THE FREQUENCY OF ACQUIRED DENTAL DISORDERS AND DISEASES IN TANZANIAN MIXED DOG BREEDS: MACROSCOPIC AND RADIOLOGIC STUDIES

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SUMMARY

A macroscopic and radiologic investigation was carried out in 330 dogs of Tanzania mixed breeds, aged 1 day to 20 years, of these 54.6% were males. The study was carried out at Sokoine University Veterinary Clinic in Morogoro, Shaaban Robert Veterinary Clinic in Dar es Salaam and the Regional Veterinary Clinic in Iringa region. The type and frequency of dental disorders and diseases were determined in randomly selected dogs available for treatment or examination. The oral carity was examined macroscopically, missing teeth, gingivitis, dental calculus (tartar), dental carries, abnormal attrition, dental discoloration, crown fractures, foreign bodies, Enamel hypoplasia and dental root exposure were recorded as to frequency and distribution. After macroscopic examination of the oral cavity dental radiography using the medio-lateral oblique view projection was done for every dog and both the right and left maxilla and mandible were radiographed. The frequency, distribution and severity of periapical destruction, apical and marginal periodontitis root resorption, root hypoplasia, pulpitis and pseudooligodontia were recorded. The most frequently noted disease was periodontitis (45%), which increased in frequency and severity with increasing age of the dogs. Root resorption was second on the list (32.4%). Others included abnormal and or excessive attrition (15.8%), Pseudooligodontia (15.2%), Fractured canine crown (11.2%); Caries (5.8%), Pulpitis (3.6%), dental deposits (3.3%), root hypoplasia (2.7%) and Enamel hypoplasia (1.2%). It is concluded from this study that acquired dental diseases and disorders are present in Tanzania mixed dog breeds, but most of the disorders are at lower frequency compared to other studies done in the temperate countries which involved European dog breeds.

INTRODUCTION

Wright 1939 stated that "The incidence of dental disorders and diseases in dogs is so high that dental surgery occupies a prominent place in the work of a Veterinarian engaged in small animal practice". The statement was later substantiated by a number of paper on disorders and diseases of the oral cavity in the dog, e.g. **periodontal disease;** (Rosenberg *et al.*, 1966; Gad 1968, Hull 1973, Hull *et al.*, 1974; Hamp 1973; Hamp and Lindberg 1977; Jeffcoat *et al.*, 1980; Sorenson *et al.*, 1980; Page and Schroeder 1981; Golden *et al.*, 1982; Hamp *et al.*, 1984; Grove 1985 and Bittegeko 1988, 1992, 1994). **dental caries**; (Gardener *et al.*, 1962, Schneck 1967; Lane 1981 and Bittegeko 1988, 1992). **Root resorption**; (Hooft *et al.*, 1979; Hamp *et al.*, 1984; Harvey 1985; Bittegeko and Arnbjerg 1987 and Bittegeko 1988, 1992).

Inspite of the amount of data available in Veterinary literature, the subject remains almost untouched and/or unreported on in tropical Africa (Bittegeko, 1992). Even the basic information concerning the frequency and distribution of dental diseases in the dog is incomplete in literature as a whole, (Hamp *et al.*, 1984). The aim of this study was to establish the frequency of acquired dental disorders and diseases in Tanzania mixed breed dogs.

MATERIALS AND METHODS

A total of 330 randomly selected dogs aged 1 day to 20 years were divided/grouped according to age into 6 age groups (Table I). The first group consisted of 7 dogs aged 1 day to 12 weeks, the second group 53 dogs aged 12 weeks to 12 months, the third group

127 dogs aged 1 year to 5 years, the fourth group 49 dogs aged 5 years to 10 years, the fifth group 10 dogs aged 10 years to 20 years, and the last group consisted of 84 dogs whose age was unknown.

The series consisted of 180 males and 150 female dogs, and were a mixture of Tanzania dog breeds. All sampled dogs were macroscopically and radiologically examined for acquired dental disorders and diseases. Most dogs were sedated using acepromazine maleate (10 mg/ml) at the dose of 0.5 mg/kg i.m in combination with 0.05 mg/kg atropine sulphate (1 mg/ml) i.m. Uncooperative dogs were anaesthetized using Immobilon^{R} (etorfin hydrochloride 0.125 mg and acepromazine hydromaleate 0.4 mg per ml, Pharmacia As 3400 Hillerød) at a dose of 1 ml/20 kg body weight (i.m.) and were revived after the examination using 1ml/20kg Revivon^{R} (diprenorfin hydrochloride 0.45mg/ml. - Pharmacia As 3400 Hillerød), (i.v.). The oral cavity of all dogs were first examined macroscopically and then radiologically for dental disorders and diseases. The open mouth oblique-medio lateral view projection was used in radiography. Photography was used in macroscopic studies.

Macroscopic Examination

The oral cavity including all of the teeth was examined for the following diseases and disorders:

Oligodontia/Pseudooligodontia: The condition was diagnosed when one or more teeth were missing. The number of teeth and position of any missing teeth were recorded.

Dental caries: Macroscopic diagnosis was based upon the finding of an area of soft, demineralized enamel or cementum with or without involvement of underlying dentine (Golden *et al.* 1982). Dental caries was recorded as to frequency, distribution (involved teeth) and involvement of dental components. Two categories were recorded depending on the components involved: (1) Enamel and dentine, (2) Enamel, dentine and pulp.

Fractured teeth crown, Dental abrasions and Traumatic dental lesions: These were postivelly confirmed when the tooth crown was traumatically frgmented, broken, abraded or when a part of crown was missing. These were recorded as to position, frequency and distribution.

Root exposure: This was diagnosed when the root of the tooth was vissible beyond the gingival margin. recorded as to frequency and position of teeth involved.

Enamel hypoplasia: This is a condition where parts of the tooth crown have no enamel, but only dentine. The condition was recorded as to frequency and position of teeth involved.

Dental deposits: Dental calculus (tartar), and Dental plaque: Tooth deposits are mineralized deposits on the tooth surface (dental calculus) or soft microbial accumulations on the tooth surface (plaque) were recorded as to presence, frequency and distribution.

Root exposure: Root exposure was diagnosed when the gingival margin was below the cemento-enamel junction. The condition was recorded as per frequency, teeth involved and part of the tooth involved (whether labial or lingual surface).

Foreign bodies: These where diagnosed when the foreign body was seen sticking between the teeth, covering the crown, embedded into the gingiva and/or periodontal space or embedded into the pulpal chamber. The condition was recorded as per type of foreign body, teeth involved, part involved and extent of involvement.

Radiologic Examination:

After the macroscopic examination, radiographs were made under general anaesthesia as described above. All radiographs were made at a focus-film distance of 100 cm. Extra-oral pan-speed films (Fuji x-ray film 18 x 24 cm, Fuji Photo Film Co., Ltd Japan) were used in combination with a Kyokko BF - III low speed intensifying screened cassette (18x24cm). For examination of the incisors,intra-oral radiographs were made using exposure settings of 60 KV and 35 MA with exposure times between 0.1 and 0.15 seconds. Right (R) and left (L) markers were used to identify the exposed jaws. Immediately after intra-oral radiography, medio-lateral-oblique and naso-mental projections were performed using the same exposure settings. The X-ray machine used was a Portable X-ray unit, Santax, Type SP 103, SHOWA X-RAY Co., LTD TOKYO

JAPAN.
All extra-oral projections were made with the mouth maximally opened, as described by Bittegeko (1992), with the jaws being put at an angle with the cassette. For medio-lateral views of the right or left mandible, the chin was placed so that the mandible formed a 35° angle with the cassette. The x-ray tube was perpendicular to the cassette. For the medio-lateral projections of the maxilla, similar positions were adopted except that the back of the nose was toward the cassette. This projection was termed mediolatero-oblique projection.

For the naso-mental projection views of the maxilla and mandible alternatively, the back of the nose and the chin were put on the cassette with the tube at an angle of about 40° to the cassette (Bittegeko, 1992).
All radiographic films were manually processed . The frequency, severity and distribution of the following diseases were recorded in each dog.

Periodontal disease: This is the condition which involves inflamation of the gingiva (gingivitis) together with the periodontal membrane (periodontitis). The presence and severity (slight or advanced) of marginal and/or apical periodontitis were recorded when there was a loss of the amount of supporting alveolar bone and/or a radiolucent area adjacent to the apex of the root and the lamina dural of the apex region had disappeared.

Root resorption: This was a positive diagnosis when there was either a well defined radiolucent area in the root (pulp cavity) or disappearance of a part of the root.

Pseudooligodontia: This was a diagnosis when there was missing teeth macroscopically and the evidence of presence of the missing teeth at one time in life was established radiologically.

Endodontic disease (Pulpitis). The condition was diagnosed when there was a well defined radiolucent area in the pulp cavity or increased size of the pulp cavity of a particular tooth compared to that of the same but opposite teeth in the other jaws of the same dog.

RESULTS

The results of the acquired dental disorders and diseases studied and their respective frequencies (%) per age group are presented in Table 2.

Periodontitis:

This represents both the marginal and apical periodontitis types (Fig 1). It was recorded in 45.8% of the dogs (Table 2). Marginal periodontitis form was more frequent than the apical form. Periodontitis was present in more than 80% of those older than five years. In the oldest group periodontitis was found in 90% of the dogs. The youngest groups revealed the lowest frequency and the earliest signs of periodontitis (Table 2). Both slight and advanced periodontitis were increasingly present with increasing age, with the frequency being higher in the maxillary teeth than in the mandibular teeth. The carnassial teeth were the mostly involved. The periodontal lesions were more common in the caudal premolar and molar teeth of both jaws than in the anterior premolars. However, canines in most dogs older than 8 years were affected at the same frequeney as the caudal premolars and molars. Also parodontopathy was a common feature in the incisors of dogs older than 10 years. In old dogs, severe destruction of the periodontal tissue seemed to be the cause of pseudooligodontia (Fig.1 & 2).

Root resorption:

Root resorption was observed in 32.4% of the dogs (Table 2). In the oldest group the frequency was as high as 40.0% (Table 2). The condition was not recorded in dogs less than 12 months old. The frequency increased with increasing age of the dogs. It was more than 87% in dog older than 5 years. The condition in most cases it was in combination with periodontal lesions (Fig.1 & 2) . The condition sometimes led to complete destruction of a significant part of a root (Fig.2).

Abnormal/Excessive Attribution:

This condition was observed in 15.8% of the dogs. It was noted to be increasingly

present with increasing age (Fig.1 & 2). The frequency was highest in the oldest group (50.0%). It was absent in the youngest group. In some cases the teeth have been worn to the gingiva

Pseudooligodontia:

Pseudooligodontia was observed in 15.2% of the dogs (Fig.1,2 & 3). The condition was not recorded in dogs younger than one year, and the frequency increased with increasing age, being 15.8% in the 1 year to 5 years group and 70.0% in the 10 years - 20 year age group, (Table 2). The most involved teeth were the incisors in most dogs (Fig.2 & 3).

Fractured teeth crown:

The condition was recorded in 11.2% of the dogs (Fig.2). It was not recorded in either the youngest or the oldest group (Table 2). However in some cases, the condition has led to the conditions called pulpitis and or apical periodontitis.

Dental caries:

This condition was recorded in 5.8% of the dogs. It was not recorded in dogs younger than one year and the frequency increased with increasing age, it was 20% in the oldest age group (Table 2). Carious lesions were predominantly seen in the caudal (posterior) teeth. The majority of the lesions were confined within the enamel and dentine of the crowns .

Endodontic disease (Pulpitis):

Endodontic disease was observed in 3.6% of the dogs (Table 2). It was in most cases combined with fractured crowns. The canine teeth were the mostly involved compared to other teeth. Apical periodontitis was a feature in most of the pulpitis cases.

Dentine hypoplasia:

The condition was recorded in (9 dogs) 2.7% of the dogs. It was observed only in dogs older than 12 months (1 year), thus in those having permanent dentition. The premolar and canine teeth were the most affected.

Root exposure:

The condition was recorded in 2.1% of the dogs. The condition recorded the highest frequency of 6.1% in the 5 years - 10 years age group (Table 2). The lingual surface of the incisor teeth was the most affected.

Enamel hypoplasia:

The condition was diagnosed in 4 dogs (1.2% of the dogs) (Table 2). All teeth were involved in the 4 cases encountered. However, the condition was more evident and pronounced in the canine teeth.

Foreign bodies:

These were recorded in 3 cases (0.9% of the dogs) . In two cases, a piece of bone was entangled and stuck over the teeth (Fig.4), and in the interdental space.

Dental deposits:

Dental deposits was recorded in 3.3% of the dogs The condition was absent in dogs younger than one year. Increasing amounts were noted with increasing age. The fourth premolar molar and canine teeth were more affected than the rest of the teeth.

Table 1: Age and Sex Distribution of the 330 Dogs.

Age	Males	Females	Total
1 day - 12 weeks	4	3	7
12 weeks - 12 months	30	23	53
1 year - 5 years	67	60	127
5 years - 10 years	25	24	49
10 years - 20 years	7	3	10
Unknown age	47	37	84
Total	180	150	330

Table 2: Distribution of acquired dental diseases/disorders in different age groups of dogs (n=330)

Dental disease or disorder	AGE GROUPS, NUMBER AND FREQUENCY (%) PER AGE GROUP						
	1 day-12 wks (7 dogs)	12 wks-12 months (53 dogs)	1 yr - 5 yrs (127 dogs)	5 yrs - 10 yrs (49 dogs)	10 yrs - 20 yrs (10 dogs)	Unknown age (84 dogs)	Total (330 dogs)
Periodontitis	0(0.0)	1(1.9	61(48.0)	40(81.6)	9(90.0)	40(47.6)	151(45.8)
Root resorption	0(0.0)	0(0.0)	29(22.8)	43(87.8)	9(90.0)	26(31.0)	107(32.4)
Abnormal/Excessive attrition	0(0.0)	0(0.0)	30(23.6)	12(24.5)	5(50.0)	5(6.0)	52(15.8)
Pseudoligodontia	0(0.0)	0(0.0)	10(7.9)	15(30.6)	7(70.0)	18(21.4)	50(15.2)
Fractured canine teeth crown	0(0.0)	0(0.0)	17(13.4)	12(24.5)	0(0.0)	8(9.5)	37(11.2)
Dental caries	0(0.0)	0(0.0)	1(0.9)	10(20.4)	2(20.0)	6(7.1)	19(5.8)
Pulpitis	0(0.0)	3(5.7)	8(6.3)	1(2.0)	0(0.0)	0(0.0)	12(3.6)
Root hypoplasia	0(0.0)	0(0.0)	6(4.7)	2(4.1)	0(0.0)	1(1.2)	9(2.7)
Root exposure	0(0.0)	0(0.0)	4(3.1)	3(6.1)	0(0.0)	0(0.0)	7(2.1)
Enamel hypoplasia	0(0.0)	2(3.8)	1(0.9)	0(0.0)	0(0.0)	1(1.2)	4(1.2)
Foreign bodies	0(0.0)	0(0.0)	3(2.4)	0(0.0)	0(0.0)	0(0.0)	3(0.9)
Dental deposits	0(0.0)	0(0.0)	4(3.1)	5(10.2)	2(20.0)	0(0.0)	11(3.3)

Fig. 1: A radiograph showing periodontitis and root resorption of the maxillary first incisor (arrow heads) and pseudooligodontia of the 1st and 2nd incisors (arrows).

Fig. 2: A radiograph showing pseudooligodontia of maxillary 2nd premolar and mandibular incisors (small arrows) as well as the dental fracture of the maxillary 3rd premolar (big arrow) and mandibular canine tooth. Note root resorption affecting the remaining mandibular incisor.

Fig. 3: A radiograph showing pseudooligodontia of maxillary first incisor.

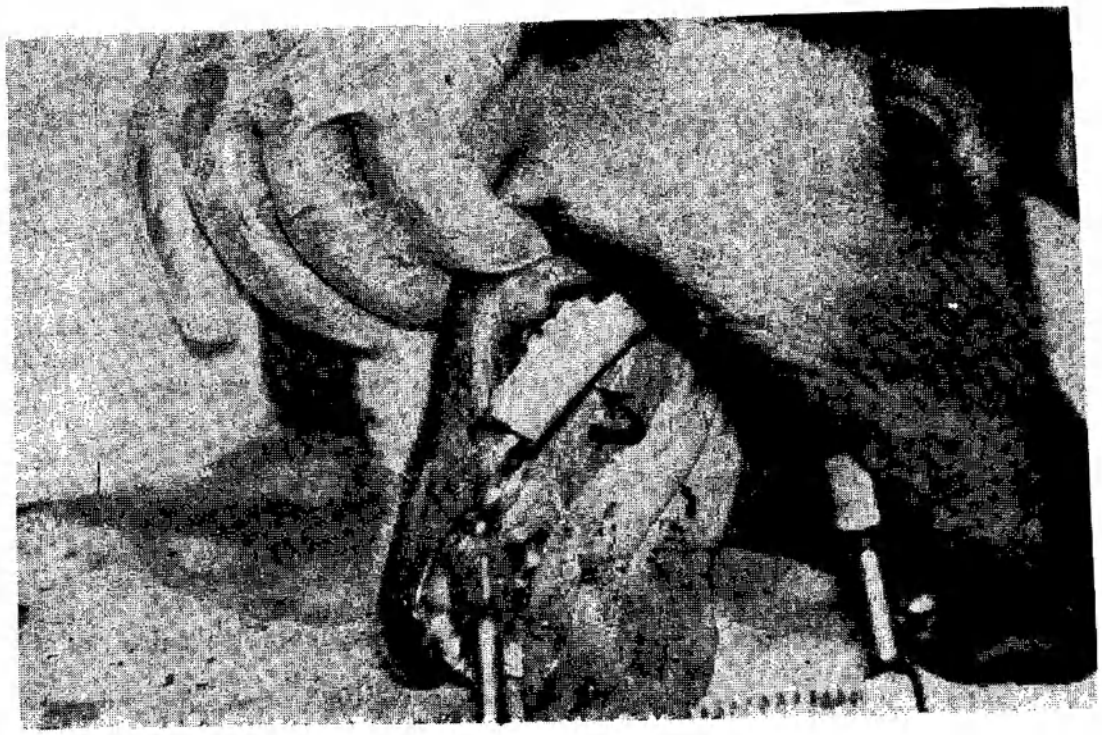

Fig. 4: A picture showing a piece of bone on the mandibular 3rd and 4th premolar and the molar teeth (curved arrow).

DISCUSSION

The present study demonstrates that dental disorder and diseases are frequent in Tropical dogs (Tanzanian dog mixed breeds). Periodontitis was the most frequent (45.8%) followed by root resorption (32.4%). Dental caries (5.8%) pulpitis (3.6%), dental deposits (3.3%), root hypoplasia (2.7%), root exposure (2.1%) and Enamel hypoplasia (1.2%) were the least frequently noted disorders.

From a comparative point of view the frequency of periodontitis, root resorption, caries, pulpitis, dental fracture and pseudoogodontia are of great interest.

Periodontal disease was the mostly frequently observed condition. It seemed to be very common in dogs. Hamp *et al.*, (1984) observed that periodontitis was as common in dogs as in human beings. He recorded the frequency of the condition in dogs as 63.6%. However in this study the frequency is as low as 45.8%. The difference may be attributed to the low frequency of dental calculus, and the breed of the dogs involved in the study as small dog breeds do experience periodontitis more frequently and severly than, medium and large dog breeds (Hamp *et al.*, 1984). The condition was the major cause of pseudooligodontia in most sever forms. The frequency of periodontal disease increased with increasing age. This is in agreement with the findings by Hamp *et al.*, (1984), Harvey (1985) and Bittegeko (1988, 1994). In general the findings in this study agree with previous findings by other researchers of the 330 dogs examined, 32.4% (107 dogs) revealed the presence of root resorption. The frequency was highest in the oldest age groups, that is 10 years to 20 years old dogs (90%).

The frequency in this study 32.4% seem to be higher than the one recorded by Hamp *et al.*, (1984) where of the 162 dogs only 17.9% were affected, and the oldest age group of 12 years to 14 years showed the frequency of 43.5%. However, Bittegeko (1988) recorded

indicates the presence of dental diseases and disorders in dogs in the Tropical dog mixed breeds. It also indicated that most of the disorders are at lower frequency compared to other studies done in the temperates with European dog breeds (Caries, Dental calculus, and periodontitis). However, root resorption frequency may be higher in tropical dog mixed breeds than the European dog breeds. The nature of food and breed seem to be major factors contributing for the difference in the frequencies of the disorders and diseases.

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