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Dental disorders in dogs and cats: A retrospective study

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Abstract

The study was conducted on 289 clinical cases of dogs and cats admitted to the Clinic of Department of Surgery, Anesthesiology, and Radiology, Faculty of Veterinary Medicine, Zagazig University, over 18 months. Thorough oral, dental, and radiographic examinations were performed on all cases. Disorders were recorded in a predesigned survey sheet along with several factors such as breed, age, sex, diet, and body condition score. Cases were categorized into four groups according to age. The results revealed that 138 (47.75%) of the total cases have dental disorders, 81 (58.7%) males and 57 (41.3%) females. Periodontal diseases were the most recorded affection 128 cases. Among animals admitted to the department clinic, then dental plaque (111 cases). Animals on soft food diet among total affected cases recorded, 89 cases (64.5%), then mixed diet (soft and hard food) 40 cases 29% and the last group dry or hard diet, 9 cases only 6.5%. The most affected breeds were German shepherd dogs 5.797% and Shirazy cats 57.97%. Data statistical analysis showed that age and diet had ($P<0.05$), which means that these two factors impacted the occurrence of dental disorders, in contrast, sex had ($P=0.143$), which indicates that sex statistically did not affect the occurrence of dental disorders, moreover a spearman correlation test was performed between age and dental disorders ($P<0.05$) and revealed that, with an increase in age, there is an increase in dental disorders.

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Introduction

The field of veterinary dentistry is constantly evolving as dental care is essential for maintaining good health and enhancing the animal quality of life. Oral problems that go untreated are uncomfortable and can lead to systemic and local illnesses (1-34). Compromised dental health can affect an animal's overall health, welfare, and interaction with its owner, without displaying evident clinical indicators of disease (2). A dental arcade is composed of teeth and their supporting structure; periodontium. Adult dogs have 42 teeth, while cats have 30 teeth. Periodontium is the supporting structure composed of the gingiva, periodontal ligament, cementum, and alveolar bone (16). Plaque-induced pathology of any part of the tissues holding the tooth in the mouth, known as periodontal disease, can extend through the area between the periodontal ligament and the root apex, resulting in the progressive loss of alveolar bone (4). There may be indications of present inflammation and significant bone loss in the alveoli without active inflammation. Two categories of clinical periodontal disease conditions are gingival irritation without bleeding, known as gingivitis, and damage or inflammation of periodontal tissue (16). The definition of periodontitis is an inflammatory disease of the teeth's supporting tissues because of certain microorganisms, or specialized groups of microorganisms, resulting in periodontal tissue being gradually destroyed with the creation or regression of pockets in the ligament and the alveolar bone. Clinically periodontitis can be distinguished from gingivitis (31).

The periodontal disease becomes more common and severe as the animal ages and causes weakening of teeth support. Early detection and treatment of these issues can frequently prevent more significant consequences later in

life. In addition to tooth loss, periodontal disease can have several potentially local severe implications, including considerable bone loss that happens with persistent periodontal disease (3,4). This study aimed to record different disorders among dog and cat breeds and investigate the effect and relation of several factors (Age, Sex, and Diet) on the occurrence of dental disorders.

Materials and methods

This study was conducted over 18 months, and an oral and dental clinical examination and case management were performed on dogs and cats admitted to the clinic of the Department of Surgery, Anesthesiology, and Radiology, Faculty of Veterinary Medicine, Zagazig University.

Animals

The total number of cases was examined 289 animals (100 dogs and 189 cats). Dental disorders were recorded along with several factors such as breed, age, sex, diet, and body condition score (B.C.S.), Purina scoring guide for dogs and cats (B.C.S.) was used (28-30). Animals were classified into 4 groups of age (I to IV). The first group is less than 6 months old; group II is between 6 months to 1 year old; group III is above 1 year to 4 years old, and group IV is above 4 years old. All the data were recorded in a predesigned survey sheet containing a checklist for most dental disorders, and owner and pet information was also registered. Animals handling and surgical procedure were performed according to the Institutional Animal Care and Use Committee, Zagazig University under the approval number of ZU-IACUC/2/F/56/2022.

Oral health assessment

Clinical cases were examined and evaluated, and results were interpreted following a standardized assessment protocol (5). Evaluation of the animal's dental health in a conscious state was performed as a rapid visual assessment of dental health in sternal recumbency using a headlight. Sedation of vicious animals with xylaject 2% was conducted per (Adwia, Egypt) of 1mg/kg intramuscularly (6). If a problem was suspected, a detailed dental examination was performed using a particular dental set as William's periodontal probe was used to assess gingival and periodontal health. The dental explorer was used to assess hard tooth surfaces for any pits, and teeth surfaces were visualized using a dental mirror for occlusal and lingo-buccal surfaces of posterior teeth. Animals were under general anesthesia in order to perform dental radiography using Ketalar 5% (Pfizer, USA), 10 mg/kg BW intramuscularly for cats (8,9), and propofol 1% (Fresenius Kabi, Egypt) 1 mg/kg BW Intravenous for dogs (7).

Treatment

The interference of the diseased cases was in a Lateral Position. Dental plaque and tarter cases were managed by tooth scaling using an ultrasonic scaler (9). Periodontal therapy was performed, including open and closed root treatment (8). Cases suffered from periodontal diseases. The gingiva was reflected as an envelope flap in the open root treatment using a periosteal elevator. A subgingival curette was used to remove the subgingival plaque material 2/0 usp for dogs and 3/0 usp for cats. In closed root treatment, only subgingival curette was introduced under gingiva. Closed tooth extraction was performed for teeth suffering from root caries. A dental extractor was applied to the luxated tooth to extract it. Open teeth extraction technique after Oxford (10) was used for retained teeth root cases. An envelope flap with one releasing incision of the gingiva was performed. The bone over the root was stripped off using a diamond burr and low-speed micromotor (Escort III, Korea). A tooth luxation was introduced to detach the tooth from the periodontal ligament and mobilize the tooth. A dental extractor was used to pull out the tooth, and the gingiva was sutured using absorbable suture material, Polyglactin 910. 2/0 usp for dogs and 3/0 usp for cats.

After care

Augmentin (Amoxycillin clavulanate, gsk, U.K.) oral suspension at a dose of 22 mg per kg BW every 12 hours for three days, and oral antiseptic (chlorhexidine 0.05%) was applied daily.

Statistical analysis

The recorded data were statistically computed by SPSS version 28. The Chi-square test was used to evaluate age and diet, and Fisher's exact test for sex as factors affecting dental disorders. The correlation between dental disorders and age was also analyzed.

Results

Among 289 animals present in the study, 138 (47.75%) of the total cases were affected, 81 (58.7%) males and 57 (41.3%) females. Most examined cases suffered from more than one oral affection at the same time when admitted to the department clinic. The cases were recorded and differentiated according to age. Periodontal diseases were the most frequently seen disorder (128 cases) than dental plaque (111 cases) and calculus (21 cases). Canine teeth were the only recorded teeth in the retained tooth root or tooth root abscess cases and persistent deciduous teeth. Dental plaque was also recorded along with some dental disorders, such as miss-aligned or crowded teeth and crown fractures in 13 cases. Recorded disorders were sorted according to the cause and number of cases recorded in dogs and cats (Figure 1 and Table 1).

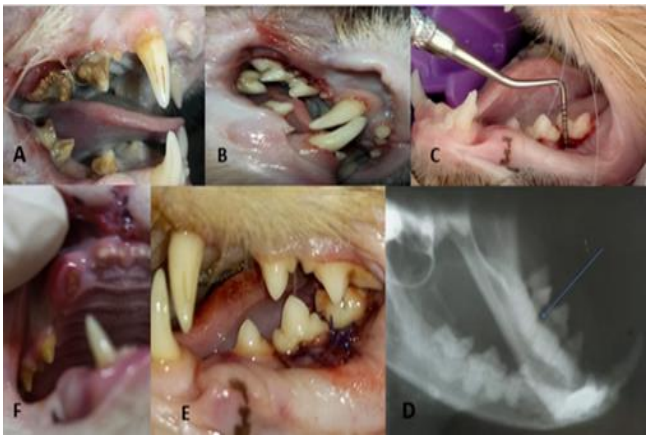

Figure 1: Extraoral picture of dental plaque and calculus in an adult male cat (A), same cat after ultrasonic dental scaling (B), periodontal probing of an adult cat suffering from gingival recession and furcation exposure type II depth (> 2 mm) (C), the radiographic appearance of bone resorption of same cat (blue arrow) (D), the appearance of gingiva after open root treatment and gingival surgery (E), extraoral picture of retained tooth abscess in 104 of adult female cat (F).

Table 1: Showing the frequency of recorded dental affections in dogs and cats

Affections	Dogs	Cats	Total
Dental Plaque	29	82	111
Dental Calculus	3	18	21
Miss Aligned Teeth	1	0	1
Crown Fractures	5	15	20
Root Caries	0	2	2
Missing Teeth	4	1	5
Lost Teeth	5	8	13
Malocclusion	3	0	3
Surface Caries	1	3	4
Dental Abrasions	1	0	1
Tooth Root Abscess	0	3	3
Impacted Teeth	1	0	1
Persistent deciduous teeth	3	4	7
Supra numerary teeth	1	0	1
Endodontic diseases*	2	2	4
Periodontal Diseases**	18	110	128
Total	77	248	325

*Endodontic diseases recorded only those confirmed by the radiographic appearance of periapical lesion. **Periodontal diseases are (gingivitis, caudal stomatitis, gingival recession, furcation exposure, and bone resorption).

Diagnosis of some dental disorders can be distinguished clinically only or by both clinical and radiographical imaging. Persistent deciduous teeth (Figure 2) can be diagnosed clinically, but radiographic images can detect other complications such as ankylosis of both permanent and deciduous teeth roots. Endodontic infection of the apex was diagnosed only by radiographic imaging as it was confirmed by the presence of a periapical lesion, an area of resorbed bone under the apex (Figure 2).

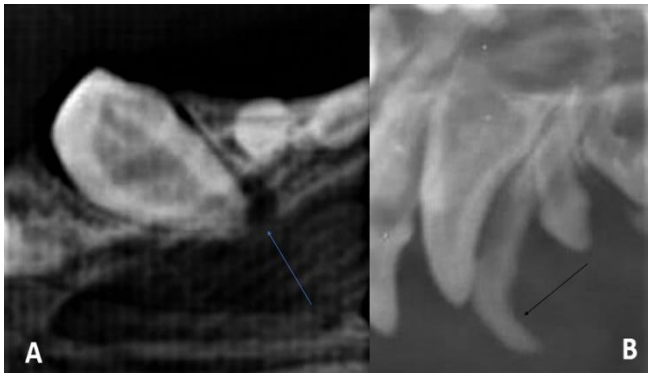

Figure 2: Showing periapical lesion of 404 teeth of a senile male dog (Blue arrow) (A). Persistent deciduous of 104 teeth in an 8-month-old male dog (Black arrow) (B).

Results of statistical data analysis showed that age and diet are highly statistically significant (P<0.05), while sex has no statistical significance (P= 0.143) (Table 2). Correlation test showed a highly significant correlation (Rs value = 0.435 and P= 0.001) between age and dental disorders (Table 3).

Table 2: Showing the results of both chi-square for age, diet, and Fisher's exact test for sex

Factor	value	df	Asymptomatic significance (2-sided)	Exact significance (2-sided)
Age	60.854	3	<0.001	
Sex	2.434	1	0.119	0.143
Diet	15.758	3	0.001	

Table 3: Showing of spearman correlation test

Factor	Age and Affection
Test	Spearman Correlation
Rs Value	0.435
SE	0.048
Approximate T^b	8.175
Significance	P<0.001

Breeds of dogs and cats admitted to the department clinic during the dental examination were also documented to investigate the prevalence of affected breeds with dental disorders (Tables 4 and 5). Among a total number of dogs 100 cases and cats 189 cases, German shepherd dogs 8 (5.797%) were the most prevalent breed. Shirazy cats 80

(57.97%) were diagnosed more than other breeds with different dental disorders.

Table 4: Showing the frequency and prevalence of recorded affected breeds of dogs

Dog breeds	Frequency	Prevalence (%)
Cane Corso	1	0.72
Cotton De Tulear	1	0.72
German Shepherd	8	5.797
Golden Retriever	2	1.449
Griffon dogs	3	2.174
Husky	2	1.449
Maleno	1	0.72
Mittel spitz	1	0.72
Mixed breed dogs	1	0.72
Baladi dogs	6	4.35
Pikengnsi	3	2.174
Pitbull	4	2.899
Pomeranian	1	0.72
Rottweiler	1	0.72
Yorkshire	1	0.72
Total	36	26.1

Table 5: Showing the frequency and prevalence of recorded affected breeds of cats

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Cat Breeds	Frequency	Prevalence (%)
Baladi cats	13	9.4
British short hair	1	0.72
Egyptian Mau	1	0.72
Persian	6	4.35
Shirazy	80	57.97
Siamese	1	0.72
Total	102	73.9

The most affected group was Group III with 69 (50%), Group II with 49 (35.5%), Group IV with 17 (12.3%), and the least one, Group I with only 3 (0.022%) of the total affected cases (Figure 3). As for sex distribution among cases (Figure 4). Affected male cases recorded 81 (58.7%), and females 57 (41.3%). The prevalence of dental disorders among different breeds of dogs and cats was calculated (Table 4). The most affected dog breed was the German shepherd 5.797%, and the cat breed was shirazy 57.97%. Animals on soft food diet were the most affected among total affected cases recorded by 89 cases (64.5%), then comes after that, the group of animals on a mixed diet (soft and hard food) with 40 cases (29%), and the last group of animals had dental disorders were on a dry or hard diet by 9 cases only (6.5%) (Figure 5).

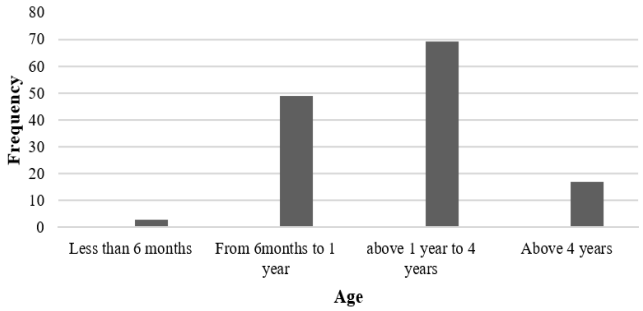

Figure 3: Shows the frequency of recorded animal cases in different age groups.

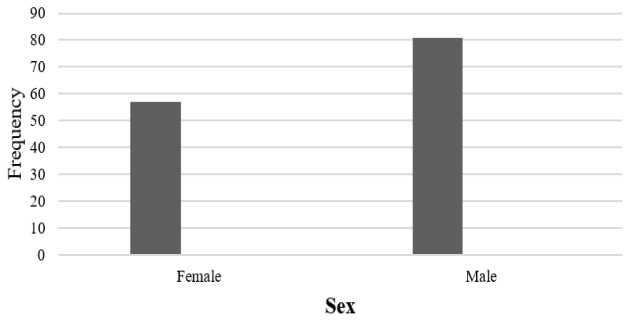

Figure 4: Showing the frequency of recorded affected animal cases sex distribution.

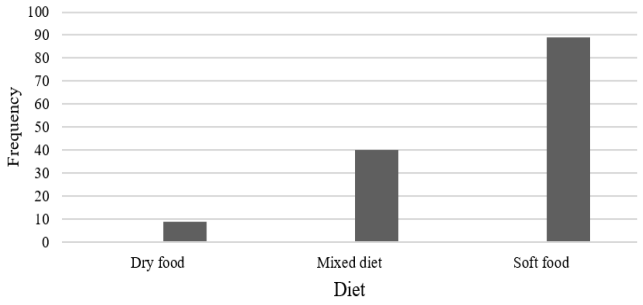

Figure 5: Showing the frequency of recorded affected animal and diet distribution.

Discussion

Among cases admitted to the department clinic, periodontal diseases were the most frequently diagnosed among all disorders (11,12). Periodontal disease is a result of undiagnosed and untreated underlying problems initiated mainly by the bacterial biofilm of the plaque and calculus material (35). This affection was the most frequently seen tooth hard structure disorder (13), as it contributes to disease progression into gingivitis and periodontitis through subgingival plaque (14,15) not only affecting dental arcade,

but also advanced stages of periodontitis can affect systemic health (33,34).

The amino acids, proteins, and glycoproteins in saliva, as well as the gingival crevicular fluid, are the primary sources of nutrition for the resident oral microbes; the metabolism of these substrates results in only slow and modest changes to the local ph (35). The bulk of the bacteria linked to oral health may develop best when the oral pH is kept close to a neutral level, which is a primary function of saliva. In contrast, the diet has a limited but largely negative effect on the balance of the oral microbiota that already exists. This effect is mainly caused by the fast pH drops in dental plaque (32).

The classic biofilm, dental plaque, develops in the same ways as biofilms elsewhere. After cleaning, tooth surfaces quickly develop dental pellicle, a thin, transparent layer of glycoprotein that makes it easier for the pioneering species of bacteria to attach and form the biofilm (plaque). In dogs and cats, the initial bacteria are typically gram-positive streptococci and Actinomyces spp. The community draws in new residents and creates a favorable setting for the growth of anaerobes and gram-negative organisms as the plaque biofilm thickens and reaches maturity. The best way to remove plaque is still mechanical removal, just like with other biofilms (14). Dental scaling for supragingival plaque and tartar only or by periodontal therapy; removal of the subgingival plaque which causes detached gingival and advanced periodontal diseases either closed through the introduction of subgingival curette only or open through a flap surgery at which a curette used after gingival flap elevation to removal subgingival plaque .By eliminating bacterial biofilm, calculus, and toxins from periodontally affected root surfaces, periodontal therapy aims to control microbiological periodontal illness (4,15,36,37). The persistent deciduous tooth is a disorder where deciduous teeth persist along with their permanent ones (16). All cases recorded with this disorder were canines (17), who reported that incisors and canines were the most retained teeth.

Crowded or miss-aligned teeth, retained deciduous teeth and crown fractures, recorded cases with plaque layers on the tooth. These findings can play a role as a predisposing factor to periodontal disease as they contribute to the accumulation of bacterial biofilm leading to the accumulation of plaque layers, which in time leads to the formation of subgingival plaque and dental calculus (18).

Periodontal therapy was performed on cases affected with periodontal diseases. The main goal was to remove all the calculus and plaque materials lying over the teeth, supragingival and subgingival, to create a media for bacteria to grow and reduce periodontal pockets detected by William's probe (19). Dental ultrasonic scaling was applied to the teeth surface first to remove the supragingival plaque and calculus, and then a subgingival curette was used to remove the subgingival plaque under the gingiva (15,20). The retained tooth root is an indication for tooth extraction, especially with the open extraction technique after antibiotics and anti-inflammatory medication to subside infection and swelling (38).

Statistical analysis showed a positive correlation between age and dental disorders and older age and dental disorders (39). Type of diet as shown in data, most affected animals with dental cases were on a soft food diet (40). Soft food diet leads to the accumulation of bacterial biofilm and formation of plaque and progression to tartar over time, and diet constituent also affects dental and oral health; not only a type of diet but also diet constituent can affect periodontal disease occurrence. Protein, minerals, and vitamin deficiency cause degenerative changes in periodontium, marginal gingivitis, gingival hyperplasia, and significant alveolar bone resorption (41). Sex as a factor related to dental disorders showed no statistical difference (42), meaning that sex does not affect the occurrence of dental disorders. The most recorded affected breeds were German shepherd dogs and Shirazy cats. This may be due to the population's interest in keeping these breeds.

Conclusion

Periodontal diseases were found to be the most seen disorder, then plaque and calculus among cases admitted to the department clinic. German Shepherd dogs and Shirazy cats were the most recorded affected breeds. Age and diet significantly impacted the occurrence of dental disorders, while sex was statistically insignificant. There is an increase in the occurrence of dental disorders in correlation to an increase in age.

Acknowledgments

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Conflicts of interest

No conflicts

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إصابات الأسنان في القطط والكلاب: دراسة استرجاعية

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الخلاصة

أجريت الدراسة على ٢٨٩ حالة سريرية للكلاب والقططالواردة لعيادة قسم الجراحة والتخدير والأشعة بكلية الطب البيطري، جامعة الزقازيق على مدار ١٨ شهرا. تم كشف كامل للفم والأسنان وأخذ أفلام أشعة سينية لأسنان وفك الحالات. الإصابات الواردة تم تسجيلها في ورقه مسح تم تصميمها مسبقا مع تسجيل بعض العوامل الأخرى مثل السلالة والعمر والجنس ونوع الغذاء ودرجه حالة الجســـم. النتائج أظهرت أن

الحلات المصابة كانت عددها ١٣٨ بنسبة ٤٧,٧٥% من إجمالي الحالات الواردة، وكانت نسبة الذكور المصابة ٥٨,٧% بإجمالي ٨٩ حاله ونسبة الإناث ٤١,٣% بإجمالي ٥٧ حالة. أمراض اللثة كانت من أكثر الحالات التي تم تسجيلها بإجمالي ١٢٨ حاله ثم حالات الترسيبات الجيرية على سطح الأسنان بإجمالي ١١١ حالة. الحيوانات التي تعتمد على نظام غذائي من على الطعام الطري كانت أكثر الحالات المصابة بإجمالي عدد ٨٩ حاله بنسبه ٦٤,٥% ثم الحيوانات التي تعتمد على مزيج من الأطعمة الجافه والطرية بإجمالي عدد ٤٠ حاله بنسبه ٢٩% وأخر مجموعه هي التي تعتمد فقط في نظامها الغذائي على الأطعمة الجافه بإجمالي عدد ٩ حالات بنسبه ٦,٥%. كانت سلالات كلاب الراعي الألماني هي الأكثر أصابه فالكلاب بنسبه ٥,٧٩٧% وسلالة القط الشيرازي كانت الأكثر إصابة فالقطط بنسبه ٥٧,٩٧%. النتائج الإحصائية أظهرت أن العمر والنظام الغذائي لهم دلاله إحصائية (أ<٠,٠٠١) مما يدل على أن هذين العاملين لهم تأثير على معدلات إصابات الأسنان بينما الجنس لا يؤثر إحصائيا. تم عمل اختبار الارتباط الإحصائي سيبرمان بين العمر والإصابات (أ< ٠,٠٥) ووجد علاقة طردية بين العاملين، مما يعني أن مع زيادة العمر تزيد معدلات إصابات الأسنان.