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Manifestation of gastric ulcers in horses used in public safety

[*Manifestação de úlceras gástricas em equinos aplicados na segurança pública]*

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ABSTRACT

We evaluated 28 horses from a squad applied in public safety in Paraná (Brazil), in order to check the incidence of gastric ulcers and its correlation with mounted policing activity, considering the initial and maintenance training to which such animals are submitted. Horses were divided in two groups, one named control with 14 individuals, used in policing community activities, and the 14 others named as target group, these were used in restoration and maintenance of public order. Both groups have differentiated maintenance training protocols, and all had been evaluated for fecal occult blood, clinical evaluation, gastroscopy and histopathological. There were no significant changes that proved the development of gastric ulcers in horses used in public safety due to initial and maintenance training, and the main factor for prevention was the diversified diet with emphasis in hayed alfalfa.

Keywords: horse, gastroscopy, policing, ulcers

RESUMO

Foram avaliados 28 equinos do plantel de animais aplicados na segurança pública do estado do Paraná, com o objetivo de verificar as incidências de úlceras gástricas e a correlação da manifestação de tal doença com a atividade de policiamento montado, considerando o treinamento inicial e o de manutenção aos quais tais animais são submetidos. Os equinos foram divididos em dois grupos: controle, com 14 indivíduos, aplicados na atividade de policiamento montado comunitário, e grupo-alvo, com os outros 14 animais, utilizados em ações de restabelecimento e manutenção da ordem pública, ambos os grupos com protocolos de treinamentos de manutenção diferenciados. Todos os animais foram submetidos à avaliação de sangue oculto em fezes, à avaliação clínica, à gastroscopia, à avaliação odontológica e comportamental, ao escore corporal e à histopatológica de mucosa gástrica. Não foram encontradas alterações significativas que comprovam o desenvolvimento de úlceras gástricas, em consequência do treinamento inicial e o de manutenção, nos equinos utilizados na segurança pública, cujo fator primordial preventivo foi a matriz alimentar diversificada com ênfase na alfafa fenada.

Palavras-chave: cavalo, gastroscopia, policiamento, úlcera

INTRODUCTION

The increase in debates on issues related to animal welfare is increasingly in vogue in Brazil and worldwide, leading different sectors of society to discuss better conditions for animal breeding (D'Almeida, *et al.*, 2014).

Faced with this issue, the public security troops that employ horses in its force, which are indispensable (Delboni, 2011), also have responsibilities towards them within the concepts of animal welfare.

The public security activity stands out for being a stressful professional activity (Jorge and Gomes, 2009), especially for military police officers (Dantas *et al.*, 2010). Considering this information, the question arises whether such activity brings also deleterious effects on the health of horses. Therefore, the present work aims to verify if there is a manifestation of gastric ulcers in such animals, due to its use in the activity of community policing or the reestablishment of public order.

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To verify if the public safety activity with the use of horses results in the emergence of gastric alterations in such animals, such as gastritis or ulcers, a group of animals from the Military Police of State of Paraná was evaluated. The animals were submitted to specific tests to evidence or rebut the manifestation of gastric ulcers.

The activities performed by horses of different classes and ages are linked with the emergence of manifestations of gastric ulcers, with multifactorial causes such as work, stabling, diet and behavior (Aranzales *et al*., 2014).

Stressful situations can stimulate the hypothalamic-pituitary-adrenal axis (Conte, 2014), altering the splenic blood flow with increased production of acid and pepsin, leading to local ischemia and mucosal changes.

As directed by the European College of Equine Internal Medicine, the term Equine Gastric Ulcer Syndrome (EGUS) is a definition that encompasses all stomach diseases described as ulcerative and that cause some type of erosion, subdivided into Aglandular Gastric Disease and Glandular Gastric Disease (Hewetson *et al*., 2015).

Such disease in horses is prevalent in foals and occurs in up to 80% of horses that are subjected to intensive categories of training and competitions (Fialho *et al.*, 2010), and there may be variation in the intensity of lesions depending on the breed and training location, diet, and deprivation of physical activities (Hewetson *et al.*, 2015).

he clinical signs of this condition can be mild and nonspecific, with a variation in symptoms and lesions, such as low body score, abdominal discomfort, loss of appetite, teeth grinding (bruxism), episodes of *Helicobacter pylori*, chronic diarrhea, recurrent colic, aggressiveness, and poor performance (Hewetson *et al.*, 2015).

The first line of defense of the gastric mucosa is the muco-bicarbonate-phospholipid barrier. Along with the property of rapid epithelialization of the mucosa, even with these protective factors, this is an area in which around 20% of gastric ulcers occur (Aranzales and Alves, 2013).

The aglandular region has a stratified squamous epithelium without efficient protection, with an 80% predisposition to the appearance of ulcers due to the action of acid causticization. (Murray, 2009).

Bicarbonate has the property of maintaining a neutral pH environment in the epithelium, thus preventing proteolytic digestion of pepsin on the epithelial surface (Aranzales and Alves, 2013).

The biochemical and physical characteristics have as their constituents the biopolymers which are composed of water and glycoprotein-mucins in the proportion of 95% and 5% respectively, added of ions, DNA, cells, lipids, proteins and cellular debris (Lai *et al*., 2009).

The *Helicobacter pylori* is highly resistant to the action of hydrochloric acid, which enables the colonization of the gastric mucosa due to the urease enzyme that contributes to the production of ammonia, acting on the ion's receptors M + leading to the formation of a neutral pH (Placido, 2003).

It is noteworthy that the virulence factor, *Helicobacter pylori* vacuolizing cytotoxin, is correlated with a greater neutrophilic action of the gastric mucosa (Leite, 2009).

Saeidi and Sheikhshahrokh (2016) suggest that horses may be, among other species of domestic mammals, reservoirs of Helicobacter pylori and that *H. pylori* has a zoonotic aspect.

Videla and Andrews (2009) state that nutritional management should receive special attention to prevent the recurrence of lesions, especially alfalfa, which acts as a protector of the gastric mucosa in horses (Vondram *et al.*, 2016), making it even more alkaline (Hewetson *et al.*, 2015). The alfalfa bears great capacity of neutralizing gastric acid and consequently reduce the incidence of gastric ulcers (Pagan, 2017), due to having high levels of calcium that inhibit such secretion (Fonseca, 2010).

Brito and Sá (2015) point out that proton pump inhibitors, mucosal protectors and gastric hypersecretion reducers are drugs usually used in the treatment of gastric ulcers.

The purpose of proton pump inhibitors is to constrain the action of K+ATPase (proton pump) and H+, acting in the secretory region of the gastric parietal cell (Lima and Neto Filho, 2013).

Mucosal protectors, has the Sulcrafate as its main representative of this class. Sulcrafate in contact with an acidic environment of pH less than four, causes a cross-linking, which generates a viscous and sticky polymer that binds the epithelial cells for up to six hours. Since it has a negative charge, it immediately binds to the mucosal proteins because they have a positive charge (Goodman and Gilman, 2013).

Type two histamine receptor antagonists prevent acid production by reversibly competing with histamine for H2 receptor sites on the basolateral membrane of parietal cells. The H2 receptor plays an important role in modulating gastric acid secretion and they are H2 receptor antagonists, which are widely used in the treatment of gastrointestinal ulcers (Deutch, 2011).

The gold standard for diagnosing the presence of gastric ulcers in horses is gastroscopy. The procedure allows the measurement of the extent and severity of the lesions (Forsman, 2014). This is an easy procedure to perform and is minimally invasive, allowing the assessment of non-glandular and glandular region (Jorge Nieto, 2012). Such examination is performed with the horse under a sedation state and 12 to 14 hours solids fasting (Zuluaga *et al.*, 2016).

The occult blood test is a good auxiliary tool for the diagnosis of gastric ulcers in horses (Andrews, 2012).

MATERIAL AND METHODS

The protocol for this study was approved by the Ethics Committee for the Use of Animals (CEAU/UFPR) under registry number 093/2016.

Twenty-eight horses were selected among the Paraná Military Police animal roster, 14 of which employed in Ordinary Ostensive Policing, for routine policing in parks, squares, and public places, while the other animals were employed in the Restoration of Public Order, with specific training for use in sports events and venues and general events.

The horses used in the project are deployed in mounted policing by the "Coronel Dulcídio" Cavalry Regiment, located in the city of Curitiba Pr. The animals have no defined breed, with an average age of 12.46 years (±1.07), with 21 castrated males and seven mares, with an average weight of 512.53kg (±2.11).

The clinical history of the animals regarding colic episodes, records of low body score, dental history and evaluation, behavioral assessment, and performance monitoring of the animals during mounted policing were evaluated.

To perform the gastric evaluation, a Storz® videogastroscope, model 60130 PKS /NKS STORZ, with 10.4 mm diameter and 3000 mm working channel length 2.8 mm and maximum deflection angle of 200 degrees, was used.

Before each gastroscopic evaluation, the horses were submitted to clinical examinations where their physiological parameters were evaluated to verify if the animals were in healthy state at the time of the evaluation.

The gastroscopy procedure started with the sedation of each animal with the intravenous administration of detomidine hydrochloride in the volume of 0.001-0.002 mg/kg body weight.

At the time of each gastroscopic evaluation, the animals were fasting solids for 12 hours, to allow the stomach to be completely empty for the examination and thus proceed the verification of occurrence or absence of gastritis, ulcers or scars. Occasionally, in some animals, in addition to chemical restraint, physical restraint with pressure on the upper lip was used.

This exam was performed by introducing the gastroscope through the nostril, passing through the esophagus and accessing the stomach.

A visual examination of the gastric mucosa was performed, and the changes found were recorded in a specific table, noting in which region of the stomach they were found, number of lesions and their grade assigned with values from 0-4, as shown in table 1 below.

Table 1. Grade of gastric lesions used to assess gastric findings in the evaluated horses

Degree	Lesion aspect
0	The epithelium is intact with no signs of Lesion
1	Presence of hyperkeratosis areas
2	Presence and significant clinical signs of gastric ulcers; a small sign of lesion is also admitted.
3	Isolated large lesions or extensive injured surfaces
4	Presence of deep ulcerations

Source: Forsman, 2014. Hewetson *et al*., 2015.

For the histopathological examination, samples were collected from several fragments from different places of the mucosa and stored in a formal container and sent for evaluation in the laboratories of the Federal University of Paraná.

With the purpose of detecting signs of bleeding from the gastric tract, occult blood tests were performed on the animals, using the test acquired on the market known as ECOTESTE ^{R} FOB supplied by ECO Diagnóstica. The ECO Test is a qualitative immunoassay for the detection of fecal occult blood, as detailed in table 2.

Table 2. Procedure used to detect occult blood test in the evaluated animals

Order	Procedure
1	Collect feces in a clean, dry container.
2	Insert the stick four times into the sample in different places.
3	Replace the applicator stick in the collection tube and close the cap.
4	Shake the collection tube for optimal homogenization.
5	Remove the STATUS device from the protective sachet and place it on a flat surface.
6	Unscrew the end cap from the collecting tube and place 04 full drops in the opening of the device identified by the letter “S”.
7	Read the results after 5 minutes.
8	“C” only, valid, and negative STATUS.
9	Simultaneous “C” and “T”, positive for fecal occult blood test STATUS.

Source: The author 2017

RESULTS AND DISCUSSION

The results of research on the clinical history of horses used in this study did not show any record of abdominal discomfort or colic episodes in the 13 months preceding the present study, as well as the entire herd of animals in the regiment, during the evaluation period. The reason for such conclusion is ascribed to the diversified food matrix composed of alfalfa, green matter (Tifton or cost-cross), pelleted feed and oat grains, supplied throughout the day in several stages.

In the evaluation of the body score, in the course of the work, none of the animals had a score below 3 or above 4, where low scores are pointed out in the literature as being one of the signs of the presence of ulcers or gastritis.

The evaluations of the physiological parameters were within normal values for all animals, on the evaluation prior to the gastroscopy exams**.**

In the dental evaluation, no signs of grinding, a manifestation linked to gastric disorders such as ulcers and gastritis, were found.

In the behavioral aspect, the animals in both groups did not show aggressiveness or stereotypies that could point to manifestations of pathologies such as ulcers or gastritis.

In the evaluated animals, no performance decrease was registered during the regular activities of mounted policing.

The gastroscopic evaluation showed alterations in only two animals, consisting of a mild hyperkeratosis, observed in the gastroscopic examination, and confirmed in the histopathological evaluation, in the aglandular region, and it was not possible to identify the cause or how long the lesion occurred. This result was attributed to unknown factors that

occurred with the animal before its entry into the regiment's roster.

The hyperkeratosis found in the second animal, characterized by the manifestation of several points of ulcers classified as grade 1, is attributed to causes not correlated with the management of training, employment in police activities or feeding. Considering that other animals are subjected to the same protocols and that such alterations in the gastric mucosa were not observed, the outcome was also attributed to causes prior to entry into the squad.

Of the 28 samples of gastric mucosa collected for histopathology, only one was found to be abnormal, one case of mild multifocal neutrophilic erosive gastritis, in which the presence of several grade 1 ulcer points was observed. The presence of Helicobacter pylori in the samples was not verified.

The methodology of collecting samples from different places aimed to avoid a low bacterial concentration region (Strauss-Ayali and Simpson, 1999). This exam allows the microscopic visualization of the mucosa with definition of the severity of an eventual inflammation (Andreia, 2010.

The occult blood test was negative for all animals in both groups, in line with Cardona *et al.* (2013) and Merrit (2003), who argue that the occult blood test is only effective as an indication of the manifestation of gastric Ulcer in newborn foals.

When research was carried out in the file of medical records of the Veterinary Service of the Military Police of Paraná, the horse in question received only one dose of phenylbutazone three years before the present research project, which by itself cannot be attributed as a motivating factor for the manifestation of gastric ulcers in horses, as such a drug would only be a predisposing factor for such pathology, if administered continuously (Jorge Nieto, 2012).

According to the same veterinary service, horses undergoing anti-inflammatory treatments receive medication with proton pump inhibitors.
In addition to the above results, another factor that meets the scientific literature is that the main roughage component available is alfalfa, distributed twice a day to the animals, which has the characteristic of acting on the gastric pH, making it more alkaline.

CONCLUSION

After analyzing the results of the assessments carried out in both groups, it is concluded that the deployment of horses in public safety, within parameters of animal welfare, from taming through maintenance instructions, does not characterize an activity predisposing to manifestation of gastric ulcer or gastritis either in use for ostensive community mounted policing or in actions related to operations of reestablishment and maintenance of public order.

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