Medical and Research Publications
International Open Access

Research Article **Journal of MAR Medicine (Volume 1 Issue 2)**

Prevalence And Risk Factors of Brucellosis Among Human During 2 Years

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Received Date: October 31, 2022

Published Date: November 15, 2022

Abstract

Brucellosis is one of the most common bacterial zoonotic infections in the world, posing a serious threat to human and animal health. This study was aimed to determine the prevalence and risk factors of brucellosis among humans in Iraq during the study period. A retrospective cross-sectional study was conducted at the Life Statistics Center of the Iraqi Ministry of Health. The study samples were collected over a two-year period. The demographic information as (age, gender, education, MS, occupation, and family history) was included. To analyze it and create tables and graphs, the STATA software program was used. The majority of cases occurred in 2019, with 56.7% being between the ages of 15 and 44, 63.6% being female, 54.2% being illiterate, and 67.9% being married. The most common clinical manifestations were fatigue, fever, and night sweats. More than a quarter of them had brucellosis in their family and lived in the rural area. The majority of them had animals and got their milk from somewhere else. The most commonly used testing method was positive rapid tests. Multidisciplinary collaborations, surveillance programs, and the implementation of public health preventive interventions are critical for brucellosis prevention and control.

Keyword: *Brucellosis; Risk factors; Human; Milk; Iraq*

Introduction

Brucellosis is a neglected zoonotic disease that can be contracted through contact with infected animals, consumption of infected dairy products, or aerosol inhalation **[**1, 2**]**. Wildlife animals in close proximity to humans and domestic animals may serve as reservoirs for both **[**3**]**. The World Health Organization (WHO) estimates that more than 500,000 new human cases of brucellosis are diagnosed worldwide each year **[**4**]**; however, this figure is likely to be underestimated due to underreporting and misdiagnosis **[**5**]**. Because the vast majorities of human cases are acquired through the consumption of contaminated dairy products or contact with infected animals, particularly ruminants, ruminant brucellosis control is critical to the prevention of human infection **[**6**]**. Aside from its impact on human health, ruminant brucellosis causes significant economic losses due to abortion in pregnant animals, decreased milk production, and infertility in adult males **[**7-8**]**. Among the occupations at high risk of Brucella infection are veterinarians, livestock farmers, milkers, abattoir workers, and laboratory

workers [9-10]. It is rarely fatal, but it has a significant impact on the livestock economy due to production losses in international markets [11]. Human brucellosis is commonly transmitted from infected livestock, either directly or indirectly, and is characterized by acute febrile illness, genital inflammation, sterility, spontaneous miscarriage, and lymphatic system lesions, with more than 500,000 new cases reported each year worldwide [12]. Increased livestock trading, rising meat consumption, a lack of quarantine or pasteurization of livestock products, and rapid population movement over the last decade have all increased the risk of infection among people who have had direct or indirect contact with livestock [13]. It is a widely spread disease in Iraqi Kurdistan, that is, the three Kurdish northern Iraqi provinces of Erbil, Dahuk, and Sulaimani, and remains a challenging health problem [14]. Sharing borders with Iran, Turkey, and Syria, wars and conflicts, insufficient preventive measures, a lack of adequate control programs, and uncontrolled animal transportation through "open" borders all increase the risk of brucellosis spreading [15], despite the fact that few studies on human brucellosis seroprevalence have been conducted in the region. The purpose of this study was to determine the prevalence and risk factors of brucellosis among humans in Iraq during the study period.

Methodology

During the study period, a retrospective cross-sectional study was conducted at the Life Statistics Center of the Iraqi Ministry of Health. The study samples were collected over a two-year period, beginning in 2019 and ending in 2020. The demographic information (age, gender, education, MS, occupation, and family history) was included. The clinical presentation included fever, nausea, ache, and other symptoms also were included. The data was entered into an Excel spreadsheet, and the STATA software program was used to analyze it and create tables and graphs.

Results

Out of a total of 1,329 participants, there were 75.2% of participants in 2019 and 24.8% in 2020. In table 1 show that the 56.7% of them were between the ages of 15 and 44, with female cases outnumbering male cases by 63.6% to 36.4%. 54.2 percent of them were illiterate. As shown in Table 1, 51.2% worked as pastoralists. As shown in Table 2, the most common clinical presentation was fatigue (61.7%), followed by fever (53.6%), and night sweats (45.2%). Figure 1 shows that 39.2% and 45.5% of them had a brucellosis family history during 2019-2020. Figure 2 shows that more than half of them live in rural areas. Figure 3 shows that 67.9% and 43.9% were married. Figure 4 also shows

that 54.9% and 43.3% of them had animals in their homes. Figure 5 show that 74% and 67.3% of them had positive rapid tests. Table 6 shows that half of them had milk from a different source. Figure 7 show that 62.2% and 66.7% of them had boiled milk before consumption.

Variables		Years				Total	
		2019(999)		2020(330)			
		Frequency	Percent	Frequency	Percent	Frequency	%
Age groups	<4 years	72	7.2	42	12.7	114	8.6
	5-14	118	11.8	45	13.6	163	12.3
	15-44	597	59.7	157	47.6	754	56.7
	≥45	212	21.2	86	26.1	298	22.4
Gender	Male	282	28.2	202	61.2	484	36.4
	Female	717	71.7	128	38.8	845	63.6
Education	Illiterate	523	52.3	197	59.7	720	54.2
	Primary & above	476	47.6	133	40.3	609	45.8
Occupation	Pastoralist	480	48.0	201	60.9	681	51.2
	Others	520	52.0	129	39.1	649	48.8

Table 1: Characteristics of studied samples

Clinical presentation*	Frequency (1329)	Percent
Fever	712	53.6
Night sweets	600	45.2
Headache	421	31.7
Ache	529	39.8
Nausea	624	46.9
Fatigue	820	61.7
Arthralgia	317	23.9

*Each participant had more than one of clinical signs

Table 2: Clinical presentation

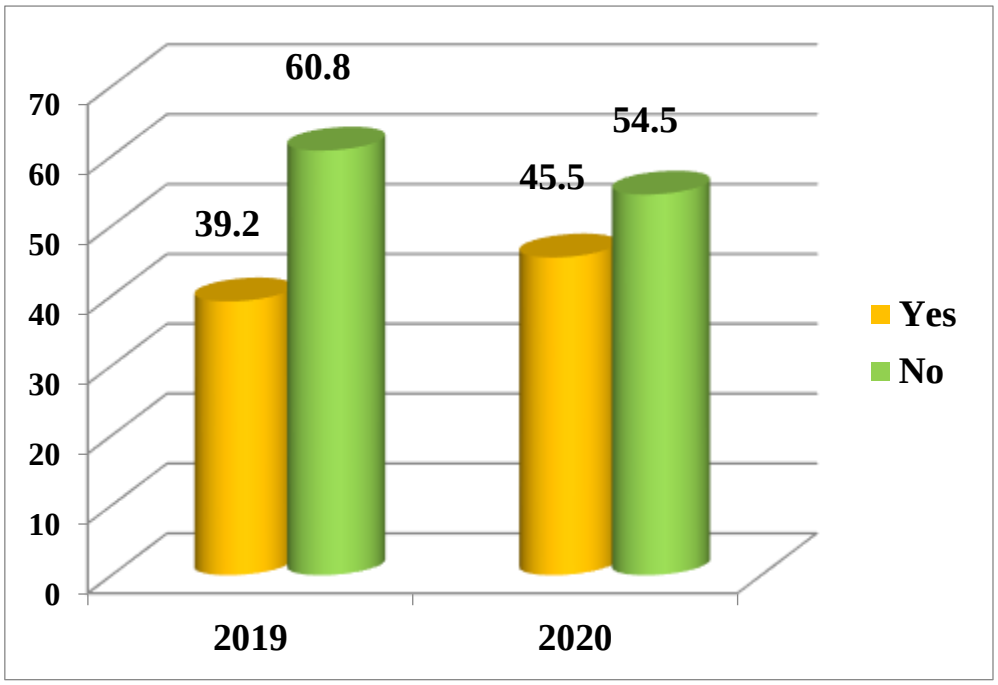

Figure 1: Family history of Brucellosis among studied samples

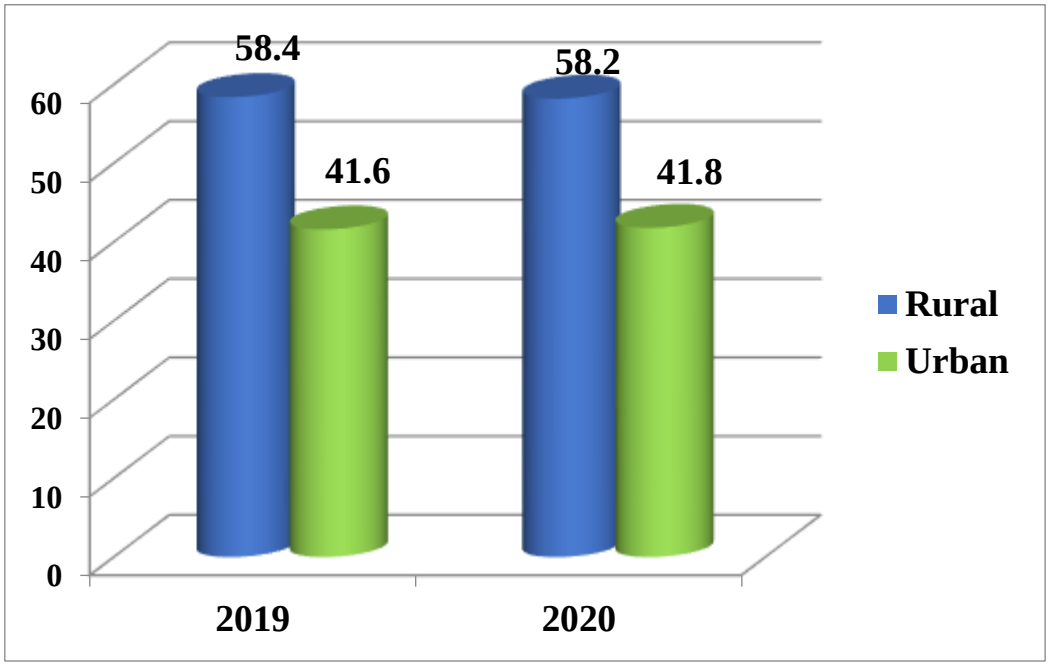

Figure 2: Residence of patients during 2019-2020

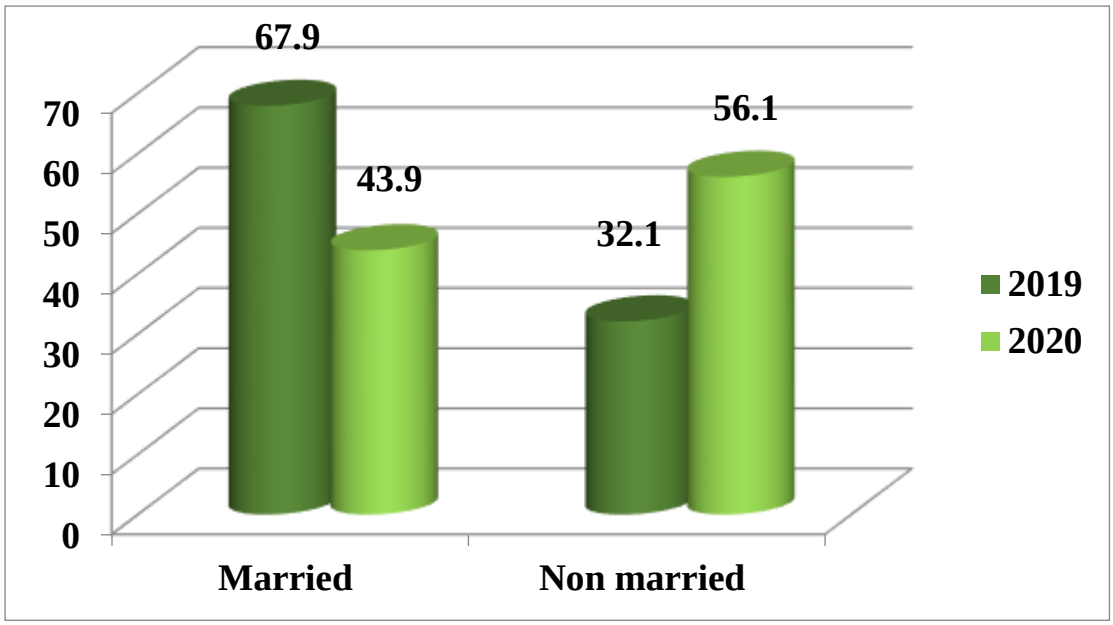

Figure 3: Martial status among studied samples

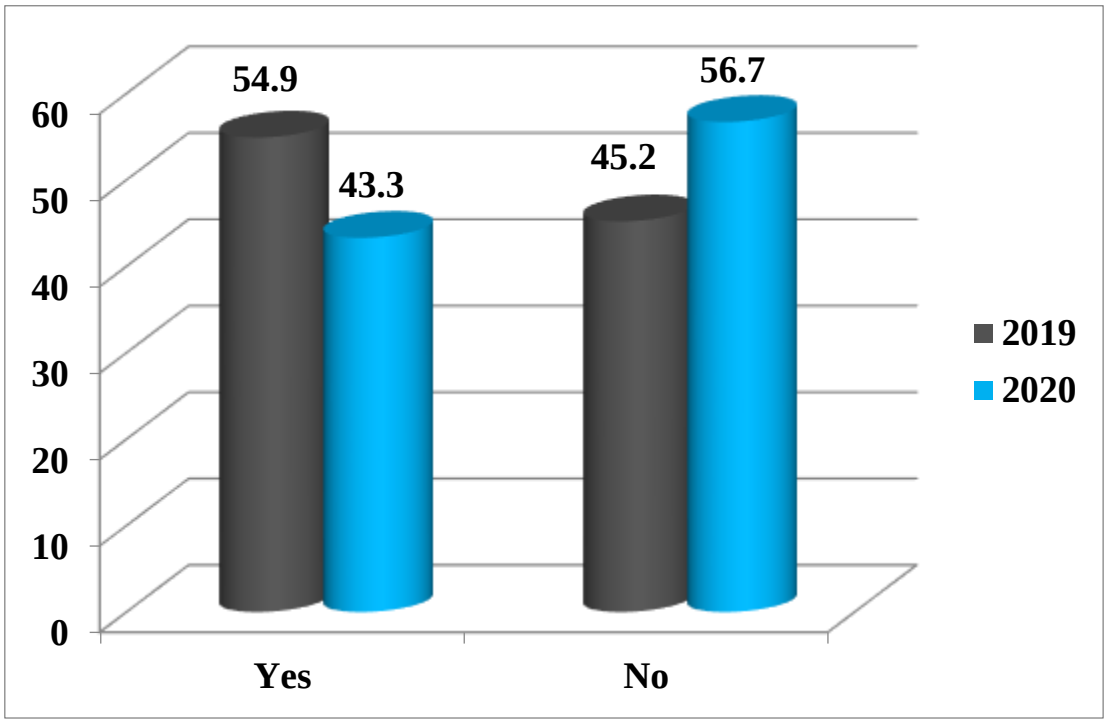

Figure 4: Animals own in your house

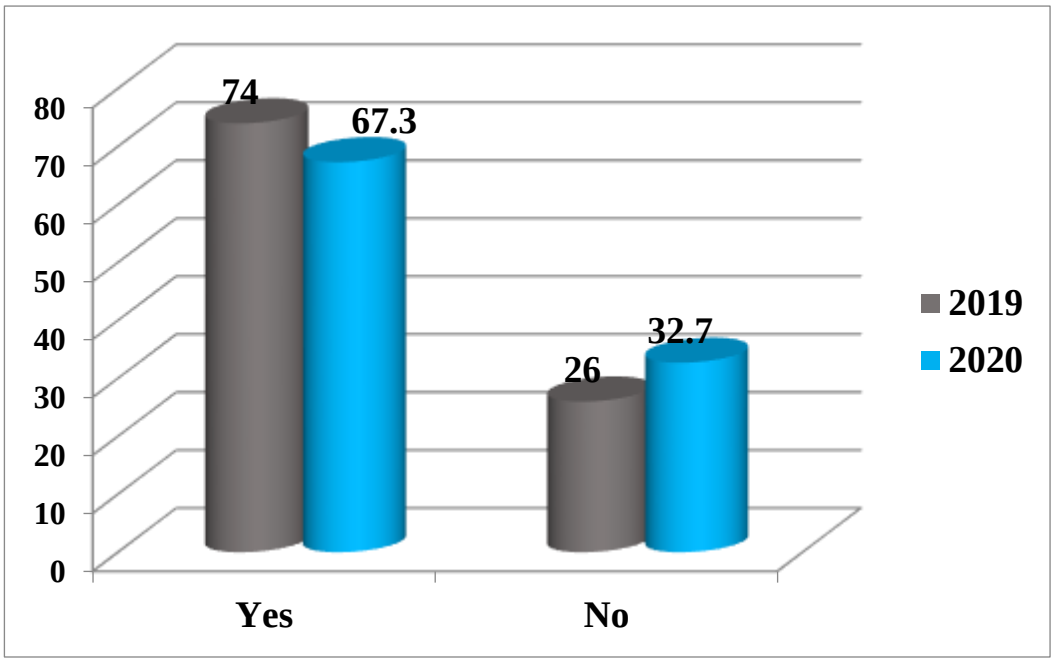

Figure 5: Rapid test positive among studied sample

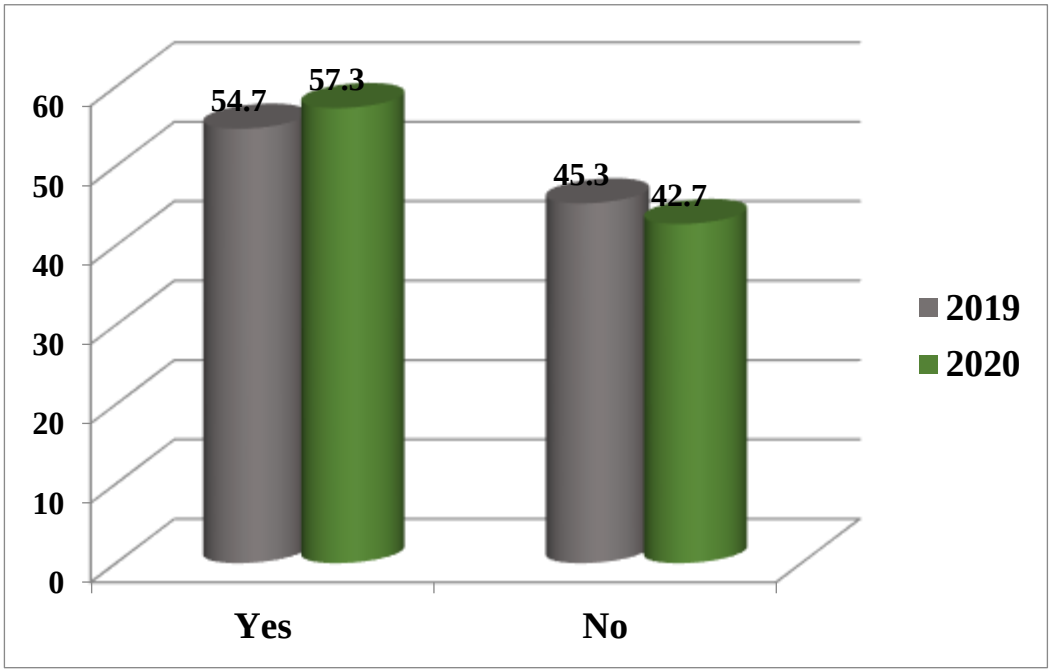

Figure 6: Milk from external source

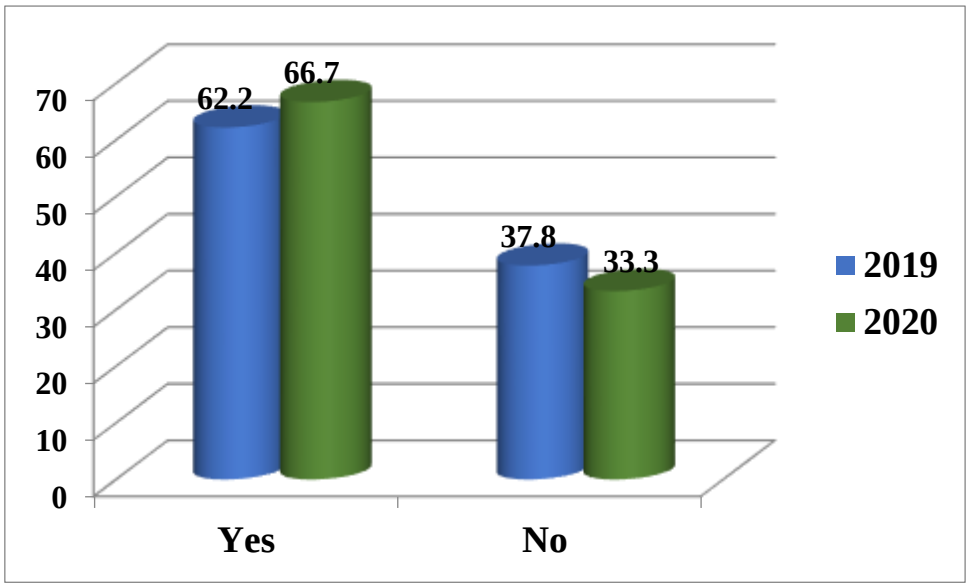

Figure 7: Boil milk before consumption

Discussion

Brucellosis is constantly emerging or re-emerging around the world, and its epidemiology has evolved over the last decade **[**16**]**. The purpose of this study was to determine the prevalence and risk factors of brucellosis among humans during the study period. Age, gender, and seasonal changes are all thought to be important risk factors for disease distribution. In the current study, the highest percentage of cases occurred between the ages of 15 and 44 years old, and when compared to another study conducted in Turkey by Gur et al in 2003, the authors noted that fifty-three (19%) were younger than 15 years old (group A), 178 (63%) were 15-45 (group B), and 52 (18%) were over 45 (group C) **[**17**]**. In a study conducted in Saudi Arabia, the authors discovered that those aged 15-44 years old had the highest prevalence, while those aged 1 year had the lowest. The average number of cases was 27.8 and the median was 29, while the average number of cases among those aged 1-4 years was 406.6 and the median was 441. The average was 2155.1 cases and the median was 2193 among those aged 15-44 years, and 784.4 cases and the median was 779.5 among those aged >45 years **[**18**]**.

Female cases outnumbered male cases in our study by 63.6% to 36.4%. Tiwari et al conducted a cross-sectional study in India and discovered that the majority of respondents (93.6%) were males between the ages of 31 and 40 years **[**19**]**. The authors found that 10029 (59%) of the people in Iran were males (mean age SD = 26.78 17.86 yr), and 7074 (41%) were females (mean age=29.4817.42 yr); the male to female ratio was 2:1**[**20**]**. This study discovered that 54.2 percent of them were illiterate. Sofian et al conducted a case control study in Iran and discovered that 44% of them were illiterate **[**21**]**.

Occupational brucellosis was thought to be a risk for animal breeders, shepherds, farmers, butchers, veterinarians, and laboratory workers [22]. This study discovered that 51.2% worked as pastoralists. Li et al conducted a cross-sectional study in China and found that the majority of them were agriculturalists (81.9%) and pastoralists (12.4%)[23]. The most common clinical manifestation in the current study was fatigue (61.7%), followed by fever (53.6%) and night sweats (45.2%). The authors reported on a study conducted in Turkey. Joint pain, high fever, weakness, low back pain, and gastrointestinal symptoms were the most common complaints [24]. El-Amin et al conducted a hospital-based study in Oman and discovered that fever was the most common presenting feature (91%) [25]. A hospital-based observational study was conducted in India among 98 cases of brucellosis, and the authors reported the fever and upper back pain were significant predictors of both acute and chronic forms of the disease by using multivariate logistic regression analysis [26].

During 2019-2020, 39.2% and 45.5% of those in this study had a brucellosis family history, respectively. A study conducted in Turkey found that seropositivity was not significantly associated with gender or age group, but was significantly associated (p0.05) with a family history of brucellosis, cattle rising, and consumption of unpasteurized milk and dairy products [27]. Hashtarkhani et al. conducted a study in Iran and discovered a significant relationship between location and both livestock vaccination history and family history [28].

According to the findings of this study, more than half of them live in rural areas. In comparison to another study conducted in Iran, the authors discovered that 4.3% of subjects lived in urban areas and 15.7% in rural areas [29]. In a cross-sectional study of 224 workers in Nigeria, the authors discovered that more than 75% of them were married and more than half of them lived in rural areas [30]. In Pakistan, the authors discovered that the prevalence was statistically higher in males (24%), the age group of 20 to 30 years (26.92%), rural residents (23%), and individuals with animals at home (22.50%) [31].

In this study, 67.9% and 43.9% of the participants were married. In a cross-sectional study conducted in Pakistan, researchers discovered no significant relationship between human brucellosis and residency (P=0.080), marital status (P=0.475), or socioeconomic status of participants (P=0.188)[32].

Keeping animals at home is regarded as one of the major risk factors for human brucellosis, with the results indicating that the risk of brucellosis is twice as high in people who keep animals at home (OR= 2.03)[32]. According to the current study, 54.9% and 43.3% of them had animals in their homes. The authors discovered that keeping animals at home [P=0.001 (OR=2.03; 95% CI = 1.55-2.65)], slaughtering of animals [P=0.001 (OR=15.87; 95% CI = 10.98-22.93)] and slaughtering of animals

[P=0.001 (OR=15.87; 95% CI = 10.98-22.93)] and raw milk consumption [P=0.001 (OR= 5.42; 95% CI= 4.11-7.14)] [32]. This study discovered that 74% and 67.3% of them had positive rapid tests. In a cross-sectional study of 113 suspected patients with various clinical manifestations, the Rose Bengal slide agglutination test, Wright test, and 2-ME test were all positive in 60 cases; however, the BrucellaCapt test titer was 1:160 in one patient. Six patients had high initial serum antibody titers, with 2-ME titers of 1:640, STA titers of 1280, and BrucellaCapt titers of 2560[33].

Raw milk consumption was also found to be statistically associated with Brucella prevalence [32]. Before drinking, 62.2% and 66.7% of them had boiled milk. A case-control study with 56 Jordanians who had been treated for brucellosis and at least three matched controls for each case [n = 247] was carried out. In total, 17 risk factors were investigated, including contact with various livestock, consumption of milk and milk products, drinking-water treatment, and disease awareness. In the univariate analysis, most variables were associated with brucellosis, but the final logistic model included only four: milking sheep and goats [OR 3.5], consumption of raw feta cheese made from sheep and goat milk [OR 2.8], consumption of cows' milk [OR 0.4], and consumption of boiled feta cheese [OR 0.4].Small ruminant farmers need to be trained in safer milking practices and feta cheese making procedures [34].

Direct contact with infected animals and consumption of raw milk and milk products were major risk factors[35]. Similarly, Cooper identified unpasteurized dairy products as the primary risk factor for brucellosis. When it came to specific animal products, milk and Zaban (buttermilk) had higher risks than cheese or raw liver [36]. According to Al-Eissa et al, raw milk consumption was the primary source of infection in 80% of the patients [37]. Direct contact with infected animals and raw milk and milk products intake were the main risk factors associated with brucellosis [38-39].

Conclusion

The majority of cases occurred during 2019; most of them were between the ages of 15 and 44; with female cases; were illiterate and married. Fatigue, fever, and night sweats were the most common clinical manifestations. More than a quarter of them had brucellosis in their family and lived in rural areas. The majority of them had animals and obtained their milk from a different source. Positive rapid tests were the most commonly used for testing.

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