

# HEPATIC ENZYME PROFILE IN INDIAN THOROUGHBRED EQUINES

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Liver enzymes such as alanine amino transferase (ALT), aspartate amino transferase (AST), alkaline phosphatase (ALP) and gamma glutamyl transferase (GGT) are of diagnostic value in diagnosing early liver disorders (Pearson, 1996). The levels of enzymes like GGT differ between adults and young ones of equines (Gosset and French, 1984) and necessitated age specific interpretation. This paper describes the physiological variation in liver enzyme levels between adult horses and foals. The individual variation of enzyme activity may limit the usefulness of liver enzyme activities in the diagnosis of hepatic diseases in equines.

Apparently healthy thoroughbred horses and foals of each twelve numbers were utilized for this study. The study comprised of two groups as Group I-Horses and Group II-Foals. The equines were kept under observation for two weeks and examined thoroughly by various physical and laboratory methods to rule out any abnormal etiologies. Five milliliters of blood was collected with vacutainers containing no additives, taking all precautions to avoid hemolysis as suggested by Alleman (1990). ALT activity was determined by IFCC – Kinetic Method with GPT/ALT Kit as per Bergmeyer (1986). AST was estimated by modified UV Method with SGOT (AST) kit. ALP and GGT were estimated with Colorimetric method as per Tietz and Rinker (1983). The data collected were analyzed using completely randomized design and analysis of variance test was carried out as per Snedecor and Cochran (1987). Microsta® USA – Statistical Software package was utilized for this study.

The values of liver enzymes of horses and foals were presented in table-1

The horses had an ALT activity of  $16.33 \pm 1.42$  IU/L and AST activity of  $189.83 \pm 7.67$  IU/L. The ALT and AST values of this study were in accordance with Gupta *et al* (1996), who reported a normal value of 13.97 to 35.78 IU/L of ALT activity and 377.6 to 509.1 IU/L of AST activity in horses. The deviation to a lower range of AST activity in this study could be due to the absence of strenuous exercise, as these were breeding stock. Koterba *et al* (1990) reported a reduction in AST activity during non exercise / resting period as observed in this study.

Foals in the present study had an ALT value of  $22.83 \pm 1.41$  IU/L and AST value of  $233.83 \pm 5.40$  IU/L. This was significantly higher than that of the adult horses. The increase in enzymatic activity of foals could probably be due to their frequent running and other sorts of muscle exertion activities, as opined by Ekman *et al* (1975). Carlson (1985) observed an increase in liver enzymes following exercise of horses.

The ALP activity of the horses in this study was  $219.33 \pm 3.74$  IU/L and that of foals was  $543.50 \pm 9.39$  IU/L. The ALP activity of foals was found to be more than two fold of its activity in adults. The ALP value of horses in the present study was in concurrence with Carlson (1985), who observed a normal value of 141.90 to 293.0 IU/L in horses. ALP values of foals in this study were in accordance with Rumbaugh and Adamson (1983), who reported values of  $516 \pm 182$  IU/L.

Gossett and French (1984) observed that the increased activity of ALP found in foals could probably be due to the presence of increased osteoblastic activity of the foals. The bone fractions

of ALP would contribute to an increase in ALP level. (Fraser and Nagode, 1979 and Rose and Hodgson, 1990).

The GGT activity of adult horses was  $9.66 \pm 1.38$  IU/L and that of foals was  $25.33 \pm 1.42$  IU/L. The GGT value of foals was more than two fold values of adults in the present study. The adult values of this study concurred with Braun *et al* (1982), who reported a maximum limit of 24 IU/L in normal horses. Gossett and French (1984) reported a value of  $62 \pm 42$  IU/L of GGT activity in foals. The doubling of the GGT activity in foals in this study could partly be due to a higher rate of production and release of the enzyme in young animals (Gossett and French, 1984).

In equine clinical practice, accurate interpretation of serum enzyme values in the animal suspected for hepatic disease requires the knowledge of normal levels or the levels during the absence of hepatic diseases. From the present study, it was observed that there was a physiologic variation in the liver enzyme values between horses and foals, especially with regard to ALP and GGT activities. Hence, while interpreting the liver enzyme values of foals, especially ALP and GGT, caution should be exercised as foals had two fold values of adults for these enzymes.

To conclude, normal values of ALT, AST, ALP and GGT of Indian thoroughbred horses and foals were reported. It was found that the ALP and GGT activities of foals were significantly higher than that of adult horses. The study highlighted that foals had more liver enzyme activities than that of adult horses and such elevated values of foals should not be misinterpreted as hepatic disorders.

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**Table 1**  
Liver enzyme levels of Horses and Foals

Enzyme	Horses	Foals
ALT in IU/L	16.33 ± 1.42 <sup>a</sup>	22.83 ± 1.47 <sup>b</sup>
AST in IU/L	189.83 ± 7.67 <sup>a</sup>	233.83 ± 5.40 <sup>b</sup>
ALP in IU/L	219.33 ± 3.74 <sup>a</sup>	543.50 ± 9.39 <sup>b</sup>
GGT in IU/L	9.66 ± 1.38 <sup>a</sup>	25.33 ± 1.42 <sup>b</sup>

Means bearing different superscripts with in a row vary significantly (P > 0.01)