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## Dental disorders in hunting dogs in Maiduguri, Borno State, Nigeria

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### Abstract

Dental disorders of dog is one of the challenges faced by veterinarians. It is an important area of interest from the economic point of view as these dogs are primarily used for hunting and guarding purposes. Although many studies on dental diseases in other mammals like cow and camels have been documented, but information on frequency of these alterations in populations of hunting dogs, especially in north eastern Nigeria, is grossly lacking. The present study was designed to evaluate the prevalence of dental disorders in hunting dogs in Maiduguri, Nigeria. A total of 142 hunting dogs of both sexes were examined between the ages of 2 and 10 years. Out of the total number, 91 (64%) were positive for at least one form of dental disorders. Out of the positive results, 73(80.2%) were males while 18(19.8%) were females. The dental abnormalities observed during the study include gingivitis (40.6%), dental calculus (36.3%), dental attrition (18.7%) and missing teeth (4.4%). The prevalence of calculus formation did not differ between left and right side. However, the upper jaw showed a higher degree of affection than the mandible. On the labial or buccal side of the teeth, a thicker calculus layer could be observed than on the lingual side. Interestingly, the degree of calculus formation, gingivitis and the missing teeth did not correlate in all cases. Dental attrition was detected only in older dogs and affected mostly canines and premolars of old dogs.

**Keywords:** Gingivitis; calculus; missing teeth; attrition; Maiduguri; Nigeria

### Introduction

Dogs in Maiduguri, Northeastern Nigeria are kept primarily for hunting and guarding purposes Zakariah *et al.* (2015) [28]. In recent study it was discovered that most of the dog owners especially the hunters hardly take their dogs to veterinary clinics for checkups or treatment Zakariah *et al.* (2015) [28]. Dogs are prone to infection through their mouths just like other animals, and gingivitis is the predominant disorder of the oral cavity especially in dogs (Page and Schroeder, 1982). They are mostly considered diet related disorders (Manfra, 2000) [20]. A soft diet causes accumulation of bacterially colonized dental plaque. Gingivitis is an inflammation affecting the tissues surrounding the tooth. It is induced either experimentally or occurs spontaneously Correl *et al.* (2005) [4]. The lack of oral hygiene causes plaque deposition and calculus formation, which harbors the bacteria and eventually induces gingival inflammation (Lobprise, 2007) [16]. It has been suggested for a long time that these disorders are detrimental not only to the oral cavity. However, some studies have showed a close association of these disorders with the general health of the animal. The persistent infection of the oral cavity does not only discomfort the affected animal, but may also cause diseases of distant organs DeBowes *et al.* (1996) [5].

There are studies on periodontal disease with large parameters, even though most of them dealt with exotic breeds of dogs and in controlled environment (Hennet, 1999) [11]. However information on oral disorders in hunting dogs especially in study area is grossly inadequate. Site prevalence and severity of affections are assessed but only rarely. Available extensive epidemiological studies concerning dental disorders in humans could serve as a model for such research in animals Genco *et al.* (1998) [7].

A decrease of tooth number in dogs can be caused by agenesis (mostly in small, brachycephalic breeds) or by tooth loss in consequence of periodontal disease or mechanical affection Harvey *et al.* (1994) [10]. The lower first premolars are often missing in young dogs, usually due to agenesis (Harvey *et al.*, 1994; Hoffmann and Gaengler, 1996) [10, 12]. Abnormal attrition is mostly observed in dogs that are fed with a hard diet or in dogs that love to play with stones, and in so called "wire-biters" (Van Foreest and Roeters, 1998) [25].

Dental caries is a rare disease compared to other dental disorders in the dog. The teeth most commonly involved are the last premolar and the first molar teeth (Hale, 1998) [9].

The purpose of this study was to document the prevalence of the most common dental disorders in hunting dogs that are used by hunters in Maiduguri, Nigeria. The results of this study will possibly find application by veterinarians to the main oral disorders of hunting dogs and help to communicate with the clients/dog owners regarding these important disorders.

**Materials and Methods**

**Study area**

The study was conducted in Maiduguri, Nigeria, located between latitude 11° and 50° north and longitude 13° and 36° east. The annual rainfall average 320mm, rainy season begins in June and last till October and dry season begins in November and last till May. The rainfall is monsoonal, generally being heaviest in August. The annual temperature average is 35.4 °C, the climate of Maiduguri can be divided into six zones: Guinea, Sudano-Guinea, Sudano-sahelian, Sahelo-sudanian, Sudano-saharan and Saharan zones (LCRI, 2007).

This study was realized during the period of 2015–2016. A total number of 142 dogs, were analyzed for alterations of the oral cavity. A well written informed consent were obtained from all the dog owners following a detailed explanation of the purpose and benefits of the study. The dogs were classified into groups according to their age (as reported by the owners): 2–4 years of age, 5–7 years of and 8–10 years of age. The standard tooth formula of the permanent dentition of the dog, which was used for determination of missing teeth and sites of other pathological changes of the dentition, is I3/3, C1/1, P4/4, M2/3 (Page and Schroeder, 1982).

Each dog was examined clinically. Number and localization of teeth, degree and localization of gingivitis, dental calculus, dental wear (attrition), dental caries and any other alterations of the oral cavity were recorded. Gingivitis, formation of dental calculus and attrition were observed and recorded according to the method described by (Loe and Silness, 1963) [17], which is based on evaluation of plaque accumulation, gingival inflammation, attrition and missing teeth.

**Results**

The total of 142 hunting dogs of both sexes were examined between the ages of 2 and 10 years. Out of the total number, 91 (64%) were positive for at least one form of dental disorders. Out of the positive results, 75(82.4%) were males while 16 (17.6%) were females. The dental abnormalities observed during the study include i, gingivitis (40.6%) ii, dental calculus (36.3%) iii, dental attrition (18.7%) and iv, missing teeth (4.4%). The age and sex distribution of all the dogs examined are presented in in (Table 1), while the prevalence of dental disorders percentage are presented in (Table 2). The gross pictures of the various forms of dental disorders are presented in (Figures 1 to 4).

**Table 1:** Age and Sex Distribution of the hunting dogs examined

Age Groups (years)	Male	Female	Ratio
2-4	34	9	34/9
5-7	32	17	32/17
8-10	38	12	38/12
Total	104	38	104/38

**Table 2:** Percentages of Dental Disorders among the hunting dogs in Maiduguri

Age Groups (Years)	Male	Female
<b>Gingivitis</b>		
2-4	11(35%)	00
5-7	5(16%)	4(66.6%)
8-10	15(48%)	2(33.3%)
<b>Dental Calculus</b>		
2-4	5(20%)	1(12.5%)
5-7	12(48%)	2(25%)
8-10	8(32%)	5(62.5%)
<b>Dental Attrition</b>		
2-4	2(15.4%)	00
5-7	2(15.4%)	00
8-10	9(69.2%)	4(100%)
<b>Missing Teeth</b>		
2-4	00	00
5-7	1(25%)	00
8-10	3(57%)	00



Figure 1. Oral mucosa of dogs showing dental calculus (black arrow) and attrition (blue arrow)



Figure 2. Oral mucosa of hunting dog showing gingivitis (arrow)



Figure 3. Picture of oral mucosa of dog showing apparently healthy gingiva and absence of calculus and attrition



Figure 4. Picture of oral mucosa of dog showing missing teeth (arrow)

## Discussion

This study is aimed at assessing the prevalence of oral diseases of hunting dogs in Maiduguri, Nigeria. Gingivitis, dental calculus and attrition were the most frequent alterations found in the Study. Our literature search and the interactions with the hunters revealed that this is the first study to be conducted in the northeastern Nigeria. It is however not surprising as reported previously by Zakariah *et al.* (2015) [28], that dogs are regarded as unclean animals in the study area. Similar results was also reported by Lund *et al.* (1999) [19]. Additionally, our study revealed higher cases of oral disorders than the report of Preshaw *et al.* (2004) [24]. This can be explained either as a result of increasing prevalence of these disorders or because most of the dogs used by hunters don't take their dogs to veterinary clinics for treatment. It could also be as a results of misinterpretation of data because of different approaches to epidemiological studies as reported by Preshaw *et al.* (2004) [24]. The present study showed higher prevalence of gingivitis and dental calculus than other dental disorders. This is also in agreement with the report of (Gorrel, 1998) [8], that gingivitis and dental calculus seems to be the most common oral disorders in small animals. We observed an increasing occurrence and severity of oral disorders with increasing age of the dogs. These findings are in agreement with previous experimental studies on exotic dog breeds (Dhaliwal *et al.*, 1998) [6] as well as with retrospective studies in pet dogs Lund *et al.* (1999) [19]. Interestingly, in our study we did not compare the prevalence between breeds as all the dogs that are used for hunting in Maiduguri, Nigeria are mongrels. The most often inflamed site of gingiva in dogs is apparently the premolar region followed by the molar, canine and then the incisor regions. The labial/buccal gingiva is more affected than the lingual/palatinal gingiva. In contrast to the dog, the molar region is most affected site for dental disorders in the human (Newman and Carranza, 2002) [21], and in camels (Yahaya *et al.*, 2011). This is probably because it is difficult to remove plaque by simple brushing in this region (Newman and Carranza, 2002) [21]. According to our study, the gingiva seems to be more often inflamed in the upper jaw than in the mandible. These results are, however, in contradiction with the reports of (Harvey *et al.*, 1994; Hoffmann and Gaengler, 1996) [10, 12], indicating the same prevalence in both areas. In our study, there were no differences between right and left side, but between the individual tooth regions. The sites of most severe affection differed in dependence on the animal age. The dental disorders indicators (scores) allowing to choose appropriate

treatment methods and to predict clinical outcome, which are suitable for the screening of large animal populations, are still lacking as reported by (Harvey *et al.*, 1994) [10]. Whether methods of assessing dental disorders from humans (Loe and Silness, 1963) [17] will be helpful in animals is unclear, as it is yet to be reported. Biopsy of apparently healthy gingival tissue followed by histological examination might be useful as an additional diagnostic tool Johnson *et al.* (1988) [13].

Dental calculus itself does not seem to be an irritant. In fact, it has been shown that under certain conditions a normal attachment may be seen between the junctional epithelium of the gingiva and calculus (Verstraete, 1999) [26]. Calculus can be encapsulated in connective tissue without causing marked inflammation (Manfra, 2000) [20]. Our study supports this information, since thick calculus deposits have been found in many examined dogs with only a light degree of gingival inflammation. Apparently, supragingival calculus is not directly involved in the etiology or even pathogenesis of periodontal disease and is mainly of cosmetic significance if plaque is not too large Lang *et al.* (1997). Yellowish discoloration of teeth may be caused by tetracycline staining (Correl *et al.*, 2005) [4]. When tetracycline is administered during pregnancy and development of deciduous and permanent teeth; the tetracycline will combine with the calcium in the teeth to form tetracycline-calcium orthophosphate complex which results in a yellowish discoloration of teeth (Verstraete, 1999) [26]. However, plaque can be indirectly responsible for gingival inflammation as a result of the immune response of the host Bascones *et al.* (2004) [2]. Loosening of teeth and following tooth loss is often elicited by inflammatory response in the gingival tissue, which leads to a progressive loss of collagen attachment of the tooth to the underlying alveolar bone (Loesche and Grossmann, 2001) [18]. Our study did not reveal a large number of missing teeth in the examined dogs. The sites of missing teeth did not completely agree with the reports of (Page and Schroeder, 1981). According to them, the missing teeth are first found in premolars; then the other premolars and incisors, and finally molars. However our study only found the missing teeth in the incisors which occurred as a results of trauma accidentally caused by the dog owners when trying to hit bush animals. The number of missing teeth increased with the progression of periodontal inflammation and with age, suggesting a causal relationship between these two alterations exist (Page and Schroeder, 1982). The only tooth loss found in our study was as a result of mechanical injury accidentally incurred by the hunter when he tried to hit the bush animals with a stick. Attrition of teeth becomes apparent in older dogs (older than eight years of age). The age of dogs can be estimated based on the degree of dental attrition. This method is, however, highly speculative, because tooth wear depends on feed and keeping conditions Berglundh *et al.* (1991) [3]. Dental attrition/abrasion and cage-Bitter syndrome, are gradual and regular loss of tooth substance. Dental abrasion is the mechanical wear of teeth caused by mechanical wear other than by normal mastication or tooth to tooth contact (AVDC, 2007). There is a constant exchange of minerals between the enamel and the oral fluid. If this exchange is balanced, no lesion develops, but if there is a net loss of mineral from the enamel, attrition develops which may results to dental caries Correl *et al.* (2005) [4]. The rate of progression of dental disorders depends more on factors external to the tooth such as the cariogenicity of

microflora, the availability of acidogenic substrates and the remineralizing capability of oral fluids (Manfra, 2000) <sup>[20]</sup>. It is speculated that the oral condition of the dog including the oral bacterial flora may be suitable rather for the development of periodontal disease than for dental caries formation (Gorrel, 1998; Hale, 1998) <sup>[8]</sup>. The anatomical conformation of the tooth crown and the thicker layer of enamel compared to human teeth could be another reason. However, there is no evidence to support this assumption so far. Our study as well as many others showed the high prevalence of oral diseases in dogs and confirmed that gingivitis and calculus are the most common oral condition in dogs. It is well known from human studies that a majority of dental disorders can be prevented by daily oral hygiene. Oral disorders is almost always significantly associated with the overgrowth of bacteria in the sub gingival plaque (Loesche and Grossman, 2001) <sup>[18]</sup>. However, the general disorders of oral cavity of hunting dogs in the study area can be controlled to the barest minimum. This can be achieved by educating the hunters to take their dogs to the nearest veterinary clinics or call on veterinarians for periodic checkup.

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