

CLINICAL AND LABORATORY EVALUATION OF TYING UP SYNDROME IN HORSES AND DONKEYS

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ABSTRACT

Exertional rhabdomyolysis is the most common muscle disorder in horses in a variety of breeds, including standardbreds, thoroughbreds, Arabians. The aim of this study is investigate the response of selected parameters (CK, AST, and LDH enzymes and some electrolytes such as Ca, K, Na, Cl, and P) associated with ER and evaluate the efficacy of the treatment protocol on clinical and selected biochemical variables. The affected animals were divided according to treatment protocol into two groups; first group treated with flunixin meglumine. While, the second one treated with Phenyl butazone. All treated groups received fluid therapy and dipyron. The results were sweating, stiff gait, reluctance to move, recumbancy, tachycardia and tachypnea was found as a constant feature of Tying-up syndrome in horses and donkeys under investigation. Also, there was an elevation in AST, LDH and CK levels in diseased animals with hyponatremia, hypochloremia, hyperkalemia, hypocalcaemia and hyperphosphatemia. Treatment results revealed that administration of flunixin meglumine is more superior than Phenyl butazone.

Keywords : Exertional Rhabdomyolysis, horse, donkey, AST, CK, LDH, flunixin meglumine, Phenyl butazone.

INTRODUCTION

Tying up or exertional rhabdomyolysis (ER), literally the dissolution of striated muscle with exercise, this problem in different ages in horses and donkeys. over the past century first described in working draft horses that were exercised after being rested 1 to 2 d and while being fed a high grain diet, a number of terms have been used to describe this syndrome including tying up, azoturia, set fast, monday morning disease, chronic intermittent rhabdomyolysis, and equine rhabdomyolysis syndrome (valberg 2006). The

purpose of this study to evaluate clinical and laboratory finding of tying up syndrome in horses and donkeys and ideal treatment of the disease.

Horses and donkeys which diseased with tying up syndrome show signs of muscle stiffness, elevated respiratory rate, profuse sweating, firm painful muscles specially hind limbs mass groups, reluctance to move that lasts for several hours, increase heart rate and in severe cases there was myoglobinuria (valberg 2006). In other hand sub clinical episodes occur in some horses and

donkeys causing decreased performance, painful muscles, hind limbs lameness and reluctance to move without other signs. In rare cases, recumbency and death was recorded.

A diagnosis of tying up is based mainly on clinical signs of muscle stiffness, pain after exercise, reluctance to move, profuse sweating, and in moderate to severe cases myoglobinuria, in conjunction with elevations in serum creatin kinase (CK), and aspartate aminotransferase (AST), and lactate dehydrogenase (LDH) activities. The degree of elevations of these enzymes in serum is dependant on the severity of muscle damage as well as the length of time elapsed between the sample collection and the occurrence of muscle damage. High serum CK indicates acute muscle necrosis. The level of this enzyme peaks 6 h after muscle damage and returns to normal within 2 to 3 d after resolution of rhabdomyolysis (Kneopfl 2002). Serum LDH and AST are not muscle specific and serum activities increase with both liver and muscle necrosis. However, in tying up, elevated LDH and AST values reflect the time interval since the mus-

cle was damaged. Values increase during the first 12 h to 24 h after muscle damage and remain elevated for 1 wk to 2 wk (Kneopfl 2002).

MATERIALS AND METHODS

Animal selection

The present study was conducted on 40 native donkeys and 20 horses suspected to have exertional myopathy. In addition, 30 apparently healthy 15 horses and 15 donkeys were selected and served as a control group. Their body weight ranged from 200 kg to 450 kg and their ages ranged from 6 months to twenty two years.

The animals under investigation were selected from different individuals at Dakahlia governorate from animals raised under different managemental conditions. Horses and donkeys were used as draft animals, and showed the typical clinical signs of acute tying up syndrome from stiff gait, sweating, reluctance to move, tachycardia, tachypnea, painful hard muscles and in some cases myoglobinuria.

Table 1. Clinical criteria on which the animals were categorized as acutely or sub acutely affected.

Group	Clinical signs
Tying-up syndrome in donkeys	Sub acute form: mild clinical signs, lameness and restricted movement of the hind quarters, if exercise is stopped, lameness disappear within 2-4 days. Acute form: Stiff gait, tachycardia, tachypnea, profuse sweating, myoglobinuria, and in some cases reach to sternal recumbency (dog sitting position) in late stages.
Tying-up syndrome in horses	Sub acute form: mild clinical signs, hind limbs lameness, restricted movement with 2 to 3 days of rest return to normal. Acute form: stiff gait, reluctance to move, profuse sweating, tachycardia, tachypnea, myoglobinuria, and recumbency.

Sampling and samples processing :

Whole blood samples were obtained (10 ml) via jugular vein puncture. Blood was left to clot and was left overnight in the refrigerator then centrifugated at 3000 r/min for 5 minutes, clean non hemolyzed sera were collected.

Biochemical analysis :

To be sure from above mentioned signs to evaluate the degree of muscle damage tested Sera levels of Aspartate aminotransferase (AST), Creatine kinase (CK), Lactate dehydrogenase (LDH), Calcium, Potassium, Chloride, Phosphorus and Sodium, were measured spectrophotometrically (Biochemistry Analyser, India & BioMed, Germany) using commercial test kits following instructions of the manufactures. For Calcium, Potassium, Chloride and Phosphorus test kits supplied by ABC Diagnostics, Egypt and Sodium test kits supplied by Accucare, Sarigam, INDIA.

Treatment protocol :

The therapeutic goals for tying up are to control pain and anxiety, restore fluid and electrolyte balance, and prevent further muscle and kidney damage. Treatment depends on severity of the episode in the individual. The most important point is to stop exercise immediately, and in myoglobinuria sign, aggressive fluid therapy is required to prevent renal damage.

Diseased animals were collected randomly to two groups. Group 1 donkeys and horses with acute exertional myopathy subjected to treatment were treated with flunixin meglumine R1 which were administered I/V at a dose rate of 10 mg kg⁻¹ and repeated every 24 hours for three days sequent. Fluid therapy

(Normal saline R3, El Nasr) was administered for all animals according to clinical degree of dehydration. In addition, Dipyrone R4 at a dose of 20 ml/I/V daily for three sequentive days was administered adjacent to the anti-inflammatory drugs. Group 2 donkeys and horses with acute exertional myopathy subjected to treatment with Phenyl butazone R2 which was administered I/V at a dose rate of 10 mg/kg B.W., every 24 hours five days consequent. Fluid therapy (Normal saline R3, El Nasr) was administered for all animals according to clinical degree of dehydration. In addition, Dipyrone R4 at a dose of 20 ml/I/V daily for three sequentive days was administered adjacent to the anti-inflammatory drugs. Clinical evaluation of the treated animals was done to assess the efficacy of efficient anti inflammatory drugs.

R1: Flunixin: Schering- Plough Veterinaire 92, RUE BAUDIN-92300 LEVALLOIS PERRET.

R2: phenylject: ADWIA Co. S.A.E. 10 of Ramadan city, Egypt.

R3: Normal saline: EL NASR PHARMCEUTICALS CHEMICALS CO, ABUZAABAL, EGYPT.

R4: Analgin 50% EL NASR PHARMCEUTICALS CHEMICALS CO, ABUZAABAL, EGYPT.

RESULTS

The clinical signs were important to evaluate tying up syndrome specially in acute form such as stiffness, sweating, reluctance to move, and myoglobinuria which diagnostic to the disease and must be differentiate with colic and other diseases with red urine. On the other hand, serum enzymes such as CK, AST, and LDH increased in these activities is com-

monly, in this study to decrease pain of muscles and make the animal more comfortable administration of non steroidal anti inflammatory such as flutibone meglumine is more superior than other anti inflammatory as phenyl butazone.

Table (2) illustrate biochemical parameters in equine both donkeys and horses with tying up syndrome which showed that there was significant increase in creatine kinase (CK), aspartate amino transferase (AST) and lactate dehydrogenase (LDH) enzyme in diseased animals comparison with control group.

Regarding minerals and electrolytes outcomes. There was significant increase in Ca, K, Na, Cl and ph levels donkeys and horses in comparison with control group Table (3) .

DISCUSSION

Tying up as the syndrome is referred to in draft horses . Is a problem that has long been known horse-people and veterinarians. It represents a major problem in performance horses by limiting or preventing training and inhibiting peak performance.

Sweating was found as a constant feature of Tying -up syndrome in horses and donkeys under investigation . This Finding is similar to that reported previously (Valberg 1995, 1996, 2006, Greene 1998, Sprayberry 1998, Macleay 1999, Knoepfli 2002 and McKenzie 2003). This finding could be attributed to severe pain and abnormal electrolyte imbalance. However other reported recorded no sweating in this disease condition (Valentine 2001, 2002, 2005, Valberg 2002, Ludvikova 2005 and Oki 2005). Siff gait was

also found as a constant finding of Tying -up syndrome in horses and donkeys under observation. This Finding is similar to that reported previously (Valberg 1995, Sprayberry 1998, Valentine 2001, 2002, 2005, Knoepfli 2002, Ludvikova 2005 and Oki 2005) This finding attributed to horse over fed build up to great store of carbohydrate in muscle when begin work these carbohydrate mobilized and cause change in acid -base balance intense stiffness. However other reported recorded no stiff gait in this disease condition (Macleay 1999, McKenzie 2003). Reluctance to move was recorded in most of horses and donkeys. This Finding is agreement to earlier reports (Valberg 1995, Sprayberry 1998, Valentine 2001, Knoepfli 2002, McKenzie 2003, Ludvikova 2005 and Oki 2005) This finding attributed to the altered relaxation of muscle following a contractile twitch in affected horses and donkeys suggests that abnormal intracellular calcium regulation is the cause of recurrent exertional rhabdomyolysis. However other reported recorded no reluctance to move in this disease condition (Macleay 1999 and Valentine 2000, 2002, 2005). Painful muscle could be attributed to changes in chemistry of the muscle fiber occur degeneration of tissues. This Finding is similar to that reported previously (Valentine 2002, 2005, Knoepfli 2002, McKenzie 2003, Ludvikova 2005 and Oki 2005). However other reported recorded no pain in muscles in this disease condition (Macleay 1999, Valentine 2001 and Valberg 2002). Myoglobinuria was found as a constant feature of Tying -up syndrome in horses. This Finding is similar to that reported previously (Valentine 2002, Knoepfli 2002, McKenzie 2003, Ludvikova 2005 and Oki 2005) This finding attributed to the myoglobin released from damaged muscles turns the urine dark

red. However other reported recorded no myoglobinuria in this disease condition (Valentine 2001, 2005 and Valberg 2002). Recumbancy was found as a constant feature of Tying -up syndrome in horses. This Finding is agreed with that reported previously (Valberg 1995, Sprayberry 1998, Valentine 2001, 2002, Knoepfli 2002 and Ludvikova 2005) attributed to cramping and pain muscles result change in chemistry of fluid within muscle tissue as the result of these changes abnormal contraction of muscle fibers occurs and degeneration of cell tissue. However other reported recorded no recumbancy in this disease condition (Maclacy 1999, McKenzie 2003 and Oki 2005). Tachycardia was found as a constant feature of Tying -up syndrome in horses. This Finding is match with reported previously (Sprayberry 1998, Valentine 2002 and McKenzie 2003) attributed to violence exercise in short time. However other reported recorded no tachycardia in this disease condition (Valberg 1995, Maclacy 1999, Valentine 2001, 2005 Knoepfli 2002, Ludvikova 2005 and Oki 2005). Tachypnea was found as a constant feature of Tying -up syndrome in horses. This Finding is similar to that reported previously (Valberg 2002, Sprayberry 1998, Knoepfli 2002, Valentine 2002 and McKenzie 2003) due to the highly effort and lack of oxygen making labored breathing. However other reported recorded no tachypnea in this disease condition (Valberg 1995, Maclacy 1999, Valentine 2001, Ludvikova 2005 and Oki 2005). Regarding to biochemical variables; AST enzyme was an important constant parameter in tying -up syndrome in horses (Sprayberry 1998 severe azotemia increased AST in day one, Elevation in AST still in day two. Valentine 2001, Knoepfli 2002, McKenzie 2003 and

Ludvikova 2005) due to destruction of skeletal muscles and accumulation of muscle enzymes in blood stream. CK enzyme was an important constant parameter in tying -up syndrome in horses (Sprayberry 1998 severe azotemia increased CK in day one, elevation had resolved some what in day two Ck but still increased. Valentine 2001, Knoepfli 2002, McKenzie 2003 and Ludvikova 2005) according to destruction of skeletal muscles and accumulation of muscle enzymes in blood stream. LDH enzyme was an important constant parameter in tying -up syndrome in horses. This findings is similar to that reported previously (Valberg 1995, Knoepfli 2002 and McKenzie 2003). However other reported didn't mention LDH enzyme as an important biochemical parameter (Sprayberry 1998, Valentine 2001, Ludvikova 2005) attributed to destruction of the muscle cell and release of muscle enzyme. Electrolytes abnormalities in serum biochemical values in day one included hyponatremia and in day two the electrolyte abnormalities hyponatremia (sprayberry 1998). Hyponatremia (Valberg 2002) in young foals. Abnormalities in serum biochemical values, Hypochloremia Valberg 1995, and sprayberry 1998 mention that in day one and still in day two hypochloremia. Abnormalities in serum biochemical values, Hyperkalemia in day one and in day two still hyperkalemia (Sprayberry 1998). Abnormalities in serum biochemical values, Hypocalcaemia Valberg 1995, sprayberry 1998.

CONCLUSION

The present study was carried out on a total of 20 horses and 40 donkeys, depending on close observation concerning the clinical picture. In serum biochemical studies of tying

up syndrome in horses and donkeys revealed significant increases in levels of enzymes Creatine kinase (CK), Aspartate aminotransferase (AST) and Lactate dehydrogenase (LDH). more over the biochemical observation Cal-

cium, Potassium, Chloride, Phosphorus and Sodium increased and decreased without significant values and within normal limits. Flunixin meglumine which more superior than phenyl butazon in treatment.

Table 2: biochemical parameters (mean & Std) in equines with tying up syndrome.

Animals	AST	CK	LDH
Donkeys (n=40)	1008.2 ±5526 ^c	9904.8 ±5068.2 ^c	10216.8 ±5200.2 ^c
Horses (n=20)	4407.1 ±1229 ^b	5031.9 ±1582.3 ^b	4631.8 ±1408.9 ^b
Control (n=30)	401.5 ±60.6 ^a	300.6 ±28.2 ^a	609.1 ±154.9 ^a

Table 3: Minerals and electrolytes parameters (mean & Std) in equines with tying up syndrome.

Mean	Ca	K	Na	Cl	p
Donkeys	3.1 ±0.03 ^b	4.2 ±0.08 ^b	145.8 ±1.6 ^c	105.7 ±1.2 ^b	1.1 ±0.03 ^b
Horses	3.1 ±0.02 ^b	4.2 ±0.06 ^b	144.7 ±1.05 ^b	105.3 ±0.8 ^b	1.1 ±0.01 ^b
control	3.1 ±0.05 ^a	4.1 ±0.03 ^a	139.7 ±0.98 ^a	103.9 ±0.9 ^a	1.1 ±0.02 ^a

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الملخص العربي

التقييم الإكلينيكي والمعملي لظاهرة التيبس العضلي في الخيول والحمير

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استهدفت هذه الدراسة إلقاء الضوء على ظاهرة التيبس العضلي في الخيول والحمير ومحاولة تقييم هذه الظاهرة من الناحية الإكلينيكية والمعملية في فصيلة الخيول والحمير المصرية وعمل محاولات علاجية للحيوانات المصابة لكي نترب من العلاج الأمثل بأسرع وأقل تكلفة. شملت الدراسة على عدد تسعون من الخيل والحمير من كلا الجنسين وتتراوح أعمارهم من ستة شهور حتى اثنين وعشرون عاما كما تتراوح أوزانهم ما بين مائة كجم حتى أربعمائة وخمسون كجم غالبية الحيوانات من حالات فردية داخل محافظة الدقهلية في مصر . وقد تم عمل الفحص الإكلينيكي للخيول والحمير وتسجيل حرارة الجسم وعدد ضربات القلب والتنفس وحالة التيبس العضلية وأعراض التعرق وتخشب العضلات وألمها وعدم القدرة على الحركة وحالات الهول المدم وحالات عدم القدرة على الوقوف في بعض منها تم الحصول على عينات من المصل من كل حيوان ثم فحصها لدراسة بعض التغيرات الكيميائية الكالسيوم والصوديوم والبوتاسيوم والكلوريد والفسفور والاسبرتيت امينو ترانسفيريز والكرياتين كايينيز و لاكتيت ديهيدرو جينيز. وقد تبين من النتائج وجود زيادة معنوية عالية في كل من الاسبرتيت امينو ترانسفيريز والكرياتين كايينيز و لاكتيت ديهيدرو جينيز وتعتبر هذه الزيادة تشخيصية للمرض. كما تبين أيضا فاعلية وكفاءة العلاج بالفلونكسين ميجلومين عن العلاج بالفنيل بيوتازون.