Original Article

The survey of the prevalence of Equine Gastric Ulcer Syndrome (EGUS) in non-racing Thoroughbred horses in Thailand

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Abstract

This study aimed to determine the prevalence, types, and risk factors of Equine Gastric Ulcer Syndrome (EGUS) in non-racing Thoroughbred horses in Thailand. A total of 56 Thoroughbreds, aged 5 to 22 years (mean age: 12.43 ± 4.65 years), were included. Before sedation, a comprehensive history and physical examination were conducted. Gastroscopy was performed to identify gastric ulcers using the Equine Gastric Ulcer Council 0–4 scoring system for non-glandular ulcers, while glandular ulcers were assessed as present or absent. Data on breed, age, sex, activity status, behavior, appetite, and medical history were collected. The overall prevalence of gastric ulcers was found to be 83.93% (47/56), with non-glandular ulcers at 82.1% (46/56) and glandular ulcers at 33.9% (19/56). Notably, 33% (19/56) of the horses had ulcers in both regions. No significant differences were found between horses with and without ulcers regarding sex, history of colic, behavior change, lameness, diarrhea, or NSAID use. This study reports a higher prevalence of EGUS compared to previous findings.

Keywords: Equine Gastric Ulcer Syndrome (EGUS), Gastric ulcer, Horse, Prevalence

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Introduction

Equine Gastric Ulcer Syndrome (EGUS) was first described by Andrews and Nadeau (1999), distinguishing between Equine Squamous Gastric Disease (ESGD) and Equine Glandular Gastric Disease (EGGD) based on the affected stomach regions (Sykes, Hewetson *et al.,* 2015). The upper third of the stomach is the non-glandular region, covered by squamous mucosa, where ESGD occurs, while the lower two-thirds comprise the glandular region, associated with EGGD, separated by the margo plicatus (Andrews *et al.,* 1999; Vokes *et al.,* 2023).

The etiology of gastric ulcers remains uncertain. ESGD is thought to result from prolonged exposure to gastric acids (hydrochloric acid, pepsin, bile acids), whereas EGGD may arise from impaired protective mechanisms in the glandular mucosa, including blood flow and mucosal barriers (Murray, 1999; Vokes *et al.,* 2023). Clinical signs often linked to gastric ulcers include abdominal discomfort, poor body condition, decreased appetite, abnormal behavior, and poor performance (Murray, 1992).

Prior studies show high prevalence rates of EGUS in performance horses, particularly in endurance, show, and racing disciplines. For instance, ESGD prevalence in endurance horses was 93% during competition seasons (Tamzali *et al.,* 2011). Thoroughbred racehorses show rates between 80-100% in training (Murray *et al.,* 1996; Vatistas *et al.,* 1999), while show horses have rates of 17-58% (McClure *et al.,* 1999; Hartmann *et al.,* 2003; Luthersson *et al.,* 2009).

This study aimed to assess the prevalence and risk factors of EGUS in non-racing Thoroughbreds in Thailand.

Materials and Methods

Animals: Data were collected from January 2023 to January 2024 across three regions in Thailand (central, northeastern, and western). The study involved 56 Thoroughbreds of varying ages, sexes, and uses from four different stables. Activity status was categorized as follows: (1) active training (≥60 minutes, 5 days a week), (2) riding lesson horses (30-60 minutes), (3) retired horses (<30 minutes), and (4) broodmares.

Questionnaire: Grooms or caretakers completed questionnaires detailing breed, age, sex, activity, behavior, appetite, and medical history. Information on any health issues in the past six months, including diarrhea, colic, and NSAID administration, was recorded.

Endoscopic Gastroscopy: Horses were fasted for 12-14 hours, with water withheld for 8 hours before gastroscopy. After sedation using xylazine hydrochloride (X-lazine® 100 mg/ml; L.B.S. Laboratory Ltd., Bangkok, Thailand) at 1.0 mg/kg, intravenously (IV) and/or detomidine hydrochloride (Domidine® 10 mg/ml; Eurovet Animal Health B.V., Bladel, The Netherlands) at 0.015 mg/kg, intravenously depending on the horse's behavior and temperament., a 3 meters flexible video endoscope (Veterinary Video Endoscope PV-G 28-300, Karl Storz SE & Co. KG, Germany) was inserted to examine the stomach. The procedure, which took 20-30 minutes, allowed for a thorough evaluation of both squamous and glandular mucosa, with video recordings stored for analysis.

Scoring: The Equine Gastric Ulcer Council 0–4 scoring system was utilized for ESGD (Bell *et al.,* 2007; Sykes *et al.,* 2015). Glandular ulcers were assessed as present or absent due to insufficient data for hierarchical grading.

Statistical Analysis: Statistical analyses were conducted using IBM SPSS (Version 29.0.1). Logistic regression compared variables between horses with and without ulcers. Significance was set at $P < 0.05$.

Result

Gastroscopy was successfully performed on all 56 horses. The fasting protocol allowed for the comprehensive evaluation of 100% of the squamous mucosa and 70% of the glandular mucosa, as shown in Fig. 1 and 2, respectively. The mean age of the horses was 12.43 ± 4.65 years, and the body condition score was 5.5 out of 9, with a distribution of 26 geldings, 29 mares, and 1 stallion.

The following clinical signs were reported: 2 (3.6%) had decreased appetite, 27 (48.20%) had increased appetite, 2 (3.60%) had nervous disposition, 7 (12.5%) had suffered from colic, 10 (17.9%) had experienced lameness, 1 (1.8%) had diarrhea, 3 (5.4%) had a poor body condition score, and 9 (16.1%) had NSAIDs administration in the past 6 months with no statistically significant associations were found between these signs and the presence of gastric ulcers.

There were 29 (51.80%) horses that were not in active training, 7 (12.50%) trained from 1 to 30 minutes, 18 (32.10%) trained for between 31 to 60 minutes, and 2 (3.6%) trained for longer than 60 minutes (Table 1). Out of all the horses, five (8.9%) had traveled, and 4 (7.1%) performed below expectations in the past 6 months (Table 1).

The overall prevalence of gastric ulcers was 83.93% (47/56), with ESGD at 97.9% (46/47). Ulcer locations in the non-glandular region included the lesser curvature (76.6%) and margo plicatus (57.4%). The glandular region had a prevalence of 40.4% (19/47), primarily in the pylorus (29.8%). Notably, 33% (19/56) of horses had ulcers in both regions. The prevalence of ulcers across ulcer scores indicated that 60.7% had scores of 2-4 (Table 2).

No significant associations were identified between sex, medical history, NSAID use, or housing conditions and the prevalence of gastric ulcers.

The accidental findings of the parasites in a nearby area of margo plicatus were discovered in 4 of 56 (7.1%) horses during a gastroscopy (Fig. 3). The gastric parasites were later identified by microscopic examination under a light microscope as *Habronema muscae*.

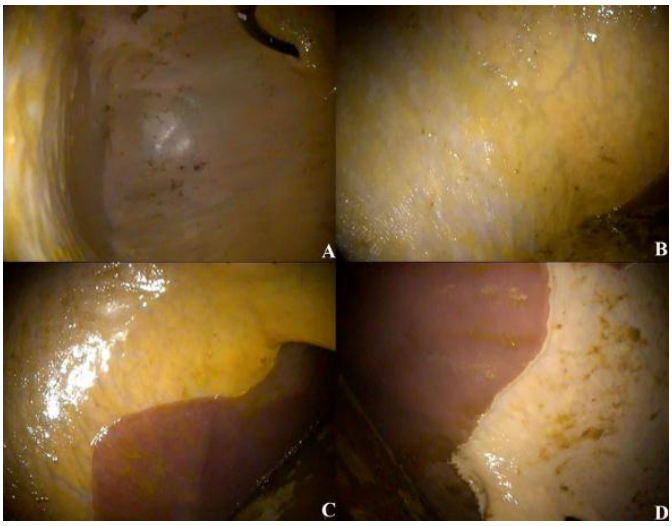

Figure 1 A normal appearance of a squamous region of the stomach seen via gastroscopy. *A = dorsal squamous fundus, B = greater curvature, C = lesser curvature, and D = margo plicatus.*

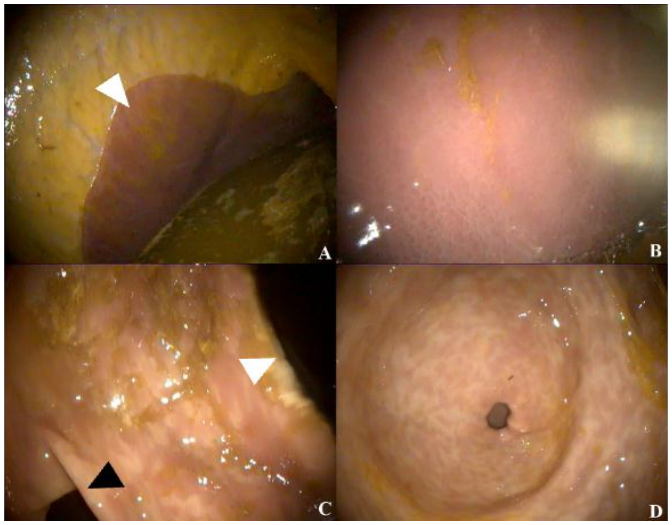

Figure 2 A normal appearance of a glandular region of the stomach seen via gastroscopy. *A = cardia (white arrowhead), B = fundus, C = antrum (white arrowhead = lesser curvature, black arrowhead = pylorus), and D = pylorus.*

Figure 3 A gastric nematodes (*Habronema muscae*; black arrowhead) found on the mucosa of the cardia near the area of margo plicatus.

Table 1 Prevalence of Equine Gastric Ulcer Syndrome (EGUS) in 56 non-racing Thoroughbred horses in Thailand, and percentage of each variable with EGUS in each part of the stomach.

Variable	No. of Horses	Ulcers (Any location)	ESGD	EGGD	Both Locations
Status					
Broodmare	14	14 (100.0%)	14	6	6
Training	17	11 (64.7%)	11	5	5
Retired	19	16 (84.2%)	16	5	5
Riding Lesson	6	6 (100.0%)	5	3	2
Age (Years)					
1-5	2	2 (100.0%)	2	0	0
6-10	16	12 (75.0%)	12	7	7
11-15	20	17 (85.0%)	17	7	7
16-20	16	14 (87.5%)	13	5	4
21-25	2	2 (100.0%)	2	0	0
BCS (-/9)					
3	3	3 (100.0%)	3	0	0
4	15	13 (86.7%)	13	5	5
5	10	6 (60.0%)	5	3	2
6	20	17 (85.0%)	17	5	5
7	7	7 (100.0%)	7	5	5
Appetite					
Not Observed	5	3 (60.0%)	3	1	1
Decrease	2	2 (100.0%)	2	1	1
Normal	22	18 (81.8%)	18	8	8
Increase	27	24 (88.9%)	23	9	8
Disposition					
Nervous	2	2 (100.0%)	2	1	1
No	54	45 (83.3%)	44	18	17
History of Colic					
Yes	7	6 (85.7%)	5	3	2
No	49	41 (83.7%)	41	16	16
History of Lameness					
Yes	10	7 (70.0%)	7	1	1
No	46	40 (87.0%)	39	18	17
History of Diarrhea					
Yes	1	1 (100.0%)	1	0	0
No	55	46 (83.6%)	45	19	18
NSAIDs used					
Yes	9	7 (77.8%)	6	2	1
No	47	40 (85.1%)	40	17	17
Training Time					
No Training	7	6 (85.7%)	6	1	1
1-30 mins	29	27 (93.1%)	27	12	12
31-60 mins	18	12 (66.7%)	11	6	5
Performance					
Below Expected	4	3 (75.0%)	3	1	1
As Expected	52	44 (84.6%)	43	18	17
Housing					
Pasture < 6 hrs/day	25	23 (92.0%)	23	10	10
Pasture Full Time	1	1 (100.0%)	1	0	0
Stable Full Time	30	23 (76.7%)	22	9	8

% = % of horses within each of the groups. Missing = No information was recorded.

Table 2 Prevalence of the equine gastric ulcer syndrome (EGUS) of 56 non-racing Thoroughbred horses in Thailand, in each location of the stomach.

Gastric Ulcerations	No. of the horses (%)
Ulcers in any location	47 (83.9%)
Ulcers in non-glandular (ESGD)	46 (82.1%)
Ulcers in glandular (EGGD)	19 (33.9%)
Ulcers in both locations	18 (32.1%)

Discussion

Gastroscopic examinations revealed a high prevalence of gastric ulcers in non-racing Thoroughbred horses in Thailand. This study provides the first assessment of gastric ulcers in this demographic, with a prevalence rate (of 83.93%) with ESGD being particularly prevalent (97.9% of the horses with ulcers) exceeding that reported in similar populations in other countries (Chameroy *et al.*, 2006, Luthersson *et al.*, 2009). Previous studies indicated lower prevalence rates in non-active horses, highlighting the unique findings of this research. This suggests that gastric ulcers are a common issue in the studied population, raising concerns about the management and health of these horses. The mean age of the horses (12.43 years) indicates that the sample may include older, potentially more susceptible individuals, as age can be a contributing factor to the development of gastric ulcers.

Clinical signs observed did not correlate statistically with the presence of gastric ulcers, suggesting that the symptoms of EGUS can be nonspecific. Interestingly, the high prevalence of EGUS in broodmares (100%) is higher than the 70.9% (44/62) reported by Le Jeune *et al.* (2009). However, the prevalence of EGUS was 64.7% (11/17) of training horses, 84.2% (16/19) of retired horses, and 100% (6/6) of riding lesson horses were comparable to previous studies (Dionne *et al.*, 2003; Luthersson *et al.*, 2009). However, no statistically significant correlation was established between the status of horses and the prevalence of gastric ulcers in this population. This lack of correlation might suggest that gastric ulcers can be present without overt clinical signs, complicating diagnosis.

In terms of EGUS location, the prevalence of ESGD was 82.1% (46/56), which is higher than EGGD at 33.9% (19/56). The prevalent ESGD in this population were located at lesser curvature (64.3%) and margo plicatus (48.2%), which was like previous studies (McClure *et al.*, 1999; Dionne *et al.*, 2003; Bell *et al.*, 2007). This incident could result from a common practice in Thailand where hay is last given or removed from the paddock in the evening before bringing the horses to their stalls until the next morning, which may prolong gastric emptying time and reduce the buffering of accumulated acid from grass and hay.

The incidental finding of gastric parasites *(Habronema muscae)* found in a small percentage of horses (7.1%) is intriguing. This parasite may contribute to inflammation in the gastric mucosa, which can lead to ulcers. While it may not be the main cause of the high ulcer prevalence, it could still affect the overall gastric health of the horses, especially those showing signs of distress. Further research is needed to better understand the relationship between this parasite and gastric ulcers to improve management and treatment strategies.

The study concludes that while gastroscopic examination is effective for diagnosing gastric ulcers, the identification of specific risk factors remains challenging. Future research is needed to elucidate the causes of gastric ulcers in various equine populations and improve diagnostic and treatment strategies for equine practitioners.

Future research should focus on investigating gastric ulcer progression and management practices over time, examining the influence of diet on ulcer prevalence and severity, assessing the impact of training intensity, travel, and housing on gastric health, cortisol level, and exploring the relationship between gastric ulcers and parasitic infections for improved health management strategies.

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