PREVALENCE OF LAMENESS AND METABOLIC DISORDERS IN ENDURANCE HORSES

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ABSTRACT. This study was carried out to investigate the prevalence of equine lameness and metabolic disorders in endurance horses during an endurance race. Out of 67 horses that participated in the race, 19 horses completed the race successfully without any derangement while 48 horses were eliminated from the race for various disorders. Fifty-three (53.73%) percent of these horses had metabolic disorders and 17.91% were eliminated due to lameness. The study showed that the highest number of endurance horses that were eliminated were due to metabolic disorders followed by lameness. These findings may assist veterinarians in designing laudable measures in the management and conditioning protocols of endurance horses during training and further prevent the morbidity and mortality during endurance races.

Keywords: endurance, horse, metabolic disorders, lameness and morbidity.

INTRODUCTION

The prominent causes of lameness in endurance horses are associated to wear and tear injuries due to concussion and the additional loading of the joints and tendons by continues long distance races. However, the cumulative effects of long distance races, specifically over rough and hard, concussive surfaces, aggravated by conformational weaknesses, poorly made shoes and nutritional imbalances, can escalate the incidence of bone, joint and tendon injuries, especially as a horse ages. The occurrences of lameness are lowered in properly conditioned horses that have adapted and strengthened their musculo-skeletal structures to withstand the rigors of endurance races (Whitney *et al.,* 1996).

On examination before, during and after races revealed an association of heart rate, cardiac recovery index, abnormal gastrointestinal sounds and gait with elimination of endurance horses from race during competition (Fielding *et al.*, 2011).

Assessment of the fitness of a horse is by thorough physical examination of heart

rates, respiratory rates and conformation (Cottin et al., 2006; Bashir and Rasedee, 2009). The active muscles of endurance horses depend on heart size and capacity to deliver large volumes of blood to the tissues and the splenic reserves supply (Persson and Lydin, 1973; Lawan, et al., 2010). Endurance horses need calcium for muscle fiber activities and decreased plasma levels of calcium during strenuous endurance rides can cause metabolic disorders, including synchronous diaphragmatic flutter. However, increased blood calcium concentration is unwanted because it may increase the odds of thumps during endurance competitions (Lewis, 1995).

The most dehydrated horses are at greatest risk of developing metabolic problems and exhaustion (Harold, 2010). Once the intensity of race reaches a certain threshold, energy is partially provided by anaerobic metabolism. Consequently, lactic acid efflux, from cells to the blood occurs, and blood lactate increases (Snow and Valberg, 1994).

During endurance races, the primary mechanism for heat removal is the evaporation of sweat. The water from sweating is derived from both extracellular and intracellular fluids, and indicates a loss of over 15% of total body water. Sweat is hypertonic in comparison to plasma (Rose *et al.*, 1980). Therefore, its production is followed by a loss of electrolytes. This change in fluid and electrolytes levels impairs performance ability, and may even be life-threatening (McConaghy, 1994). Lameness and metabolic derangements are the major causes of reduced performance in endurance horses. Therefore, this study was conducted to investigate the prevalence of equine lameness and metabolic disorders in endurance horses during an endurance race.

MATERIALS AND METHODS

Subjects

Sixty-seven endurance horses participated in endurance competitions of 40, 80 and 120 km racing category. Among these, 48 horses were eliminated and 19 horses completed the race successfully.

Veterinary inspection

Veterinary inspection was conducted after each loop of the race on all competing horses and physical parameters recorded. The physical parameters evaluated were the resting heart rate, cardiac recovery index (CRI), the gut sound, dehydration status, capillary refill time, color of mucous membrane, the muscle and anal tone and the gait soundness. All these parameters were re-evaluated and recorded each time the horses enter the vet-check after each loop of the race. The horses were also observed for soreness or injuries on the back, withers, girth area, body or distal extremities. Good performance horses continue the race in the subsequent loop, while poor performance horses are eliminated either due to metabolic ailments

or due to lameness and are sent to the clinic for treatments and further workout.

Blood samples from the jugular vein were obtained from the eliminated horses with metabolic disturbances that are sent to the clinic for treatments and also from the good performance endurance horses using 21G needles in ethyldiaminotetra-acetic acid (EDTA) for whole blood analysis, lithium heparin for serum biochemistry. Other instruments were the hematocrit centrifuge machine to obtain plasma for biochemistry analysis, the hematocrit centrifuge for hemoglobin concentrations analysis, by (Hettich-Hematocrit 210 and micro hematocrit reader-Hawksley), spectrophotometer (UV/visible-Secomam-Anthelie Advanced) as well as the Automatic Hematology Analyzer (Abbot-cell Dyn 3700) for blood cells count. Descriptive statistic was used to analyse the results using statistical software JMP 9, SAS.

RESULT

Forty-eight (48) horses were eliminated from the endurance competition. Nineteen (19) horses managed to complete the race without metabolic signs. A total of 36 (53.73%) and 12 (17.91%) horses were eliminated due to metabolic disorders and lameness respectively as shown in Figure 1 and 2.

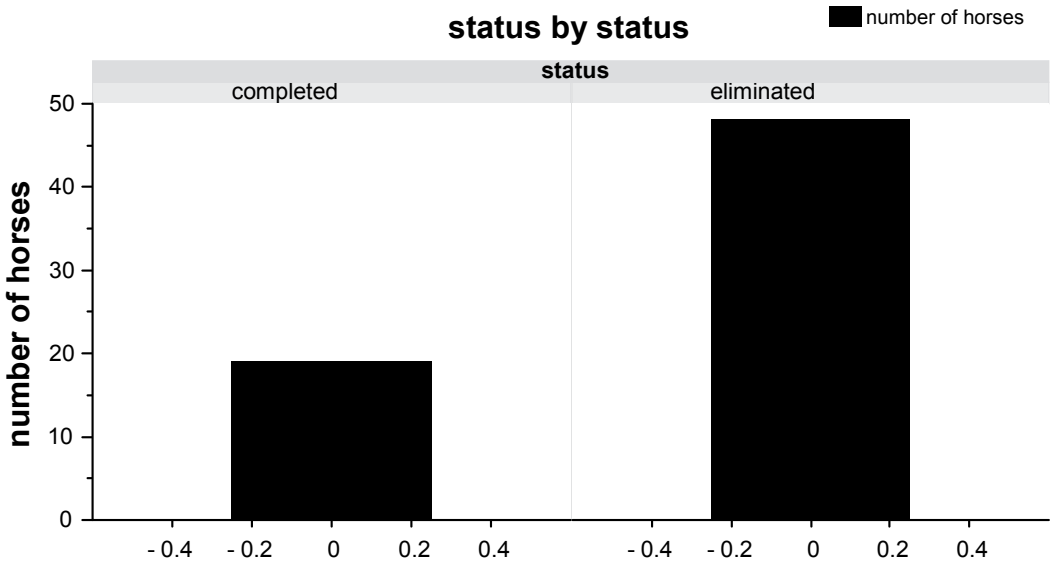

Figure 1. Status of performance in endurance horses

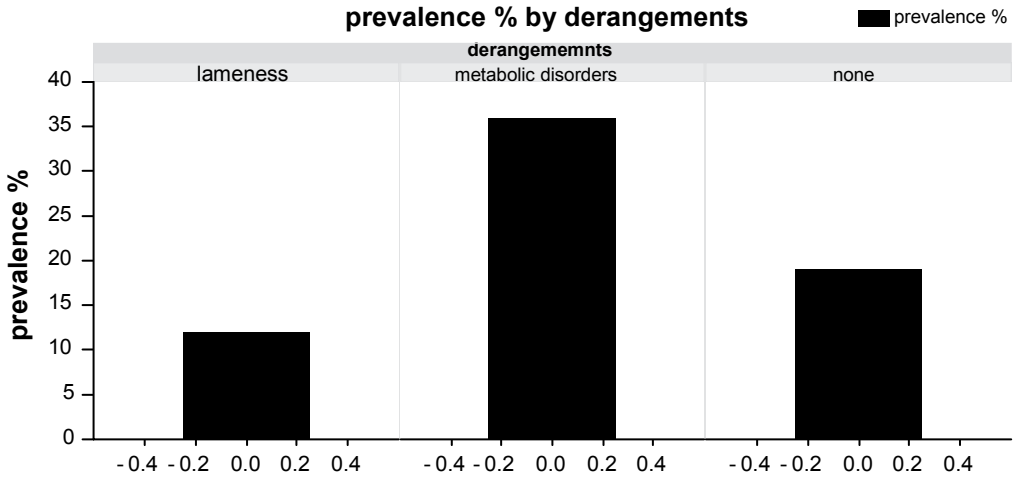

Figure 2. Percentage prevalence of derangements in endurance horses

DISCUSSION

This study shows that up to 71.64% of the horse population in one of the endurance races in Malaysia were eliminated from the endurance race due to various derangements comprising of metabolic disorders and lameness. This may be due to the small number of horses exposed to inappropriate conditioning protocols that are continuously being circulated for endurance races.

The results show that approximately 28.36% of these horses managed to complete the races in good condition. Metabolic disorders seem to be the major contributory factor in elimination of horses from races. The metabolic disorders include high heart rates, dehydration, increase capillary refill time, severely congested mucus membrane and decrease gut motility. Endurance horses need calcium for muscle contractions. Low and very high plasma levels of calcium during strenuous endurance rides can lead to metabolic problems (Lewis, 1995).

The most dehydrated horses are at greatest risk of developing metabolic problems and exhaustion (Harold, 2010). When endurance race is prolonged in such situations, muscle strain may occur, giving way to muscle damage and myopathy (Arthur, 2005). Sweat production is accompanied by a loss of electrolytes. This change in fluid and electrolytes levels impairs performance ability, and may be life-threatening (McConaghy, 1994). The wear and tear injuries due to concussion and the additional loading of the joints and tendons by continues long distance races is one of the major causes of lameness during endurance ride (Whitney *et al.*, 1996).

CONCLUSION

The study showed that the highest number of endurance horses that were eliminated were due to metabolic disorders followed by lameness. These findings may assist veterinarians in designing laudable measures in the management and of endurance horses during training and further prevent the morbidity and mortality during endurance races.

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