

ALTERATIONS IN SERUM AST, ALT AND ALKALINE PHOSPHATASE ACTIVITY DURING DIFFERENT DAYS OF FMD INFECTION IN LACTATING COWS

T. K. SAR*, R. BURAGOHAIN, S. AKHTAR AND T. K. MANDAL

*Department of Veterinary Pharmacology and Toxicology
West Bengal University of Animal and Fishery Sciences
37, K.B.Sarani, Kolkata – 700 037, India*

The present study aims monitoring of AST, ALT and alkaline phosphatase activity on different days in six healthy and six FMD affected lactating cows in field condition. The FMD affected six lactating cows were selected on the basis of clinical signs including high temperature, excessive salivation, formation of vesicles on the oral and nasal mucosa, the inter-digital spaces and coronary bands on the feet. Six apparently healthy lactating cows in the field condition were considered as control group. One mL of blood was collected aseptically from each cow from jugular vein at day 0, 3, 6, 12 and 21. AST, ALT and alkaline phosphatase activity were estimated as per reported methods. AST activity was found to be increased significantly ($p<0.05$) on 0, 3 and 6 day in FMD affected cows compared to healthy cows. Alkaline phosphatase activity was increased significantly ($p<0.05$) on 0, 3, 6 and 12 day in FMD affected cows compared to healthy cows indicating liver tissue damage. However, the alkaline phosphatase activity was observed to return to the normal level on day 21 in FMD affected cows without systemic application of any drug. Interestingly, ALT activity did not alter significantly in FMD affected cows compared to healthy cows. The observations may be correlated with liver impairment in FMD affected cows.

Key words: Alkaline phosphatase, ALT, AST, Cows, FMD

FMD is a highly contagious viral disease of cloven-hoofed animals, causing severe clinical signs including fever, lameness and vesicular lesions on tongue, muzzle, feet and teats (Arzt *et al.*, 2011; Grubman and Baxt, 2004). FMD is caused by Picorna

virus that also causes immune suppression in the affected animals (Cusick *et al.*, 2004). FMD causes serious production losses, transmitted through multiple routes and hosts which make it one of the most important diseases affecting trade in

*Corresponding Author

livestock. In cows, infection of udder and teats may progress to mastitis that causes milk loss (Wellenberg *et al.*, 2002; Govindaraj *et al.*, 2017). The economic loss per cow due to FMD was estimated to be Rupees 12,532 (Singh *et al.*, 2013). A total of 1,082 FMD outbreaks were reported in the state of West Bengal, India during the 18 years from 1985 to 2002 (Bhattacharya *et al.*, 2005). The liver impairment and alterations in AST, ALT and alkaline phosphatase in FMD in cattle has been studied earlier in cattle (Gattani *et al.*, 2011). But, the alterations at different time interval have not yet been studied necessitating the present study.

The FMD affected six lactating cows were selected on the basis of clinical signs including high temperature, excessive salivation, formation of vesicles on the oral and nasal mucosa, the inter-digital spaces

and coronary bands on the feet. One milliliter of blood was collected aseptically from each cow from jugular vein in test tubes at day 0, 3, 6, 12 and 21. Zero day collection was done in both healthy and FMD affected cows at field level and the enzyme activity values were compared between the two groups. Zero day collection from FMD affected cows was done when the affected cows started to show the clinical signs. ALT and AST activities were measured as per the method described by Yatazidis (1960). A standard curve for pyruvic acid was prepared previously with sodium pyruvate at different concentration and utilized for calculations. Estimation of alkaline phosphatase activity was done according to the method described by Bernt (1974). Mean values, standard error, and analysis of variance of the tabulated data were

Table 1. AST (IU/L), alkaline phosphatase (n mole ρ NP hr⁻¹mL⁻¹) and ALT (IU/L) activities on different days in healthy and FMD affected lactating cows

Day	AST (IU/L)		Alkaline phosphatase (n mole ρ NP hr ⁻¹ mL ⁻¹)		ALT (IU/L)	
	Healthy group	FMD group	Healthy group	FMD group	Healthy group	FMD group
0	27.534 ± 1.406	35.228 ± 1.224**	18.401 ± 0.966	24.106 ± 1.134**	10.069 ± 0.815	12.489 ± 1.019
3	27.385 ± 1.345	34.867 ± 1.307**	18.435 ± 0.937	23.856 ± 1.124**	10.328 ± 0.735	12.277 ± 0.995
6	27.118 ± 1.389	31.801 ± 1.185*	18.789 ± 0.919	23.460 ± 0.897**	10.856 ± 0.718	11.989 ± 0.917
12	27.446 ± 1.414	29.035 ± 1.307	17.983 ± 0.913	22.144 ± 0.878	11.126 ± 0.737	11.586 ± 0.787
21	27.631 ± 1.393	28.979 ± 1.345	18.567 ± 0.967	19.742 ± 0.704	10.896 ± 0.789	11.213 ± 0.727

Significant differences were marked by *(P<0.05), **(P<0.01)

calculated where applicable using the statistical software programme Mstat (Michigan State University, USA).

AST activity was significantly increased on day 0, 3 and 6 in FMD affected lactating cows compared to healthy lactating cows (Table 1). Alkaline phosphatase activity was significantly increased on day 0, 3, 6 and 12 in FMD affected lactating cows compared to healthy lactating cows (Table 1). ALT activity was non-significantly increased in FMD affected lactating cows on day 0, 3 and 6 (Table 1). So, the significantly increased alkaline phosphatase activity indicated liver damage in FMD affected cows which may be reversible as the enzyme activity returned to normal level on day 21. Significantly increased AST

activity on day 0, 3 and 6 indicated liver damage which was reflected in alkaline phosphatase activity in FMD affected lactating cows.

Gökçe *et al.* (2004) reported alkaline phosphatase value of 93.07 ± 39.1 IU/L in FMD affected cows compared to 73.70 ± 26.20 IU/L in healthy cows. But, Gattani *et al.* (2011) reported significantly increased serum AST activity and non-significantly increased ALT activity in FMD affected sheep in accordance with our present findings in FMD affected cows.

Therefore, our present study indicated that liver function impairment with liver tissue damage occurs in FMD affected lactating cows.

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