ASIAN JOURNAL OF PHARMACEUTICAL AND CLINICAL RESEARCH

INNOVARE ACADEMIC SCIENCES
Knowledge to Innovation

Vol 17, Issue 12, 2024

Online - 2455-3891
Print - 0974-2441

Research Article

TO STUDY THE SEROPREVALENCE OF BRUCELLOSIS IN CASES OF ACUTE UNDIFFERENTIATED FEBRILE ILLNESS AT A TERTIARY CARE HOSPITAL, AMRITSAR

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Received: 05 October 2024, Revised and Accepted: 17 November 2024

ABSTRACT

Objective: This study sought to determine the seroprevalence of human brucellosis in patients presenting with acute undifferentiated illness at a tertiary care hospital.

Methods: The cross-sectional investigation was done on patients presenting to the outpatient or inpatient Department of Medicine at Government Medical College, Amritsar during the study period, regardless of age group, with an acute undifferentiated febrile illness. A 5 mL of whole blood was extracted in a plain vacutainer from suspected patients and enzyme-linked immunosorbent assay (ELISA) was performed.

Results: Out of 100 samples,11 came out positive by ELISA. Four females and seven males tested positive. Three (27.27%) of the 11 samples had immunoglobulin (Ig)G anti-bodies, whereas 8 (72.72%) samples had IgM anti-bodies.

Conclusion: Brucellosis is a serious zoonotic illness with consequences for public health. Efforts should be focused on creating and executing efficient animal vaccination programs, as well as on better diagnostic techniques.

Keywords: Acute febrile illness, Fever, Zoonotic.

 DOI: http://dx.doi.org/10.22159/ajpcr.2024v17i12.52967. Journal homepage: https://innovareacademics.in/journals/index.php/ajpcr

INTRODUCTION

Human brucellosis is a common bacterial zoonosis reported globally. The assumption and application of the 500,000 new case estimate globally have been crucial in assessing the disease's global importance and impact on people. It is caused by non-motile, non-encapsulated Gram-negative coccobacilli of the genus Brucella. David Bruce isolated the causative bacterium for the 1st time in 1887, and Alice Evans named it in 1918 [1]. The Indian subcontinent, the Mediterranean region, and Central and South America are endemic to the bacterium. Given its origin, other often used names are Malta fever or the Mediterranean fever. Because the infection has a remitting-relapsing pattern, it is usually referred to as undulant fever.

Any organ or system in the body can be affected by the systemic disease brucellosis. The majority of cases involving humans are caused by four species: *Brucella suis* (found in pigs), *Brucella abortus* (found in cattle), *Brucella melitensis* (found in sheep and goats), and *Brucella canis* (found in dogs). Worldwide, *B. melitensis* continues to be the predominant cause of brucellosis in humans [2].

The main signs of brucellosis in people include an uncontrollably high fever, weight loss, and nocturnal sweats. It is one of the major causes of pyrexia of undetermined origin (PUO) and one of the reasons for fever of protracted duration in endemic areas. Weakness, scrotal enlargement and soreness, fatigue, chills, decreased appetite, arthralgia, myalgia, weight loss, headache, back pain, and psychiatric issues are among the other typical clinical signs. Due to its clinical symptoms sharing similarities with those of other bacterial illnesses, human brucellosis is frequently misdiagnosed or underdiagnosed.

There are several ways that a person can contract brucellosis. These include drinking unpasteurized or unboiled milk or consuming other contaminated dairy products, inhaling infectious aerosols, consuming contaminated meat, microbial inoculation through cuts or abrasions on the skin's surface, conjunctival inoculation, and unintentional human contact with infected animals. Brucella is excreted by diseased animals through their urine, milk, placenta, and miscarriage products. Thus, the primary sources of Brucella are contaminated animals or animal by-products. Brucella can cause infertility, abortion, placenta retention, weak or dead calves born, and decreased milk production in animals. Brucella's ability to survive outside of mammalian organisms varies. According to reports, Brucella may survive for 70–80 days in damp soil when feces are spread out over the ground. *B. melitensis* can survive in dust for anywhere between 15 and 40 days, depending on the surrounding humidity. As a result, brucellosis poses a risk to workers in laboratories, farms, veterinary clinics, and abattoirs [3].

There are two categories for cases of brucellosis: probable and confirmed [4]. A probable case is defined as one that is clinically compatible, epidemiologically linked to a confirmed case, or has a Brucella agglutination titer of ≥160 in one or more serum specimens obtained after the onset of symptoms. A clinically compatible case that has been laboratory-confirmed is a confirmed case. Nonetheless, clinical signs linked to a positive serology without the isolation of Brucella species have been recognized as human-confirmed cases in brucellosis-endemic nations. Microbiological, serological, or molecular techniques — each with pros and cons of their own — are the foundation for the laboratory confirmation of human brucellosis. For the diagnosis of human brucellosis, a variety of serological tests are performed, including the Rose Bengal plate test (RBPT), complement fixation test, Coombs test, enzyme-linked immunosorbent assay (ELISA), and serum agglutination test (SAT) [5]. Polymerase chain reaction (PCR) assays specific to a given species can be used to molecularly diagnose human brucellosis. The most often used molecular targets in clinical

applications are the IS711 insertion element and the bcsp31 gene, which codes for a 31-kDa immunogenic outer membrane protein that is conserved across all Brucella species [6]. The most reliable method of diagnosing human brucellosis is still pathogen isolation from blood culture, although ELISA and agglutination-based serological testing are also commonly used. The current study set out to determine the prevalence of brucellosis in people with pyrexia of unknown origin (PUO) and those who had occupational exposure.

METHODS

The cross-sectional study was conducted at a tertiary care hospital, Amritsar. The study population constitutes patients of any age group with an acute undifferentiated febrile illness (body temperature more than 38.2C) presenting to the outpatient or inpatient Department of Medicine of Government Medical College, Amritsar during the study duration. A 5 mL of whole blood sample was drawn from suspected cases using a plain vacutainer while adhering to very rigorous aseptic guidelines. The serum was separated and stored in the refrigerator till processing. ELISA testing was performed on the samples to look for immunoglobulin (Ig)M and IgG anti-bodies to brucellosis as per kit manufacturer's instructions.

Inclusion criteria

- Suspected case of brucellosis (according to clinical case definition)
- Patients giving consent for participation in the study.

Clinical Case Definition: Brucellosis

An illness characterized by acute or insidious onset of fever and one or more of the following: night sweats, arthralgia, fatigue, anorexia, myalgia, weight loss, meningitis, or focal organ involvement (endocarditis, orchitis, hepatosplenomegaly, and splenomegaly [7].

Exclusion criteria

- Cases of acute febrile illness who do not fit in the clinical case definition of brucellosis.
- Patients who refuse to consent in research participation.

RESULTS

Out of 100 serum samples, 11 (11%) were positive for brucellosis by ELISA. Fifty-seven (57%) were males, whereas the rest 43 (43%) were female. Seven males and four females came out positive. Of the 11 samples, IgM anti-bodies were detected in 8 (72.72%) samples, whereas IgG anti-bodies were detected in 3 (27.27%) samples.

DISCUSSION

Globally, brucellosis continues to be the most prevalent zoonotic illness. Despite having a low death rate, its significance is demonstrated by the significant morbidity that it causes in both humans and animals. There is no documentation regarding the prevalence in and around the Amritsar district. Since Punjab is an agricultural state with livestock-related employment, there are few prevalent cases. Blood cultures for brucellosis have a very low positive rate. Therefore, using a commercial ELISA kit (IgM and IgG), we examined the prevalence related to human brucellosis in tertiary care health setting in the current study. As an assay that is quick, sensitive, and precise. Recent studies have demonstrated that ELISA is a more dependable method for brucella infection diagnosis than the Rose Bengal precipitation test (RBPT) and SAT [8]. ELISA has been used for mass screening in suspected and confirmed cases because of its ability to quickly identify individual IgM and IgG anti-bodies to the surface antigens, allowing for a better clinical correlation that may aid in the early stages of brucellosis diagnosis.

In a study by Aghamohammad *et al*., the prevalence of anti-*Brucella* IgG was 3.9% among human participants [9] which was contradicting to the present study conducted at GMC Amritsar. Using IgG ELISA, RBPT, SAT, IgM ELISA, and PCR, 6.76, 6.38, 3.90, 2.67, and 2.0% of

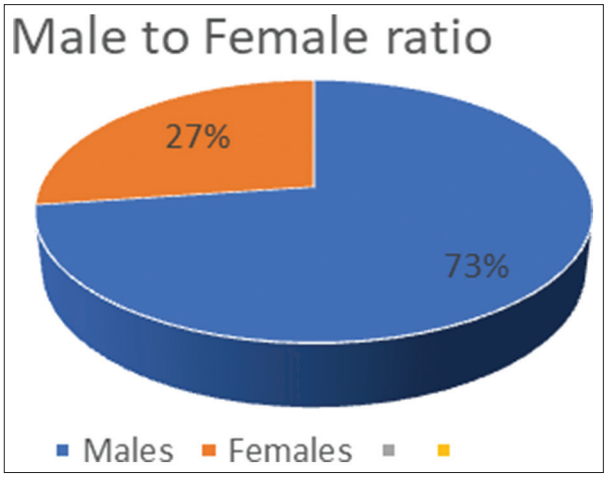

Fig. 1: Distribution of brucellosis cases by gender

Table 1: Frequency of symptoms reported in 100 patients

Signs and symptoms	n (%)
Fever	11 (100)
Headache	2 (18.1)
Myalgia	7 (63.6)
Chills and rigor	2 (18.1)
Vomiting	1 (9.09)
Joint pain	3 (27.2)
Jaundice	2 (18.1)
Anuria/oliguria	1 (9.09)
Cough	4 (36.3)
Breathlessness	2 (18.1)
Haemoptysis	1 (9.09)
Chronic illnesses	2 (18.1)
Seizures	1 (9.09)

the 1050 samples analyzed were found to be positive; the overall prevalence was 7.04% by Shome *et al*. [10]. In a study by Buzgan *et al*., out of the 1028 patients, 489 (47.6%) were women and 539 (52.4%) were men. The average age of the patients was 33.7±16.34 years, with 13–44-year-olds accounting for 69.6% of cases. A history of livestock raising was present in 435 (42.3%) patients, whereas 55.2% of the cases had no occupational risk for brucellosis. Six hundred and fifty-four out of the cases (63.6%) had previously consumed raw milk or dairy products. The most prevalent clinical findings were hepatomegaly (20.6%) and fever (28.8%) [11]. In this investigation by Madzingira *et al*., we reported an apparent serological frequency of 11.64% for brucellosis among patients in Namibia from 2012 to 2017 who presented with symptoms suggestive of human brucellosis, despite their varying ages [12]. In a study by Handa *et al*., 121 cases of fever of undetermined origin (FUO) and 50 cases of occupational exposure were prospectively investigated. Acute brucellosis affected four patients with FUO (3.3%), and 8 (6.6%) patients had serological evidence of prior brucella infection. Seven cases (14%) out of 50 with occupational exposure had brucella seropositive results [13]. A prospective observational study conducted by Shukla *et al*. showing similar findings to the study done at GMC Amritsar. This study was done in the districts of Meghalaya from July 2018 to July 2020. Clinical characteristics were recorded of all the consenting participants and blood samples were analyzed for brucellosis-specific IgM anti-bodies through ELISA. The overall seroprevalence of brucellosis was found to be 11.37% out of a total of 1046 suspected patients with febrile illness in the defined region as per the pre-specified inclusion and exclusion criteria. Among the clinical presentations, pyrexia of unknown origin, myalgia, and chronic fatigue syndrome were found to be significantly associated with brucellosis disease in IgM positive cases [14].

CONCLUSION

The prevalence of zoonotic diseases has increased in many parts of India. Clinical diagnosis of brucellosis and other acute febrile illnesses is challenging due to their non-specific and overlapping clinical features. In the current study, ELISA was done to diagnose brucellosis in patients with acute undifferentiated febrile illness. A significant percentage (11%) of cases were found to be seropositive for brucellosis. This would help in early detection of such cases resulting in better management. Thus, reducing the morbidity and mortality in the future. Implementation of programmatic approach for the prevention, control and management of this disease in Punjab, which is primarily agriculture and livestock-based society more so in rural areas, is strongly advised.

AUTHORS CONTRIBUTION

All authors contributed satisfactorily to the study.

CONFLICTS OF INTERESTS

The authors declare that they have no conflicts of interest

AUTHOR'S FUNDING

None.

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