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## RESEARCH ARTICLE

### PREVALENCE OF DENTAL DISORDERS IN WORKING DONKEYS IN EGYPT

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#### ABSTRACT

A total of 100 working donkeys of both sexes and different ages (between 2 and 10 years) was subjected to field clinical dental examinations. A modified flexible low costed industrial endoscope, attached to a laptop facilitated detailed examination of the occlusal and caudal surfaces of the cheek teeth. All of the presented donkeys were found suffering from different varieties of dental disorders despite their owners' histories devoid of any dental complaints. The recorded prevalent dental disorders were dental tartar or calculus (97%), Gingivitis and periodontal disease (80%), focal dental overgrowth (55%), sharp enamel points (28%), fractures(18%), gingival recessions (18%), caries (10%), diastema (5%) and brachygnathism (4%).

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## INTRODUCTION

There are about 44 million donkeys worldwide (FAO, 2007). About 95% of the world's population donkeys are involved in agriculture, transport and some industries in developing countries, where millions of families depend on them for their livelihood (Gebreab, 1997). Dental disorders have recently been recognized as a significant welfare problem in donkeys in many countries (Trawford and Crane, 1995; Roy, 2006; Fernando-Martinez *et al.*, 2006; du Toit *et al.*, 2008; Giorgis *et al.*, 2013). Previous studies have demonstrated that donkeys are very stoic animals and a high number of animals suffer from asymptomatic dental and oral disorders (du Toit and Dixon, 2012). Recent studies have documented a high prevalence of dental disorders in donkeys (Gebreab, 1997; Roy, 2006; du Toit *et al.*, 2008; Rodrigues *et al.*, 2013). In Egypt, there are about 3 million donkeys that provide a good work source (cart and pack) and have important economic and social cultural functions in poorer communities. The welfare of these working animals is closely interlinked with the welfare of the human population (Line 19 (Starkey and Starkey, 2004; OsegueraMontiel *et al.*, 2006). Despite such valuable contribution of donkeys in the rural community in Egypt, the welfare of donkeys requires proper health attention.

Therefore, the aim of this study was to investigate the prevalence of dental disorders of donkeys in Egypt.

## MATERIALS AND METHODS

A total of 100 donkeys of different ages (between 2 and 12 years and sexes were used as a random sample study to determine the prevalence of dental disorders in a localized rural community. The sample size was collected during the veterinary mobile clinic serving one of the farmers' markets and capitals for the donkey sanctuary welfare center. The majority of the presented donkeys was ridden by their owners that accompanied other farm sick animals. Historical information from each case was taken from the owners, including the feeding (type and amount), appetite and any health complaint. The animals were then subjected to thorough dental examination after their heads were examined for any abnormal asymmetry or obvious swellings. Animals showing reluctance and resentment were mildly sedated by xylazine HCl -1 mg/kg, im (Xylajet, Adwya, Egypt). Triadan numbering system for the affected teeth was used.

### Equipment

For examination of the oral cavity and teeth, minimal equipment was used and comprised a twitch, mouth gag, light source, dental explorer and probe. To facilitate cheek teeth

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examination, a special flexible industrial endoscope, (Endoskop-Kamera "E-Cam" LED beleuchtete, 38118 Braunschweig, Germany) having the ability of tip angulation, attached to a laptop (Fig.1). Digital recordings were made using video editing software with capture function to permit detailed examination of the occlusal surface of the teeth.

### Technique

Using a mouth gag, the oral cavity was opened to record any sites of any food accumulation between the teeth i.e. diastema (an abnormal space between the adjacent teeth) or in the buccal vestibule. Then the teeth were washed with water to remove food and debris. The gingiva was examined for gingivitis and the buccal mucosa and tongue for lacerations or ulcers. The occlusal surfaces of the maxillary and mandibular cheek teeth were then inspected by the endoscope to record any teeth abnormalities such as arcade defects (sharp enamel points, prominent ridges, focal dental overgrowth, waves in the form of a series of ascending and descending occlusal surfaces, ramp with an upward slope of the lower cheek teeth and steps when one cheek tooth has grown in the gap of the opposite cheek teeth). The incisors, canines and cheek teeth were visually examined for any lesions such as plaque, tartar, calculus, caries, periodontal pockets, gingival recession and fractures.

### RESULTS

All of the presented donkeys were found suffering from different varieties of dental disorders or abnormalities despite their owners' histories were devoid of any dental complaints. Although no gender association with dental disorders or abnormalities was recorded, younger age donkeys were highly presented. Wheat bran and straws were the most common feed as a preservative ration in dry season in combination with leguminous forages only in the winter. Some donkeys of poor owners were allowed to graze on poor pasture.

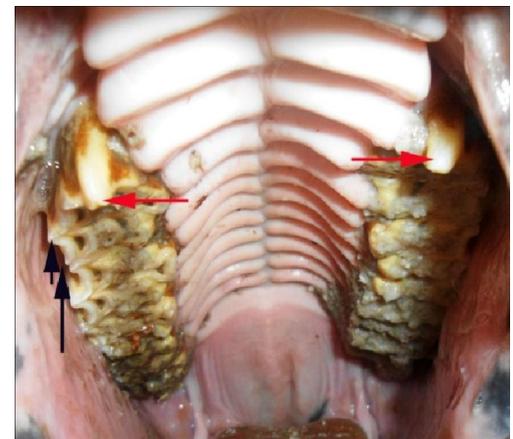


**Fig. 1.** The endoscope attached to a laptop

Table 1 summarized the distribution of dental disorders or abnormalities among the presented donkey cases. As shown in table 1, the presented cases had a high prevalence of incisor and canine dental tartar and calculus ((97%) (Fig .2).



**Fig. 2A.** 9-year old female donkey showing dental tartar with gingivitis (upper incisors) and hypercementosis (lower incisors) (black arrows)



**Fig. 3.** 4-year old female donkey showing focal maxillary teeth overgrowth (red arrows) and sharp enamel points (black arrows)



**Fig. 4.** 6-year old donkey showing chip fractures of the incisors (red arrows)

Gingivitis and periodontal disease were predominated (80%) among the examined donkeys. Focal dental overgrowth of the maxillary teeth were highly prevalent (55%) (Fig. 3). Sharp enamel points were also highly recorded in donkeys (28%), involving the buccal and lingual aspects of the maxillary and mandibular arcades respectively.

**Table 1. Distribution of dental abnormalities and disorders among the presented donkeys**

Dental Disorders	Number of affected donkeys	Number of affected teeth	Triadan Location
Dental tartar & cementosis	97	367	101-104,201-204,301-304,401-404
Gingivitis & Periodontal disease	80	160	101-103,107-109,201-209,301-304,401-409
Focal dental overgrowth	55	110	106,206
Sharp Enamel Points	28	72	106-110,206-210,306-310,406-410
Fractures	18	36	101,102,201,202,301-303,401-403
Gingival Recession	18	36	101-104,201-204,301-304,401-404
Dental Caries	10	10	103,203,303,304,108,207,209,307,308,407
Diastema	5	8	101-102,402-403
Brachygnathism	4	24	101-103, 201-203



**Fig. 5. 7-year old donkey showing incisors overjet (brachygnathism) and hypercementosis of lower incisor**



**Fig. 6. 6-year old donkey showing incisor diastema**

Teeth fractures were recorded in (18%) of maxillary and mandibular incisors (Fig. 4). The majority of fractured teeth was affecting the enamel and sometimes extending to the dentin. The incisor gingival recession was exhibited in a considerable number of cases (18%). Dental caries were shown to affect the incisors with peripheral caries and cheek teeth with infundibular caries (10%). Diastema (5%) and brachygnathism (4%) were the last recorded prevalent dental disorders in this study (Figs.5 and 6).

## DISCUSSION

From the present sample clinical study, no one donkey was found not suffering from dental disorders or abnormalities so that many donkeys were found affected by several varieties of dental disorders.

Surprisingly, almost all owners' case histories were devoid of any dental complaint. In developing countries, such orodental problem can impose great economic effects on poor people that mainly depend on such species of animals in their daily life. Dental disease can cause decreased food intake and feed efficiency and severe oral discomfort (Dixon and Dacre, 2005; Dixon *et al.*, 2000). However, previous studies showed that donkeys have a high pain threshold with a great number suffering from asymptomatic orodental disorders (Dixon, 2012). To overcome the limited range of opening the mouth of the donkey, an industrial, low costed flexible endoscope was efficiently used to visualize the oral cavity and the occlusal surfaces of cheek teeth. Similar device has been used in a previous study for extraction of fractured cheek teeth in horses (Ramzan and Palmer, 2011). Also, another study accurately examined the equine mouth using a high costed rigid endoscope (Tremaine, 2005). In this study, there was an equal gender presentation with dental disorders. This is not coincided with other studies that reported on the paucity of female donkey population suffering dental disorders (Giorgis *et al.*, 2013). The majority of the presented donkeys were young. While previous studies have recorded high prevalence of dental disorders in older donkeys (Giorgis *et al.*, 2013).

In the present study, the Triadan numbering system indicated that incisors showed higher prevalence of dental disorders than cheek teeth. These results are consistent with other similar studies (Rodrigues *et al.*, 2013). Clinical dental examination revealed a high prevalence of tartar and calculus (97%), gingivitis and periodontal disease (80%), focal dental overgrowth teeth (55%) and sharp enamel points (28%), and a low prevalence of fractures (18%), gingival recession (18%), caries (10%), diastema (5%) and brachygnathism (4%) among the presented donkeys. Variable dental disorders prevalence percentages were reported in other studies in donkeys at different countries (du Toit *et al.*, 2008; Rodrigues *et al.*, 2013). The predominance of dental tartar (supragingival) calculus (subgingival) in the present study (97%) might be due to plaque mineralization. The prevalence of incisor gingivitis in young donkeys might be secondary to permanent tooth eruption. Recent clinical and postmortem studies have documented a high prevalence of incisor disorders in young donkeys (56.8%) (Rodrigues *et al.*, 2013).

Sharp enamel points were presented in high numbers of donkey cases (28%). Anatomically, the donkey has a greater degree of anisognathism, the maxilla is approximately wider than the mandible (5-7% wider than in horses, although the disproportion of width appears to stem from a narrower mandible rather than a wider maxilla (du Toit *et al.*, 2009).

Furthermore, the perimeter of the donkey peripheral enamel is significantly greater than the perimeter of the whole tooth in maxillary and mandibular cheek teeth, thereby increasing the amount of enamel ridges exposed on the occlusal surface (du Toit *et al.*, 2008). Fractured teeth were also presented in high numbers (18%). Most of the fractures were superficial and occlusal. The conditions might be also attributed to the grazing on poor pasture and biting of hard objects (Smith and Wood, 2008). Donkeys at times peel the bark off trees with their teeth when there is food scarcity (Aganga and Tsopito, 1998).

Other marked dental disorders in this study were incisor diastema (5%). This is similar to other results (4%) (du Toit *et al.*, 2008). While, previous studies have recorded high percentage rates of diastema (14.38%) and (8.95%) (Giorgis *et al.*, 2013; Rodrigues *et al.*, 2013). Brachygnathism and supernumerary teeth were recorded in 4% and 3% of the presented cases. On the contrary, other study has recorded a highest rate (40%) of brachygnathism and a lowest rate (0.13%) of supernumerary teeth (Rodrigues *et al.*, 2013).

### Conclusion

This study provides important information about the current status of dentistry of donkeys in a localized rural community in Egypt. The unexpected high prevalence of dental disorders in donkeys in this study, required veterinary professional attention to manage this problem by providing consistent periodical dental care to donkeys for their health welfare. This should be also combined with an educational dentistry guide to donkeys owners' about the magnitude of this problem on the animal health and performance.

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