

EFFECT OF ACUTE LAMINITIS ON HEMOGRAM AND SERUM BIOCHEMISTRY IN MULES

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ABSTRACT

The present project was executed to compare the haemogram and serum biochemistry in healthy males and these affected with acute laminitis. A total of 20 mules of either sex and at 19-24 months of age were divided in two equal groups I and II. The group I comprised of healthy mules, while group II comprised of mules affected with acute laminitis. The parameters compared were haematological parameters (RBC count, TLC, haemoglobin and PCV) and serum biochemical parameters (bilirubin total, direct and indirect, ALP and ALT, serum creatinine, and serum cholesterol). The results showed a non-significant difference in values of TLC and PCV between groups I and II, while the values of RBC were significantly lower and haemoglobin were higher ($P<0.05$) in group I as compared to those of group II. The values of bilirubin (total, direct and indirect) in group II were significantly higher ($P<0.05$) as compared to group I. The values of ALP, ALT, serum creatinine and serum cholesterol of diseased mules were significantly higher when compared with those of healthy mules.

Key words: Acute laminitis, hemogram, serum biochemistry, mules.

INTRODUCTION

Laminitis is one of the most commonly encountered diseases in equines, characterized by inflammation of the sensitive laminae of the hooves, and clinically manifested by severe lameness with heat and pain around the coronet. It is thought to be mainly caused by an intoxication, usually related to bacterial toxins after digestive disturbance, usually overeating of grains, or related to a local infection such as metritis or retained placenta in mares. Other causes include trauma, excessive cold water intake etc. Amongst horses, ponies are much more susceptible, as much as four times more than other horses. However, sex and age exert very little influence (Radostits *et al.*, 2000). Death is unusual, however, the affected animals may develop permanent deformities of the feet rendering them partially or completely incapacitated from work and hence impart significant economic loss to the owners. Diagnosis of acute laminitis is not an easy job for the clinicians because of its close resemblance with conditions like tetanus, azoturia, rupture of stomach or bladder and colic.

Examination of blood and biochemical parameters of serum are among the most common methods of health evaluation in man and animals. Liver and kidneys are amongst the important organs, performing a battery of diverse functions. Their functions vary with the advancement in age. Abnormal biochemical values

determined by serum analysis are often the first suggestion of the hepatic disease (Noonan and Meyer, 1979). Yet many other systemic diseases may affect its activity. Similarly, renal function tests provide part of the evidence upon which a prognosis should be based (Benjamin, 1978). There are many tests currently available for the evaluation of liver and kidney functions. A good number of these tests can be better correlated with metabolic activities, rather than merely used as diagnostic aid for their own disorders.

Practising veterinarians face an additional problem of dealing with variety of animal species. The reference values of blood and biochemical parameters of one animal species do not apply to the others. In addition, values of biochemical parameters also change in advancing age (Gossett and French, 1984). It is pertinent to mention here that reference values for various parameters in mules both in health and disease are completely missing in the literature, as far as our knowledge is concerned.

Keeping in view the usefulness of this important species in peace and war and the lack of reference values in literature pertaining to health and diseases, particularly regarding acute laminitis, the present study was carried out to compare the haemogram and serum biochemistry in healthy mules and those affected with acute laminitis.

MATERIALS AND METHODS

A total of 20 mules of either sex and at 19-24 months of age were selected from Chenab Breeding Area, Faisalabad through the courtesy of Remount Veterinary Department, Faisalabad. These were divided into two groups of 10 subjects each viz. group I and group II. Group I comprised healthy mules, while group II comprised mules suffering from acute laminitis.

Ten ml of venous blood was collected from jugular vein of each animal and divided into two aliquots A and B, containing 4 and 6 ml, respectively. Aliquot A was treated with EDTA (ethylene diamine tetra-acetic acid) @ 1mg/ml and used for various haematological parameters, whereas aliquot B was allowed to clot for harvesting of serum and was used for various biochemical profiles.

The haematological parameters i.e., RBC count, TLC count, haemoglobin and PCV were analyzed using conventional laboratory techniques (Benjamin, 1978). Various serum biochemical parameters of the mules under study were determined photometrically (Photometer 4010), using commercially available diagnostic kits. These include bilirubin (total, direct and indirect), ALP, ALT, creatinine and cholesterol. The data, thus obtained, was analyzed statistically using one way ANOVA as well as T-test (Steel and Torrie, 1984).

RESULTS AND DISCUSSION

Despite the significance of mules in providing the cheapest source of transportation, riding, carrying loads, pulling carriages and supply of ammunition during peace and war, especially in the modern era of mechanization, a little work has been reported regarding this dependable partner of the mankind. Even information on various parameters indicative of the health and disease status of mules is completely lacking when either searched in literature or when tried to track from the passing millenium boon i.e. internet.

People engaged in breeding and rearing mules are totally dependent on haematological and serum biochemical values of horses which is entirely a different species. The present study was, therefore, conducted incorporating 20 mules for the evaluation of various parameters during health and model disease i.e. acute laminitis which are as under:

Haematological parameters

The mean values of RBC count and haemoglobin of group I and II differed significantly (Table 1). This increase in RBC count in mules with laminitis could be due to the bone marrow activation in response to the

excessive use of vasodilators. These findings are not in agreement with those of Kameya (1973) and Riber *et al.* (1995), who reported non-significant differences in RBC values of healthy and acute laminitis affected horses.

This difference of results in the present and previous studies could be due to the variation of etiology of the laminitis however, it needs further investigations.

In the present study, mean values of TLC of groups I and II differed non-significantly (Table 1). It indicates that acute laminitis does not impart any significant effect on TLC values in mules. These results are in a complete agreement with those of Riber *et al.* (1995), who reported a non-significant effect of laminitis on TLC. Non significant change in TLC could be due to the fact that acute laminitis is an acute degeneration of the sensitive, primary and the secondary laminae of the hoof (Radostits *et al.*, 2000) and the secondary bacterial infection was checked by the excessive use of antibiotics. These results are, however, not in agreement with Kameya (1973) and Eaton *et al.* (1995), who reported a significant effect of acute laminitis on TLC values in horses.

The mean PCV values of group II did not differ significantly from those of group I. These findings are in line with those of Kameya (1973), who reported that acute laminitis did not impart a significant effect on PCV values.

Biochemical parameters

The mean values of bilirubin (total, direct and indirect) of diseased mules of group II were significantly higher than those of group I, comprising the healthy mules of the same age. As the acute laminitis responds well to the administration of antihistamines combined with corticosteroids and diuretics; high levels of bilirubin in acute laminitis affected mules may indicate the allergic and inflammatory reaction going on there (Bone *et al.* 1963; Kameya 1973). It may be as a result of endotoxaemia (Radostits *et al.*, 2000).

The mean values of ALT of ALP and group II were significantly higher than those of group I, (Table 1), indicating an increase in these enzymes with acute laminitis. These findings are in agreement with those of Riber *et al.* (1995), who reported an increased enzymatic activity in the horses with laminitis, strongly suggesting the muscular and hepatic disorders which might be in response to the endotoxaemia.

The mean values of serum creatinine of group II were significantly higher than group I, yet it is not

dangerous because it has not exceeded 2 mg/dl (Benjamin, 1978). It only indicates a reduced glomerular filtration rate which might be due to less water intake (Bone *et al.*, 1963).

The mean values of serum cholesterol level of group II mules were significantly higher than those of group I (Table 1), indicating an increase in the serum cholesterol level in the mules with acute laminitis. This increase could be attributed to stress in animals affected with acute laminitis. Those findings are in agreement with those of Rashid (1997), who reported a high cholesterol levels in the horses with stress as the stress causes hyperthyroidism which elevated the blood cholesterol level in horses.

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