Seroreivalence of Brucellosis in Cattle and their Attendants


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(Received 08.11.2011; accepted 15.12.2012)

ABSTRACT

A total of 545 serum samples comprising 428 of cattle and 117 of human were examined for brucellosis by standard tube agglutination test (STAT), rose Bengal plate test (RBPT), heat inactivation test (HIT), 2- mercaptoethanol test (2-MET) and enzyme linked immunosobent assay (ELISA). A total of 81 (18.93%), 96 (22.43%), 59 (13.78%), 50 (11.68%), and 103 (24.07%) of cattle and 8 (6.84%), 9 (7.69%), 5 (4.27%), 3 (2.56%) and 10 (8.55%) of human sera were found positive by the above mentioned tests, respectively. A total of 353 milk samples were tested by milk ring test (MRT), of which 87 (24.66%) were found positive.

Keywords: Brucellosis, cattle, human, seroreivalence

Brucellosis is recognized as one of the most important bacterial zoonosis of worldwide distribution (Acha and Szyfres, 1982; Schwabe, 1984), which causes great economic loss to the dairyman, shepherd and farmers by abortions, still births, infertility and low milk yield in cows, buffaloes, sheep and goats. The present study was undertaken to assess seroreivalence of brucellosis in cattle of Ranchi region by applying serological tests like standard tube agglutination test (STAT), rose Bengal plate test (RBPT), heat inactivation test (HIT), 2- mercaptoethanol test (2-MET) and enzyme linked immunosobent assay (ELISA) and milk ring test (MRT).

A total of 545 serum samples comprising 428 from cattle and 117 from human. Among cattle 33 sera were from R.V.C Dairy Farm, 220 from Military Dairy Farm, 80 from Kisan Dairy Farm and 95 from local cattle were collected aseptically with history of abortion, retention of placenta, repeat breeders and apparently healthy cattle. Altogether 117 serum samples from human comprising of 17 from animal handlers, 55 from farmers and 45 from cases of pyrexia of unknown origin were also collected aseptically. All the collected serum samples were tested by STAT, RBPT, HIT, 2-MET and ELISA. The STAT, RBPT and 2-MET were done according to the recommendation of Alton et al. (1975). HIT was performed as per the method described by Amerault et al. (1961). A total of 353 milk samples were collected from milking cows comprising 16 samples from R.V.C Dairy Farm, 214 from Military Dairy Farm, 78 from Kisan Dairy Farm and 45 from local farms were collected aseptically. The MRT was conducted according to method described by Sharma et al. (1968). The test’s antigens were procured from the Division of Biological Products, Indian Veterinary Research Institute, Izatnagar, Uttar Pradesh (India). For ELISA smooth lipopolysaccharide (S-LPS) based (A-B ELISA) kit supplied by the Project Directorate on Animal Disease Monitoring and Surveillance (ADMAS), Bangalore was used, as per their instruction. In the present study, the efficacy of the two conventional serological tests (RBPT and STAT)
Table 1. Distribution of *Brucella* agglutinin positive cases in cattle on the basis of different serological tests

<table>
<thead>
<tr>
<th>Area</th>
<th>No of samples tested</th>
<th>STAT No. of positive (%)</th>
<th>RBPT No. of positive (%)</th>
<th>2-MET No. of positive (%)</th>
<th>HIT No. of positive (%)</th>
<th>ELISA No. of positive (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>R.V.C dairy</td>
<td>33</td>
<td>4 (12.12)</td>
<td>2 (6.06)</td>
<td>0 (0.00)</td>
<td>0 (0.00)</td>
<td>2 (6.06)</td>
</tr>
<tr>
<td>Military dairy</td>
<td>220</td>
<td>36 (16.36)</td>
<td>46 (20.91)</td>
<td>24 (10.91)</td>
<td>26 (11.82)</td>
<td>49 (22.27)</td>
</tr>
<tr>
<td>Kisan dairy</td>
<td>80</td>
<td>16 (20.00)</td>
<td>20 (25.00)</td>
<td>11 (13.75)</td>
<td>13 (16.25)</td>
<td>22 (27.50)</td>
</tr>
<tr>
<td>Local cattle</td>
<td>95</td>
<td>25 (26.32)</td>
<td>28 (29.47)</td>
<td>15 (15.79)</td>
<td>20 (21.05)</td>
<td>30 (31.58)</td>
</tr>
<tr>
<td>Total</td>
<td>428</td>
<td>81 (18.93)</td>
<td>96 (22.43)</td>
<td>50 (11.68)</td>
<td>59 (13.78)</td>
<td>103 (24.07)</td>
</tr>
</tbody>
</table>

Table 2. Prevalence of brucellosis in pyrexia of unknown origin groups and occupationally exposed groups based on different serological tests

<table>
<thead>
<tr>
<th>Category</th>
<th>Occupation</th>
<th>No. of Sera tested</th>
<th>STAT No. positive (%)</th>
<th>RBPT No. positive (%)</th>
<th>2-MET No. positive (%)</th>
<th>HIT No. positive (%)</th>
<th>ELISA No. positive (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occupationally exposed gp</td>
<td>Animal handler</td>
<td>17</td>
<td>2 (11.76)</td>
<td>2 (11.76)</td>
<td>1 (5.88)</td>
<td>1 (5.88)</td>
<td>2 (11.76)</td>
</tr>
<tr>
<td></td>
<td>Farmer</td>
<td>55</td>
<td>1 (1.82)</td>
<td>1 (1.82)</td>
<td>0 (0.00)</td>
<td>0 (0.00)</td>
<td>2 (3.64)</td>
</tr>
<tr>
<td>Human having Pyrexia of unknown origin</td>
<td></td>
<td>45</td>
<td>5 (11.11)</td>
<td>6 (13.33)</td>
<td>2 (4.44)</td>
<td>4 (8.89)</td>
<td>6 (13.33)</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>117</td>
<td>8 (6.84)</td>
<td>9 (7.69)</td>
<td>3 (2.56)</td>
<td>5 (4.27)</td>
<td>10 (8.55)</td>
</tr>
</tbody>
</table>

Table 3. Source-wise distribution of *Brucella* agglutinins in cattle based on milk ring test (MRT)

<table>
<thead>
<tr>
<th>Source</th>
<th>Total no. of samples</th>
<th>MRT No. positive (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>R.V.C dairy</td>
<td>16</td>
<td>4 (25.00)</td>
</tr>
<tr>
<td>Military dairy</td>
<td>214</td>
<td>45 (21.03)</td>
</tr>
<tr>
<td>Kisan dairy</td>
<td>78</td>
<td>20 (25.64)</td>
</tr>
<tr>
<td>Local cattle</td>
<td>45</td>
<td>18 (40.00)</td>
</tr>
<tr>
<td>Total</td>
<td>353</td>
<td>87 (24.66)</td>
</tr>
</tbody>
</table>

Out of 428 sera samples of cattle, the overall seropositivity of brucellosis was recorded as 81 (18.93%), 96 (22.43%), 59 (13.78%), 50 (11.68%), and 103 (24.07%) in STAT, RBPT, HIT, 2-MET and ELISA test, respectively (Table 1). Farm wise...
Seropositivity of brucellosis was 4 (12.12%), 36 (16.36%), 16 (20.00%) and 25 (26.32%) in STAT, 2 (6.06%), 46 (20.91%), 20 (25.00%) and 28 (29.47%) in RBPT, 0 (0.00%), 26 (11.82%), 13 (16.25%) and 15 (15.79%) in 2-MET and 2 (6.06%), 49 (22.27%), 22 (27.50%) and 30 (31.58%) in ELISA test from cattle of R.V.C Dairy Farm, Military Dairy Farm, Kisan Dairy Farm and local cattle, respectively. Similar findings were reported by Chaterjee et al. (1984); Tayshette (2001); Kalimuddin et al. (1990) and Varasada, (2003). The present findings are not in line with Chakravarty et al. (2007) who reported higher seropositivity of 45.71% and 53.33% in RBPT and STAT, respectively. The findings were not in accordance with Jainandh et al. (2006) who reported lower seropositivity of 10.55% by RBPT and 15.07% by ELISA test, respectively.

Out of 117 sera samples of human the overall seropositivity of brucellosis was recorded as 8 (6.84%), 9 (7.69%), 5 (4.27%), 3 (2.56%), and 10 (8.55%) in STAT, RBPT, HIT, 2-MET and ELISA test, respectively (Table 2). Similar findings were reported by Mohanty et al. (2000), Kalorey et al. (2000), Pilet and Person (1985) and Kalimuddin et al. (1990). In a similar study EL-Hafeez et al. (2001) reported higher seropositivity of brucellosis (9.8%) in human serum samples. Likewise, Tayshette (2001) reported higher values of 13.51% of seropositivity in human. The present findings were not in accordance with EL-Ansary et al. (2001) who reported lower seropositivity of 1% in human.

The results of area-wise distribution of *brucella* agglutination in cattle based on milk ring test (MRT) are presented in Table 3. Out of 535 milk samples tested from individual cow, 87 (24.66%) were found positive. with 4 (25.00%), 45 (21.03%), 20 (25.64%) and 18 (40.00%) samples positive from R.V.C Dairy Farm, Military Dairy Farm, Kisan Dairy Farm and local cattle, respectively. The present findings by MRT are in close agreement with Shakya et al. (1995); Hussain et al. (2009) and Kalimuddin et al. (1992).

The RBPT showed 91.26% sensitivity and 99.38% specificity in cattle when compared with ELISA. The results were in close agreement with that of other workers (Varasada, 2003), Uzal et al., 1995, Saravi et al., 1995). The STAT showed 77.66% sensitivity and 99.69% specificity in cattle when compared with ELISA. Similar observations were made by Varasada (2003), and Agrawal and Batra (1999).

The STAT showed 70% sensitivity and 99.06% specificity in human when compared with ELISA. In earlier studies, Varasada (2003) reported 57.14% sensitivity and 100% specificity and Tayshette (2001) reported 66.66% sensitivity and 100% specificity. The RBPT showed 90% sensitivity and 100% specificity in human when compared with ELISA. While, Barbuddhe et al. (1994) reported 33.33% sensitivity and 96.92% specificity in RBPT, which is lower than present findings in terms of sensitivity.

On the basis of above findings it may be concluded that ELISA test in conjunction with other serological test can give more reliable diagnosis of brucellosis.

**Acknowledgement**

The authors are thankful to Dean, Ranchi Veterinary College, Kanke, Ranchi for providing all the necessary requirements and valuable suggestion to carry out the Research.

**References**


