucellosis cases in the world, including around 2,000 cases with fatalities [3].

Over the last decades, the epidemiology of this disease has significantly changed under the influence of various socio-economic factors, among which migration processes take an important place, which has led to its attribution to transboundary infections [4].

All these factors create the prerequisites for the occurrence of the disease in non-endemic countries and regions, which requires high level of alertness to this pathology [5].

Transmission from person to person can occur transplacental, through breastfeeding, rarely through sexual intercourse, organ transplants and blood transfusions, however, in most cases, people are infected from domestic small and large bovine animals when consuming infected meat or dairy products. This causes the development of brucellosis worldwide, especially in countries where livestock farming is developed. The seven countries of the former Soviet Union are in the list of 25 countries with the highest number of human cases of brucellosis, including Azerbaijan, which annually reports about 450 new cases of brucellosis [6, 7].

The evolution of brucellosis in modern socio-economic conditions has occurred not only in the epidemiology of the disease, but also in the clinical course. The incidence of acute brucellosis with severe course and early development of focal metastatic and infectious-allergic lesions increased - in almost half of the patients and, as a consequence, the percentage of secondary chronic brucellosis increased compared to the primary chronic brucellosis, with more frequent involvement of various organs and systems in the infectious process [8, 9].

Brucellosis is a systemic disease. Therefore, any organ or system of the human body can be involved in the pathological process. This infection is characterized by nonspecific symptoms, which causes some difficulties in making a timely diagnosis. As a consequence, late diagnosis can lead to serious consequences, such as the development of complications, prolonged loss of workability and disability [10].

Therefore, the **purpose of our study** was to analyze the epidemiological features of acute brucellosis in the Republic of Azerbaijan.

Study materials and methods: 178 patients with suspected brucellosis who sought medical attention at Baku Clinic and Baku Central Clinical Hospital were examined. All patients allowed their data to be included in the study.

When diagnosed with acute brucellosis, it was taken into account that the duration of clinical manifestations was no more than 3 months from the onset of the first symptoms. The diagnosis was confirmed on the basis of a comprehensive assessment: clinical data, medical history, including epidemiological, objective examination data, laboratory diagnostic results.

All patients were carefully examined: complaints with full detail, history of illness and life, epidemiological history with an emphasis on occupational risks, staying in endemic territories, and use of livestock products. A complete general clinical examination in accordance with conventional methods, a complex of laboratory (general clinical, biochemical, immunological, molecular) and instrumental studies were carried out.

Specific study methods were performed by ELISA on Awareness and Stat Fax 3200 using NovaLisa Brusella IgG, IgM (Germany) test systems with the IgM and IgG detection.

Of the 178 brucellosis patients, only 120 were eligible for inclusion in the main study group. The control group consisted of 30 healthy individuals who underwent a scheduled annual review. The groups were divided by age and gender. The mean age of the patients was 35.9 ± 2.8 years. Among the surveyed persons, males prevailed - 75.00%.

Statistical processing of the study results was performed using the programs “SPSS 20.0”, “STATISTICA 6.0” using parametric and non-parametric methods of evaluation of the obtained results.

Exclusion criteria: persons under 18 years of age, confirmation of diagnosis of subacute or chronic brucellosis, coinfection with other acute infectious diseases, presence of severe chronic comorbidity, which could significantly affect the reliability of the results obtained.

Results. Discussion

After the analysis of gender-age characteristics it was found that acute brucellosis was 7.5 times more frequent among women aged 40 to 49 years ($p < 0.05$), whereas in the group of women up to 19 years of age there were no cases of brucellosis. In other age groups, no significant difference was found between men and women (Table 1).

Table 1

Sex-age characteristics of patients with acute brucellosis

Age Gender		≤19 years	20-29 years	30-39 years	40-49 years	≥50 years
Men (n = 90)	Abs.	6	30	31	6	17
	%	6.67 ± 2.63	33.33 ± 4.97	34.44 ± 5.01	6.67 ± 2.63	18.89 ± 7.15
Women (n = 30)	Abs.	0	5	6	15	4
	%	0	16.67 ± 6.81	20.00 ± 7.30	50.00 ± 9.13 *	13.33 ± 6.21
Total (n = 120)	Abs.	6	35	37	21	21
	%	5.0 ± 1.99	29.17 ± 4.15	30.83 ± 4.22	17.5 ± 3.47	17.5 ± 3.47

Note: * - p <0.01 - statistically significant difference between the different age groups.

In the study of the place of residence of patients, it was found that people living in rural areas are 2.5 times more likely to suffer from acute brucellosis compared to urban residents (p <0.01), namely 71.67 ± 4.12% against 28.33 ± 4.11% of persons (Fig. 1).

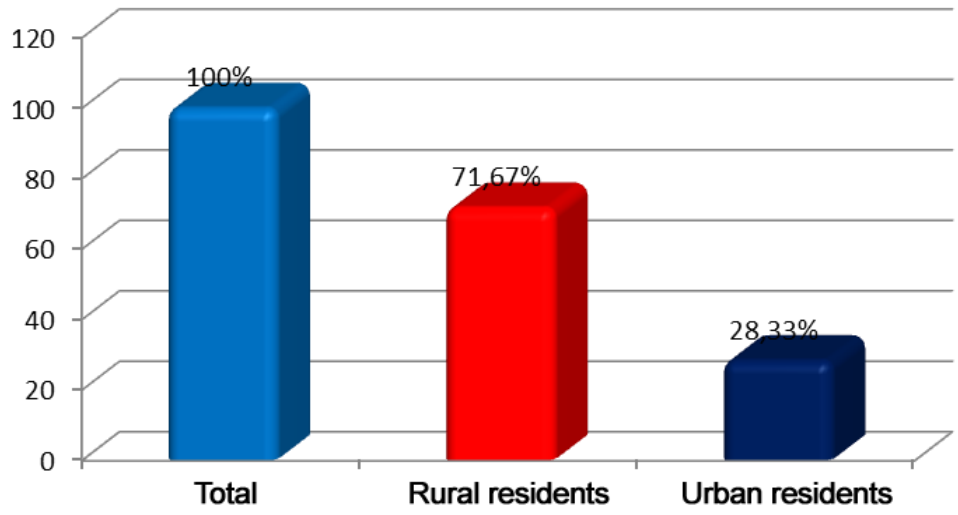

Fig. 1 - Distribution of brucellosis patients by place of residence

Studying the professional orientation of brucellosis patients, it was found that the highest infection rate was recorded among farm workers and veterinarians, namely 64.17 ±

4.38%. Persons whose professional activity was not related to animal care was 35.83 ± 4.37% (Table 2).

Table 2

Distribution of brucellosis patients by activity

Occupation	Brucellosis patients (n = 120)	
	Abs.	%
Livestock workers and veterinarians	77	64.17 ± 4.38
Persons not associated with the stockbreeding industry	43	35.83 ± 4.37

When establishing sources of infection, it was found that overwhelmingly 57.5 ± 4, 51% of people could not identify the source of the infection or it was mixed. The role of large cattle in 57.5 ± 4.51% of persons was proved, whereas the role of small cattle proved in only 13.33 ± 3.10% of patients with acute brucellosis (Fig. 2).

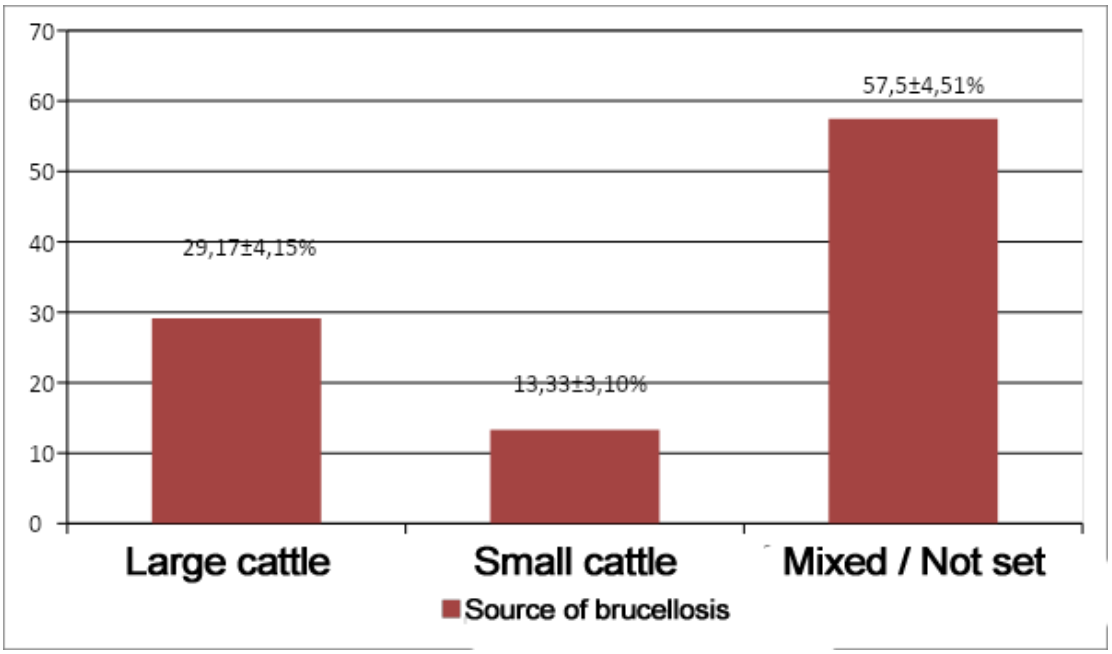

Fig. 2 - Distribution of brucellosis patients by source of infection

The main route of infection in 45,0 ± 4,54% of cases was contact, in 32,5 ± 4,28% - alimentary, in 7,5 ± 2,4% - mixed. In 15,0 ± 3,26% of patients the source and the path of transmission of infection could not be established (Fig. 3).

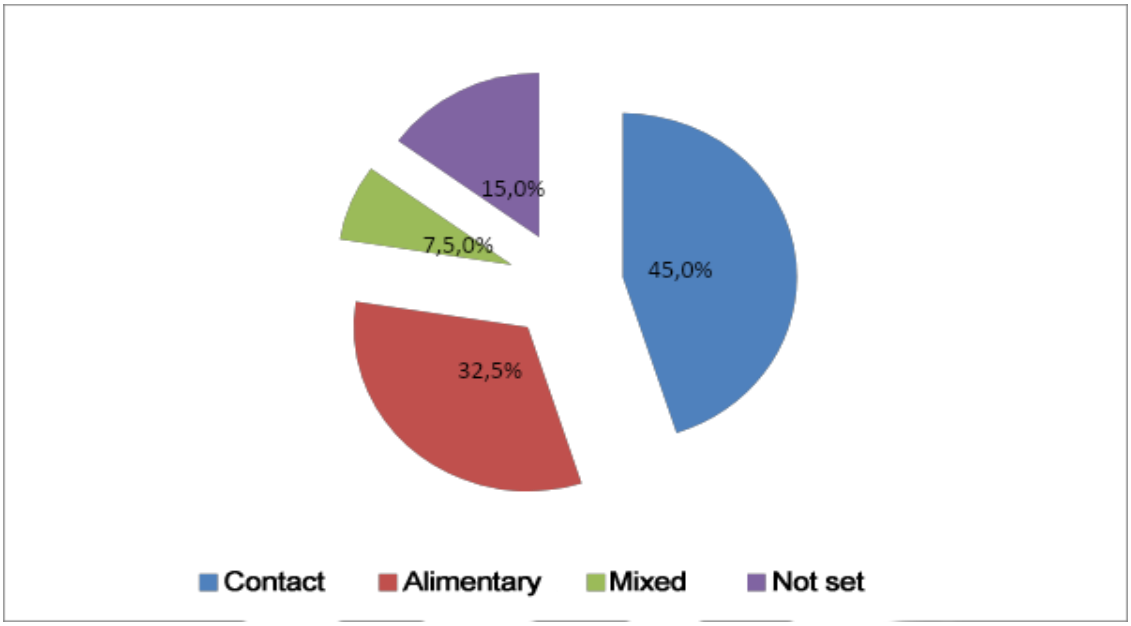

Fig. 3 - Distribution of brucellosis patients depending on the route of transmission.

A significant difference was found between the frequency of infection in different pathways depending on gender. Thus, males were 8.7 times more likely to be infected by direct contact with infected animals, whereas women were 4.8 times more likely to be infected with the use of thermally processed livestock products (Table 3).

Table 3

Distribution of brucellosis patients by route of transmission

Patients with brucellosis / Pathways to infection	Total (n = 120)		Men (n = 90)		Women (n = 30)		p
	Abs.	%	Abs.	%	Abs.	%	
Contact	54	45.00 ± 4.54	52	57.77 ± 5.21	2	6.67 ± 4.56 *	<0.05
Alimentary	39	32.50 ± 4.28	15	16.67 ± 3.93	24	80,00 ± 7,30 *	<0,05
Mixed	9	7,50 ± 2,4	8	8,89 ± 2,99	1	3,33 ± 3,27	>0,05
Not set	18	15,00 ± 3,26	15	16.67 ± 3.93	3	10.00 ± 5.48	>0.05

Note: * - p <0.05 - statistically significant difference between men and women.

After the analysis of seasonal features of brucellosis it was revealed that the largest proportion of patients with brucellosis was registered in the summer and autumn, ie mainly in 3rd, 4th quarters - 69,17 ± 4,22% compared with 1st, 2nd quarters of spring and winter, namely the number of patients in this period was 30.83 ± 4.21% (Fig. 4).

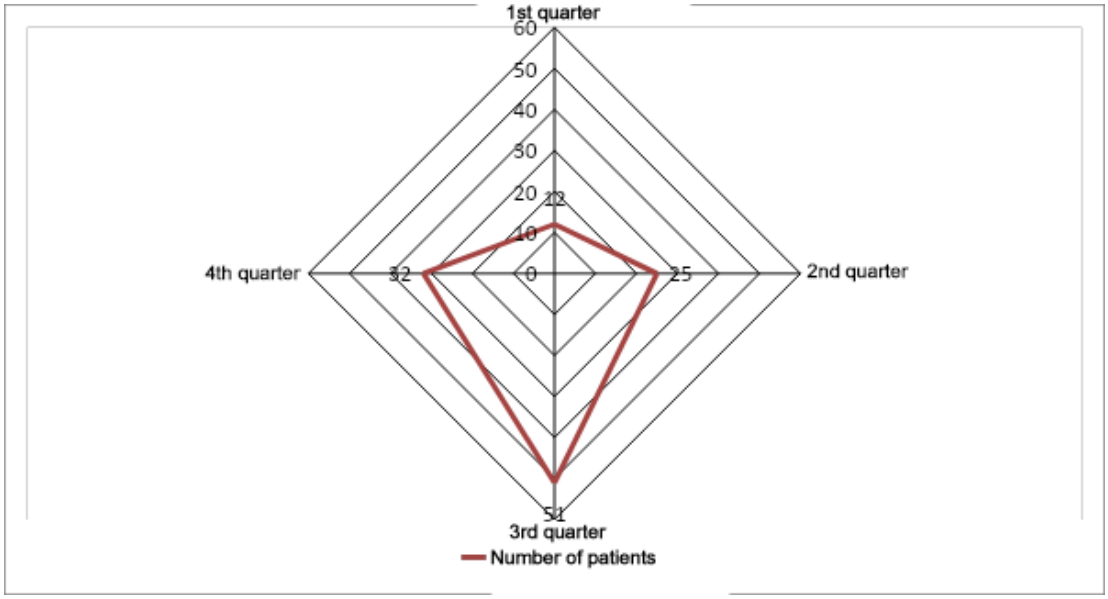

Fig. 4 - Distribution of brucellosis patients depending on seasonality.

In most patients, the diagnosis was made and laboratory confirmed between 2 and 4 weeks from the onset of the first clinical signs of the disease.

Brucellosis remains a significant problem for the healthcare of endemic countries. Given the polymorphism of symptoms, the multisystem nature of this disease, there are difficulties in the early diagnosis of the disease and verification of complications [11]. Therefore, brucellosis is the most common among the rural population, living in a livestock-oriented areas, and has a polymorphic course that impedes its early diagnosis.

Brucellosis is common among all age groups, although in most cases the young, able-bodied population is affected, as evidenced by the data of a number of researchers [12, 13]. In other studies, it has been noted that brucellosis is more common among older patients [14, 15]. Sexual distribution among our patients, namely male predominance (75.00%) is in line with the data of most researchers [16, 17], which may be related to the widest involvement of men in the work with animals and the use of raw livestock products. Whereas, other researchers point out the opposite, that women with brucellosis are predominant among brucellosis patients [18].

Conclusions:

1. Acute brucellosis was 7.5 times more common among women aged 40 to 49 years.

2. Acute brucellosis is 2.5 times more likely to affect people living in rural areas compared to urban residents

3. The main route of infection in 45.00% of cases was contact

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