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Prevalence of common oral conditions in dogs and cats attending a veterinary teaching hospital in SpainPrevalence of common oral conditions in dogs and cats attending a veterinary teaching hospital in Spain

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Auteur correspondant:	M. Teresa Tejedor, Ph.D Universidad de Zaragoza Facultad de Veterinaria Zaragoza, --None--- SPAIN
Premier auteur:	A Whyte, Ph.D
Ordre des auteurs:	A Whyte, Ph.D
	F San Román - Llorens, Ph.D
	J Whyte, Ph. D
	LV Monteagudo, Ph.D
	M. Teresa Tejedor, Ph.D
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Titre auteurs coordonnées

Prevalence of common oral conditions in dogs and cats attending a veterinary teaching hospital in Spain

Prévalence des affections bucco-dentaires courantes chez les chiens et les chats fréquentant un hôpital universitaire vétérinaire en Espagne.

A. Whyte [a], F. San Román - Llorens [a], J. Whyte [b], L. V. Monteagudo [c], M. T. Tejedor [c,d,*]

[a] Department of Animal Pathology, Faculty of Veterinary Sciences, Universidad de Zaragoza, Miguel Servet 177, 50.013 Zaragoza (Spain).

[b] Department of Human Anatomy and Histology, Faculty of Medicine, Universidad de Zaragoza, Domingo Miral , s/n, 50.019 Zaragoza (Spain)

[c] Department of Anatomy, Embryology and Animal Genetics, Faculty of Veterinary Sciences, Universidad de Zaragoza, Miguel Servet 177, 50.013 Zaragoza (Spain).

[d] CIBERCV, Faculty of Veterinary Sciences, Universidad de Zaragoza, Miguel Servet 177, 50.013 Zaragoza (Spain).

*Corresponding author: María Teresa Tejedor. Department of Anatomy, Embryology and Animal Genetics, CIBERCV, Faculty of Veterinary Sciences, Universidad de Zaragoza, Miguel Servet 177, 50.013 Zaragoza (Spain). E-mail address: ttejedor@unizar.es (M.T.Tejedor); Phone: + 34 976761542; Fax: +34 976 761 612;

http://orcid.org/0000-0001-5026-5144

Original article

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Abstract

Our aim is to provide a look into the typical clinical caseload from odontology primary care, based on dogs and cats treated at a veterinary teaching hospital. From 2013 to 2019, 468 dogs and 139 cats were treated; data come from primary care practice; no referral cases were considered. The most frequently detected conditions in dogs were periodontal disease (59.6%), oral tumors (11.3%), dental fractures (7.7%), class 1 malocclusion (7.1%), dental fistulas (5.8%), class 3 malocclusion (3.4%), gingivitis (1.7%), periodontal disease with tooth resorption (0.4%), class 2 malocclusion (0.2%) and others (2.8%). Different distributions of main conditions were found when considering age and weight/breed (P<0.001). In cats, the main conditions were periodontal disease (30.9%), periodontal disease with tooth resorption (23.0%), tooth resorption (12.2%), gingivostomatitis (10.8%), gingivostomatitis with tooth resorption (7.2%), oral tumors (7.2%) and others (8.6%). When considering age, different distributions of main conditions were found (P<0.001). In dogs and cats, both sexes showed similar distributions of main conditions (P>0.05). No significant temporal trends were detected. These prevalence estimations can be useful in the diagnosis and establishment of preventive measures. Attention could be focused on different oral conditions depending on breed (dogs) and on age (both dogs and cats).

Keywords: Oral conditions; Primary care; Pets; Periodontal disease; Tooth resorption.

Résumé

L'objectif de cette étude est de présenter la charge de travail typique en soins dentaires primaires, à traves de l’analyse des chats et des chiens traités dans un hôpital universitaire vétérinaire. Les problèmes le plus

fréquemment diagnostiqués chez le chien sont la maladie parodontale (59,6 %), les tumeurs buccales (11,3 %), les fractures dentaires (7,7 %), les malocclusions de classe 1 (7,1 %), les fistules dentaires (5,8 %), les malocclusions de classe 3 (3,4 %), la gingivite (1,7 %), la maladie parodontale avec résorption dentaire (0,4 %), malocclusion de classe 2 (0,2 %) et autres (2,8 %). L'âge, le poids et la race des patients modifient significativement la prévalence des maladies mentionnées ci-dessus (P<0,001). Chez le chat, les diagnostiques les plus fréquents sont la maladie parodontale (30,9 %), la maladie parodontale avec résorption dentaire (23,0 %), la résorption dentaire (12,2 %), la gingivostomatite (10,8 %), la résorption dentaire avec gingivostomatite (7,2 %), les tumeurs buccales (7,2 %) et autres (8,6%). Dans l'espèce féline, seulement l'âge des patients modifie significativement les prévalences des différentes maladies (P<0,001). Par contre, le sexe des patients n'a aucun impact significatif sur la prévalence des principales maladies dans les deux espèces (P>0,05), et aucune tendance temporelle significative n'a été détectée. Ces estimations de prévalence peuvent être utiles dans le diagnostic et la mise en place de mesures préventives. L'attention pourrait être portée sur différentes conditions buccales en fonction de l'âge des chiens et des chats et de la race des chiens (chien).

Mots clés: Maladies bucco-dentaires; Soins primaires; Animaux domestiques; Maladie parodontale ; Résorption dentaire.

Introduction

Data about oral health of dogs and cats based on owner self –reporting are not very reliable. However, data from veterinary primary care show higher prevalence values. From UK veterinary primary care, annual prevalence in dogs was highest for dental disorder (9.6%) followed by overweight/obese (5.7%) and anal sac disorder (4.5%) [1]; recent studies on dogs in England detected raised prevalence values of up to 14.10% for dental disorders [2]. In cats, data from primary care in England showed that the most prevalent disorder groups were dental conditions (15.1%), traumatic injury (12.9%) and dermatological disorders (10.4%) [3].

On the basis on their high prevalence, duration and severity, oral disorders can cause particular welfare impact [1]. When a pet is suffering from oral disorders, pain and inflammation might not be apparent to the owners, but this can affect its overall health, behaviour, longevity and quality of life [4].

Diagnosis and treatment of oral conditions are specialized procedures, so that professional veterinary care is needed for maintaining pet oral health. Periodontal disease (PD) is frequently a preventable condition [4]. The aim of this study is to provide an insight into the typical clinical caseload

from odontology primary care of dogs and cats treated at our odontology service in a veterinary teaching hospital. Hence, both our undergraduates and practitioners are aware of the main oral disorders of pets in our influence area (Northeastern Spain) and can prioritize the health control strategies. Furthermore, these data could be compared with data from other countries and allow the estimation of the global prevalence of oral condition in pets.

Material and methods

From 2013 to 2019, 468 dogs and 139 cats were treated in the odontology service at our veterinary teaching hospital (Northeastern Spain). No reliable data were available from 2020, due to the Covid-19 pandemic. All data come from primary care practice and no referral cases were considered; therefore, selection bias towards more complicated disorders was avoided. The distribution of sex, age, weight and breed of dogs and cats are shown in Tables1 and 3, respectively. Eighty nine dogs were mongrels and the rest belonged to 53 different breeds which were grouped in six categories according to weight [5]: Extra small (<6.5kg), Small (6.5-9.0kg), Medium small (9.1-15.0kg), Medium large (15.1kg-30.0Kg), Large (30.1-40.0Kg) and Giant (>40Kg). Mongrels were also assigned to these categories according to weight. Most cats were European common (101/139; 72.7%) but Persian, Siamese, British Shorthair, Norwegian Forest, Sphinx, Russian Blue and Maine Coon were also present.

The best practice of veterinary care and legal and ethical requirements for humane treatment are guaranteed for all animals cared in our university veterinary hospital. Since our objectives are assistance, education and research, the informed consent for the use of anonymized data is part of our routine admission protocol. No approval by the local ethical committee was needed for the present study, in accordance with Spanish legislation for animal protection in non-experimental veterinary procedure (RD 53/2013) [6].

Both dogs and cats were anesthetized to enable their dental examination. Diagnoses of periodontal disease (PD), tooth resorption (TR), gingivitis, feline chronic gingivostomatitis (FCG) and malocclusions were made in accordance with the American Veterinary Dental College (AVDC) recommendations [7]. AVDC considers that malocclusion may be due to abnormal positioning of a tooth or teeth (dental malocclusion) or due to asymmetry or other deviation of bones that support the dentition (skeletal malocclusion) [7]. Therefore, AVDC´s classification of malocclusion is as following [7]:

- Class 1 malocclusion: A normal rostrocaudal relationship of the maxillary and mandibular dental arches with malposition of one or more individual teeth.

- Class 2 malocclusion: An abnormal rostrocaudal relationship between the dental arches in which the mandibular arch occludes caudal to its normal position relative to the maxillary arch.

- Class 3 malocclusion: An abnormal rostralcaudal relationship between the dental arches in which the mandibular arch occludes rostral to its normal position relative to the maxillary arch.

- Class 4 malocclusion: Asymmetry in a rostrocaudal, side-to-side, or dorsoventral direction.

Detailed descriptions of dental examinations can be found elsewhere [8]. Fistulas included infraorbital, mandibular and oronasal fistulas. Recorded diagnoses corresponded to the first individual attendance at our hospital and no data from follow-up clinical work were considered. When several disorders were found in the same individual, only the most severe and/or extensive was recorded as the "main condition", with the exception of the following combinations: PD & TR (periodontal disease and tooth resorption) in both dogs and cats and TR & FCG (tooth resorption and feline chronic gingivostomatitis) in cats.

The statistical analysis was carried out using IBM SPSS Statistic 26.0 software. Pearson´s χ^2 test was used to compare the frequencies of males/females and breed categories among the main conditions. The temporal evolution of prevalence for the main conditions was studied by analyzing the correlation between annual prevalence and year as ordinal variable (Kendall´s tau test) and by means of linear and quadratic fit. Analysis of variance (ANOVA) was used to compare the main conditions (fixed effects) for age and weight; when comparing weight, age was also included as a co-variable. Tukey's range test was used to carry out multiple comparisons among the main conditions. *P* values <0.05 were considered as statistically significant

Results

Dogs

Table 1 shows the main conditions observed, with prevalence and distribution per sex, age, weight and breed categories. More than a half of the patients showed PD as the principal condition (59.6%). Cases of tumors, dental fractures and class 1 malocclusion (including retained deciduous teeth) had a much lower prevalence (7.1% - 11.3%, see Table 1). Fistula, class 3 malocclusion and gingivitis occurred with a low frequency (1.7% - 1.7%). PD and TR together and class 2 malocclusion were rare (0.4% and 0.2%, respectively) and the "Others" category (13/468, 2.8%) included rare or unique cases, not included in the observed main conditions: amelogenesis imperfecta (n=1); gingival hyperplasia (n=4), enamel hypoplasia (n=4), myositis (n=1), pulp necrosis (n=1), papillomatosis (n=1) and radicular cyst (n=1).

No significant difference was found between males and females for distribution of main conditions (Pearson´s χ^2 test=7.704; *P*=0.564). However, these main conditions differed in age (F=29.560; *P*<0.001): class 1 malocclusion was seen in patients with the lowest mean age, while cases of PD and TR together, oral tumor, PD and fistula were seen in the older ones (Table 1). No significant effect of age (co-variable) on weight was found (F=0.831; *P* =0.351). Significant differences for weight among main conditions were detected (F=18.000; *P* <0.001); dental fracture cases were seen in patients with the heaviest weights and patients with the lightest weights showed malocclusion classes 1 and 3, and PD (Table 1). In addition, the main conditions differed depending on breed distribution (Pearson´s χ^2 test =153.749; *P*<0.001). Extra small breeds accounted for 53.0% of PD and only 5.6% of dental fractures (*P*<0.050). Percentages of small breeds did not differ among principal conditions (*P*>0.050). Medium small breeds accounted for 100% of class 2 malocclusion and 2.8% of dental fractures (*P*<0.050). Medium large breeds accounted for 36.1% of dental fractures and 30.2% of oral tumors but for only 11.1% of PD (*P*<0.050). Large breeds accounted for 52.8% of dental fractures and 6.1% of PD (*P*<0.050). Giant breeds accounted for 9.1% of class 1 malocclusion and 0.7% of PD (*P*<0.050).

Table 2 shows the temporal distribution of the main conditions observed in the 2013-2019 period. Kendall´s tau test did not show any significant correlation for prevalence and year (*P*>0.050) and no significant fit (linear or quadratic) was achieved (*P*>0.050); also, no significant results were obtained for the total number of patients seen per year (*P*>0.050).

Cats

Table 3 shows the observed main conditions, with prevalence and distribution per sex, age, weight and breed. Most prevalent conditions were PD and TR: PD as principal condition showed the highest prevalence (30.9%), followed by PD and TR together (23.0%) and TR, alone or associated with FCG (19.42%; Table 3). Gingivostomatitis (FCG) and oral tumors as main conditions were seen less frequently (10.8% and 7.2%, respectively). Rare or unique cases, not included in the observed main conditions were grouped into the "Others" category (8.6%, Table 3): dental fractures (n=6), oronasal fistula (n=4) retained deciduous teeth (n=1) and dental avulsion (n=1).

Males and females did not significantly differ for distribution of main conditions (Pearson´s χ^2 test=11.030; *P*=0.087). Significant differences in age were detected among main conditions (F=5.129; *P*<0.001): the lowest mean age corresponded to the "Others" while cases of PD and TR together showed

the highest age value (Table 3). No significant effect of age (co-variable) on weight was found (F=0.016; *P*=0.898). The main conditions did not differ in weight (F=1.327; *P*=0.250). On the other hand, significant differences were found among main conditions and breed distribution (Pearson´s χ^2 test =77.190; *P*<0.001); percentages of both Norwegian forest and European common breeds differed among principal conditions. Norwegian forest cats accounted for 29.4% of TR and were absent in the rest of the conditions (Table 3). European common cats greatly differed among principal conditions accounting for 88.4% of PD and only 41.2% of TR (Table 3).

The temporal distribution (2013-2019) of the main conditions is shown in Table 4. No significant correlation for prevalence and year and no significant fit were found (*P*>0.050); also, no significant results were obtained for the total number of patients seen per year (*P*>0.050).

Discussion

The most important limitation of this study is the small sample size considered. This fact would cause the prevalence values to be underestimated and the distribution of main disorders per age, weight and breed could also be biased. However, this study would be a glance into the most frequent oral disorders in pets usually attending primary care practices in the influence area of our veterinary teaching hospital.

Dogs

In this study, PD turned out to be the most frequently observed oral condition, which is in agreement with previous studies. PD and dental calculus are considered as the most common oral diseases in the dog, although prevalence values differ widely. Kyllar and Witter [9] found periodontitis in 60.0% of 408 dogs attending a Czech veterinary hospital. In UK dogs under veterinary primary care, the most prevalent recorded disorders was PD (12.52%) [2].

It has been shown that PD prevalence increases with age; a prevalence of 80-89% has been reported in dogs over three years of age [10]. In accordance with these findings, our results also showed older dogs were affected by PD. As shown previously, PD prevalence increases in small breed dogs; a body weight effect has been suggested, with a significant and negative correlation for PD and body weight [11]. Kyllar and Witter [9] suggested a genetic predisposition to PD and malocclusion in small breeds; gingiva would be more susceptible to PD and malocclusion would favor subgingival plaque and therefore, PD development. Our results are in agreement with these, with lightest weights for PD affected

dogs. Since breeds were grouped on a weight basis, a concordant association of PD and dog breeds was also found; extra small breeds accounted for 53% of PD while medium large, large and giant breeds only accounted for 11.1%, 6.1% and 0.7% respectively.

TR is one of the most common dental disorders in cats [12] and it has also been described in dogs; TR was detected in 53.6% of dogs older than one year admitted for dental procedures, accounting for 11.1% of total teeth [13]. TR was more frequent in older and large breed dogs; but no significant differences were found between males and females [13]. In this study, only two individuals showed TR, both of them in combination with PD; while one of them was an extra small dog, the other one was a medium large mongrel (23 kg) and both of them were older than nine years old and were diagnosed recently (in 2018 and 2019, respectively). These characteristics were compatible with those more frequently described in the PD and/or TR cases; the low frequency of these individuals could be due to the small sample size considered.

Oral tumors showed low frequency, in agreement with previous reports estimating that oral tumors accounted for six percent of all canine tumors [14]. Although data differs among tumor types and canine breeds, relationships between ageing and tumors seem clear [15]. Our data showed that tumors were detected more frequently in older dogs and this agrees with the previously described relationship.

Dental fractures often result from external trauma or from biting hard objects; the use of suitable dental chews and toys and avoiding anxiety and cage –biting can prevent them [9]. Frequency of dental fractures depends on the life style of dogs; In a recent study on packs of dogs, most individuals showed dental fractures and/or dental attrition (68.75%) and 3.9% of present teeth were fractured; canines showed the highest frequency of fractures (16.5%) [16]. In this study, dental fractures accounted only for 7.7% of cases attending our odontology services and most of them corresponded to large breeds; these large dogs could probably be more frequently involved in physical activities with increased risk of dental fractures (playing, hunting, etc.)

Malocclusions have been reported as very common in small bred [13]. Recently, a global prevalence of 26% has been reported for every class of malocclusions in puppies, being more frequent in purebreds than in mixed breed [17]. In this study, global prevalence for every class of malocclusions was 10.7% and often occurred in small breeds; the prevalence value could be an underestimate due to the small simple size considered.

Previous data estimated the prevalence of dental fistulas at 1.18% in dogs attending primary care; the highest prevalence was reported for dogs between six and 12 years old and the German shepherd was

the most affected purebred [18]. The infraorbital fistula is considered among oral diseases affecting dogs [19]. Oronasal and oroantral fistulas are often secondary to PD in dogs [20]. Therefore, the higher prevalence of fistula detected in this study, affecting older dogs, could be related to the high prevalence of PD.

Two conditions are recognized in PD: gingivitis (reversible inflammation and redness of the gingiva) and periodontitis (irreversible inflammation of periodontium with destruction of periodontal ligament, cementum and alveolar bone and finally, loss of attachment) [21]. It is recognized that gingivitis does not always progress to periodontitis, but the likelihood of developing periodontitis increases with age [22]. In this study, gingivitis was detected in lower prevalence than PD in younger dogs, although the age difference was not significant ($P>0.05$); these findings could be explained by the fact that gingivitis is an initial stage of PD, with a higher prevalence in older dogs.

No temporal trends were found for the prevalence of the main conditions. However, it is noteworthy that the two PD &TR cases occurred recently, in two successive years (2018 and 2019). The small sample size could explain the failure in the detection of significant trends.

Cats

In the study period (2013-2019), fewer cats than dogs were presented to our university teaching hospital. This difference in healthcare use is a general observation [23]; in cats, both difficult detection of pain signs and their self-sufficiency supposed by owners would explain this [23]. However, PD is considered to have impacts on systemic health and welfare [24] and oral health contributes greatly to a cat's quality of live [4]. A higher risk for chronic azotemic kidney disease was reported when PD was present in cats [25].

The most common oral diseases in cats are PD, TR and FCG. PD is considered as the most prevalent oral disorder in cats [26] and prevalence increases with age reaching 96% at five years of age [27]. The prevalence values for TR vary from 29% to more than 60% [12, 16], on the basis of cat populations and age, with aging a risk factor for TR [28] . Periodontitis is often associated with TR [29]. Prevalence for FCG is lower, between 0.7% [30] and 10% [27] and no differences when considering age, sex and breed has been detected [27].

Oral health is affected by age. In kittens (up to 1 year), examination focus must be on detection of malocclusion or developmental dental issues; above one year of age, attention should be focused on PD and TR detection and cats older than seven years must be monitored for oral tumors [23]. Also, PD

severity has been associated with age [24]. Our results are in agreement with these findings, since the mean age of the cats affected by PD, TR and tumors exceeds six years of age.

In contrast with dogs, PD severity was previously associated with weight in cats; however, the causes of this association remain unclear [24]. In this study, no differences in weight have been detected among main conditions in cats. The significant differences found among main conditions as to breed distribution seem to be due to the dispersal of breeds in the small number of cats studied rather than to differences in body size.

As with dogs, the small sample size could be the cause of not detecting significant temporal trends in any main condition in cats.

Conclusion

These prevalence estimations of most common oral health concerns in pets can be useful in facilitating their diagnosis and establishing adequate preventive measures. These findings highlight the importance of oral examination during routine veterinary visits. In this way, the appearance of bacterial plaque, which is usually the basis of the most common conditions, could be prevented. Also, extra attention during physical examination should be focused on different oral conditions according to breed in dogs and age in both dogs and cats.

Conflict of interest: The authors declare no conflict of interest.

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Animal Rights Statement : The best practice of veterinary care and legal and ethical requirements for humane treatment are guaranteed for all animals cared in our university veterinary hospital. Since our objectives are assistance, education and research, the informed consent for the use of anonymized data is part of our routine admission protocol. No approval by the local ethical committee was needed for the present study, in accordance with Spanish legislation for animal protection in non-experimental veterinary procedure.

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Legends for tables:

Table 1. Dogs: observed main conditions, with prevalence and distribution per sex, age, weight and breed categories. SD: standard deviation; PD: periodontal disease: TR: tooth resorption. [a, b, c, d:] Different letters in the same column indicate significant differences ($P < 0.05$)

Table 2. Dogs: temporal distribution of the main conditions observed in the 2013-2019 period. PD: periodontal disease: TR: tooth resorption.

Table 3. Cats: observed main conditions, with prevalence and distribution per sex, age, weight and breed categories. SD: standard deviation; PD: periodontal disease: TR: tooth resorption; FCG: feline chronic gingivostomatitis. [a, b, c:] Different letters in the same column indicate significant differences ($P < 0.05$).

Table 4. Cats: temporal distribution of the main conditions observed in the 2013-2019 period. PD: periodontal disease: TR: tooth resorption; FCG: feline chronic gingivostomatitis.

Table

Main process	Prevalence	Male frequency	Age		Weight		Breed category
			Mean	SD	Mean	SD	
PD	279/468 (59.6%)	159/279 (57.0%)	9.26[d]	3.271	9.79[a]	8.360	Extra small:148/279 (53.0%); Small: 30/279 (10.8%); Medium small: 51/279 (18.3%); Medium large:31/279 (11.1%); Large: 17/279 (6.1%); Giant: 2/279 (0.7%)
Oral tumors	53/468 (11.3%)	28/53 (52.8%)	9.50[d]	3.171	20.84[a,b]	13.412	Extra small :9/53(17.0%); Small: 3/53 (5.7%); Medium small:11/53(20.8%); Medium large:16/53 (30.2%); Large: 12/53(22.6%); Giant: 2/53(3.8%)
Dental fractures	36/468 (7.7%)	25/36 (69.4%)	4.38[a,b,c]	3.275	27.75[b]	9.921	Extra small :2/36 (5.6%);Medium small:1/36 (2.8%); Medium large:13/36 (36.1%); Large: 19/36 (52.8%); Giant: 1/36(2.8%)
Malocclusion (class 1)	33/468 (7.1%)	22/33 (66.7%)	1.918[a]	1.525	12.07[a]	14.709	Extra small :16/33 (48.5%); Small: 4/33 (12.1%); Medium small:3/33(9.1%); Medium large:4/33 (12.1%); Large: 3/33(9.1%);Giant: 3/33(9.1 %)
Fistula	27/468 (5.8%)	17/27 (63.0%)	9.13[d]	3.902	14.31[a,b]	11.810	Extra small:10/27 (37.0%); Small: 4/27 (14.8%);Medium small:2/27(7.4%); Medium large:8/27 (29.6%); Large: 3/27(11.1%).
Malocclusion (class 3)	16/ 468 (3.4%)	7/16 (43.8%)	8.52c,d	4.354	9.76a	8,623	Extra small :8/16 (50.0%); Small: 3/16 (18.8%); Medium small:3/16(18.8%); Medium large:1/16 (6.3%);Large: 1/16(6.3%).
Gingivitis	8/468 (1.7%)	6/8 (75.0%)	7.63[b,c,d]	4.138	14.89[a,b]	9.290	Extra small :3/8 (37.5%); Small: 1/8 (12.5%); Medium small:2/8(25.0%); Medium large:2/8 (25.0%);
PD & TR	2/468 (0.4%)	1/2 (50.0%)	10.55[d]	2.051	18.13[a,b]	6.894	Extra small :1/2 (50.0%); Medium large:1/2 (50.0%)
Malocclusion (class 2)	1/468 (0.2%)	0/1 (0.0%)	9.00	-	15.60	-	Medium small: 1/1 (100%)
Others	13/468 (2.8%)	8/13 (61.5%)	3.93[a,b]	2.981	16.20[a,b]	10.376	Extra small :4/13 (30.8%); Small: 1/13 (7.7%); Medium small:2/13(15.4%); Medium large:2/13 (15.4%); Large: 4/13(30.8%)

Table

Main condition	2013	2014	2015	2016	2017	2018	2019
PD	27/52 (51.9%)	43/63 (68.3%)	41/61 (67.2%)	21/42 (50.0%)	41/87 (47.1%)	54/81 (66.7%)	52/82 (63.4%)
Oral tumor	7/52 (13.5%)	5/63 (7.9%)	7/61 (11.5%)	9/42 (21.4%)	13/87 (14.9%)	3/81 (3.7%)	9/81 (11.0%)
Dental fracture	6/52 (11.5%)	3/63 (4.8%)	3/61 (4.9%)	3/42 (7.1%)	7/87 (8.0%)	6/81 (7.4%)	8/82 (9.8%)
Malocclusion (type 1)	3/52 (5.8%)	3/63 (4.8%)	4/61 (6.6%)	4/42 (9.5%)	11/87 (12.6%)	5/81 (6.2%)	3/81 (3.7%)
Fistula	3/52 (5.8%)	5/63 (7.9%)	2/61 (3.3%)	3/42 (7.1%)	6/87 (6.9%)	3/81 (3.7%)	5/82 (6.1%)
Malocclusion (type 3)	3/52 (5.8%)	2/63 (3.2%)	2/61 (3.3%)	1/42 (2.4%)	3/87 (3.4%)	3/81 (3.7%)	2/81 (2.4%)
Gingivitis	2/52 (3.8%)	0/63 (0%)	1/61 (1.6%)	0/42 (0%)	3/87 (3.4%)	1/81 (1.2%)	1/82 (1.2%)
PD&TR	0/52 (0%)	0/63 (0%)	0/61 (0%)	0/42 (0%)	0/87 (0%)	1/81 (1.2%)	1/82 (1.2%)
Malocclusion (type 2)	0/52 (0%)	0/63 (0%)	0/61 (0%)	0/42 (0%)	1/87 (1.1%)	0/81 (0%)	0/81 (0%)
Others	1/52 (1.9%)	2/63 (3.2%)	1/61 (1.6%)	1/42 (2.4%)	2/87 (2.3%)	5/81 (6.2%)	1/81 (1.2%)
Total	52	63	61	42	87	81	82

Table

Main condition	Prevalence	Male frequency	Age		Weight		Breed
			Mean	Standard deviation	Mean	Standard deviation	
PD	43/139 (30.9%)	27/43 (62.8%)	6.66[a,b,c]	4.618	4.35	1.323	Russian blue: 1/43 (2.3%); European common: 38/43 (88.4%); Persian: 1/43 (2.3%); Siamese: 3/43(7.0%)
PD&TR	32/139 (23.0%)	21/32 (65.6%)	9.80[c]	3.920	4.51	1.522	British Short hair: 2/32 (6.3%); European common: 21/32 (65.6%); Persian: 6/32 (18.8%); Siamese:3/32 (9.4%)
TR	17/39 (12.2%)	5/17 (29.4%)	9.18[b,c]	3.321	4.77	1.593	Norwegian forest: 5/17 (29.4%); British short hair: 1/17 (5.9%); European common: 7/17 (41.2%); Persian: 3/17 (17.6%); Siamese: 1/17 (5.9%)
FCG	15/139 (10.8%)	10/15 (66.7%)	5.01[a,b]	3.575	4.03	1.207	European common: 11/15 (73.3%); Sphynx: 1/15 (6.7%); Persian: 2/15 (13.3%); Siamese: 1 /15 (6.7%)
TR &FCG	10/139 (7.2%)	5/10 (50%)	8.60[b,c]	3.098	4.35	1.370	European common : 7/10 (70.0%); Maine Coon : 1/10 (10%); Persian: 1/10 (10%); Siamese: 1/10 (10%)
Oral tumors	10/139 (7.2%)	7/10 (70%)	9.16[b,c]	5.881	3.68	1.705	European common 7/10 (70%); Sphynx: 1/10 (10%); Persian: 1/10 (10%); Siamese: 1/10 (10%)
Others	12/139 (8.6%)	4/12 (33.3%)	3.90[a]	3.874	3.53	1.338	European common : 10/12 (83.3%); Persian : 2/12 (16.7%)

Table

Main condition	2013	2014	2015	2016	2017	2018	2019
PD	7/19 (36.8%)	7/15 (46.7%)	6/15 (40.0%)	7/23 (30.4%)	7/33 (21.2%)	5/17 (29.4%)	4/17 (23.5%)
PD&TR	4/19 (21.1%)	0/15 (0%)	4/15 (26.7%)	5/23 (21.7%)	14/33 (42.4%)	2/17 (11.8%)	3/17 (17.6%)
TR	5/19 (26.3%)	0/15 (0%)	2/15 (13.3%)	4/23 (17.4%)	0/33 (0%)	3/17 (17.6%)	3/17 (17.6%)
FCG	1/19 (5.3%)	4/15 (26.7%)	1/15 (6.7%)	3/23 (13.0%)	2/33 (6.1%)	1/17 (5.9%)	3/17 (17.6%)
TR & FCG	1/19 (5.3%)	1/15 (6.7%)	0/15 (0%)	1/23 (4.3%)	2/33 (6.1%)	3/17 (17.6%)	2/17 (11.8%)
Oral tumors	1/19 (5.3%)	1/15 (6.7%)	2/15 (13.3%)	1/23 (4.3%)	2/33 (6.1%)	1/17 (5.9%)	2/17 (11.8%)
Others	0/19 (0%)	2/15 (13.3%)	0/15(0%)	2/23 (8.7%)	6/33 (18.2%)	2/17 (11.8%)	0/17 (0%)
Total	19	15	15	23	33	17	17

Answer to reviewers:

Évaluateur n°1 :
Abstract: please see instructions for authors, the abstract (english and french) must be written without abbreviations. The french version is not the exact/complete translation of the english one: please, complete and modify (if you wish, we can help for translation). If primary care means no referral cases, « premiers soins » is not a correct translation: you have to write « soins de première intention ».

Now, English abstract has been rewritten without abbreviation, following the instructions for authors. Also, French abstract has been carefully and fully revised, being an exact translation of the English one. However, it would perhaps improve if a French colleague could review it; we would be very grateful if you could have a look to it.

48: use behaviour rather than behavior.
Done
50: you must write PD in total (the abbreviation included in the summary is not the correct procedure).
Done

Could be useful to give a definition of class 1, 2, and 3 malocclusion for colleagues who are not specialized in dentistry (all the other terms are well-known).
Lines 81-90 include now a description of malocclusion classes according to the American Veterinary Dental College (AVDC)

68: legal and ethical requirementsas in human odontostomatology (is this what you mean ?).
In this sentence humane treatment means treatment characterized by tenderness, compassion, and sympathy for people and animals, especially for the suffering or distressed

74 and followings: please give the complete wordings and the abbreviations together (not only the abbreviations); Why RD? I don't find it in the abbreviations when reading your abstract.
Done. Sorry: RD was wrong and has been deleted.

215 : aging rather than ageing?
Done