



Original Research Article

Occurrence of brucellosis in patients of pyrexia of unknown origin

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ABSTRACT

Background: Brucellosis is the most common bacterial zoonotic disease worldwide. It is mainly occupational disease reported in farmers, slaughter house workers, animal handlers and meat inspectors. This disease is endemic in many parts of Asia, including India. Brucellosis is an important, but neglected major cause of pyrexia of unknown origin (PUO). Diagnosis of brucellosis is difficult. Hence the medical and laboratory staff needs to be alert to recognize this condition.

Objective: To assess the possible risk factors associated with human brucellosis. To study frequency of human brucellosis in relation to occupation, age and sex.

Materials and Methods: From September (2018) to November (2019) 102 Serum samples of PUO cases were analysed for brucellosis. All serum samples were analysed by slide agglutination method using standard specific brucella antigen.

Result: We observed that human brucellosis is present in PUO patients. The total number of brucellosis positive cases were found to be 14 (13.72%) out of 102 PUO cases. Among positive cases, males were 8 (57.14%) and females were 6 (42.85%). Highest brucellosis positive cases were seen in age-group between 15-30 years 6 (42.85%) followed by 31-45 years 5 (35.71%), 46-60 years 2 (14.28%) & >60 1 (7.14%) in PUO patients.

Conclusion: With the growing number of brucellosis cases detected in India. Brucellosis is the fast emerging as a public health threat and also due to limited diagnostics leading to underreporting. The study also highlights the innovative and cost effective methods for rapid and early reporting and ruling out brucellosis in PUO cases.

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1. Introduction

Brucellosis is an old, infectious and common zoonosis whose causative agents are Gram-negative bacteria from the Brucella genus. Brucellosis is transmitted by goats, pigs, camels, sheep, buffalo and cows. Brucellosis is more common in children than in adults. Non-specific symptoms of brucellosis include fever, chills, restlessness, headache, fatigue and weakness.¹ One of the most common symptoms of this disease is bone involvement that is seen in over half of the affected people. The association between Brucella and brucellosis was first discovered by an army surgeon

named David Bruce.² He isolated bacteria from the spleen of patients in Malta from 1886 to 1887. Brucellosis is still one of the most common zoonosis in the world and more than 500 000 cases each year are diagnosed with the disease, most of whom live in developing countries.³ The number of brucellosis cases are over 1 million people in some countries where brucellosis is endemic. Centers for Disease Control and Prevention has classified brucellosis as a category B bioterrorism agent due to its easy transmission.

The disease cycle can be acute, sub-acute or chronic.⁴ Four different Brucella species, i.e. Brucella suis (B. suis), Brucella melitensis (B. melitensis), Brucella abortus (B. abortus) and Brucella canis can be pathogenic to humans.² Among these species, B. melitensis is the

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most contagious species, followed by *B. abortus* and *B. suis*. *Brucella* species are intracellular, obligate and Gram-negative coccobacilli and are not able to produce spores.⁵ *Brucella* species have no classic virulence genes encoding capsules, plasmids, pili or exotoxins, and because of factors that cause the bacteria to acquire resistance to phagocytes and increase the proliferation of phagocytic cells, they are relatively less known than other pathogenic bacteria.^{4,5}

Each year more than 500 000 people acquire brucellosis and most of them live in Asian countries including Syria, Iraq, Iran, India and Mongolia. The overall prevalence has been reported to be high but the prevalence in China and South Korea is low.⁶ However, the disease remains endemic in some areas of the two countries. Brucellosis is more common in men due to their greater activity than women and children.⁴

1.1. Ethics and consent to participate statement

Ethics approval was obtained from TMMC Moradabad institutional Ethics committee (TMMC-IEC) Ref. No. TMMC & RC/IEC/18-19/080. Written consent/assent was sought from all individuals before enrolment.

2. Material and Methods

The study was conducted in serology section of Microbiology, Department of Teerthanker Mahaveer Medical College & Research Centre, Moradabad. 102 clinical samples received as per inclusion and exclusion criteria were processed over the period of 11 months from September (2018) to November (2019). Patients with Widal test, MP test and dengue test positive were kept in exclusion criteria for PUO patients. Blood was collected & tested for anti-brucella antibodies against *B. abortus* antigen by slide agglutination method.

3. Result

The total number of brucellosis positive cases were found to be 14 (13.72%) out of 102 PUO cases. Among positive cases, males were 8 (57.14%) and females were 6 (42.85%). Highest brucellosis positive cases were seen in age-group between 15-30 years 6 (42.85%) followed by 31-45 years 5 (35.71%), 46-60 years 2 (14.28%) & >60 1 (7.14%) in PUO patients.

Table 1: Distribution of positive and negative cases

Test	Number of PUO cases
Brucella -A Positive	14
Brucella-A Negative	88
Total	102

Showing a total 102 blood samples were processed from suspected case of pyrexia of unknown origin (PUO) patients

in which 14 were positive and 88 were negative for brucellosis.

Table 2: Sex-wise distribution

Gender	Brucella	Percentage%	Total PUO cases
Male	8	7.84	44
Female	6	5.88	58
Total	14	13.72	102

A total 102 blood samples were processed from suspected case of pyrexia of unknown origin (PUO) patients in which 14 were positive for brucella species among them 8 were males and 6 were females.

Table 3: Age-wise distribution

Age	Male	Female
15-30	3	3
31-45	3	2
46-60	1	1
>60	1	0
Total	8	6

The maximum numbers of patients were in the age group 15-30 years (6.0) followed by 31-45 years (5.0), 46-60 years (2.0) & >60 years (1.0) in PUO patients.

Highest prevalence was seen in age group between 15-30 years 6 (42.85%) followed by 31-45 years 5 (35.71%), 46-60 years 2 (14.28%) & >60 years 1 (7.14%) in PUO patients.

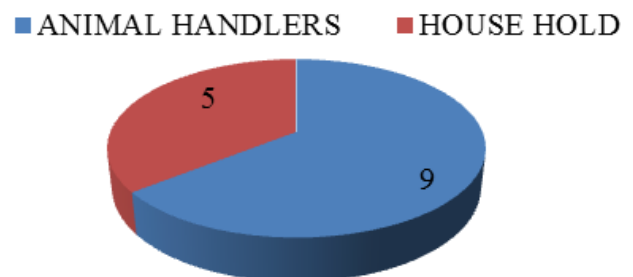


Fig. 1: Occupation – wise positive cases

Out of 14 brucella positive cases, 9 were animal handlers and 5 were household.

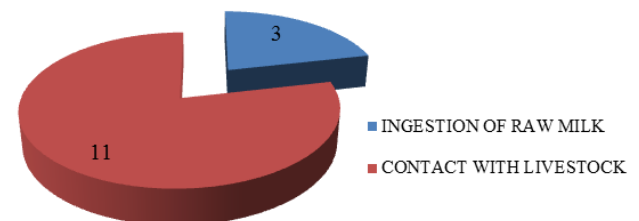
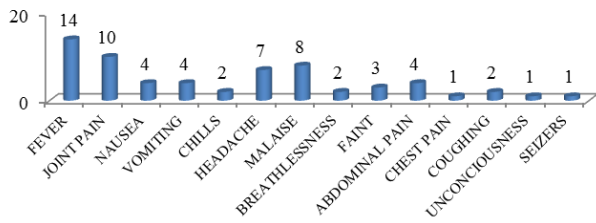


Fig. 2: Correlation of risk factors in brucella

Table 4: Distribution of brucellosis according to gender and age

Age	Puo cases	Male	Female	Total positive	Percentage%
15-30	57	19	38	6	42.85
31-45	28	17	11	5	35.71
46-60	11	5	6	2	14.28
>60	6	3	3	1	7.14
Total	102	44	58	14	100%

Risk factors such contact with livestock was found to be more clearly linked with brucellosis. 11 out of 14 cases were in contact with livestock.

**Fig. 3:** Clinical symptoms in brucellosis positive PUO patients

Showing majority of brucellosis positive patients presented with symptoms of fever, joint pain followed by malaise, headache, nausea, vomiting, abdominal- pain, faint, chills, breathlessness, chest pain, unconsciousness & seizures.

4. Discussion

In this study, we investigated the incidence of brucellosis in pyrexia of unknown origin from patients attending TMMC & RC Moradabad (UP). In our study total 102 blood samples of PUO patients were screened for brucellosis test 14 patients were showed to be brucellosis positive and 88 were negative.

In this study prevalence of human brucellosis in pyrexia of unknown origin patients is 13.72%. These are similar to recent study Rahamathulla MP et al. analyzed the seroprevalance in different regions of Saudi Arabia, the maximum prevalence of 20% and 18.3% were seen in northern as well as southern area respectively by 14% in the central and eastern region each, 11.6% in the western region.⁷ In contrast Patil DP et al (2016) analyzed the sero positivity of brucellosis in PUO suspected cases in north Karnataka region was to be 189(5.1%). Males are more effected due to their professional activities. This study indicated that the male constituted the majority 8(57.14%) of the patients by females 6(42.85%).³ In contrast' Prakash P et al (2012) which show that prevalence is more among females 58 (53.70%) as compare to males 50 (46.29%) in 108 brucellosis positive cases. Highest brucellosis infection was showed in age group between 15-30 years 42.85%, followed by 35.71% in the range of 31-45 years age group,

14.28% in 46-60 and 7.14% were >60 years of age.⁸ The present study correlates with Mangalgi SS et al (2012) which showed that majority of the patients were seen in age group 21-30 years 28 (24.56%) followed by 0-10 years 19 (16.66%), 11-20 years 21 (18.42%), 31-40

years (19.29%), 41-50 years 11 (9.6%), 51-60 years 8 (7.01%), >60 years 5 (4.38%).¹ In contrast Prakash P et al (2012) which show that maximum positive were seen in age group 31-40 years. 8.77% were between 11-20 year, come after 24.07% in the scale of 21-30 years, 26.85% in 31-40 years, 16.66% in 41-50 years, 10.18% in 51-60 years and 13.88% were >60 years of age.⁸ Out of 14 brucella positive cases, 9(64.28%) were animal handlers. 5 (35.71%) patients were household. These similar were studies done by Muloki HN et al (2018) who also reported maximum positivity rate in animal handlers 145 (57.76%).⁹ But in contrast Metri BC et al (2011) which show that maximum positive were seen in household 187 (49.21%) followed by farmers 115 (30.26%), shepherd 17 (4.47%), others 61 (16.05%).¹⁰

These finding were similar to the studies done by Muloki HN et al who also shown brucellosis seropositivity to be highly associated with consumption of unpasteurized milk and milk products.⁹ This study clearly shows livestock rearing to be firmly linked with human brucellosis. The highest symptoms with fever (100%) followed by joint pain (71.42%). Patients had complaints of malaise (57.14%), headache (50%), vomiting (28.57%), nausea(28.57%), abdominal pain (28.57%). Rest of patients had complaints of chills (14.28%), breathlessness (14.28%), coughing (14.28%), chest pain (7.14%), unconsciousness (7.14%), seizure (7.14%).

5. Conclusion

Finding in this study show clearly that the sero-prevalence of human brucellosis among patients with prolonged fever is high (13.72%). Rearing livestock and consumption of raw milk and milk products were factors associated with brucellosis. Strategies to control animal brucellosis and raising awareness about the consumption of raw milk and milk products are necessary to reduce the incidence of human infection. Innovative methods to sensitize the community on brucellosis and cost effective methods to control animal brucellosis are required & recommended.

6. Source of Funding

None.

7. Conflict of Interest

None.

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