

## PRELIMINARY OBSERVATIONS ON HEPATIC INVOLVEMENT IN BRUCELLOSIS AFFECTED CATTLE

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### ABSTRACT

A total of 35 adult cattle of Tharparkar breed in a private dairy farm were screened for *Brucella abortus* antibodies using rose bengal plate agglutination test and standard tube agglutination test. Of the 35 serum samples, nine were found positive for the presence of antibodies against *B. abortus*; the titres were 1:320 (in five cattle), 1:640 (in three cattle) and 1:1280 (in one cattle). Liver function tests were performed by monitoring aspartate aminotransferase and alanine aminotransferase in these animals. Levels of both the enzymes were significantly higher in the sero-positive animals as compared to the sero-negative animals. Similarly, total serum bilirubin levels were also higher in the sero-positive animals as compared to the sero-negative animals. Evidently *B. abortus* seems incriminated to significantly increase in the liver specific enzymes and bilirubin in sero-positive animals.

**Key words:** *Brucella abortus*, cattle, liver

Brucellosis is an important zoonotic infectious disease, affecting health of livestock and man, especially in underdeveloped and developing countries including India and South Asia. More than 500,000 human cases of this disease have been reported to occur annually worldwide (Pappas *et al.*, 2006). In these countries closer association of livestock owners especially nomads with food animals on grazing lands, unhygienic life style and poverty are important predisposing factors for widespread infection in human population (Mantur and Amarnath, 2008). In India, the disease is mainly caused by *Brucella melitensis* in man and *Brucella abortus* in cattle. Meager information is available on the involvement of liver and altered biochemical serum profiles in brucellosis affected cattle. The present study was undertaken to determine the levels of certain enzymes in brucellosis affected cattle.

### MATERIALS AND METHODS

**Source of Animals:** The study was carried out in 35 adult dairy cattle of Tharparkar breed in a dairy farm

located near Jaipur city (Rajasthan). The herd had clinical history of frequent abortions (mainly during second half of gestation), retention of the placenta, and arthritis of fetlock joint in the stillbirth/ or birth of weak calves. On owner's initiation, the cattle population in the herd was screened for brucellosis.

**Serum Samples:** Blood (10 ml) was aseptically collected from each animal. Serum was separated and stored at -20°C until further use.

**Serological Techniques:** All the serum samples (n=35) were screened for brucellosis using serological tests i.e. Rose Bengal plate agglutination test (RBPT) and standard tube agglutination test (STAT). The colored antigen for the RBPT and *B. abortus* serum agglutination test antigen for STAT were procured from the Division of Biological Products, Indian Veterinary Research Institute, Izatnagar. Both the tests were performed as per manufacturer's protocol.

**Biochemical Estimation:** The activity of liver specific enzymes, mainly aspartate aminotransferase (AST) and alanine aminotransferase (ALT) was assessed by DNPH colorimetric method using commercial kits (Span diagnostics Ltd., Surat). Level of total serum bilirubin was also assayed by Jendrassik and Grof

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method using a commercial kit (Span diagnostics Ltd., Surat). The data was statistically analyzed (Snedecor and Cochran, 1989).

## RESULTS AND DISCUSSION

Of the 35 serum samples, nine had antibodies to *B. abortus* by both RBPT and STAT. The titres were 1:320 (in five animals), 1:640 (in three animals) and 1:1280 (in one animal).

The sero-positive cows had significantly higher levels of AST ( $144.63 \pm 7.51$  I.U./L) and ALT ( $98.235 \pm 6.83$ ) I.U./L as compared to sero-negative cattle (AST and ALT were  $103.01 \pm 3.12$  I.U./L and  $36.72 \pm 5.41$  I.U./L, respectively). In healthy animals, the activity of these enzymes is mainly confined to the cytoplasm and mitochondria of the hepatocytes, however, elevated levels of these enzymes in brucellosis affected cattle might be due to pumping of enzymes into host circulation by the injured hepatocytes, thereby reflecting persistent but moderate degree of damage to hepatic cells. The elevated activities of the enzymes in sero-positive animals in this study are in conformity with the findings in *Brucella* affected camel and/ or other ruminants (Radostits *et al.*, 2007; El-Boshy *et al.*, 2009; Lefevre *et al.*, 2010).

In addition, the sero-positive cattle also had higher levels of total serum bilirubin (4.2-4.4 mg/dL) in comparison to sero-negative animals (0.01-0.5 mg/dL) in the same herd. Elevated serum bilirubin levels could be incidental to persistent non-regenerative normocytic normochromic anaemia incriminated to the *in situ*

pathogen and consequential inflammatory chemical mediator pathobiological changes induced by the damage to circulating erythrocytes (Lefevre *et al.*, 2010).

Higher serum enzymes and elevated total serum bilirubin in sero-positive *Brucella* infected animals in comparison to sero-negative cattle indicate the possible involvement of liver in affected animals. The present study was undertaken only in one herd and that too on 35 animals. Further studies involving more number of animals would strengthen our observation on hepatic involvement in *Brucella*-affected cattle population.

On the basis of present results, it can be concluded that *Brucella* organisms may affect the liver functioning in cattle. Thus testing of such animals for liver enzymes and bilirubin may also be undertaken which may aid in diagnosis.

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