



Impact of subclinical mastitis on blood biochemistry of dairy cows

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Mastitis, the inflammation of udder, constitutes one of the most important and expensive diseases of dairy industry. In India, the losses due to mastitis amount to about ₹ 71650 millions per annum (Bansal and Gupta 2009).

Subclinical mastitis (SCM) is difficult to detect due to the absence of any visible indications in the mammary glands and in milk (Mohammadian 2011). SCM is important due to the fact that it is 15 to 40 times more prevalent than the clinical form, is of long duration, difficult to detect, adversely affects milk quality and production of dairy animals and constitutes a reservoir of microorganisms that can infect other animals within the herd due to its contagious nature (Schultz *et al.* 1978). The aim of present study was to evaluate the influence of subclinical mastitis on biochemical components of blood in dairy cows.

Holestien Fresien crossbred lactating cows (54), in their first to fifth lactation, of an organized farm were selected. The quarter milk and blood samples were collected from the animals and transported to the laboratory. The quarter health status was accessed by California mastitis test (CMT), and the degree of mastitis was measured as 0, negative; 1, weak positive; 2, positive; and 3, strong positive. The cows having negative CMT score for all the 4 quarters were kept as control (G 1). The cows having CMT score of 2 or 3 at least in 2 quarters were considered as mastitic animals and grouped as G 2. The blood samples were analyzed for aspartate aminotransferase (AST), alanine aminotransferase (ALT), glucose, total serum protein (TSP), albumin, globulin, A: G ratio, urea and cholesterol (using commercial test kits), magnesium (titan yellow method), sodium and potassium (flame photometry) and chloride (titration method).

The significant ($P < 0.01$) effect of mastitis was observed

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on AST (62.52 ± 4.46 vs 76.03 ± 2.27 IU/L), TSP (5.77 ± 0.14 vs 6.29 ± 0.11 g%), globulin (2.95 ± 0.13 vs 3.82 ± 0.15 g%), AG ratio (0.99 ± 0.11 vs 0.70 ± 0.05), Na (127.58 ± 3.28 vs 107.05 ± 3.90 mEq/L), K (4.08 ± 0.18 vs 3.14 ± 0.16 mEq/L) and Cl (97.83 ± 6.35 vs 76.36 ± 2.67 mEq/L). The significant higher level of AST in mastitis cows and nonsignificant effect on ALT are in line with the findings of Zaki *et al.* (2008) in cows and Zaki *et al.* (2010) in buffaloes. The increase in level of AST indicates the damage to the secretary epithelium of udder. The increase in TSP with CMT score may be attributed to significant increase in serum globulin with increase in severity of infection. The significant decline was seen in AG ratio in mastitis that again may be explained by nonsignificant change in albumin and significant rise in globulin level in mastitis. Our findings simulate the result of Dwivedi *et al.* (2004) and Zilaitis *et al.* (2006). Presence of infection stimulates the host's immune system resulting in increased synthesis of gamma-globulin. However, Zaki *et al.* (2008, 2010) reported decline in TSP in subclinical mastitis in buffaloes and Friesian cows, respectively.

A significant decline was observed in level of Na, K and Cl in mastitic cows. The lower levels of serum electrolytes in SCM in present study simulate the earlier reports of Hayerttin *et al.* (2005) in clinical mastitis. Intra mammary infection results in damage to the ductal and secretary epithelium, and opening up of the tight junctions between secretary cells and increased permeability of blood capillaries. Thus Na and Cl (which are high in extracellular fluid) pour into the lumen of the alveolus and maintain osmolarity K decreased proportionately (Batavani *et al.* 2007). However, Dwivedi *et al.* (2004) observed significant increase in level of serum Na and K in mastitic cows. Other parameters considered within this investigation (ALT, urea, cholesterol and Mg) did not show statistically significant differences between the groups. These findings corroborate the findings of authors earlier (Dwivedi *et al.* 2004, Hayerttin *et al.* 2005, Zaki *et al.* 2008).

It can be concluded from this study that, the invasion of pathogenic organism in udder bring about the damage to ductal and secretary epithelium that leads to increased level of AST in blood where as leakage of electrolyte (Na, K and

Cl) into the milk through damaged epithelium, decreased the level of these components in blood. The immune response to the infection resulting in increased synthesis of gamma globulin which was evident from increase in TSP, globulin and decrease in A: G ratio.

SUMMARY

The present investigation was conducted to elucidate the influence of subclinical mastitis (SCM) on some biochemical and enzymatic components of blood in dairy cows. The health status of animals was accessed by California mastitis test (CMT) in quarter milk of cows. The biochemical analysis of blood samples revealed a significant elevation in serum AST, TSP and globulin whereas significant decline was observed in level of AG ratio, Na, K and Cl in cows having subclinical mastitis as compared to healthy cows. These noticeable changes are due to the damage caused to ductal and secretory epithelium of udder by invading pathogenic organism.

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