EPIDEMIOLOGY OF BRUCELLOSIS IN OCCUPATIONALLY EXPOSED HUMAN BEINGS

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ABSTRACT

A serological survey was undertaken to assess the extent of brucellosis in human beings of Lakhidi district in Kerala. A total of 365 serum samples were examined for the presence of Brucella agglutins. The sera were screened by Rose Bengal Plate Test (RBPT) and Standard Tube Agglutination Test (STAT) and the samples, which showed a positive reaction, either by RBPT or STAT or both, were subjected to Heat Inactivation Test (HIT) and 2-Mercaptoethanol Test (MET). The human sera revealed 2.74% seroprevalence for brucellosis by RBPT and 1.74% by STAT. Only three out of ten showed an agglutination titre positive for brucellosis in HIT whereas one out of ten were positive in MET. Seroprevalence of brucellosis was recorded only among farmers (2.78%). Females recorded a relatively higher (3.45%) seroprevalence than males (2.33%). Human reactors positive for brucellosis were aged above 40 years. None of the sera collected from patients joint pain and veterinary or paraveterinary staff were positive for the disease. Of the serological tests, RBPT detected the highest number of samples as positive for brucellosis followed by STAT, HIT and MET. It was also observed that, of the RBPT and STAT positive cases, HIT recorded more positivity than MET.

Key words: Brucella, Human being, Zoonoses, Seroprevalence

INTRODUCTION

Brucellosis is believed to be an ancient disease that was described more than 2000 years ago by the Romans. Since then Brucellosis has become an emerging disease in many part of the world including India. It has emerged as threatening Zoonotic disease caused by bacteria Brucella, which causes abortion and sterility in both humans as well as animals. The global burdens of Brucellosis remain enormous; it causes more than 500000 infections per year worldwide. The annual numbers of cases reported worldwide have been decreased significantly because of scheduled planned mass vaccination programme and milk pasteurization. Most of the cases emerging today are because of either exposure to infected animals or consumption of unpasteurized milk. Incidence of brucellosis is higher in rural areas where agriculture is the main occupation. Occupational infection occurs to butchers, milkmen, laboratory staff, veterinarians and farmers. Being milk is the main source of transmission of this disease, increase demand for dairy products accompanied with changing and intensified farming practices has raised the concern for increased spread and intensified transmission of this infection to human population with increased risk of disease. Brucellosis is said to be deceptive occupational disease because of difficult diagnosis and treatment. Only a few recent studies here addressed the prevalence and importance of brucellosis as human

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disease problem in India. The present study is one more step to check out the prevalence of this menace in the state of Kerala.

**MATERIAL AND METHODS**

**Serum samples**: Serum samples were collected from randomly selected human beings from different parts of Lakhidi District in Kerala. A total of 356 human serum samples were collected from randomly selected animal farmers (72), veterinary and para-veterinary staff (53), patients with pyrexia of unknown origin (195) and patients with joint pain (45), belonging to the area from which the animal samples were drawn. The serum samples of patients with pyrexia of unknown origin were collected from the Government Regional Public Health laboratory, Lakhidi (121), Fatima Hospital Kalpeta (23) and Government Taluk Hospital Pookot (51). Serum samples of patients with joint pain (45) were collected from Regional Public Health Laboratory, Lakhidi. Out of the 72 farmers, fifty one were milkers and twenty one were associated with slaughter and sale of meat. Fifty were males and twenty two were females. Out of the total of 53 veterinary and para-veterinary staff, 33 were veterinarians, 11 were livestock-Inspectors and 9 were animal attendants. All of them were working in field, institutions and had regular direct contact with animals.

**Human beings**: About 10 ml of blood was collected from the cephalic vein of each selected individual with the help of a nurse. Further processing of the samples was carried out as in the case of animal blood and the serum was stored at -20°C for further studies.

**Evaluation of serum**: All serum samples collected were subjected to Rose Bengal Plate Test (RBPT), Tube Agglutination Tests (STAT, MET and HIT) to detect the presence of Brucella antibodies in the sera of animals and human beings. All the human sera which were positive either in Rose Bengal Plate Test (RBPT) or Standard Tube Agglutination Test (STAT), or both, were further subjected to Heat Inactivation Test (HIT) and 2-Mercaptoethanol Test (MET). All antigens required for the tests were procured from the Division of Biological Products, Indian Veterinary Research Institute (IVRI), Izatnagar. Analytical grade chemicals were used in the tests.

**Rose Bengal Plate Test**: The human serum samples were analyzed using plate agglutination test as per the procedure described by Alton et al (1975).

**Standard Tube Agglutination Test**: The sera of human beings were subjected to Standard Tube Agglutination Test (STAT) as described by Alton et al (1975).

**Heat Inactivation Test**: Heat Inactivation Test (HIT) was performed as per the principle described by Amerault et al., (1961).

**2 Mercaptoethanol Test**: 2-Mercaptoethanol Test (MET) was performed according to the procedure described by Alton et al., (1975).

**RESULTS AND DISCUSSION**

**Seroprevalence of human brucellosis**: During the present investigation, sera from 365 human beings were examined and the seroprevalence of human brucellosis is depicted in Table 1.

Sero positivity of brucellosis was observed among the patients with pyrexia of unknown origin (PUO) and farmers in contact with the animals surveyed. The serum samples from farmers in contact with the animals surveyed were investigated.

<table>
<thead>
<tr>
<th>Sampling group</th>
<th>No. of serum samples</th>
<th>Tested</th>
<th>Positive by any tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients with Pyrexia of unknown origin (PUO)</td>
<td>195</td>
<td>7</td>
<td>3.59</td>
</tr>
<tr>
<td>Patients with joint pain</td>
<td>45</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>Farmers in contact with the animal surveyed</td>
<td>72</td>
<td>3</td>
<td>4.17</td>
</tr>
<tr>
<td>Veterinary and para-veterinary staff</td>
<td>53</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>Total</td>
<td>365</td>
<td>10</td>
<td>2.74</td>
</tr>
</tbody>
</table>

Table 1: Sero positivity of human sera belonging to different sampling groups
to be the highest (4.17%) whereas, serum samples from patients with pyrexia of unknown origin (PUO) were found to be (3.59%). The serum samples obtained from patients with joint pain, veterinary and para-veterinary staff was found negative by all the tests. The absence of positive reactors among patients with pyrexia of unknown origin was also reported by Verma (1982). However, the seroprevalence of brucellosis of one, three and 30% was reported by Umapathy et al (1984), Hussain et al (2000) and Mohanty et al (2000), respectively.

Out of the 365 human sera samples, ten (2.74 %) samples were positive by RBPT and six (1.64 %) were found positive by STAT. All the human sera sample found positive by RBPT & STAT were subjected to HIT & MET. Three of ten sera samples were resulted as positive by HIT and only one out of ten were found to be positive by MET. In the present study RBPT and STAT revealed a seropositivity of 2.74 %. This was higher than the observation of 0.62 % brucellosis- seroprevalence recorded by Koshi. et al., (1988). Thakur and Thapliyal (2004) also recorded much lower (0.56%) seroprevalence of the disease in man by RBPT. However the finding of the study was much lower than that of the 15 % recorded by Rahman et al., (1983) and the seven % seroprevalence reported by Masoumi et al., (2000). High Seroprevalence of human brucellosis observed in the study, might be due to the low level of personal hygiene, lack of health awareness and non-healthy food habits like consumption of raw milk, and it’s products, prevalent among the people. The test showing the highest % of samples as positive for brucellosis was RBPT, followed by STAT, HIT and MET. Stemshorn et al (1985) and Barbuddhe et al (1994) has observed the higher sensitivity of RBPT over STAT. Morgan et al (1969) observed that RBPT is the better screening test than STAT. The findings of the present study also corroborate the above observation.

The agglutination titers in STAT ranged from 20 to 160 iu/ml. Six out of ten positive serum showed an agglutination titer of 20 iu/ml by STAT and four out of ten by HIT. Only one positive serum showed an agglutination titer of 40 iu/ml by STAT as well as by HIT. While two positive serum showed an agglutination titer of 80 iu/ml by STAT and only one by HIT. While another positive serum had a titer of 160 iu/ml by STAT. There is only one sample which is positive serum showed an agglutination titer of 40 iu/ml by STAT, HIT and MET.

Among all the human sera positive samples six sera which are positive reactors were male and the other four were female. The relative sex wise distribution of brucellosis seroprevalence among the farmers showed higher sero prevalence among the males (1.64 %) as compared to females (1.09 %). The female farmer tested positive, was aged between 37 to 45 years and was reported to be practicing animal husbandry having both bovines as well as caprines. They didn’t have the anamnesis of the habit of consuming raw milk in any form. The only sample which showed the highest agglutination titer of 160 iu/ml in STAT and 80 iu/ml in HIT belong to a female practicing animal husbandry to earn its livelihood. There were six males farmer tested positive were aged between 45 to 55 years. Their serum had an agglutination titer of 20 to 80 iu/ml in STAT & HIT. All these reactors did not have any major complaints of illness apart from occasional mild back pain, which they attributed to their age and stressful occupation. All these subjects were lost for further follow up. In the study, the veterinary and para-veterinary staffs were found to be free from Brucella agglutinins by all the tests employed in this present study, but a high prevalence of 20 % was reported by Savalgi et al., (1987) and 6.5 % by Mohanty et al., (2000). For the validation of the present finding, there is a need to screen a larger number of samples obtained from the occupational group. The prevalence of brucellosis among the farmers is contact with the animals was 4.17 percent. Masoumi et al., (1992) recorded a little lower seroprevalence of 2.48 % among the rural farmers. However, Kalorey et al.,(2000) recorded a higher seroprevalence of 9.67 % among farmers. The seroprevalence in female farmers was 3.45 % and
was high as compared to the 2.33 % in males. Kapoor et al., (1985) also recorded a higher seroprevalence (4.44 %) in females compared to males (1.78 %). However, contrary to the present finding, Mausoumi et al., (1992) recorded higher seroprevalence of the disease among males. The higher seroprevalence in females might be attributed to the fact that, all sorts of husbandry activities, like cleaning of animals and animal sheds, removal of dung, milking and feeding are carried out by females which, consequently exposes them more to infection than males. All the farmers positive for brucellosis were above 40 years of age. Kapoor et al., (1985) recorded a higher seroprevalence among farmers above 30 years of age. HIT detected 0.27 % of farmers as positive for brucellosis however, it was higher of one percent observation recorded by Kalimuddin et al., (1990).

CONCLUSION

Result of the above investigation and review of literature clearly reveals that brucellosis is an endemic disease in India. Considering it’s devastating ill effects on public health, productivity and economy of our country, a well thought-out national level fact-finding study is an urgency so as to get an authentic comprehension of the true prevalence of this disease in our country. Cases of human brucellosis, going undiagnosed, and consequently under-reported, are on the rise, due to the present day physicians’ unfamiliarity with the clinical manifestations, diagnostic options and treatment of this zoonosis. With the disease becoming rare this is all the more true. Brucellosis should be considered as an essential differential diagnosis in many illnesses. A proper liaison between the medical and veterinary professionals is an essential prerequisite for the diagnosis, treatment and control of this disease. The economic losses immanent to farmers consequent to the elimination of infected animals, the inconvenience of repeated testing, the ignorance of farmers about the long-term benefits of the control of this disease, and the dearth of resources are the major stumbling blocks in the implementation of a brucellosis control programme. However, the provision of adequate compensation to farmers for the losses they incur, enlightening them of the urgency and long term gains of controlling such a disease and the implementation of a fool-proof surveillance and control programme, can definitely be fruitful in eradicating this menace.

REFERENCES


