Seroepidemiology of Human Brucellosis in Karnataka

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ABSTRACT

A seroprevalence study of brucellosis in humans was undertaken among high risk population of north Karnataka. A total of 201 serum samples were collected from various high risk group individuals and subjected to three different tests i.e., Rose Bengal plate test (RBPT), standard tube agglutination test (STAT) and 2 mercaptoethanol test (2-MET). On the analysis of 201 serum samples, 30 (14.92%) were positive to RBPT, 33 (16.41%) to STAT and 8 (3.98%) to 2-MET. The prevalence of brucellosis was found to be highest among individuals in the age group of >50 yrs and lowest in age group of <20 yrs. Sex wise prevalence of brucellosis was more prevalent among males compared to females.

Keywords: Brucellosis, human, 2-mercaptoethanol, North Karnataka, serological tests

Brucellosis is a major zoonosis in the developing countries including India. It is acquired by direct or indirect contact with infected animals or consumption of contaminated milk and their products. Incidence of brucellosis is higher in rural areas where animal husbandry is the main occupation. Though isolation of Brucella from clinical specimens remains as the gold standard test (Young et al., 2007) it is a very tedious and time taking process. Hence a presumptive diagnosis can be made by many serological tests like Rose Bengal plate test (RBPT), standard tube agglutination test (STAT) and 2 mercaptoethanol test (2-MET). These agglutination tests are based on the detection of antibodies against smooth lipopolysaccharide antigen of Brucella abortus strain 99. The RBPT is commonly used as a screening test, followed by STAT, which remains as the most widely used test for the detection of Brucella antibodies in humans (Ruiz-Mesa et al., 2005 and Mantur et al., 2007). To exclude the cross-reacting IgM antibodies and measure Brucella specific IgG antibodies, 2ME test is performed (Maria et al., 2007). Brucellosis in man has been frequently reported from various parts of India (Mantur et al., 2007). A number of seroprevalence studies have shown wide variation in the prevalence of brucellosis among human population. The presence of brucellosis in India was established early in the last century and since then has been reported from almost all states (Sehgal and Bhata 1990; Renukaradhya et al., 2002). However, the epidemiological data on this disease is frequently incomplete. It has been estimated that the true incidence may be 25 times higher than the reported incidence due to misdiagnosis and under reporting (Boral et al., 2009). Cattle and goat farming is widely practiced in north Karnataka and contributes to the major source of livelihood in rural population (Sachinkumar et al., 2012). At the same time these farming practices have increased the risk of human brucellosis cases in the area. Keeping all the above points in mind, the present work is undertaken to study the seroepidemiology of human brucellosis in different parts of north Karnataka.

A total of 201 serum samples were collected between a period from November 2011 to December 2012 among various high risk groups like animal farmers, villagers, veterinary and para veterinary staff of various districts of North Karnataka who had a history of consumption of raw milk, fever, joint pains and animal contacts. Of the 201 serum samples, 126 were procured from Belgaum Institute of Medical Sciences (Belgaum, Karnataka), which had cases from five different districts of North Karnataka (Belgaum, Dharwad, Gadag, Bagalkot, Bijapur) and the rest of 75 serum samples were collected from remaining six districts of North Karnataka (Raichur, 

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Yadgir, Gulbarga, Bellary, Bidar, Koppal).

The colored antigen for RBPT and the plain *Brucella abortus* antigen for STAT, 2-MET were procured from Biological Products Division, Indian Veterinary Research Institute (IVRI), Izatnagar. The RBPT, STAT and 2-MET were performed as described by Alton *et al.* (1975). Appearance of agglutination within 4 min of mixing of antigen and serum was taken as positive while absence of agglutination was recorded as negative result for RBPT. For STAT and 2-MET, the samples showing agglutination titres of 80 IU/ml and above were considered as positive.

On the analysis of 201 human sera, 30 (14.92%) samples were positive to RBPT, 33 (16.41%) to STAT, 8 (3.98%) to 2-MET. The prevalence was found highest among individuals in the age group of >50 yrs followed by 40-50 yrs, 30-40 yrs, 20-30 yrs with lowest in the group of <20 yrs (Table 1). Sex wise prevalence of brucellosis was higher among males compared to females (Table 2).

On the analysis of 201 human sera of North Karnataka, 30 (14.92%) samples were positive to RBPT, 33 (16.41%) to STAT, and 8 (3.98%) to 2-MET. The percent prevalence by RBPT in our study was little higher i.e., 14.92% when compared to Narayana Rao *et al.* (2011) who reported a seropositivity of 9.5 per cent by RBPT in Karnataka. The results of STAT in our study were contrary to that of Mantur *et al.* (2004a) who observed a seroprevalence of 1.6 per cent by STAT. Only eight samples were found positive (3.98%) to 2-MET indicating lesser number of chronic brucellosis cases in present study. A negative 2-MET titer is strong evidence against chronic brucellosis (Buchanan and Faber, 1980).

The analyses of the human sera samples showed that the seroprevalence was highest among individuals in the age group of >50 yrs, which may be because of higher outdoor livestock farming activities among this group and lowest in the group of <20 yrs (Table-1), which could be because of less contact with the animals and farming activities. In contrary, brucellosis equally affects all age groups under natural conditions (Sauret and Vilissova, 2002). Sex wise prevalence of brucellosis was found higher in males compared to females. Male preponderance in our study may be because of constant close contact with livestock during outdoor farming activities and contact with animals. However, both male and female are equally susceptible if provided exposure to potential risk factors. In the present study, most of the positive individuals had a history of consumption of raw milk. In India, Mathur in 1954 has reported many outbreaks of brucellosis in families and Institute which he attributed to consumption of raw milk and ice cream. Al-Fadhli *et al.* (2008) also reported that raw milk was the major source of infection. The history of the positive individuals also revealed other risk factors like contact with parturient animal, animal husbandry, participation in vaccination and eating during working hours were identified as the main risk factors. This finding is reasonably in agreement with Ali *et al.* (2007) who reported contact with animals (32%); occupation, mainly farmers or butchers (18%); raising animals in the vicinity of residence (14%); and drinking unpasteurised milk (4%) as risk factors for brucellosis. Meky *et al.* (2007) reported that workers in occupations dealing with animals had a 2.4-fold higher risk of brucellosis than those in occupation not dealing with animals. In view of the limited efficacy of the vaccine, maintaining the hygiene especially while being associated with the livestock and consumption of properly processed milk and milk products is the only

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>RBPT(%)</th>
<th>STAT(%)</th>
<th>2-MET(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;20 (40)</td>
<td>3 (7.50)</td>
<td>5 (12.50)</td>
<td>1 (2.50)</td>
</tr>
<tr>
<td>20-30 (58)</td>
<td>9 (15.51)</td>
<td>9 (15.51)</td>
<td>1 (1.72)</td>
</tr>
<tr>
<td>30-40 (50)</td>
<td>7 (14.00)</td>
<td>8 (16.00)</td>
<td>3 (6.00)</td>
</tr>
<tr>
<td>40-50 (32)</td>
<td>6 (18.75)</td>
<td>6 (18.75)</td>
<td>2 (6.25)</td>
</tr>
<tr>
<td>&gt;50 (21)</td>
<td>5 (23.80)</td>
<td>5 (23.80)</td>
<td>1 (4.76)</td>
</tr>
<tr>
<td>Total (201)</td>
<td>30 (14.92)</td>
<td>33 (16.41)</td>
<td>8 (3.90)</td>
</tr>
</tbody>
</table>

Table 1. Seroprevalence of brucellosis in different age groups of humans as detected by RBPT, STAT and 2-MET

<table>
<thead>
<tr>
<th>Sex (No. Samples)</th>
<th>RBPT(%)</th>
<th>STAT(%)</th>
<th>2-MET(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male (134)</td>
<td>22 (16.41)</td>
<td>24 (17.91)</td>
<td>7 (5.23)</td>
</tr>
<tr>
<td>Female (67)</td>
<td>8 (11.94)</td>
<td>9 (13.43)</td>
<td>1 (1.49)</td>
</tr>
<tr>
<td>Total (201)</td>
<td>30 (14.92)</td>
<td>33 (16.41)</td>
<td>8 (3.98)</td>
</tr>
</tbody>
</table>

Table 2. Seroprevalence of brucellosis in males and females (humans) as detected by RBPT, STAT and 2-MET
way to prevent brucellosis among the general human population.

On the basis of the present study, it can be concluded that human brucellosis is fairly endemic in many parts of north Karnataka. Most of the cases being misdiagnosed and underreported due to the unfamiliarity with the clinical manifestations, diagnosis and treatment of the disease, calls for a proper liaison between the medical and veterinary professionals to deal with the control and prevention of the disease. To deal with occupation-related disease like brucellosis, knowledge of risk factors is vital in control and prevention programmes. Thus, an extension education campaign, particularly in high-risk groups such as veterinary practitioners and livestock owners, could aid in decreasing the incidence of brucellosis.

References