Seroprevalence of brucellosis in slaughter cattle of Kerala, India

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Abstract
Brucellosis is a major zoonotic disease as well as it cause heavy economic losses through reproductive problems. The present study was undertaken to know the seroprevalence of bovine brucellosis in Kerala among slaughter cattle. A total of 1020 serum samples were collected from three different slaughterhouses of Kerala from the period June, 2013 to March, 2014. The study included the animals aged >3 years of both the sex. Serum samples were processed for detection of antibodies against *Brucella abortus* and *Brucella melitensis* using RBPT and C-ELISA, which is more specific than the indirect ELISA and which could discriminate vaccinal antibody from antibody induced by infection, showed overall prevalence rate of 6.17 per cent (n=63) out of this 6.81 per cent was in female animals and 5.26 per cent in male animals. The detection rate in RBPT was 7.74 per cent (n=79) out of this 7.90 per cent was in female animals and 5.26 per cent in male animals. Considering the positive reactors, study recommended to implements *Brucella* control programme in Kerala so as to protect the health of consumers, abattoir workers as well as the animals.

Keywords: Brucellosis, RBPT, C-ELISA, slaughterhouse, zoonoses.

Introduction
Brucellosis is endemic in animals and is caused by *Brucella abortus* and *Brucella melitensis* which is readily transmissible to man as an occupational hazard. Based on the epidemiological data of active surveillance programme, it was estimated that there is a loss of US$ 58.8 million per year in India due to brucellosis (Kollannur et al., 2007). Brucellosis is one of the world’s most widespread zoonotic diseases (WHO, 2009; Moreno et al., 2002), which has been reported in almost all species of animals (Radostitis et al., 2007) and brucellosis is an economically important disease in productive animals worldwide (Corbel, 1997). Brucellosis in cattle is caused almost exclusively by *B. abortus*. There are some areas where the co-existence of cattle and small ruminants (mainly goats) facilitate cattle infection with *B. melitensis* (Lopez-Merino, 1989).

In India 80% of the population live in approximately 575000 villages and thousands of small towns, have close contact with domestic/ wild animal population owing to their occupation. Hence, human population stand at a greater risk of acquiring zoonotic diseases including brucellosis (Mantar and Amarnath, 2008). Serological detection of antibody is the mainstay of bovine brucellosis control and eradication programs (Saravi et al., 1995). In endemic areas, the disease is under-diagnosed and under-reported (Pappas et al., 2006) and leads to chronic debilitating disease (Franco et al., 2007). Although, there are documented evidences of brucellosis in India. However, further study is required to design suitable control programmes. This task is a challenge for the future in terms of veterinary public health, as for wildlife and ecosystem managers and will need a “One Health” approach to be successful (Godfroid et al., 2011). Infection with *B. melitensis* is regularly reported in the Middle East where it has become an emerging veterinary and public health problem (Samaha et al., 2008).

In the diagnosis of brucellosis vaccinal antibodies some time interfere and cause problems therefore a serological test that could distinguish vaccinal antibody response from that resulting from infection with pathogenic strains of *B. abortus* has been goal of much research. The C-ELISA was capable of eliminating reactivity in over 90% of the sera from vaccinated cattle and 99.7% specific. Therefore C-ELISA appears to be a ideal tool for use in eradication programs for brucellosis in that it could be used in tandem with extensive vaccination (Nielsen et al., 1995). Hence, the present study was undertaken to know the prevalence of *Brucella* in cattle using C-ELISA which is able to detect *B. abortus* and *B. melitensis* and differentiate the vaccinated.
animals. The study also evaluates the specificity and sensitivity of detection of *Brucella* with RBPT.

**Materials and Methods**

**Sera collection and study area**

The study was carried out in two municipal slaughterhouses (Cochin and Thrissur) located in central Kerala and one local slaughter house in Northern Kerala (Wayanad). A total of 1020 serum samples were collected and screened for brucellosis.

**Source of animals**

Kerala is mainly being a consumer’s state, the source of cattle in the slaughterhouses were from various parts of Kerala (n=118) and also from Tamil Nadu (n=431), Karnataka (n=264) and Andhra Pradesh (n=207).

**Serological tests**

**Rose Bengal Plate Test (RBPT)**

Rose Bengal Plate Test (RBPT) was performed for initial screening using coloured RBPT antigen procured from Institute of Animal Health and Veterinary Biologicals (IAH and VB), Bangalore. Procedure followed was as per the standard protocol described in OIE Terrestrial Manual (2009).

**C-ELISA**

All samples were then subjected for the C-ELISA for detecting antibodies against *B. abortus* and *B. melitensis*. The test was performed using commercial kit (96 wells Ag coated microtiter plate, reagents and test protocol) provided by S AVONOVIR® Sweden.

**Test validation and comparison**

Both RBPT and C-ELISA tests were validated using positive and negative control serum samples and compared.

**Results and Discussion**

A total of 1020 serum samples were tested which includes 602 female and 418 male cattle. On performing RBPT as screening test 79 (7.74%) samples, out of 1020 were found positive. By C-ELISA which is reported to have high specificity and capability to distinguish vaccinal antibody and infectious antibody, detection rate was 6.17 per cent hence, the overall prevalence of brucellosis in slaughter cattle found to be 6.17 per cent. Among the *Brucella* positive animals 6.81 per cent was prevalent in females and 5.26 per cent in males (Table 1).

Brucellosis in India is an important disease and cause wide spread to human on account of unhygienic conditions and poverty, the culling and segregation of positive bulls is necessary to control brucellosis (Kollannur et al., 2007) and found 12.4 per cent seropositivity in bulls, which is comparable with the present findings. An epidemiological study on brucellosis conducted in Punjab by Dhand et al. (2005) found 9.9% brucellosis in cattle, which is in comparable with the present study findings. In India, effective control of brucellosis is a national problem. A major obstacle in the control of this disease has been the disposal of the positive animals. In brucellosis free countries, test and slaughter of positive animals is proved effective. However, in India the existing socioeconomic conditions do not advocate this policy. The alternative method of “test and segregation” is perhaps the only method, which is practical and feasible (Kollannur et al., 2007).

Study conducted by Thakur and Thapliyal (2002) revealed prevalence rate of 4.97% in samples obtained from persons exposed to animals. The much higher seroprevalence rate has also been noted in specific risk groups such as abattoir workers (Barbuddhe et al., 2000; Chadda et al., 2004). These observations support the occupational risk factors. In spite of the clinical efficacy and cost effectiveness of vaccination, the limited availability of vaccines and lack of awareness have led to the persistence of brucellosis in most areas especially India (Mantur and Amarnath, 2008).

<table>
<thead>
<tr>
<th>Parameter</th>
<th>RBPT</th>
<th>C-ELISA</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Male</td>
</tr>
<tr>
<td>Animal Tested</td>
<td>418</td>
<td>602</td>
<td>418</td>
</tr>
<tr>
<td>Positive Animal</td>
<td>31</td>
<td>48</td>
<td>22</td>
</tr>
<tr>
<td>Percent Positive</td>
<td>7.40</td>
<td>7.90</td>
<td>5.26</td>
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Table 1: Prevalence of brucellosis in cattle slaughtered in Kerala
Conclusion

The present study recommends routine practice of Brucella testing programme during ante-mortem inspection and advocates protective measures to safeguard the abattoir workers and consumers health. Proper health education for the abattoir workers and regular health testing policy with collaborative efforts from both Veterinary and Medical Professionals plays an important role in controlling the spread of disease.

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References


