PREVALENCE OF BOVINE BRUCELLOSIS IN ALGETAINA LOCALITY, WHITE NILE STATE, SUDAN

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ABSTRACT

Brucellosis is responsible for massive economic losses around the world due to losses of meat and milk (according to abortion, stillbirth, weak of spring and prolonging calving period). The study was conducted at Algetaina Locality of White Nile State of Sudan, during the period of six months of the year 2018. The study was aiming at detection of bovine brucellosis in different dairy farms within the Locality. A total of 100 blood samples and 100 milk samples were collected from the same lactating cows. Sera were separated from blood samples and subjected using Rose Bengal Plate Test (RBPT) and modified Rose Bengal Plate Test (mRBPT 1:2) for detection of Brucella antibodies. Milk samples were examined using Milk Ring Test (MRT) for detection of Brucella antibodies. According to questionnaire survey of dairy farms in Algetaina locality there were no records about brucellosis in the locality, but there were records about stillbirth 5 (45.5 %) and cases of retained placenta 8 (72.2 %). Six (6%) serum samples gave positive results with RBPT and 12 (12%) were positive for mRBPT 1:2. Only 2 (2%) milk samples gave positive reaction with MRT. From this study we conclude that mRBPT is more specific and sensitive than RBPT and MRT in detecting Brucella antibodies.

KEYWORDS: RBPT, MRT, mRBPT.
I. INTRODUCTION

Brucellosis is one of the most common bacterial zoonotic diseases in the world. The geographical distribution of brucellosis constantly changes as new foci emerge or re-emerge. The disease occurs worldwide in both animals and humans, except in those countries where bovine brucellosis has been eradicated. The worldwide economic losses due to brucellosis are extensive, not only in terms of animal production but also in terms of human health. However, when the incidence of brucellosis is controlled in the animal reservoirs, there is a corresponding and significant decline in the incidence in humans.[1] Brucellosis is a one of the highly contagious and most important zoonotic diseases in tropical area and a significant cause of reproductive losses in animals.[2] Animal brucellosis poses barrier to trade in animals and animal products and could seriously impair socio-economic development, especially for livestock owners.[3] Losses due to abortion or stillbirths, irregular breeding, loss of milk production and reduced human productivity are some of the economic consequences of the disease. The reduced human productivity can hardly be measured in medical care. Brucella considered as a possible bio-terrorist agent. However, it has never been successfully used in this manner. Brucella abortus, Brucella melitensis and Brucella suis considered as “agents of mass destruction” and as category B organisms. In animals, bovine brucellosis is characterized by reproductive failure which can include abortion, birth of weak, unthrifty calves, orchitis and/or epididymitis in male. The organism causes abortion in cattle after the fifth month of pregnancy with retention of placenta, metritis and subsequent period of infertility. The proportion of cows that abort within a herd is variable and small percentage of infected cows abort more than once.[4] In Sudan[5] reported 15.75% prevalence rates of brucellosis in cattle in Eldein area.Musa reported 15.8% prevalence rates of the disease in cattle in Bram area and this locality bordering Eldein area. Also Musa found that the prevalence rate of the disease in cattle of some close locality in great Darfur state is 22.2% in Idd El Firsan locality, 9.6% in Nyala locality, 12.8% in Wadi Salih locality, 8.8% in Zalingei locality.[6] reported 10.3% prevalence rates of the disease in West Darfur state.[7] reported in different states of the Sudan and prevalence rate of the disease ranges from3-40%.Higher percentages of brucellosis-positive dairy cattle were obtained in a study carried out by[8] in the Kassala Area, Eastern Sudan, near to the Eritrean border.[9] reported that the prevalence of bovine brucellosis in Kuku Dairy Scheme (Sudan) was found to be 24.9% based on c-ELISA as a confirmatory test after screening using Rose Bengal Plate test (RBPT).
This study was aiming at detection of bovine brucellosis in Algetaina locality of White Nile State, Sudan.

II. MATERIALS AND METHODS

Area of Study
This study was conducted out in Algetaina locality, White Nile State (Sudan), during the year 2019.

Source of samples
In this study which lasted for the first 6 months of the year 2019, a total of 100 blood and 100 milk samples were collected from the different dairy cattle in Algetaina locality, White Nile State (Sudan).

Sampling procedure
Collection of blood samples
Blood samples were collected in 10 mL sterile tubes from jugular vein. Sera were separated from blood samples by using centrifugation at 1000 rpm/ 5mins. Sera were stored in -20°C and transported in iceboxes to the Veterinary Laboratory in college of Veterinary Medicine University of Bahri.

Collection of milk samples
Before collection of milk samples from the tested cows, the udder was thoroughly cleaned with soap and water, rubbed dry, and the teat area was rubbed thereafter with a piece of cotton soaked in 70% alcohol. The first stream of milk was discarded and samples were collected in sterile containers. Milk samples were immediately submitted under ice and stored at 4°C, examined within 72 hours after collection and transported to the Veterinary Laboratory in college of Veterinary Medicine University of Bahri.

Sample testing
Rose Bengal Plate Test (RBPT)
Serum samples were tested for Brucella antibodies using the Rose Bengal Plate Test (RBPT). The test was performed according to the provisions of the World Organization for Animal Health (OIE) Manual of Diagnostic Tests and Vaccines for Terrestrial Animals (World Organization for Animal Health). The antigen used in the RBPT was obtained from Central Veterinary Research Laboratory, Soba, Sudan. It was prepared and standardized as described
The serum samples and the antigen were removed from the refrigerator and placed at room temperature for an hour then the test was done by dispensing 0.025 ml of each serum to be tested to an enamel white plate. The same amount of RBPT antigen was added to each serum and both were thoroughly mixed, rocked by hand for four minutes after which the test was immediately read. Agglutination appeared as weak positive, positive, strong positive or very strong positive.[10]

**Modified Rose Bengal Plate (mRBPT 1:2)**

This was similar to the classic Rose Bengal test but differed in the volume of serum used which was double or triple of the antigen volume (antigen to serum was 1:2). This procedure was deemed suitable for detection of weakly positive samples.[11]

**Milk Ring Test**

About 30μl of antigen were added to 1 ml of milk in a narrow test tube and mixed thoroughly. The tubes then were incubated at 37°C for one hour. A strongly positive reaction was indicated by formation of dark blue ring above a white milk column. The test was considered to be negative if there was uniform blue colour for the milk column and cream layer.[10]

**III- RESULTS**

**Results of Rose Bengal test**

In this study 100 serum samples collected from Algetaina locality were investigated for the presence of Brucella Antibodies using Rose Bengal antigen test. 6 (6%) samples gave positive reaction with the antigen (Table 1 and Figure 1).

<table>
<thead>
<tr>
<th>Farm</th>
<th>No. of Samples</th>
<th>Positive samples</th>
<th>Negative samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algetaina South</td>
<td>28</td>
<td>1</td>
<td>27</td>
</tr>
<tr>
<td>Algetaina North</td>
<td>10</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Algetaina West</td>
<td>30</td>
<td>0</td>
<td>30</td>
</tr>
<tr>
<td>Algetaina East</td>
<td>32</td>
<td>3</td>
<td>29</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
<td><strong>6</strong></td>
<td><strong>94</strong></td>
</tr>
</tbody>
</table>
Results of modified Rose Bengal test

In this study 100 serum samples collected from Algetaina locality were investigated for the presence of Brucella Antibodies using Modified Rose Bengal test (1:2). 12 (12%) samples gave positive reaction with the antigen (Table 2 and Figure 2).

Table (2): Results of Modified Rose Bengal test.

<table>
<thead>
<tr>
<th>Farm</th>
<th>No. of Samples</th>
<th>Positive samples</th>
<th>Negative samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algetaina South</td>
<td>28</td>
<td>2</td>
<td>26</td>
</tr>
<tr>
<td>Algetaina North</td>
<td>10</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Algetaina West</td>
<td>30</td>
<td>1</td>
<td>29</td>
</tr>
<tr>
<td>Algetaina East</td>
<td>32</td>
<td>5</td>
<td>27</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>12</td>
<td>88</td>
</tr>
</tbody>
</table>

Results of Milk Ring test

In this study 100 milk samples collected from Algetaina locality were investigated for the presence of Brucella Antibodies using Milk Ring Test (MRT). Only 2 (2%) samples gave positive reaction with the antigen (Table 3 and Figure 3).
Table (3): Results of Modified Rose Bengal test.

<table>
<thead>
<tr>
<th>Farm</th>
<th>No. of Samples</th>
<th>Positive samples</th>
<th>Negative samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algetaina South</td>
<td>28</td>
<td>1</td>
<td>27</td>
</tr>
<tr>
<td>Algetaina North</td>
<td>10</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Algetaina West</td>
<td>30</td>
<td>0</td>
<td>30</td>
</tr>
<tr>
<td>Algetaina East</td>
<td>32</td>
<td>0</td>
<td>32</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>2</td>
<td>98</td>
</tr>
</tbody>
</table>

**IV. DISCUSSION**

In this study which lasted for 6 months, 11 dairy farms in Algetaina locality of White Nile State of Sudan were investigated for the problem of Bovine brucellosis. According to Questionnaire survey of dairy farms, the general evaluation of the housing condition was poor for 45.5% of the farms, 81.8% of the stall surfaces were clay and the hygiene level was poor in 72.7% of the farms. According to[12] finding, these factors increase the incidence of any disease. No cases of Brucellosis were reported in all farms. 5 farms (45.5%) experienced cases of stillbirths and 8 farms (72.7%) managed cases of retained placenta and these signs according to[13] could be signs of brucellosis. In this study total of 100 blood and 100 milk samples were collected from the different dairy cattle in Algetaina locality for detection of brucellosis. 6 (6%) blood samples gave positive reaction with Rose Bengal test.[14] found that 4.5% of the samples collected from Khartoum State were positive for positive RBPT. In Pakistan[15] found 3% of serum samples were positive for RBPT and[16] found the percentage was 9.6 %.In Nigeria[17] found 5.8% of serum samples were positive for RBPT. Senien and[18] found that 8.4% of the samples collected from Eastern Darfur State were positive for positive RBPT In this investigation 12 (12%) blood samples gave positive reaction with modified Rose Bengal test (mRBPT).[19] found that 12% of the samples collected from Khartoum State...
were positive for RBPT and 11% samples were positive for mRBPT. So our findings disagree with that study.\cite{20} found that 27% of the samples collected from Khartoum State were positive for RBPT and 32.5% samples were positive for mRBPT. So that the previous study was in the same line of our study that mRBPT is more sensitive than RBPT in detecting brucellosis. Also our study agrees with\cite{21} findings that 12.6% of the samples collected from Red Sea State were positive for RBPT and 25.7% of the sera positive for mRBPT. Also were in agreement with\cite{22} who found that 7.8% of the samples collected from Khartoum State were positive for positive RBPT and 33.3% samples were positive for mRBPT. In this study out of 100 milk samples investigated for the presence of Brucella spp. Antibodies using Rose Milk Ring test, Only 2 (2%) samples gave positive reaction with the antigen.\cite{19} reported that 11% of 200 milk samples from collected from Khartoum State were positive for Milk Ring Test. However, the low percentage of Brucella antibodies detected by MRT in this study was attributed to the secondary infection of the mammary gland.\cite{23}

**V. CONCLUSION**

According to the results of Questionnaire survey of 11 dairy farms in Algetaina locality of White Nile State, there were no records about brucellosis in the locality but there were records about cases of stillbirth, retained placenta and abortion. Six (6%) serum samples out of 100 blood samples gave positive reaction with RBPT and12 (12%) samples gave positive reaction with mRBPT. Only 2 (2%) out of 100 milk samples gave positive reaction with MRT. So that the sensitivity of the 3 serological tests used in this study was variable. From this study we conclude that mRBPT is more sensitive than RBPT and MRT in detecting Brucella antibodies.

**VI. ACKNOWLEDGEMENT**

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**VII. REFERENCES**

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