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SERO-PREVALENCE OF BRUCELLOSIS AND COMPARISON OF SERUM BIOCHEMICAL PARAMETERS BETWEEN INFECTED AND HEALTHY GOATS

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Abstract- A sero-prevalence study was carried out in caprine population of Sidhi (M.P.) using Rose Bengal plate test and comparison of serum biochemical parameters between *Brucella* infected and healthy goats was done. Sixty blood samples were collected from different areas of Sidhi district of Madhya Pradesh and sero-prevalence study was carried out according to age and body condition of animals. Following screening by Rose Bengal plate test 7.69% and 17.64% sero-conversion was seen in young and adult animals, respectively. In reference to body condition good and poor body conditioned animal showed 5.88% and 16.27% sero-prevalence, respectively. The overall sero-prevalence calculated was 13.33% as performed by RBPT. RBPT positive serum samples were analyzed for serum biochemical parameters like total protein, albumin, globulin, glucose, cholesterol, blood urea nitrogen (BUN),) alanine transaminase (ALT) and aspartate transaminase (AST). The result of biochemical parameters showed that value of total protein and blood urea nitrogen did not show any significant changes ($P<0.05$) in *Brucella* infected goats. Value of glucose and albumin significantly decreased ($P<0.05$) whereas value of cholesterol, globulin, aspartate transaminase and alanine transaminase increased ($P<0.05$) significantly. Sero-prevalence study is important in calculating the population of animal, which are exposed to infection and to detect anti *Brucella* antibody in serum. Biochemical parameters studies revealed the change in blood profile of animals following *Brucella* infection and observe the deteriorative changes in animal health.

Keywords- *Brucella melitensis*, goats, RBPT, Sero-prevalence, Serum samples, Zoonoses.

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Introduction

Brucella melitensis, the main causal agent of brucellosis in small ruminants, was the first species in the genus *Brucella* described. Isolation of this bacterium was first done by; David Bruce in year 1887, on the island of Malta from the Mediterranean fever affected soldier's spleen [1]. This is considered as most pathogenic *Brucella species. B. melitensis* has zoonotic implication and posses a work-related risk in exposed professionals such as veterinary persons, farm workers, abbatoir personnel and laboratory technicals. *Brucella* species are cocco-bacilli or short rods, Gram-negative, moderate acid-fast, non-motile, and aerobic with well-defined growth distinctiveness. In *Brucella* infected goats abortion and occasionally mastitis can be observed. In comparison to uninfected goat, if infected goat did not abort, give less milk. In a susceptible flock abortion reaches to epidemic proportion and occurs usually at three-four month in pregnancy. Goat develop immunity after abortion, there is possibility of to infected pregnant goat that is born in an infected group give birth at the normal time [16].

There is a significant body of information available on the investigative value of tests such as rose Bengal plate test (RBPT), standard tube agglutination test (STAT), indirect ELISA (iELISA), competitive ELISA (cELISA), Coombs test or immune capture test for *Brucella* infection ruminants in all-purpose. Though, such information does not make possible to make a obvious choice concerning the assortment of a test for use in the sero-diagnosis of ovine and caprine brucellosis [14]. In present scenario there are no specifically validated tests for the serological finding of *Brucella* infection in small ruminants as the tests were transferred from those second-hand for the diagnosis of *Brucella* in cattle. Although the very little and sometimes contradictory information accessible [6,12,17], Rose Bengal plate test is globally recommended for the viewing of brucellosis in small ruminants [8,10]. Some workers claimed that, the sensitivity of the Rose Bengal test can be enhanced considerably, when the antigens are standardized against a panel of sera from several *B. melitensis* culture positive and *Brucella*-free sheep, respectively, when the volume tested is increased from 25 µl to 75 µl [3].

There is inadequate information available regarding the study of serum biochemical parameters of *Brucella* infected goats. Serum biochemical profile is important, that it reflect the actual health condition of animal. Any deviation in the normal value reflects the deteriorative changes in animal health due to *Brucella* infection. Keeping these points in mind the present study was carried out with the aim to study the sero-prevalence and comparison of serum biochemical parameters.

Materials and methods

Sample collection

Sixty blood samples (10 ml each) in sterile test tubes were collected from goat population of Upani, Karaudia, Sidhi, and Kamarjee villages of Sidhi district (M.P). The test tubes were kept in slanting position for 3-4 hours and then Centrifuged at 1500 rpm for 10 minutes to separate serum. Serum samples collected aseptically were stored at -20°C till further use.

Rose Bengal Plate Test

The RBPT used as a screening test in this study. To increase the sensitivity of the test, the modified procedure recommended for sheep and goats was followed [3, 10]. Briefly, 75 µl of test serum was dispensed on each of the circles of the plate and 25 µl of antigen (procured from department of animal husbandry, M.P.) was

placed alongside the serum. Antigen and serum were mixed thoroughly and the plate was rocked by hand for about 4 min at room temperature. A magnifying glass was used to read the result and interpret it; the results were recorded as 0, 1+, 2+, 3+ according to the degree of agglutination. Similar method was adopted, named as modified Rose Bengal test (mRBT) for screening the sera [7].

Biochemical parameters study

Biochemical parameters analysis was carried out in six sero-positive and six sero-negative goat sera using the commercial kits of ERBA following standard protocols.

Statistical analysis

Serum biochemical parameters results were analyzed by the paired "t" test [15]. $P < 0.05$ was measured as statistically important

Results and discussion

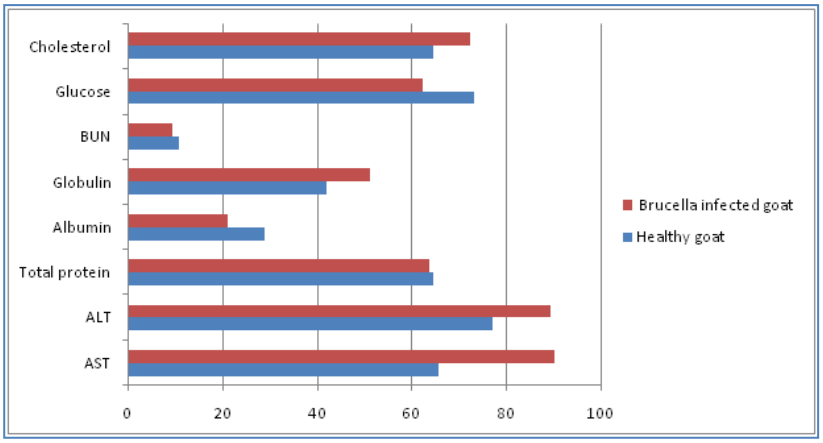
Among sixty animals tested for brucellosis eight cases shown positive reaction to RBPT (13.33%). Sero-prevalence study carried out according to age and body condition of animal. In young animal 7.69%, while in adult animal 17.64% sero-conversion was calculated. In context to body condition good and poor body conditioned animal showed 5.88% and 16.27% sero-prevalence [Table-1]. The sero-prevalence study showed that there is marked presence of *Brucella* antibodies in caprine population, which indicate the infection of *Brucella* organism. The result of biochemical parameters shown that value of total protein and blood urea nitrogen does not show any significant changes ($P<0.05$) in *Brucella* infected goat. Value of glucose and albumin significantly decreased ($P<0.05$), whereas value of cholesterol, globulin, aspartate transaminase and alanine transaminase increased ($P<0.05$) significantly [Table-2], [Fig-1].

Factors	No. of Serum samples tested	RBPT positive (%)
A) Age		
a) Young	26	2 (7.69%)
b) Adult	34	6 (17.64%)
Sub total	60	8 (13.33%)
B) Body Condition		
a) Good	17	1 (5.88%)
b) Poor	43	7 (16.27%)
Sub total	60	8 (13.33%)

Value of total protein (g/L) and blood urea nitrogen (mmol/L) changed from 64.67±1.11 to 63.66±2.41 and 10.81±0.81 to 9.34±4.18, respectively in *Brucella* infected goats as compared to healthy goats. The observation showed that there are not any significant changes in these parameters in *Brucella* infected goats; the result of total protein is in accordance with the study in cattle [13]. But in contrast to result in goat [2], camel [5] and ewe [11], who observed decreased in total protein concentration in ewe, though not significant. Result of blood urea nitrogen is in accordance with the study in cattle [13], and ewe [11].

Table-2 *Serum biochemical parameter (Mean± Standard Deviation) of Brucella infected and healthy goats*

Serum biochemical parameter	Healthy goats (n=6)	*Brucella* infected goats (n=6)
Aspartate transaminase (U/L)	65.69±1.40	90.18±4.15
Alanine Trnsaminases (U/L)	77.11±0.44	89.43±2.23
Total protein (g/L)	64.67±1.11	63.66±2.41
Albumin (g/L)	28.86±1.14	21.13±1.02
Globulin(g/L)	42.19±1.31	51.34±1.60
Blood urea nitrogen (mmol/L)	10.81±0.81	9.34±4.18
Glucose (mg/dL)	73.12±2.14	62.41±3.23
Cholesterol (mg/dL)	64.51±1.65	72.41±2.11



BUN- Blood urea nitrogen, ALT- Alanine transaminase, AST- Aspartate transaminase

Fig-1 Comparison of serum biochemical parameters in healthy and *Brucella* infected goats

Value of glucose (mg/dL) and albumin (g/L) significantly decreased from 73.12±2.14 to 62.41±3.23 and 28.86±1.14 to 21.13±1.02, respectively, in *Brucella* infected goats as compare to sero- negative goats. The result of glucose value is in accordance with the study in camel [5], ewe [11] but in contrast to result in cattle [13] that did not show any significant change in glucose level. The decrease in glucose level may be attributed to decrease in feed intake. Decrease in albumin concentration is in accordance to the study in goat [2], ewe [11] and cattle [13] and camel [5]. Decrease in albumin level may be due to liver damage, lower production of albumin due to damaged liver and also due to lowered feed intake.

Value of cholesterol (mg/dL), globulin (g/L), aspartate transaminase (U/L) and alanine transaminase (U/L) increased significantly from 64.51±1.65 to 72.41±2.11, 42.19±1.31 to 51.34±1.60, 65.69±1.40 to 90.18±4.15 and 77.11±0.44 to 89.43±2.23, respectively. The increased value of cholesterol is in accordance with study in goat [2], ewe [11] and cattle [13]. Increased globulin level was also observed in cattle [13] and ewe [11]. AST and ALT increased level was also observed in goat [2], cattle [4, 13], camel [5], and ewe [11]. Increase in cholesterol, ALT and AST level are seen due to hepatic damage. Increases in globulin concentration are seen due to increased immune response following *Brucella* infection [9]. Study of serum biochemical parameter showed that there is

deteriorative change in the health of animal.

Conclusion

Sero-prevalence study and biochemical parameter comparison in *Brucella* infected and healthy goats revealed that Brucellosis is a serious problem in goat population of Sidhi (M.P.). *Brucella* antibodies are prevalent in old and poor body conditioned animals. Deviation from normal value in serum biochemical parameter showed that there is deterioration in health of animal like, liver damage, kidney damage etc.

Conflict of Interest: None declared

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