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Research article

A clinical survey of 244 equines with dental disorders in Thailand

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Abstract

Dental problems in equines can cause emaciation, colic, and poor performance. Types of dental disease in equine populations have been reported worldwide in veterinary medicine; however, few detailed investigations of equine dental problems in Thailand have been published. Thus, this study aimed to determine the prevalence of equine dental problems in Thailand. Standard dental and oral cavity examinations were performed on 244 equines (232 horses and 12 donkeys) ranging in age from 2–21 years (median = 9.88) from Western, Northern, and Central parts of Thailand between January 2015 and December 2017. The dental disorders were recorded and the data was analyzed to determine the proportion as a percentage of dental disorders. Logistic regression was used to find relations between dental floatation routine, gender, age, body weight, and dental disorders. The survey showed that sharp cheek teeth (82.37%) was the most common problem, which was often associated with frontal hook (10.65%) and caudal hook (6.55%). Other disorders observed included incisor tartar (9.42%) and canine teeth tartar (9.42%). One to two years routine of dental examination and floatation has 2.54 times (p<0.01) higher chance to develop sharp teeth compared to 0.5-1 year routine. In addition, not having any routine increased this effect by 22 times(p<0.01). Sharp cheek teeth was by far the most found and significant dental problem in these equines. These findings show the importance of regular dental floating and tartar scaling. Early detection and treatment can improve equine oral health.

Keywords: Dental disorders, Equine, Sharp cheek teeth, Thailand

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INTRODUCTION

In 2017, Thailand has 4,754 registered horses. The majority of the population is in central (1,446), west (979), North-east regions (716), (Department of Livestock Development, 2017). The popular business in Thailand consists of riding, trail, racing, show, and dressing horse. There has not been established common guideline for horse dental examination in Thailand. Most of the time, there are annual or no routine visits despite the bi-annual recommendation. (Scrutchfield, 2022). Which can increase dental problems in horses. Dental problems in horses (Dixon and Dacre, 2005) and donkeys (du Toit and Dixon, 2012) can cause emaciation, colic, and poor performance. It has been reported that the most common dental disorder found in equine cadavers in Queensland, Australia (Chinkangsadarn et al., 2015), the United Kingdom (du Toit et al., 2008), and Sweden (Gere and Dixon, 2010) was sharp enamel points of cheek teeth. Clinical surveys of equine dental diseases have also reported high prevalences of sharp enamel points in donkeys in Mexico (du Toit et al., 2009) and horses in the United Kingdom (du Toit et al., 2008). Types of dental disease in equine populations have been reported worldwide in veterinary medicine. However, few detailed investigations of equine dental abnormalities in Thailand have been published. Thus, the aim of this study was to determine the proportion of dental disorders in equine populations in Thailand.

MATERIALS AND METHODS

Study approval

This study was approved by the Faculty of Veterinary Medicine Animal Care and Use Committee, Chiang Mai University (Approved protocol number R1/2558). The owners of the equines provided permission for this study.

Clinical case

Clinical dental exams were performed on 244 equines between January 2015 and December 2017. Of these, 85 horses and ponies were examined at a riding stable in Chiang Mai province (Northern Thailand), 47 equines at the Pack Squadron in Chiang Mai province (Northern Thailand), 24 equines at the Third Livestock and Agriculture Division, Veterinary and Remount Royal Thai Army Department in Chiang Mai province (Northern Thailand), 37 horses at the First Livestock and Agriculture Division, Veterinary and Remount Royal Thai Army Department in Kanchanaburi province (Western Thailand), and 51 horses at the Cavalry Center in Lopburi province (Central Thailand).

Sedation and control

All equines in this study were physically restrained according to standard protocol using either halter and lead, stall, and/or nose twitch. For 244 of the equines, dental exams were performed under sedation using Xylazine HCl 100 mg/ml (AnaSed® Injection, Akorn, Inc. Lake Forest, IL; U.S.) at a dose of 0.5 – 1.1 mg/kg body weight via slow intravenous injection.

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Diagnostic protocol

The intra-oral cavity was flushed with pressure water to clean it of food and hay. During the exam, the head was supported on a headrest, and a full-mouth speculum (EQUIVET Haussmann Speculum, Kruuse UK Ltd., N. Yorks, United Kingdom) or Schoupe Mouth Wedge (Kruuse UK Ltd., N. Yorks, United Kingdom) was inserted to open the mouth. The intra-oral exam was conducted using a headlight, dental pick, dental mirror, dental pulp probes, and periodontal dental probe (PZ-TECHNIK GMBH Holger Rosenberg, Hachenburg, Germany). The check teeth edges and soft tissue were palpated, and tongues were held by hand during visual examinations as shown in Figure 1. If required, radiographs were taken.

Figure 1 An equine intra-oral examination

Recording the dental disorders

All lesions and dental disorders were charted using the Triadan dental numeric system. Photographs were taken of all dental disorders and soft tissue lesions. Bad odor was recorded. Record definition was shown in Table 1. Top 5 most common disorders found in our study will be categorize as Major dental disorder.

Table 1 Definition of dental disorders

Dental disorders	Definition
Abscess	Structure fill with pus appears radiolucent in x-ray film.
Absent	Teeth that are absent to the normal on each triadan.
Bit sore	Oral Lesions on the bit area.
Caudal hook	Development of sharp dental on caudal part.
Cap teeth	Abnormal retention of the remnants of the deciduous cementum.
Decay	Dental plaque or oral biofilm. The irregular tooth surfaces.
Displace	Teeth do not sit in normal alignment.
Dorsal curvature	Ocular surface of the upper incisors is curved so that the top central incisors are longer than the teeth on either side.
EORTH	Periodontal disease associated with radiographically lytic changes and cemental hyperplasia.
Fracture	Loss of portion of tooth
Frontal hook	Development of sharp dental on rostral part.
Gingivitis	Red, swollen of gingival.
Overbit	Upper incisors grow down below the level of the lower incisor occlusal surface.
Overgrowth	One tooth is longer than the others in the same triadan.
Periodontal disease	Inflammatory conditions that affect the tissues that surround and anchor the teeth within the jaw bone.
Sharp teeth	Development of sharp dental overgrowth.
Supernumerary	Teeth are additional to the normal on each triadan.
Tartar	A yellow-brown chalky deposit develops on the teeth.
Tongue scar	Contracted tissue in the tongue.
Ulcer	Disruptions in the integrity of the oral mucosa.
Underbit	Overgrowth of the lower incisors, such cases develop a concave occlusal surface of their upper incisor occlusal surface.
Ventral curvature	Ocular surface of the lower incisors is curved so that the lower central incisors are longer than the teeth on either side.
Wave teeth	The teeth in the middle are shorter than the others, creating a wave-like pattern.

Statistical analysis

Data was presented in both descriptive and inferential statistical. For descriptive, data was presented in frequency, mean, IQR and proportion (as a percentage). All dental disorders were shown with proportion and percentage. Top 5 most common disorders found in our study will be categorize as major dental disorder. Statistical analysis was performed by imported and calculated in R version 4.2.1 and R studio Build554. The inclusion criteria of independent variables consist of animal signalment (Gender, Age, Body weight), the routine dental management of animals on available data.

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The effect of length between each floatation, gender, age, body weight (independent variable) was used to predict the occurrence of the major disorder (dependent variable). Each dependent variable effect on each major disorder was calculated using simple logistic regression. Multiple logistic regression for identifying relationship of variables was modeled. The factor variables were selected for model when the p-value from univariate analysis was less than or equal to 0.2 or odds ratio (OR) was not equal to 1. Statistic significant was considered with p-value ≤ 0.05.

RESULTS

Of the total 244 equines that were examined, 85 had not had a dental exam in over a year, 98 in two years, and the remaining 61 had no record of ever having a dental checkup. This study examined 232 horses and 12 donkeys. The horses included 162 mixed-breeds, 13 Thoroughbreds, 8 Warmbloods, 3 Quarter Horses, 26 Shetland ponies, and 20 local ponies. The donkeys included 10 Australians and 2 mixed-Dezhou (China). The equines ranged in age from 2 - 21 years (mean = 9.88). The body weight of the equines ranged from 113 - 700 kg (mean = 361.7 kg). There were 75 stallions, 74 geldings, and 94 mares. Five of the 244 (1.9%) equines had a bad odor in the mouth. Fifteen of the equines (5.74%) had problems with dropping food.

The activities of 154 equines were recorded between January 2015 and December 2017. The most common activity was School 72(46.75%) and Presure 45 (29.22%). The other activities was showed in Figure 2
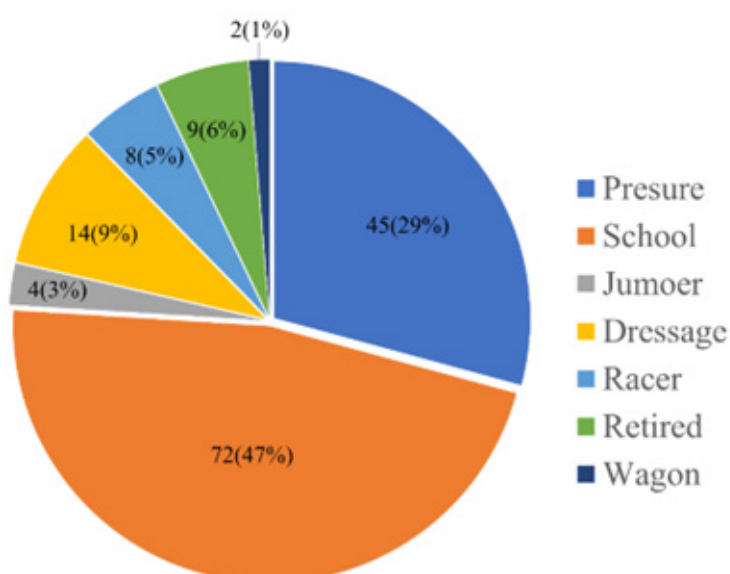

Figure 2 The activities (Presure, School, Jumper, Dressage, Racer, Retired, Wagon) of 154 equines

Equines have been divided into 3 groups (A, B, C). Group A contains equines from private horse club that has 0.5 - 1 year dental examination and floatation routine, Group B contains equines from Pack Squadron in and Cavalry Center, Royal Thai Army that has 1–2 year routine. Group C contains equines from 1st and 3rd Livestock and Agriculture Division Veterinary that have no record of dental examination and floatation.

Group A presented 28 (32.94%) stallions, 20 (23.52%) geldings, 37 (43.52%) mares. Group B presented 40 (40.81%) stallions, 49 (50%) geldings, 9 (9.18%) mares. Group C presented 7 (11.47%) stallions, 5 (8.19%) geldings, 49 (80.32%) mares. (Figure 3)
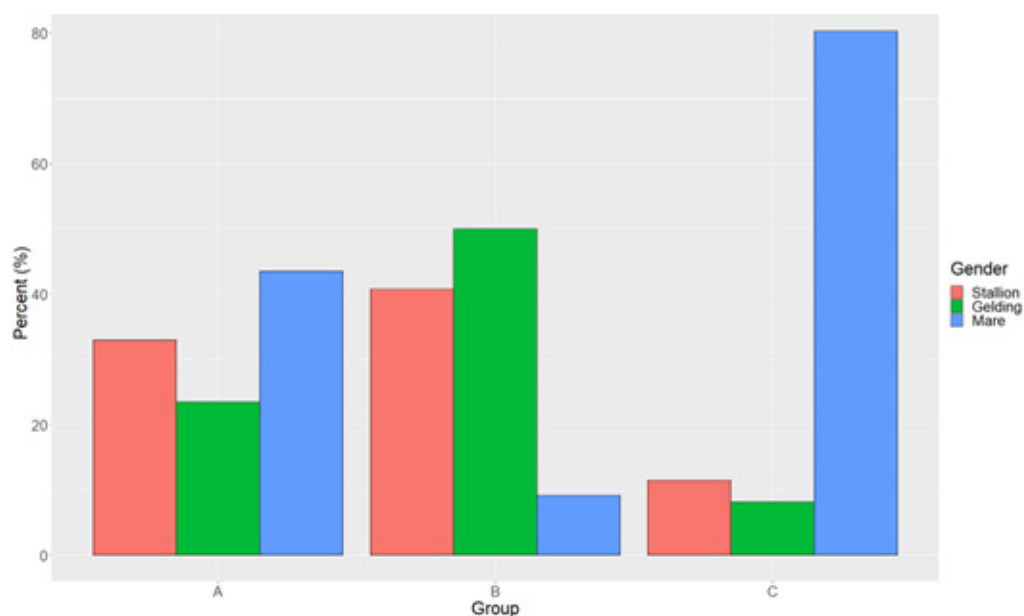

Figure 3 The percentage of equine gender (Stallion, Gelding, Mare) in each Group (A, B, C)

Group A had age range between 2-21 years old (IQR=13), group B had age range between 3-20 years old (IQR=7.8), and group C had age range between 4-21 years old (IQR=5).

Group A had body weight range between 113-700 kg (IQR=303), group B had body weight range between 200-631 kg (IQR=85), and group C had body weight range between 162-589 years old (IQR=236)

Oral cavity lesions

The most common soft tissue disorder was tongue ulcers (3.27%) (Figure 4 (A), which were related to the sharp edge points on the cheek teeth. Other disorders were found, including bit sores and periodontal disease, as presented in Table 2.

Figure 4 Equine dental disorders were found in the study. (A) severed tongue ulcer, (B) Sharp cheek teeth, (C) Frontal hook, (D) Tartar accumulation on incisor teeth with gingivitis, (E) Tartar accumulation on the lower canine teeth, and (F) A missing teeth (the fourth premolar at upper left; 208 in Triadan system) and an overgrowth (the fourth premolar at lower left; 308 in Triadan system) of cheek teeth

Table 2 Oral cavity disorders in 244 equines

Oral cavity disorders	Frequency	(%)
Ulcer	8	3.27
Bit sore	4	1.63
Periodontal disease	3	1.22
Facial asymmetry	2	0.81
Tongue scar	2	0.81
Abscess	1	0.40

Dental disorders

Sharp cheek teeth (Figure 4(B)) were a very common problem (82.37%), often associated with frontal hook (10.65%) (Figure 4(C)) or caudal hook (6.55%). Other disorders were related to incisor and canine teeth, as well as other disorders in the cheek teeth group. Of the incisor disorders (Table 3), tartar accumulation (Figure 4(D)) was the most prevalent (9.42%).

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Table 3 Incisor teeth disorders in 244 equines

Incisor disorder	Frequency	(%)
Tartar	23	9.42
Fracture	5	2.04
Gingivitis	5	2.04
Underbit (sow mouth)	5	2.04
Cap (retained milk teeth)	4	1.63
Overbit (parrot mouth)	4	1.63
Supernumery	4	1.63
Ventral curvature	4	1.63
Absent (missing teeth)	2	0.81
Dorsal curvature	1	0.40
EOTRH (Equine Odontoclastic Tooth Resorption and Hypercementosis)	1	0.40

Of the canine teeth disorders observed (in the geldings and stallions), tartar (9.42%) was the most common (Figure 4(E)), with the most common point of accumulation on the lower canine teeth on both sides (304, 404 in Triadan system) (Table 4). In addition to sharp cheek teeth, the other cheek teeth problems included wave teeth (5.73%), overgrowth (2.04%), and fractures (0.82%) (Fig. 4(F) and Table 5)

Table 4 Canine teeth disorders in 244 equines

Canine teeth disorder	Frequency	(%)
Tartar	23	9.42
Sharp	2	0.81
Fracture	1	0.40
Decay	1	0.40
Displace	1	0.40

Table 5 Cheek teeth disorders in 244 equines

Cheek teeth disorder	Frequency	(%)
Sharp teeth	201	82.37
Frontal hook	26	10.65
Caudal hook	16	6.55
Wave teeth	14	5.73
Overgrowth	5	2.04
Fracture	2	0.81

Top five disorders (sharp teeth, frontal hook, caudal hook, tartar, wave) were used in analysis. All 244 equines were included. The disorders consist of 201 sharp teeth, 26 frontal hook, 16 caudal hook, 42 tartar (which merge incisor and canine tartar), and 14 wave teeth. (Figure 5)
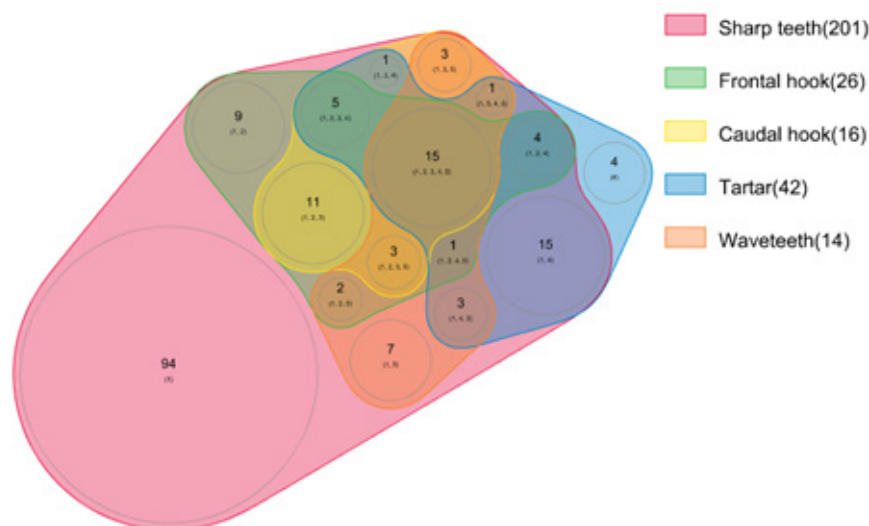

Figure 5 Major teeth disorders (Sharp teeth, Frontal hook, Caudal hook, Tartar, and Wave teeth) in 244 equines. The present of number in group represent the disorder

Group A presented 60 (68.2%) sharp teeth, 4 (4.71%) frontal hook, 3 (3.53%) caudal hook, 10 (11.8%) tartar, and 8 (9.41%) wave teeth. Group B presented 83 (84.7%) sharp teeth, 20 (20.4%) frontal hook, 12 (12.2%) caudal hook, 11 (11.2%) tartar, and 5 (5.1%) Wave teeth. Group C presented 60 (98.4%) sharp teeth, 2 (3.28%) frontal hook, 1 (1.64%) caudal hook, 2 (3.28%) tartar, and 1 (1.64%) wave teeth. (Figure 6)
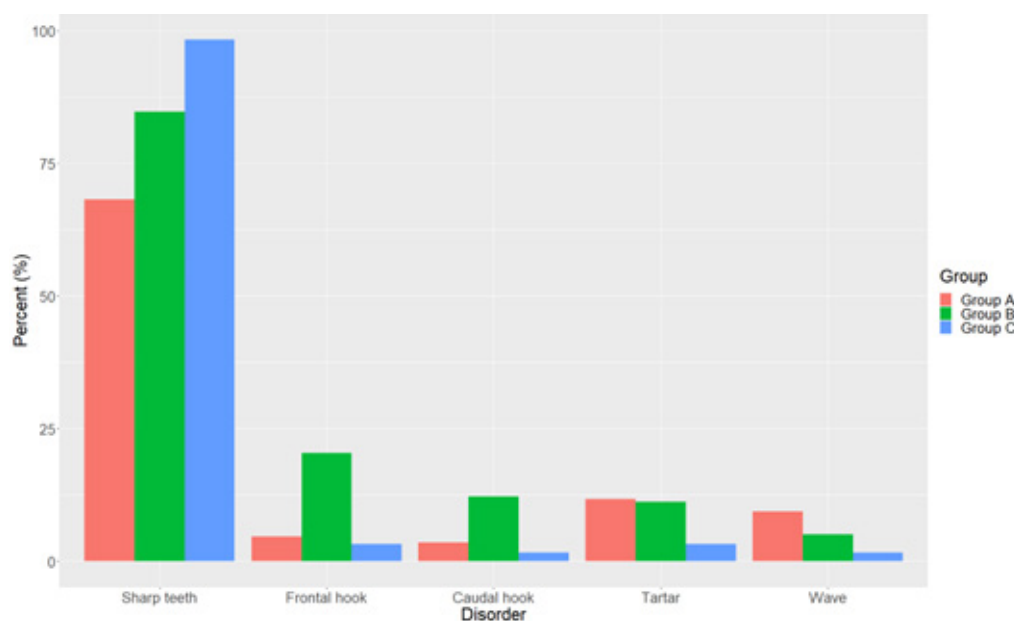

Figure 6 Major teeth disorders (Sharp teeth, Frontal hook, Caudal hook, Tartar, and Wave teeth) in 244 equines between group (A, B and C).

The relationship between equines (Group, Gender, Age, Weight) and occurrence of Major teeth disorder

There is a significant effect between sharp teeth and age, group (Table 6). Group B (p=0.011) and C (p=0.003) are 2.54 and 22 times higher risk to develop Sharp teeth than Group A. Proportion of Sharp teeth and Group was plot as shown in Figure 6. Each year equine had aged increase the risk to develop Sharp teeth by 10% (p=0.040). Probability of Sharp teeth and age (years) was plot as shown in Figure 7A. Group B has 5.19 times risk to develop Frontal hook than Group A (p=0.020). Stallion has 8.35 times risk to develop caudal hook compared to Gelding (p=0.007)

The chance that equine developing Tartar increases by 8% each year (p=0.031) Probability of tartar and age (years) was plot as shown in Figure 7B. Stallion has 6.25 times risk to develop dental tartar than Gelding (p=0.021)

Table 6 Univariable (U) and multivariable (M) logistic regression of each factor variable and dental

Factors	Sharp teeth		Frontal hook		Caudal hook		Tartar		Wave	
	U	M	U	M	U	M	U	M	U	M
Age (Year)	0.01*	0.04*	0.52	-	0.75	-	0.02*	0.03*	0.21	-
BW (Kg.)	0.10	-	0.01*	0.03*	0.10**	-	0.49	-	0.15**	-
Gender										
Gelding										
Mare	0.43	-	0.07	0.49	0.80	0.51	0.08	0.12	0.14	0.04*
Stallion	0.87	-	0.84	0.62	0.01*	0.01*	0.01*	0.02*	0.42	0.41
Group										
A										
B	0.01*	0.01*	<0.01*	0.02*	0.04*	0.06	0.30	0.12	0.27	0.11
C	<0.01*	<0.01*	0.67	0.45	0.50	0.71	<0.01*	0.15	0.09	0.12

* Statistical significant p<0.05
** Variable factor was omitted for multivariate analysis due to the OR = 1
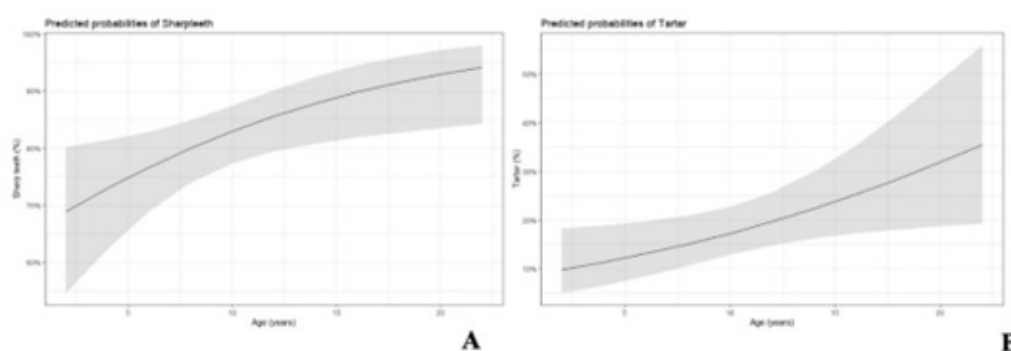

Figure 7 Major teeth disorders (Sharp teeth, Frontal hook, Caudal hook, Tartar, and Wave teeth) in 244 equines between group (A, B and C).

DISCUSSION

The age range (2-21 years) of the equines in our study was much lower than in a previous clinical study of 357 donkeys in Mexico (2-53 years) (du Toit et al., 2009), and the range age of the population of 203 donkeys in the UK between 6 and 10 years (du Toit et al., 2008). This might be lower the proportion of dental disorders in our study.

A previous study in equine cadavers in Australia found a prevalence of sharp edge points of 55% (Chinkangsadarn et al., 2015). Our clinical study, based on visual and manual examination in alive equines, found a very high proportion (82.37%) of sharp-edged points. This was lower than the above-mentioned study of 203 working donkeys in Mexico that reported 98% sharp edge points (du Toit et al., 2008). Another study in Belgium, which used rigid endoscopy, also found a high prevalence of sharp edged points (present in 96.3% of the horses) (Simhofer et al., 2008). Since the average age of our sample in this study was relatively young, diastemata abnormalities were not as prevalent as in the older equines as reported by Du Toit (du Toit et al., 2008). The majority of the equines with sharp cheek teeth were treated by the manual dental floating technique. Electric floating technique was used in three cases with overgrowth and sharp teeth. Cheek teeth with fractures (the fourth premolar and the first molar at lower right; 408 and 409 in Triadan system, respectively) accompanied by infection were radiographed and then extracted by intraoral technique performed under standing sedation. The intraoral extraction was not successful for one mule with a fractured cheek tooth, which had been kicked (the fourth premolar at upper right; 108 in Triadan system), with apical infection, so it was just given supportive treatment.

The odd of having sharp teeth has increase correlated to the length between each floatation, also teeth tend to be sharper via palpation Routine dental examination play an important role of develop sharp teeth, at least annual dental floatation and examination can reduce the risk of develop sharp teeth by 10 time this effect increase 22 times when done bi-annually. It is highly recommended to have at least annually dental examination and dental floatation programs.

Tartar accumulation was the most common problem of the incisor and canine teeth. The recommended treatment was to remove the tartar. The risk factors for tartar accumulation in Thailand were age of equine and group. The chance of developing tartar increases with aging, which might come from degenerative change or a reduction in activity of the equines. The other incisor and canine disorders found in our study were consistent with previous studies (Dixon et al., 1999). Conservative treatment was recommended for supernumerary and fractured incisors (which had been kicked) (Dixon and Dacre 2005). Retained milk (deciduous) incisiform teeth were recommended for removal. Equine Odontoclastic Tooth Resorption and Hypercementosis (EOTRH) was found in one older pony; this required radiography to confirm the diagnosis and treatment plan. This EOTRH case found incisors (the first incisor, the second incisor and the third incisor at the lower right; 401,402, and 403 in Triadan system) and lower right canine teeth (404) with bone change and infection, and surgery and extraction were used for treatment (Earley and Rawlinson, 2013).

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Stallion has higher change to develop caudal hook and tartar accumulation than gelding this might indicated changed after castration has play a role in dental disorder (direct, indirect, both). Frontal hook that has no difference might come from present of canine teeth.

Sharp cheek teeth have the highest proportion (82.37%), which is mostly related to frontal hook (10.65%) and caudal hook (6.55%), as well as tartar (9.42%). Two dental problem clinical signs were found: bad mouth odor (1.90%), and dropping food (5.74%), which can lead to emaciation, colic, and poor performance (Chinkangsadarn et al., 2015). These will cause problems in daily activity with a moderate to high workload. Sharp teeth develop contrariwise dental examination and floatation; this indicated that routine dental examination and floatation at least twice a year was recommended to reduce the development of dental problems.

CONCLUSIONS

These findings have shown the importance of regular dental examination and dental floatation in equines, so bi-annual dental examination and floatation routine is recommended.

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AUTHOR CONTRIBUTIONS

Porrakote Rungsri Conceived and planned the dental examination, Data collection and handle, Drafted the manuscript
Nuttapon Satumay Equine Dental Examination
Phreuthi Pornprasitroj Equine Dental Examination
Phuthita Rueangareerat Equine Dental Examination, Data management
Supphavit Ninthisen Equine Dental Examination
Supasinee Chaiya Equine Dental Examination
Kannika Na-Lampang Wrote the paper, Data Analysis, Designed the figures and table.

CONFLICT OF INTEREST

The authors have declared no conflict of interest

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