EVALUATION AND MANAGEMENT OF DENTAL AFFECTIONS IN DOGS

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DECLARATION

I hereby declare that this thesis, entitled **"EVALUATION AND MANAGEMENT OF DENTAL AFFECTIONS IN DOGS"** is a bonafide record of research work done by me during the course of research and that the thesis has not previously formed the basis for the award to me of any degree, diploma, associateship, fellowship or other similar title, of any other University or Society.

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CERTIFICATE

Certified that this thesis, entitled **"EVALUATION AND MANAGEMENT OF DENTAL AFFECTIONS IN DOGS"** is a record of research work done independently by **Archana. A**, under my guidance and supervision and it has not previously formed the basis for the award of any degree, diploma, fellowship or associateship to her.

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INTRODUCTION

1. INTRODUCTION

Dental health is an extremely important but underrated aspect of companion animal health care. Oral disorders are of major clinical importance in the dogs. A survey made in the United States of America evolved that only seven percent of the dog population can be considered healthy with regard to oral cavity. Epidemiological studies had shown that the periodontal disease and the dental calculus were the most common oral diseases in the dogs (Lund *et al*., 1999).

Plaque is the *numero uno* oral problem in canines. If the plaque is not removed regularly it will turn to form dental tartar that leads to gingivitis and bad breath in dogs. Halitosis is a hallmark sign of periodontal disease and gingivitis, which makes the dog socially unacceptable (Carmichael, 2006b). In fact, apart from bad odour, it affects the periodontal tissues too. Periodontal disease makes the dogs suffer from progressive inflammation and destruction of tissues supporting the teeth. In addition to oral pain and tooth loss, periodontal infection can spread systemically and affect various remote organs like liver, kidneys and heart. Plaque is considered as a diet related disorder. A soft or a minced diet favour rapid accumulation of dental plaque and calculus which eventually result in periodontal disease. Many other factors like age, breed, chewing habits and occlusion can predispose the condition.

Every pet with teeth will need dental care at some point in its life time. Dental examination must be made an integral part of health check-ups in dog. This will help early detection of plaque formation and its prevention by making alterations in diet and feeding habits. But at many of the occasions the owner will be unaware of the situation and the dental problems will be diagnosed only when the dog is presented for some other condition. The diagnosis and grading of periodontal disease require periodontal probing and radiographic examination. The periodontal probe has a calibration for measuring the gingival sulcus depth or pocket depth.

Normal pocket depth is one to two millimeters and it increases with tissue destruction. Intra oral radiography can be used to assess the degree of destruction of bony alveoli and integrity of tooth attachment (Tsugawa *et al*., 2003).

The treatment for all cases of periodontitis is aimed at the complete removal of bacterial plaque and calculus from the tooth crown, gingival sulcus and root surface and regaining the compromised tooth attachment. Manual or ultrasonic dental scaling is useful for removing the plaque and calculus which can promote in periodontal tissue regeneration. For cases with mild to moderate bone loss, treatment includes scaling, root planning, and administration of local and systemic antibiotics. But patients with deep pockets and bone loss may require mucogingival surgery and open curettage to access and clean the pockets and even at times exodontias (Eisner, 1989a).

Providing good oral hygiene at home is essential in preventing the disease. It includes daily tooth brushing and the use of commercial dental diets. Chew treats and toys are also effective in the control and removal of plaque. Oral rinses containing chlorhexidine gluconate kills the bacterial pathogens that contribute to periodontal disease and halitosis.

Systematic studies on dental affections in dogs in India were found scanty on reviewing the available literature. Hence the present study was proposed. The study was conducted with an objective to investigate the prevalence of various dental affections in dogs, to assess the relationship of age, breed, sex, food habits and systemic diseases with the incidence of dental affections and to evaluate the efficacy of the treatment protocols adopted.

REVIEW OF LITERATURE

2. REVIEW OF LITERATURE

2.1. ANATOMY

Lobprise (2000b) stated that periodontium was the supportive tissues around teeth, and was comprised of the gingiva, cementum (external layer of tooth root), alveolar bone (socket), and the periodontal ligament extending from the cementum to the alveolus.

Tsugawa and Verstraete (2000) opined that a keen understanding of the supporting structures of a tooth was essential to the radiographic interpretation of periodontal disease. The support structure of a tooth included the lamina dura, alveolar crest, periodontal ligament (PDL) and cancellous bone.

Carmichael (2006b) described the periodontal anatomy which included the structures that attached the teeth to the jaws: gingiva, the alveolar bone, the cementum and the periodontal ligament. The pocket depth was measured from the gingival margin to the apical extent of the pocket and the normal pocket depth was 1 - 2mm.

2.2. PREVALENCE OF DENTAL AFFECTIONS

Gad (1968) evaluated the prevalence and etiology of periodontal disease in dogs and found that periodontal disease, debris and calculus were present in 97 percent of dogs and showed a statistically significant increase in incidence with age.

Isogai *et al.* (1989) studied the prevalence of dental disorders in 251 mongrel dogs and found that periodontitis was prevalent among these dogs and also the lesions were found to be severe and more frequent in the premolar and molar teeth.

Haws and Antony (1996) conducted a survey in small animal dentistry and found a high prevalence of oral disease to the tune of 10% to 12% of the general case loads.

Lund *et al*. (1999) found that dental calculus and gingivitis were the most common dental disorders in dogs and cats.

Kyllar and Witter (2005) studied the prevalence of dental disorders in 408 dogs and found that 348 dogs had dental alterations which consisted of periodontitis (60.0%), calculus (61.3%), missing teeth (33.8%) and abnormal attrition (5.9%).

Persistent deciduous dentition, missing teeth, fractured deciduous teeth and malocclusions were the common oral and dental problem diagnosed during the pediatric dental period in dogs (Niemiec, 2007a).

In a study of 173 dogs with dental diseases, out of 355 cases screened, Vani *et al.* (2007) observed that six had developmental abnormalities, 28 had irregular wear and tear, and 92 showed disease in tooth substance and 47 showed disease of alveoli and gum.

Kumar *et al.* (2008) conducted an epidemiological study on periodontal disease in dogs and revealed maximum incidence of dental tartar (80.43%) followed by dental caries (8.70%) and sporadic cases of oral tumor (2.17%), gingival hyperplasia (3.27%), dental fistula (2.17%), fracture of mandible (2.17%) and nasal tumor (1.09%).

2.3. AGE - WISE INCIDENCE OF DENTAL DISEASES

Gad (1968) reported that periodontal disease, debris and calculus were present in 97 % of dogs and their incidence increased with age.

Sorensen *et al*. (1980) conducted a cross sectional study about periodontal disease in seventy-four beagle dogs and pocket formation was found, most often at the distal surface of the mandibular fourth premolar, in dogs of six to seven years of age.

Hamp *et al.* (1984) studied the type and frequency of dental disease and disorders in 162 randomly selected dogs and revealed that the most frequently noted disease was periodontitis, which increased in frequency and severity with age in dogs.

Isogai *et al*. (1989) studied the prevalence of dental disorders in dogs and found that calculus was seen on many teeth and aging aggravated its prevalence and severity.

Hoffman and Gaengler (1996) analyzed plaque and calculus accumulation in dogs and demonstrated significantly higher scores at buccal surfaces compared to oral (*i.e.* lingual and palatal) and reported that the number of teeth with deep pockets (> 8mm) was found in dogs aged between six and seven years and would continued to increase in the older age groups.

Harvey (1998) pointed out that 80% of dogs over the age of two years were affected with periodontal disease, the single most common disease in middle aged and aging companion animals, and also noted that calculus was present in greater amounts on the maxillary fourth premolar and first molar teeth.

Klein (2000) reported that periodontal disease was the most common malady affecting more than 80% of dogs and cats older than two years affected to one degree or other.

According to Holmstrom *et al*. (2005), most small dogs had periodontal disease by the age of three years.

Kyllar and Witter (2005) opined that dental calculus in young age was observed mostly in small dogs and pointed that periodontitis and dental calculus were occurred preferentially in the upper jaw of small dogs and incidence was increased with age. Abnormal tooth wear was detected only in older dogs and it affected mostly in canines and premolars of larger breeds.

According to Niemiec (2007a), oral and dental problems were more common during the pediatric dental period in dogs *i.e.,* from birth to about one year.

Vani *et al.* (2007) studied an age wise incidence of dental problems in 173 dogs and found that 1.15% of the cases were in one to three months of age, 11.56% in three to twelve months, 30% in one to four years, 36.4% in four to eight years and 20.8% above eight years of age.

Kortegaard *et al.* (2008) estimated the prevalence of periodontal disease and described the extent and severity and associated periodontal parameters in Beagle dogs. According to the authors the prevalence increased with age but was high at the age of two years. It was also noticed that plaque and calculus were observed in all dogs, irrespective of age and the extent of calculus deposits was clearly increased in older dogs.

Kumar *et al.* (2008) studied the age-wise incidence of periodontal disease and was found to be the lowest in the group of young dogs less than three years of age and highest in the group of old aged dogs.

2.4. BREED – WISE INCIDENCE OF DENTAL DISEASES

Mills and Lewis (1981) reported a case of a large mass on the mandible between the canine teeth in a Boxer and was diagnosed as an epulis.

Dubielzig (1982) pointed out that a familial hyperplastic lesion of gingiva had been reported in Boxer dogs.

Eisner (1989b) reported a case of Grade IV periodontal disease / moderate periodontitis in a Samoyed dog.

Isogai *et al.* (1989) studied the prevalence of dental disorders in 251 mongrel dog breeds.

Sarkiala *et al*. (1993) pointed out that small breeds appeared to be more often affected with periodontitis than large breeds.

Hoffman and Gaengler (1996) assessed the periodontal condition of 123 Poodle dogs using the parameters of depth of gum pocket, attachment level, bleeding on probing, plaque and calculus accumulation and reported that no dogs were free of periodontal disease.

Bellows (1999) reported a case of carious molar in a Labrador Retriever.

Lobprise (2000a) pointed out that in some breeds, most notably in Boxer, an alternate response to plaque could be found and was the proliferation of the free margin of the attached gingiva known as gingival hyperplasia resulted in increased pocket depths, not because of attachment loss but due to increase in gingival height, creating pseudopockets.

Carmichael (2004) reported a case of chronic ulcerative paradental stomatitis in a Maltese dog.

Kyllar and Witter (2005) pointed out that abnormal wear was found mostly in the canines and premolars of large breeds.

Holmstrom *et al.* (2005) stated that the onset and severity of periodontal disease varied widely with breed, diet and homecare.

Hoffman (2006) reported a case of severe periodontitis in Miniature pinscher.

Vani *et al*. (2007) studied the overall incidence of dental problems in173 dogs of different breeds of and observed that 5.78% cases were Alsatians, 2.89% Dachshunds, 4.4% Dobermans, 30.63% Pomeranians and 56.64% Mongrels.

Kortegaard *et al.* (2008) estimated the prevalence and described the extent and severity of periodontal disease and associated periodontal parameters in Beagle dogs.

The breed wise distribution of periodontal disease revealed highest occurrence in Pomeranians (42.39%), followed by German Shepherd Dogs (20.65%), Non – descript dogs (13.04%), Labrador Retrievers (8.70%), Cocker Spaniels (5.45%), Dobermans (4.35%), Dalmatians (2.17%), Dachshunds, Saint Bernards and Boxers (1.09%) (Kumar *et al*., 2008).

2.5. SEX - WISE INCIDENCE OF DENTAL DISEASES

Gad (1968) evaluated the prevalence and etiology of periodontal disease in dogs and could not found any sex difference in periodontal disease in the studied dog-material.

Vani *et al.* (2007) stated that the overall incidence of dental problem in male and female dogs were 53.17% and 46.82% respectively.

Kumar *et al.* (2008) reported that the sex-wise incidence of periodontal disease was more in male (56.52%) than female dogs (43.48%).

2.6. DIET AND INCIDENCE OF DENTAL DISORDERS

In a survey of oral and dental disorders in dogs anaesthetized for reasons other than oral diseases, found that incidence of gingivitis and calculus were significantly less in dogs fed with dry feed and caries was uncommon in dog (Golden *et al.,* 1982).

According to Eisner (1989a), dietary considerations were important to keep the pet healthy. Dry foods were best for the teeth because they were abrasive, which helped to remove plaque from the crowns of the teeth.

Lage *et al.* (1990) studied the effect of chewing raw hide and cereal biscuits on removal of dental calculus in 67 dogs and found that raw hide was effective than biscuits in removing supragingival calculus.

Gorrel (1998) pointed that dietary texture had an effect on the accumulation of dental deposits and consequently on disease development and progression.

Holmstrom *et al.* (2005) stated that the onset and severity of periodontal disease varied widely with breed, diet and homecare.

A study on the incidence of dental affections in dogs with respect to feeding habits revealed that a higher incidence were noticed in pets fed on soft diet than in those fed with hard diet (Vani *et al*., 2007) .

Kumar *et al.* (2008) studied the dietary pattern offered to dogs and revealed that soft diet increased the frequency and severity of periodontal disease and found that majority of owners (89.3%) fed homemade food either pure vegetarian or mixed, while a few (10.87%) offered commercial food in addition to homemade food.

Kressin (2009) opined that dietary factors could influence the accumulation of plaque and calculus.

2.7. ETIOLOGY

Eisenmenger and Zetner (1985) reported that most of the inflammatory disease of the gingiva and periodontium were caused by a formation of mycotic and bacterial deposits, or plaque on the tooth surface.

Gorrel (1998) pointed out that dietary texture had an effect on the accumulation of dental deposits and consequently on disease development and progression.

Klein (2000) stated that the main predisposing factors for periodontal disease included anatomical concerns, coexisting oral disease, and genetic predisposition.

Lobprise (2000b) described that the inflammatory effects of the bacteria found in plaque on the tooth surface combined with the host's defense reaction were the causes for inflammation of the periodontal tissues.

Hennet *et al*. (2006a) reported that periodontal disease was a plaque induced disease initiated by early colonization of bacteria in the tooth surface.

Carmicheal (2006b) described the factors affected the severity of periodontal disease were patient’s age, diet, chewing habits, occlusion and size.

Pavlica *et al. (*2008) reported that bacterial plaque associated periodontal disease was the most common chronic infection in man and dogs.

Glickman *et al*. (2009) stated that oral bacteria entering into the systemic circulation would be filtered out by the kidney and liver, and could cause micro abscesses within these organs and decreased function of these vital organs over the time.

2.8. CLINICAL SIGNS AND SYMPTOMS

Mills and Lewis (1981) reported a case of a large mass on the mandible between the canine teeth in a 12 year old Boxer and was diagnosed as an epulis with many features of an adamantinoma.

In a survey of oral and dental disorders in dogs anaesthetized for reasons other than oral diseases, the most common abnormalities reported were halitosis (Golden *et al*., 1982).

Smith *et al.* (1985) conducted a correlative study of the clinical and radiographic signs of periodontal disease in dogs and the clinical signs exhibited were gingivitis, exuberant calculus formation and root exposure.

Lobprise (2000a) reported that chronic ulcerative paradental stomatitis, a chronic form of oral disease, was characterized by extreme ulceration in the buccal mucosa overlying teeth, known as kissing lesions.

A case of rooting out in a greyhound presented with the complaint of marked halitosis and pain when chewing was reported by Bellows (2002).

Carmichael (2004) reported a case of chronic ulcerative paradental stomatitis in a dog.

DeForge (2004) reported a case of periodontal disease in an eight year old female domestic cat with the history of oral malodor and inappetance.

Carmichael (2006a) pointed the clinical signs of feline gingivo-stomatitis were partial to complete anorexia, ptyalism, halitosis, weight loss, abnormal swallowing and oral pain.

Carmichael (2006b) opined that halitosis was a hallmark sign of periodontal diseases.

Kumar *et al*. (2008) studied the epidemiology of periodontal disease in dogs and revealed that halitosis and anorexia were the principal complaints.

2.9. PATHOGENESIS

Lord (1960) stated that epulis was a fibrous tumor of the gingiva usually seated on the periosteum of the jaw bone and in its development; it might envelop the teeth and cause a gross displacement of the tooth involved.

Sorensen *et al*. (1980) conducted a cross sectional study about periodontal disease in seventy-four Beagle dogs and observed that calculus scores were highest on the buccal surface of the maxillary fourth premolar followed by the buccal surfaces of the maxillary first molar and mandibular fourth premolar and were low in the incisor regions and on the lingual surfaces.

Eisenmenger and Zetner (1985) narrated the pathogenesis of periodontal disease. When plaque deposited on the neck of the tooth resulted in the formation of gingival pockets and subgingival tartar which caused the progression of tartar towards the root apex, with marked swelling and inflammation of the gingival, losing of gingival and alveolar bone and resulting in loosening of the tooth.

Eisner (1989a) pointed out that bacteraemia originating in an infected mouth could spread to other areas of the body and resulted in various systemic complications.

Rawlings *et al*. (1997) opined that the initial stages in the pathogenesis of periodontal disease were associated with plaque induced inflammation of the gingiva.

The plaque microbiota as well as the inflammatory reactions of the host contributed to the destruction of the periodontium, according to Gorrel, (1998).

Harvey (1998) reported that no consistent pattern of blood glucose concentration was apparent on initial review of blood glucose data from many hundreds of dogs treated for periodontal disease.

Harvey (2005) pointed out that when oral hygiene was poor, the bacterial load rackets up the inflammatory response and became destructive in its effect on the periodontal tissues and eventually resulted in tooth loss.

Carmichael (2006b) reported that inflammation and destruction associated with periodontal disease was initiated by bacterial plaque accumulating on the tooth surface *i.e.*, the periodontopathogens, and so in addition to causing oral pain and tooth loss, it could spread systemically and might adversely affect various organs including the heart, kidney and liver.

Pavlica *et al*. (2008) investigated the hypothesis of the association of periodontal disease burden and the degree of pathological changes in distant organs and reported that there was higher likelihood for liver and kidney pathology, implying that periodontitis might contributed to the development of systemic pathology in dogs.

Glickman *et al.* (2009) reported that the pathogenesis of periodontal disease involved bacteria, primarily gram negative motile anaerobic rods that accumulated within the gingival sulcus, that could cause inflammation of the gingiva and formation of periodontal pockets, which resulted in periodontitis when left untreated.

Peddle *et al*. (2009) analyzed the association of periodontal disease, oral procedures and other clinical signs with bacterial endocarditits in dogs and did not find any evidence of that.

2.10. DIAGNOSIS

Smith *et al.* (1985) conducted a correlation study of the clinical and radiographic signs of periodontal disease and a consistent correlation supported the need for routine dental radiography as an adjunct to periodontal therapy.

Morgan *et al*. (1990) conducted a radiographic study on periodontal bone loss and found that bone loss is frequent in the maxillary arcades, around third and fourth upper premolars and first and second lower molars.

Depth during periodontal probing, measurements of the amount of attachment, and dental radiography were the most common methods for diagnosis of periodontal disease in clinical practice (Nieves *et al.*, 1997).

Lobprise (2000b) reported that the use of periodontal probe/explorer was the most effective ways to evaluate periodontal disease progression. The probe end had the means to measure root exposure, pocket depth, and to determine the level of attachment. Each tooth was checked at six points around the tooth, or the probe could be gently inserted into the sulcus or pocket around the tooth and moved circumferentially around the tooth to check for any variations. The normal pocket depth could be up to 1 to 2 mm in the dog, but minimal (less than 0.5 mm) in the cat.

Lommer and Verstraete (2000) determined the patterns of alveolar bone loss (periodontitis) and other lesions evident on full mouth survey radiographs of cats and observed that periodontitis was common in cats and that horizontal bone loss was the most common radiographic pattern of alveolar bone loss.

Tsugawa and Verstraete (2000) pointed out that the routine usage of dental radiography to evaluate the periodontium was the standard of practice in human dentistry and was rapidly becoming a standard in veterinary medicine. The intraoral films of sizes 0, 2, and 4 were the most commonly used films in veterinary dentistry.

Dental radiographs were obtained by paralleling or bisecting angle techniques. In the paralleling technique, the radiographic film was positioned parallel to the long axis of the tooth, and the x-ray beam was directed perpendicular to the film. In the bisecting angle technique the film must be placed within the oral cavity as close to and parallel to the long axis of the tooth and the x-ray beam was directed perpendicular to the line that bisects the angle formed by the film and the long axis of the tooth. The pocket depth measurements were obtained by lightly grasping the periodontal probe and the measurements were obtained at four sites (mesial, buccal, distal, and lingual/ palatal) on each tooth (Tsugawa *et al.,* 2003).

DeForge (2004) observed the radiographic changes in a domestic cat with oral infection which included multifocal tooth root resorption with horizontal bone loss and exposure of the furcation of several teeth.

Harvey (2005) suggested that dental scaling, periodontal probing or a radiograph were the only accurate means for determining the severity of periodontitis.

According to Holmstrom (2005) periodontal diagnostics included periodontal probing and intraoral radiography. Radiograph should be taken to evaluate the dental and bony structures for periodontal bone loss, root canal affections and other condition.

Carmichael (2006b) reported that periodontal probe was an essential diagnostic tool which had a calibrated marking for measuring the gingival sulcus depth.

Hennet *et al*. (2006b) described the Logan and Boyce plaque index for the study of dental plaque accumulation in dogs by assessing the coverage and thickness scores.

Hoffman (2006) opined that probing of the gingival sulcus and intraoral radiography revealed the extent of the periodontal disease. The author used intraoral radiography in a four year old dog with severe periodontitis and observed horizontal and vertical bone loss pattern in the radiograph.

Lemmons and Carmichael (2007) described the use of periodontal probe which was a blunt type instrument with graduated markings and could be gently inserted between the free gingiva and tooth to measure pocket depth and gingival recession. A dental explorer which had a sharp curved end which looked like a shepherd's hook was used to detect irregularities in teeth such as fractures, caries, feline resoptive lesions, tooth mobility, tooth root fracture and neoplasia. The authors also opined that intraoral radiography was superior to skull radiography for assessing the periodontal tissues because it eliminated super-imposition and had better resolution.

Niemiec (2007b) opined that a full mouth dental radiograph was an essential step in dental cleaning, for accurate oral evaluation and diagnosis. The common sizes of films used in veterinary dentistry were Size 4 and 2. Size 0 and 1 for small and pediatric patient. The author explained the placement of film for radiography of all types of teeth in dog.

Lommer (2008) reported the use of full mouth radiography for the evaluation for evidence of odontolastic resorption lesions and periapical lucencies in cats.

Kressin (2009) reported that oral examination was an integral part of every general physical examination for companion animals and dental radiographs, periodontal and dental probing and transillumination of teeth were the fundamentally important diagnostic test in the comprehensive oral examination.

2.11. GRADING OF DENTAL DISORDERS

Eisner (1989a) put forward the five grade classification system for charting the progression of periodontal disease in dog and Grade I, II and III were reversible where as IV and V should require additional attention *i.e.,* open curettage.

Klein (2000) reported that there were four grades of periodontal disease of which Grade I periodontal disease was noted by the presence of halitosis and plaque or calculus formation. Grade II periodontal disease was noted by all the findings from Grade I along with destruction of up to 25% of the periodontal attachment, Grade III periodontal disease by 25% to 50% attachment loss around the teeth and Grade IV periodontal disease by destruction of more than 50% of the tooth's attachment and mobility of tooth might be present

Bellows (2002) classified the periodontal disease into four stages: Stage I: gingivitis, Stage II: upto25% attachment loss, Stage III: 25 to 50% attachment loss and Stage IV: 50% attachment loss. The mobility index was graded as Class I: tooth mobility 1mm and less, Class II: about 1mm and Class III: tooth movement greater than 1mm.

Oakes (2006) stated the grading of periodontal disease as Grade I: reversible gingivitis, Grade II: early periodontitis with some attachment loss (2 - 3mm), Grade III: moderate periodontitis with attachment loss (3 - 6mm) and Grade IV: advanced periodontitis with attachment loss more than 6mm.

According to Carmichael (2006b), the staging of periodontal disease varied from (1) mild gingivitis with pocket depth less 3 mm, (2) treatable periodontitis with pocket depth upto 5 mm, (3) established periodontitis with pocket depth more than 5 mm and (4) end stage periodontitis with greater than 75% attachment loss.

Mayer and Antony (2007) described the classification of epulis into fibromatous epulis, ossifying epulis and accanthomotous epulis, of which fibromatous and ossifying epulis were confined to the gingival and acanthomatous epulis often extensively invaded adjacent bone.

2.12. CULTURE AND SENSITIVITY TEST

Syed (1980) isolated Gram negative, non saccharolytic, anerobic coccobacillary organism such as *Bacteroids asaccharolyticus* from the supra and subgingival plaques of beagle dogs with gingivitis or periodontitis.

Sarkiala *et al*. (1993) studied the clinical and radiographic features and bacterial flora in dogs with periodontitis. Samples taken from diseased pockets were found to be positive in Gram negative pigmented, non pigmented fusiform rods and Gram positive cocci.

Nieves *et al.* (1997) evaluated the association between dental procedures and bacteraemia in dogs. The authors recorded that Gram-negative or Gram-positive, and anaerobic bacteria were present in blood during dental procedures, the bacteraemia could persist beyond the dental procedure, and was not associated with the severity of dental disease.

Elliot *et al.* (2005) isolated the bacteria which were found most frequently in plaque and were *Porphyromonas* spp (20%), *Actinomyces* spp (12%) and *Neisseria* spp (10%).

Harvey (2005) opined that Gram negative anaerobic rod *Porphyromonas gingivalis* was found more commonly in canine and feline periodontal specimen.

Radice *et al*. (2006) evaluated the subgingival aerobic and anaerobic flora of dogs with periodontal disease and reported that, of the anaerobic bacteria, *Bacteriodes fragilis* was the most frequent, followed by *Peptostreptococcus* and *Porphyromonas gingivalis*, and of the aerobic bacteria, Streptococcus was most frequently found, often associated with *Escherichia.coli* or *Pasturella multocida.*

2.13. TREATMENT

2.13.1. Medical Treatments

Williams *et al.* (1982) evaluated the efficacy of tetracycline hydrochloride in the treatment of alveolar bone resorption due to chronic destructive periodontal disease in beagle dogs and observed a reduction in the rate of alveolar bone resorption following one year of tetracycline treatment.

Reed (1988) studied the effectiveness of antimicrobial agents like tetracycline, metronidazole and chlorhexidine in the treatment of periodontitis in dogs and found that metronidazole was more effective in preventing the inflammation and development of the bacterial flora usually associated with the natural accumulation of plaque.

Lage *et al*. (1990) studied the effect of chewing raw hide and cereal biscuits on removal of dental calculus in sixty seven dogs and found that raw hide was effective than biscuits in removing supragingival calculus.

According to Sarkiala (1993) tinidazole administration in addition to a single course of scaling in the treatment of periodontitis in dog was found to produce long lasting improvement than scaling alone.

Rawlings (1997) compared the effect of two commercially available dietary regimens on the development of gingivitis and accumulation of dental plaque, calculus and stains in dogs and found that both the diets were effective in reducing the accumulation of plaque and calculus.

Gorrel (1998) stated that daily tooth brushing was the single most effective mean of removing plaque and the usage of dental hygiene chew and diet designed to reduce dental deposit could be a useful adjunctive measure to maintain healthy periodontal tissue.

Anthony (2000) described that the fundamental goal of all periodontal therapy was the retention of the natural dentition which is a relative state of health, comfort and function for the animal's life span. The author explained the targets of periodontal therapy as (1) elimination of periodontal pockets (2) maintenance of an adequate functional band of attached gingival tissue (3) debridement of pockets (4) production of a contour and form of the periodontium that would be less susceptible to further break down.

Peak (2003) described that the successful prevention of dental disease could be achieved by oral examination, charting and recording pathology, cleaning of periodontal pockets, polishing of enamel using fluoride, home care and follow up examination. Two systemic antibiotics which were approved for veterinary dental use were also suggested: clindamycin hydrochloride and amoxicillin trihydrate - clavulanate potassium. Dilute chlorhexidine (0.1% to 0.2%) as dilute sprays, rinse and gels was one of the most effective antimicrobial agents for plaque bacteria.

Carmichael (2004) reported a case of chronic ulcerative periodontal stomatitis in a dog and its effective treatment including a complete dental prophylaxis and the use of selective antibiotics mainly metronidazole and clindamycin together with anti-inflammatory agents. Preventive measures for periodontitis consisted of daily tooth brushing, use of chlorhexidine gluconate as oral rinse, which could kill the bacterial pathogens that contribute to periodontal disease and halitosis.

Holmstrom (2005) reported the use of diluted chlorhexidine (0.12% and 0.05% solution) saline or stannous fluoride for irrigating periodontal pockets. Application of acid diluted phosphate fluoride foam at a dilution of 1.23% was reported to retard the reattachment of plaque.

Carmichael (2006a) described the measures for controlling feline gingivo-stomatitis, which included the topical application of chlorhexidine and long term/ long term intermittent antibiotic therapy whose spectrum of activity included Gram negative anerobic bacteria.

Hennet *et al*. (2006a) studied the effectiveness of oral chew to reduce dental deposits in small breed dogs and reported that there was a significant reduction in plaque deposition and calculus accumulation. It was also noticed that the teeth that were not naturally involved in food crushing like incisors, canines, and small premolars showed less dental deposits.

Radice *et al.* (2006) evaluated the susceptibility of bacteria to antibiotics and found that anaerobic bacteria were susceptible to amoxicillin - clavulanic acid, doxycycline and erythromycin and for aerobic bacteria amoxicillin - clavulanic acid, erythromycin, gentamicin and sulfa-trimethoprin.

Hennet *et al.* (2007) who studied the effect of pellet food size and polyphosphates in preventing calculus accumulation in dogs reported that increased kibble diameter by 50% was associated with a 42% calculus reduction and coating with sodium tripolyphosphate further caused a 55% calculus reduction.

2.13.2. Surgical Treatments

Lindhe *et al.* (1975) demonstrated that it was possible in dogs to establish and maintain a normal gingiva simply by eliminating calculus and then subjecting the animals to daily repeated and carefully performed tooth cleaning.

Black *et al.* (1980) pointed out that ultrasonic tooth cleaning was a commonly used method for the removal of dental plaque and calculus in both man and small animals.

Werner (1981) evaluated the therapy of nineteen cases of oral neoplasia in the dog and observed that benign tumours, comprised primarily of epulis, responded very well to cryosurgery.

Eisner (1989a) reported that the purpose of dental prophylaxis was to remove plaque, calculus and stains from the exposed and unexposed tooth surface and to leave tooth as smooth as possible so it took longer to reattach and to accumulate. Dietary considerations were important to keep the pet healthy, so dry foods were best for the teeth because they were abrasive, which helped to remove plaque from the crowns of the teeth.

Barrette (1990) reported that both, ration and monitoring and early detection of oral health problems could slow aging in dogs. Hence steps like regular scaling and daily tooth brushing should be undertaken to maintain oral hygiene.

Cleland (2000) reported the non-surgical treatment of periodontal disease using ultrasonic scaler and was effective in removal of dental plaque supragingivally and subgingivally. The author pointed out that ultrasonic scalers were highly efficient so that a light brushing touch should be used to allow the vibrations to remove the plaque and calculus. A water spray onto the tip of the scaler and the tooth should be constant to prevent overheating of the tooth.

Lobprise (2000b) described three major goals when dealing with therapy of the periodontium: to remove or to clean away all debris and biofilm (including plaque, calculus, and diseased tissue), to maintain as much attached gingiva as possible, and to minimize periodontal pocket depth.

Colmery (2005) reported that the golden standards of veterinary oral health were clinical pathological findings, anesthesiology, radiology, operative dentistry, oral medicine and home care. General anesthesia was required for all oral procedures.

DeBowes (2005) pointed out that, for periodontal disease with significant attachment loss, extraction might be the best treatment option. These extractions were generally not difficult and did not require the use of muco-periosteal flap or bone removal, unless a complication of breaking a root tip might have occurred.

According to Harvey (2005), dental scaling and / or polishing were a preventive procedure which would remove the cause of the disease and restore the normal health.

Holmstrom (2005) described the effective use of ultrasonic scaler for periodontal debridement as the primary treatment of gingival and periodontal inflammation. The author pointed that home care was vital for disease control which included the frequency, duration and method of rinsing and brushing and the usage of special foods and dental chews.

Carmichael (2006b) reported that the treatments for early periodontitis included complete dental scaling and polishing and for end stage periodontitis it was dental extraction.

Successful treatment of a case of severe periodontitis, with a probing depth of 6 mm in a four year old dog, by extraction of tooth was reported by Hoffman (2006).

Anoop (2007) reported a case of treatment of dental tartar using ultrasound scaling in a dog.

Lemmons and Carmichael (2007) opined that ultrasonic scalers were efficient tools for plaque and calculus removal.

Narayanan *et al*. (2008) reported a case of effective removal of supragingival and subgingival tartar using an ultrasonic dental scaler.

MATERIALS AND METHODS

3. MATERIALS AND METHODS

The study was conducted in dogs of different age, breeds and of both sexes presented to Veterinary College Hospitals at Mannuthy and Kokkalai.

3.1. SCREENING OF CASES FOR DENTAL AFFECTIONS

All the dogs presented to the Surgery units of Veterinary College Hospitals, Mannuthy and Kokkalai belonging to different age, breeds and of both sexes, during a period from April 2008 to December 2008 were screened for dental affections. A detailed database was gathered to study the prevalence of dental and periodontal affections, and their relation to age, breed, sex, diet and food habits (Annexure 1).

3.2. SELECTION OF CASES

Among the dogs having dental affections, 24 dogs of various ages, breeds and of either sexes were randomly selected to study the efficacy of various treatments, and were serially numbered from D_1 to D_{24}.

3.3. MAIN ITEMS OF OBSERVATION

3.3.1. Signalment

The age, breed, sex, signs noticed by the owner, details of the diet and feeding habits of the dogs were collected with the help of a questionnaire and were recorded in all the cases screened for dental affections. Previous treatment if any, given were also recorded.

3.3.2. Clinical examination

Detailed clinical and oral examination was carried out in the 24 dogs selected.

3.3.2.1. General condition of the animal

The general condition of the animal was assessed and recorded as good, fair and poor.

3.3.2.2. Condition of the oral cavity

The oral cavity was visually assessed for the detection of any gross lesion in the teeth or in the periodontal tissues and the observations were recorded.

3.3.2.2.1. Colour of gingival mucous membrane

Colour of the gingival mucous membrane was observed and recorded as pale roseate, pale, congested and icteric.

3.3.2.2.2. Nature of the gum

Nature of the gum was examined and recorded as normal, inflammed, ulcerated, presence of tumour, hypertrophied and hypotrophied /receeded.

3.3.2.2.3. Halitosis

Halitosis, if present was observed and recorded

3.3.2.2.4. Dental tartar

Presence of dental tartar and the tooth affected were recorded.

3.3.2.2.5. Condition of the tooth

Teeth were examined and the presence of shaky tooth, exposure of tooth root, caries, exposure of pulp cavity, presence of discharge from the root canal, broken tooth, evenness of wear and change in dental alignment, if any and any other relevant observations were recorded.

3.3.2.2.6. Gingival sulcus depth

Periodontal probe (Williams probe) was used to measure the depth of the gingival sulcus or periodontal pocket in millimeters for evaluating the extend of support loss. The probe was marked at 1, 2 and 3 millimeters and then at 5, 7, 8, 9 and 10 millimeters. Inserting the periodontal probe into the gingival crevice and recording millimeter finding was called probing and probing depth was the distance between the base of the pocket to the gingival margin (Plate 1a).

The probe was inserted in line with the vertical axis of the tooth and "walked" circumferentially to observe at least four measurements per tooth. The probe could be placed in at least six places (three facial, labial or buccal, three lingual or palatal) around the tooth to record millimeter reading (Lobprise, 2000b). The highest value of the depth was recorded.

3.3.2.2.7. Grading of periodontal disease

Periodontal disease was graded according to the severity of the lesions and periodontal pocket depth (Oakes, 2006).

Grade 1: Reversible gingivitis

Grade 2: Advanced gingivitis with pocket depth 2 - 3 mm,

Grade 3: Moderate periodontitis with pocket depth 3 - 6 mm. Teeth had a fair to guarded prognosis.

Grade 4: Advanced periodontitis with pocket depth greater than 6 mm. Teeth had a poor prognosis.

3.3.3. Physiological parameters

The rate of respiration (per minute), pulse rate (per minute), rectal temperature (^{0}C) were recorded in all the selected cases.

3.3.4. Haematological parameters

Blood samples collected in a vial with EDTA dipotassium salt at the rate of 1mg/ml of blood as anticoagulant and were used for haematological evaluation *viz.*, haemoglobin concentration (Sahli's acid haematin method), volume of packed red cells (VPRC), erythrocyte sedimentation rate (ESR) (Wintrobe haematocrit method) and total leucocyte count (TLC). Blood smear was prepared for differential leucocyte count (DLC) and the results were recorded.

3.3.5. Biochemical parameters

About 5 ml of blood was collected in a clean dry test tube without anticoagulant, allowed to clot and centrifuged at 3000 rpm for 15 minutes. Serum samples were analyzed colorimetrically for the activities of alanine amino transferase (ALT), aspartate amino transferase (AST), blood urea nitrogen (BUN), creatinine and blood sugar. All the biochemical analysis was performed in semi automatic blood analyzer[1] using specific diagnostic kits[2] as per the manufacturer's instructions.

3.3.6. Diagnostic radiographs

Lateral or cranio-caudal radiographs of skull were taken to image the complete dental arcade in cases required. Radiographs were also taken using intraoral films of size 2 and 4 depending on the tooth, in which ever cases required (Plate 1b). Intraoral dental radiographs were obtained by paralleling or bisecting angle techniques (Plate 1a). In the paralleling technique, the radiographic film was positioned parallel to the long axis of the tooth, and the x-ray beam was directed perpendicular to the film and in the bisecting angle technique the film must be placed

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1. Microlab (200), Merk, Vital Scientific, Netherlands.
2. M/s. Agape Diagnostics Ltd. India.

within the oral cavity as close to parallel to the long axis of the tooth and the x-ray beam was directed perpendicular to the line that bisects the angle formed by the film and the long axis of the tooth (Tsugawa *et al.,* 2003).

3.3.7. Culture and sensitivity of gingival sulcus swab

Sterile swabs for culture and sensitivity tests were collected before scaling, from the gingival sulcus. The samples were inoculated in Bovine Heart Infusion Agar using quadrant streaking method. All the plates were incubated at 37^0C for 24 hours and were examined for the presence of any bacterial colony. Sensitivity test was carried out by antibiogram with available antibiotic discs.

3.4. TREATMENT

Those with gingivitis and ulceration of buccal mucosa (Dog Nos. D_{23} andD_{24}) were subjected to medical treatments and those (all except Dog Nos: D_{20}, D_{21}, D_{22}, D_{23} and D_{24}) with severe gingivitis, halitosis and dental calculus were subjected to ultrasonic dental scaling followed by medical therapy. Exodontia was performed in case of tooth which are shaky and with furcation exposure (Dog Nos: D_1, D_2 and D_3). Tumours were surgically excised (Dog No: D20) or treated with chemotherapeutic agents as and when the condition warranted. Anti neoplastic treatments were undertaken in two cases of gingival tumour (Dog Nos: $D_{21}$and D_{22}).

3.4.1. Medical treatment

Medical treatment consisted of oral administration of amoxycillin – cloxacillin[1] at the rate of 20 mg/kg body weight three times daily and metronidazole[2] at the rate of 25 mg/ kg body weight twice daily for seven days.

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1. Novaclox, (250mg tab), Ranbaxy Laboratories Ltd., New Delhi.

2. Metrogyl (200mg tab), Unique, J.B. Chemicals & pharma Ltd., Mumbai.

Choice of antibiotic was changed later, if required, according to the result of culture and sensitivity test of oral swab. Intraoral application of metronidazole gel[1] was advised in case of severe gingivitis.

For tumour conditions chemotherapy with vincrystine sulphate[2] at the rate of 0.025mg/ kg body weight intravenously at weekly interval for three weeks was used.

3.4.2. Surgical treatment

All the surgical manipulations were performed under general anaesthesia.

3.4.2.1. Anaesthesia

All the dogs were induced and maintained under general anaesthesia during the surgical procedure. Atropine sulphate[3] at a dose rate of 0.045mg/kg body weight was administered intramuscularly as premedicant, then xylazine hydrochloride[4] at the rate of 1.5 mg/ kg body weight followed by ketamine hydrochloride[5] at the rate of 5mg/kg was given intramuscularly at fifteen minutes interval to induce general anesthesia. The anaesthesia was maintained by administering incremental amounts of combination of xylazine (20 mg/ ml) and ketamine (50mg/ ml) (1:1 by volume) intravenously to effect.

3.4.2.2. Ultrasonic dental scaling

Ultrasonic dental scaling was performed under general anesthesia for removing dental calculus.

1.Metrogyl gel, Unique. J.B. Chemicals & pharmaceuticals Ltd., Ankleshwar.

2.Oncocrystine AQ, Sun pharmaceutical Ind.Ltd., Gujarat.

3. Atropine Sulphate Injection, (0.6mg/ ml), Mount Mettue pharmaceuticals Ltd., India.

4. Xylaxin, Indian Immunologicals Ltd.(20mg/ml), Andrapradesh.

5. Ketmin 50, Themis Medicare Ltd., Mumbai.

3.4.2.2.1. Instruments (Plate 1a and1b)

1. Ultrasonic dental scaler [1]
2. Dental curette
3. Dental explorer- Number 23 Shepherd's hook
4. Compressor [2]

3.4.2.2.2. Technique

In ultrasonic dental scaler, a piezoelectric unit was activated to produce dimensional changes in crystals housed within the hand piece by an electric current passed over the surface of the crystals. The resultant vibration produced the scaler tip movements which in turn cause debridement and removal of the dental calculi.

Mouth was kept open using a spring mouth gag and head was held in a slightly elevated position by placing a pad under the head. The hand piece was held lightly in a modified pen grasp. A light pressure was applied to the tip working in a coronal-to-apical direction. Water spray was adjusted using a compressor or with a syringe to deliver a steady drip in order to prevent thermal damage to the pulp and surrounding bone. The side of the working end of the scaler was passed over the calculus and plaque in short, light vertical strokes. The lateral end of the working end was kept in constant motion.

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1. EMS-Electro Medical System, Swiss quality, Switzerland.
2. Mectron S P A,Carasco ge Italy

Care was taken not to hold the tip perpendicular to the surface of the tooth surface since it would cause tooth damage. Dental scaling was done on all quadrants of dental arcade initially at the buccal surface and then at the lingual surface.

Dental curette was used to remove the subgingival calculus. It had a smooth rounded heel opposite to the cutting surface; this rounded back would cause fewer traumas to soft tissues.

Dental explorer which was having a shepherd's hook end was used for the exploration of the periodontal pocket and to check any abnormalities below the gingiva.

3.4.2.3. Exodontia

Exodontia was performed, in case of tooth which was shaky and with furcation exposure, using a dental extraction forceps under general anaesthesia. The tooth was held by its neck by means of an extraction forceps, and it was pulled out by swift and slight rotary traction.

3.4.2.4. Surgical extraction of tumour

Surgical excision of the tumour with careful dissection was carried out with the assistance of surgical diathermy[1]. Sutures and ligatures were applied where ever necessary. Cryodestruction[2] of the tumour was performed whenever tumour mass was beyond the scope of surgical resection.

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1. Spark 400 Digital Surgical Diathermy, Biomed Electronics,India.
2. Basco cryos, Super Deluxe Scilencer Cryo, Chennai, India.

3.4.2.5. Postoperative care

Teeth were cleaned with 1:1000 Potassium permanganate solution. Antibiotic therapy consisted of oral administration of amoxycillin - cloxacillin at the rate of 20mg/kg body weight thrice daily and metronidazole at the rate of 25mg/ kg body weight twice daily for seven days. Choice of antibiotic was changed later, if required, according to the result of culture and sensitivity test of gingival sulcus swab. Intraoral application of metronidazole gel was used in case of severe gingivitis.

Soft diet was advised for seven days in all cases in which surgical treatment was adopted.

The cases were reviewed at weekly interval to assess the status of oral health for a period of one month. The hematological and biochemical parameters were analyzed on the first, 15^{th} and 30^{th} days of observation.

The observations of the study were statistically analyzed.

RESULTS

4. RESULTS

4.1. SCREENING OF CASES FOR DENTAL AFFECTIONS

All the dogs belonging to either sexes and various age and breed presented to Veterinary College Hospital, Mannuthy and Kokkalai during the period from April 2008 to December 2008 were screened for dental affections. Among these 102 dogs were found affected with dental or periodontal problems.

4.1.1. Prevalence of dental diseases (Table 1)

Among of the 102 dogs affected, incidence of dental tartar was found high *i.e.*, 91 dogs (89.22%), followed by epulis in five (4.9%), oral ulcer in four (3.92%) and dental attrition in two (1.96%) (Fig.1 and plate 2).

4.1.2. Age-wise incidence of dental diseases (Table 2)

Among the 102 dogs affected with dental disorders 38 dogs (37.25%) belonged to the age group of one to four years, 46 dogs (45.09%) belonged to the age group of five to eight years and 18 dogs (17.65%) to the age group of nine to twelve years. Incidence of dental affections was more in dogs in age group of five to eight years of (45.09%) (Fig.2).

4.1.3. Breed-wise incidence of dental diseases (Table 3)

Out of 102 dogs with dental affections, the incidence was maximum in German Shepherd Dog with 27 numbers (26.47%), followed by Spitz with 21 dogs (20.59%), Dachshund with 15 (14.71%), Labrador Retriever with 12 (11.76%), Non-descript dogs with nine (8.82%), Doberman Pinscher with five (4.90%), Cocker Spaniel with four (3.92%), Rottweiler and Chinese Pug with two each (1.96%) and Boxer, Great Dane, Basset hound, Lhasa Apso and Miniature Pinscher with one each (0.98%) (Fig.3).

4.1.4. Sex-wise incidence of dental diseases (Table 4)

Among the 102 dogs with dental disorders 53 (51.96 %) were females and 49 (48.04 %) were males (Fig.4).

4.1.5. Diet and incidence of dental diseases

Major diet: Of all the dogs screened, 90.0% of the dogs were fed with homemade food alone and 4% with commercial food alone. A combination of homemade and commercial food was fed to 6% of animals.

Incidence of dental affection was 71.1% among those fed with homemade food and 50% among those fed with commercial food.

Dog's preference for food**:** Among all the dogs screened, 40.67% were fed with purely non-vegetarian diet and 5.33% with vegetarian diet. Both non-vegetarian and vegetarian foods were included in the diet in 54% of the dogs.

Among the dogs fed purely on non-vegetarian diet, the incidence of dental affection was 62.3 % and it was 37.5% among those fed with vegetarian diet and 75.31 % in those fed with both.

No: of feeds/day**:** Out of the 150 dogs screened 56.66% of dogs were fed twice daily followed by 26% thrice daily and 17.33% once daily.

Nature of consumption**:** Regarding the nature of consumption, 44% of the dogs preferred to consume the food in a single stretch while 56% finished the food in small quantities at different frequencies.

Titbits**:** Titbits like bread, biscuits, rusk and sweets were fed to 36.67% pets, apart from the major food. About 63.33% of dogs were not fed with titbits.

Among the dogs fed with titbits, the incidence of dental affection was 81.8% and it was 60.0 % among the dogs which were not fed with titbits.

Feeding of bone: Among the dogs screened, 31.34% were fed with bones daily, 34% weekly, 5.33% monthly and 29.33% not at all fed with bones.

Among the dogs fed with bones daily, the incidence of dental affections was 44.68 %, it was 74.50% among those fed bones weekly and it was 100% among those fed monthly. Among the dogs which were not fed with bone, the incidence of dental affection was 78.72%.

4.2 SELECTION OF CASES

Out of 102 dogs with dental affections, 24 cases belonged to various age, breed and of both sexes were selected at random for detailed investigation and were serially numbered from $D_1$to D_{24}

4.3. MAIN ITEMS OF OBSERVATION

4.3.1. Signalment (Table 5)

The age of the dogs under the study ranged from one to 12 years with an average of 5.79± 0.66 years. Of those selected cases, 10 dogs (41.67%) belonged to the age group of five to eight years, eight dogs (33.33%) to the age group of one to four years and six dogs (25%) to the age group of nine to 12 years.

Out of the 24 cases six were Spitz (25%), followed by Cocker spaniel, Labrador Retriever , German shepherd Dog and Non- descript three each (12.5%), Doberman Pinscher and Dachshund two each (8.3%), then Boxer and Miniature pinscher one each(4.16%) .

Out of those 24 dogs, 16 were females (66.67%) and eight were males (33.33%).

All the selected dogs were maintained with homemade food and 10 dogs (41.67%) were given titbits apart from the major food.

Among the 24 dogs selected, incidence of dental tartar was found high *i.e.*, in 19 dogs (79.17%) followed by epulis in three (12.5 %) and oral ulcer in two (8.33%).

Majority of the dogs, 18 cases (75%), were presented with halitosis, off feed and pain on chewing as the common complaint and two cases (8.33%) with the history of swelling at the lower jaw. Only in four cases (16.67%) the owners were unaware of the disease condition.

In any of the selected cases, no treatment was adopted previously for dental diseases.

4.3.2. Clinical examination

Detailed clinical examination was carried out in all the 24 dogs selected, for general condition and condition of the oral cavity.

4.3.2.1. General condition of the animal*:*

The general condition of all the animals was good except for Dog Nos: D_3, D_7, D_{10}, and D_{21} which were fair in condition and the same were maintained by all throughout the observation period.

4.3.2.2. Condition of the oral cavity

The oral cavity was assessed for the colour of gingival mucous membrane, nature of gum, halitosis, dental tartar, condition of tooth, gingival sulcus depth and grading was done based on the gingival sulcus depth.

4.3.2.2.1. Colour of gingival mucous membrane

For all the selected cases the gingival mucous membrane was congested on the day of presentation. In Dog Nos: D_1, D_2,D_3,D_4,D_5,D_6,D_{23} and D_{24} congestion reduced after first week and on second week the colour became pale roseate. In Dog Nos: D_{20}, D_{21} and D_{22} in which tumor of gum was observed, the colour of the gingival

mucous membrane was highly congested and no remarkable change were noticed on weekly examination. In all the other cases the colour of the gingival mucous membrane became pale roseate after one week.

4.3.2.2.2. Nature of gum

In Dog Nos: D_{20}, $D_{21}$and D_{22} tumor mass was noticed on the gum on the day of presentation.

In Dog No: D_{20}, the tumor mass was surgically excised and after two weeks recurrence of the tumor noticed and no reduction in the size of the mass could be noticed during the period of observation.

In Dog Nos: D_{21} and D_{22}, in which anti-neoplastic drug was given on the day of presentation and at weekly interval as a treatment modality, no change in the size and texture of tumor was noticed on weekly examination. For all other cases, in which the gum was inflamed due to gingivitis on the day of presentation became normal on subsequent observations.

4.3.2.2.3. Halitosis

All the dogs had halitosis on the day of presentation.

In the Dog Nos: D_1, D_2, D_4, D_5 and D_7, halitosis was present on the first week, but it was reduced by second week. Scaling was repeated on second week in these cases and halitosis was absent on third week. The Dog Nos: D_{20}, D_{21} and D_{22}, with tumor of the gum, halitosis was present throughout the period of observation.

In all other dogs, halitosis was absent on first week and on subsequent weeks after the treatment.

4.3.2.2.4. Dental Tartar

Dental tartar was present in the dogs. The teeth commonly affected were fourth premolar first and second molars of the maxillary dental arcade in the buccal surface or on either side. It was followed by first, second, third premolars and canines. Incisors were the least affected. Dental tartar was completely removed by scaling and was absent on subsequent observations.

4.3.2.2.5. Condition of tooth

Tooth was examined in detail and found that shaky teeth were present in four cases which consisted of right maxillary fourth premolar in Dog No: D_1, left maxillary first molar in Dog No:D_2, left maxillary first incisor and right fourth premolar and first molar in Dog No: D_3 and right maxillary third premolar in Dog No: D_4. Exposure of tooth root was found in the right maxillary fourth premolar in Dog No: D_1, left maxillary first molar in Dog No: D2 and left maxillary first incisor in Dog No: D_3. Exodontia was performed in Dog Nos: D_1, D_2 and D_3 whose tooth root was exposed and complete healing of gum noticed after first week of treatment.

4.3.2.2.6. Gingival sulcus depth

Gingival sulcus depths of affected teeth were measured and maximum depth obtained was recorded in all cases. In Dog Nos. from D_1 to D_9 the sulcus depth exceeded the normal and in rest of the cases, from D_{10} toD_{24}, had normal pocket depth (less than 2 mm).

4.3.2.2.7. Grading of periodontal disease (Table 6)

Periodontal disease was graded according to the severity of lesions and the measurement of gingival sulcus depth.

In Dog No: D_1 the pocket depth was 8 mm at the right maxillary fourth premolar, for Case No: D_2, it was 8 mm at the left maxillary first molar, for Dog No: D_3 it was 7 mm at the right maxillary first molar, for Dog No: D_4 the depth was10 mm in the left maxillary fourth premolar and for Dog No: D_5 it was 9 mm on the right maxillary fourth premolar.Dog Nos: D_1, D_2, D_3, D_4 and D_5 were graded as Grade IV, since the pocket depths were more than 6 mm.

For Dog No: D_6, the depth was 5 mm on right maxillary fourth premolar and for Dog No: D7, the depth was 6 mm on left maxillary first molar. Dog Nos: D_6 and D_7 were graded as Grade III, since the pocket depths were ranging from 3 to 6 mm.

For Dog No: D8, the pocket depth was 3 mm at left maxillary fourth premolar and for Dog No: D9, the pocket depth was 3 mm at right maxillary first molar. So Dog Nos: D_8 and D_9 were graded as Grade II, since the pocket depths were ranging from 2 to 3 mm.

For all other cases, since the pocket depth was normal (less than 2mm), they were graded as Grade I. It included Dog Nos: D_{20}, D_{21} and D_{22} with tumours on lower jaw.

4.3.3. Physiological parameters (Table 7)

4.3.3.1. Rate of respiration

The mean rate of respiration (per minute) was 35.20 ± 2.78 on the day of presentation. It was 34.20 ± 1.59 and 34.40 ± 2.73 on 15^{th} and 30^{th} days respectively. All the values were within the normal range.

4.3.3.2. Rectal temperature

The mean rectal temperature (^{0}C) was 38.85 ± 0.10 on the day of presentation. It was 38.89 ± 0.14 and 38.64 ± 0.11 on 15th and 30th day respectively. All the values were within the normal range.

4.3.3.3. Pulse Rate

The mean pulse rate (per minute) was 89.0 ± 2.71 on the day of presentation. It was 84.7 ± 3.22 and 86.4± 2.73 on 15th and 30th day respectively. All the values were within the normal range.

4.3.4. Haematological parameters (Table 8)

4.3.4.1. Haemoglobin concentration

The mean haemoglobin concentration in g/dl were 13.3 ± 0.43, 13.61 ± 0.41 and 13.55 ± 0.38 on the day of presentation, 15th and 30th day respectively. All the values were within the normal range.

4.3.4.2. Volume of Packed Red Cells

The mean values of volume of packed red cells (%) were 42.10 ± 1.87, 40.0 ± 1.41 and 41.5 ± 1.43 on the day of presentation, 15th and 30th day respectively. All the values were within the normal range.

4.3.4.3. Erythrocyte Sedimentation Rate

The mean values of erythrocyte sedimentation rate (mm/hr) were 5.7 ± 0.42, 4.8 ± 0.57 and 5.0 ± 0.56 on the day of presentation, 15th and 30th day respectively. All the values were within the normal range.

4.3.4.4. Total Luecocyte Count

The mean values of total leucocyte count (x 10^3 cells / cmm) were 10.34 ± 0 .58, 10.38 ± 0.95 and 10.26 ± 0.48 on the day of presentation, 15th and 30th day respectively. All the values were within the normal range.

4.3.4.5. Differential Leucocyte Count

The mean percentages of neutrophils were 72.50 ± 1.77, 70.20 ± 1.41 and 70.20 ± 1.44 on the day of presentation, 15th and 30th day respectively. The mean percentage of lymphocytes was 23.80 ± 1.40, 23.80 ± 0.95 and 25.0 ± 1.37 on the day of presentation, 15th and 30th day respectively. The mean percentage of monocytes was 2.7 ± 0.65, 3.7 ± 0.62 and 3.0 ± 0.75 on the day of presentation, 15th and 30th day respectively. The mean percentages of eosinophils were 1.2 ± 0.49, 1.3 ± 0.56 and 1.8 ± 0.44 on the day of presentation, 15th and 30th day respectively.

All the values for differential leucocyte count were within the normal range through the period of observation

4.3.5. Biochemical parameters (Table 9)

4.3.5.1. Blood sugar

The mean values for blood sugar (mg/dl) were 98.33 ± 5.82, 90.11 ± 5.54 and 92.6 ± 4.53 on the day of presentation, 15th and 30th day respectively. All the values were within the normal range.

4.3.5.2. Alanine amino transferase (ALT)

The mean values for Alanine amino transferase (U/L) were 23.5 ± 2.97, 21.30 ± 2.67 and 20.5 ± 2.33 on the day of presentation, 15th and 30th day respectively. All the values were within the normal range.

4.3.5.3. Aspartate amino transferase(AST)

The mean values for aspartate amino transferase (U/L) were 31.50 ± 2.97, 29.60 ± 2.67 and 29.0 ± 2.92 on the day of presentation, 15^{th} and 30^{th} day respectively. All the values were within the normal range.

4.3.5.4. Blood Urea Nitrogen (BUN)

The mean values for blood urea nitrogen (mg/dl) were 23.49 ± 1.72, 22.53 ± 1.70 and 21.80 ±1.35 on the day of presentation, 15^{th} and 30^{th} day respectively. All the values were within the normal range.

4.3.5.5. Creatinine

The mean values for creatinine (mg/dl) were 1.29 ±0.14, 1.16 ± 0.15 and 1.01 ± 0.11 on the day of presentation, 15^{th} and 30^{th} day respectively. All the values were within the normal range.

4.3.6. Diagnostic radiographs

Lateral radiograph of the skull was taken for Dog Nos. D_{20} and $D_{21.}$ In Dog No.D_{20}, there was rarefaction of the mandible and displacement of teeth from the alveolar socket and for Dog No. D_{21} no abnormality could be detected. Intraoral radiographs of mandibular incisors and canines, and right fourth maxillary premolar teeth were taken in Dog Nos: D_{15} and D_{16} respectively and no abnormality to the tooth root and the alveolar bone could be observed.

4.3.7. Culture and sensitivity test of gingival sulcus swabs (Table 10)

Gram positive cocci were isolated by the culture of gingival sulcus swabs in six cases(Dog Nos.D_3, D_8, $D_{15,}$ $D_{17,}$ D_{23} and D_{24}) and the rest were Gram negative cocco-bacillary organisms.Culture and sensitivity test was not done in Dog Nos.D_{20}, D_{21}

and D_{22}, which were tumor cases. Gram positive cocci were sensitive to amoxycillin, ampicillin, enrofloxacin, ciprofloxacin, gentamycin, doxycyclin and cefotaxime and were resistant to chloramphenicol. Gram negative cocco- bacillary organisms were sensitive to ciprofloxacin, enrofloxacin, cefotaxime, gentamycin, chloramphenicol and were resistant to sulphadiazine.

4.4. TREATMENT

4.4.1. Medical treatment

Dog Nos. D_{23} and$D_{24}$with mild to moderate gingivitis and ulceration of buccal mucosa were treated with oral administration of amoxicillin – cloxacillin combination 20 mg/kg body weight three times daily and metronidazole at the rate of 25 mg/ kg body weight twice daily for seven days and metronidazole oral gel for intraoral application. Healing of the ulcer and regression of gingivitis was noticed in the first week and complete healing was noticed by fifteenth day. The treatment regimen adopted was found satisfactory for controlling and healing the periodontal changes.

For Dog Nos.: $D_{21}$and D_{22}, Vincrystine sulfate at the rate of 0.025 mg/kg body weight was given intravenously at weekly intervals. But no improvement was noticed in both the cases.

4.4.2. Surgical treatment

4.4.2.1. Anaesthesia

The anaesthetic protocol adopted using ketamine with atropine – xylazine premedication was satisfactory for the surgical procedures and all animals had uneventful induction, maintenance and recovery.

4.4.2.2. Ultrasonic dental scaling

All the selected cases with severe gingivitis, halitosis and dental calculus, except Dog Nos: D_{20}, D_{21}, D_{22}, D_{23} and D_{24}, were subjected to ultrasonic dental scaling under general anaesthesia, on all four surfaces. The ultrasonic scaling was found feasible in all cases for removing dental tartar. Bleeding from gum noticed in a few cases, where accidental contact of the ultrasound scaler tip to the gums had occurred. A continuous water jet maintained was found effective for controlling over heating of the teeth. Scaling was repeated in subsequent observation on fifteenth day in Dog Nos: D_1, D_2, D_4 and D_5 for removing the remnants of the calculi. (Plate 3 and 4)

4.4.2.3. Exodontia

Exodontia was performed in cases where the tooth was shaky and with furcation exposure. Right maxillary fourth premolar was extracted in Dog No.D_1, left maxillary first molar in Dog No: $D_2$and left maxillary first incisor in Dog No:D_3. In all the cases with exodontias, complete healing of gum was noticed after one week and animal started taking food normally. (Plate 5)

4.4.2.4. Surgical excision of tumour

In Dog No: D20, surgical excision followed by cryodestruction of the remaining tumour mass was done under general anaesthesia, but recurrence of tumor noticed after three weeks. Animal died after one month due to the complication of tumour. (Plate 6)

4.4.2.5. Post operative care

Antibiotic therapy was initiated with amoxicillin – cloxacillin combination at the rate of 20mg/kg body weight thrice daily and metronidazole at the rate of 25mg/ kg body weight twice daily. The same was continued in Dog Nos: D_3, D_8, D_{15} $D_{17,}$

D_{23} andD_{24} for seven days, as the culture and sensitivity test gave a similar choice. In all other cases except D_{20}, D_{21} and D_{22} antibiotic was changed to ciprofloxacin at the rate of 10mg /kg body weight according to the results of culture and sensitivity test. The antibiotic therapy was found satisfactory in controlling the infection.

Soft diet was advised for seven days in all cases were surgical treatment was adopted.

Table 1. Prevalence of dental diseases in dogs from April 2008 to December 2008

Dental affections	**No. of dogs affected**	**Percentage of dogs affected (%)**
Dental Tartar	91	89.22
Epulis	5	4.90
Oral ulcer	4	3.92
Dental attrition	2	1.96
Total	102	100

Table 2. Age- wise incidence of dental diseases in dogs from April 2008 to December 2008.

Age groups (in years)	**No. of dogs affected**	**Percentage of dogs affected (%)**
1 - 4	38	37.25
5 - 8	46	45.09
9 - 12	18	17.65
Total	102	100

Table 3. Breed-wise incidence of dental diseases in dogs from April 2008 to December 2008

Breed	Number	Percentage (%)
German Shepherd Dog	27	26.47
Spitz	21	20.59
Dachshund	15	14.71
Labrador Retriever	12	11.76
Non-descript dogs	9	8.82
Doberman Pinscher	5	4.90
Cocker spaniel	4	3.92
Rottweiler	2	1.96
Pug	2	1.96
Boxer	1	0.98
Great Dane	1	0.98
Basset hound	1	0.98
Lhasa Apso	1	0.98
Miniature Pinscher	1	0.98
Total	102	100

Table 4. Sex-wise distribution of dental diseases in dogs from April 2008 to December 2008.

Sex	Number of dogs affected	Percentage of dogs affected (%)
Female	53	51.96
Male	49	48.04
Total	102	100

Table 5. Signalment of the dogs selected for the study

Dog No.	Breed	Sex (M/F)	Age (yrs)	Diet	Owner's complaint
D_1	Dachshund	M	12	Homemade + titbits	Halitosis, pain on chewing
D_2	Spitz	F	10	Homemade food	Halitosis, salivation, difficulty in taking food
D_3	Miniature Pinscher	M	$2\,^1/_2$	Homemade food+ Commercial food	Halitosis + Off feed
D_4	Dachshund	F	9	Homemade food + titbits	Halitosis & Off feed
D_5	Doberman Pinscher	M	8	Homemade food	Halitosis
D_6	Cockers Spaniel	M	9	Homemade food + titbits	Halitosis
D_7	Spitz	F	3	Homemade food + titbits	Halitosis
D_8	German Shepherd Dog	M	6	Homemade food	Halitosis
D_9	Doberman Pinscher	F	$2^1/_2$	Homemade food	Unaware of the condition
D_{10}	Labrador Retriever	F	$3^1/_2$	Homemade food	Halitosis
D_{11}	Labrador Retriever	F	2	Homemade food	Unaware of the condition
D_{12}	Spitz	F	8	Homemade food	Halitosis & unable to chew food with its right cheek.
D_{13}	Cocker Spaniel	F	6	Homemade food + titbits	Halitosis
D_{14}	Labrador Retriever	F	2	Homemade food + titbits	Halitosis
D_{15}	Non- descript	F	1	Homemade food	Unaware of the condition
D_{16}	Non-descript	F	$1^1/_2$	Homemade food + titbits	Unaware of the condition
D_{17}	Non-descript	F	10	Homemade food	Halitosis
D_{18}	Cocker Spaniel	F	5	Homemade food	Pain on chewing
D_{19}	Spitz	F	11	Homemade food	Halitosis, pain on chewing
D_{20}	German Shepherd Dog	F	5	Homemade food	Swelling on the lower jaw + Halitosis
D_{21}	German Shepherd Dog	F	7	Homemade food + titbits	Swelling at the lower jaw
D_{22}	Boxer	M	7	Homemade food	Growth on the gum
D_{23}	Spitz	M	6	Homemade food + titbits	Halitosis and ulceration of cheek
D_{24}	Spitz	M	5	Homemade food + titbits	Halitosis, discharge from mouth

Table 6. Observations on gingival sulcus depth (millimeters)

Sl.No.	Dog No.	Tooth affected	Sulcus depth (millimeters)
1	D_1	Right Maxillary fourth Premolar	8
2	D_2	Left maxillary first molar	8
3	D_3	Right maxillary first molar	7
4	D_4	Left maxillary fourth premolar	10
5	D_5	Right maxillary fourth premolar	9
6	D_6	Right maxillary fourth premolar	5
7	D_7	Left maxillary first molar	6
8	D_8	Left maxillary fourth premolar	3
9	D_9	Right maxillary first molar	3

Table 7. Mean physiological parameters on first, 15th and 30th day of observation

Parameters	**Observations**		
	1st day	**15th day**	**30th day**
Rate of Respiration (per minute)	35.20± 2.78	34.20 ± 1.59	34.40 ± 2.73
Rectal Temperature (^{o}C)	38.85 ± 0.10	38.89 ± 0.14	38.64 ± 0.11
Pulse Rate (Per minute)	89.0 ± 2.71	84.7 ± 3.22	86.4± 2.73

Table 8. Mean hematological parameters on first, 15th and 30th day of observation

Parameters		**1st day**	**15th day**	**30th day**
Hemoglobin concentration (g/dl)		13.3± 0.43	13.61 ± 0.41	13.55 ±0.38
Volume of Packed Red Cells (%)		42.10 ± 1.87	40.0 ± 1.41	41.5± 1.43
Erythrocyte Sedimentation Rate (mm/hr)		5.7 ±0.42	4.8 ±0.57	5.0 ± 0.56
Total Leukocyte Count (10^3cells/cmm)		10.34 ±0 .58	10.38 ± 0.95	10.26 ± 0.48
Differential Leucocyte Count (%)	N	72.50 ± 1.77	70.20 ± 1.41	70.20 ± 1.44
	L	23.80 ± 1.40	23.80 ± 0.95	25.0 ± 1.37
	M	2.7 ± 0.65	3.7 ± 0.62	3.0 ± 0.75
	E	1.2 ± 0.49	1.3 ± 0.56	1.8 ± 0.44
	B	0	0	0

Table 9. Mean biochemical parameters on first, 15th and 30th day of observation

Parameters	1st day	15th day	30th day
Blood sugar (mg/dl)	98.33 ± 5.82	90.11 ± 5.54	92.6 ± 4.53
Alanine amino transferase (U/L)	23.5 ± 2.97	21.30 ± 2.67	20.5 ± 2.33
Aspartate amino transferase (U/L)	31.50 ± 2.97	29.60 ± 2.67	29.0 ± 2.92
Blood urea nitrogen (mg/dl)	23.49 ± 1.72	22.53 ± 1.70	21.80 ±1.35
Creatinine (mg/dl)	1.29 ±0.14	1.16 ± 0.15	1.01 ± 0.11

Table 10. Culture and sensitivity test of the oral swabs

Dog No.	Organisms cultured	Sensitive to	Resistant to
D_1	Gram negative coco-bacillary	Ciprofloxacin, Enrofloxacin, Cefotaxime, Gentamicin and Chloramphenicol	Sulphadiazine
D_2	Gram negative coco-bacillary	-do-	-do-
D_3	Gram positive cocci	Amoxycillin, Ampicillin, Enrofloxacin, Ciprofloxacin, Gentamycin and Doxycyclin, cefotaxime	Chloramphenicol
D_4	Gram negative coco-bacillary	Ciprofloxacin, Enrofloxacin, Cefotaxime, Gentamicin and Chloramphenicol	Sulphadiazine
D_5	Gram negative coco-bacillary	-do-	-do-
D_6	Gram negative coco-bacillary	-do-	-do-

Contd……..

Table 10. (Continued) Culture and sensitivity test of the oral swabs

Dog No.	Organisms cultured	Sensitive to	Resistant to
D_7	Gram negative coco-bacillary	Ciprofloxacin, Enrofloxacin, Cefotaxime, Gentamicin and Chloramphenicol	Sulphadiazine
D_8	Gram positive cocci	Amoxycillin, Ampicillin, Enrofloxacin, Ciprofloxacin, Gentamycin and Doxycyclin, cefotaxime	Chloramphenicol
D_9	Gram negative coco-bacillary	Ciprofloxacin, Enrofloxacin, Cefotaxime, Gentamicin and Chloramphenicol	Sulphadiazine
D_{10}	Gram negative coco-bacillary	-do-	-do-
D_{11}	Gram negative coco-bacillary	-do-	-do-
D_{12}	Gram negative coco-bacillary	-do-	-do-
D_{13}	Gram negative coco-bacillary	-do-	-do-
D_{14}	Gram negative coco-bacillary	-do-	-do-
D_{15}	Gram positive cocci	-do-	-do-
D_{16}	Gram negative coco-bacillary	Ciprofloxacin, Enrofloxacin, Cefotaximee, Gentamicin and Chloramphenicol	Sulphadiazine
D_{17}	Gram positive cocci	Amoxycillin, Ampicillin, Enrofloxacin, Ciprofloxacin, Gentamycin and Doxycyclin, Cefotaxime	Chloramphenicol
D_{18}	Gram negative coco-bacillary	Ciprofloxacin, Enrofloxacin, Cefotaxime, Gentamicin and Chloramphenicol	Sulphadiazine
D_{19}	Gram negative coco-bacillary	-do-	-do-
D_{23}	Gram positive cocci	Amoxycillin, Ampicillin, Enrofloxacin, Ciprofloxacin, Gentamycin and Doxycyclin, Cefotaxime	Chloramphenicol
D_{24}	Gram positive cocci	-do-	-do-

Fig. 1. Prevalence of dental diseases in dogs

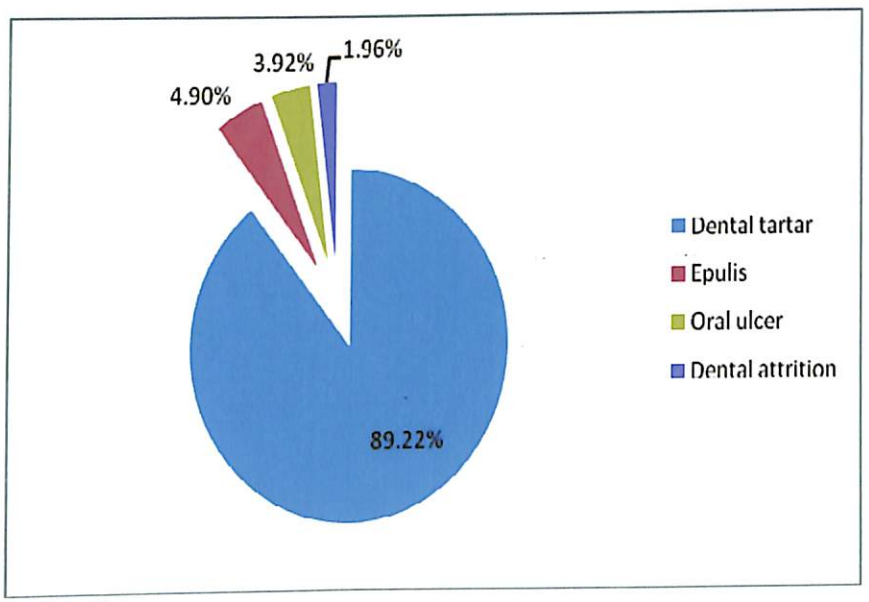


Fig. 2. Age - wise incidence of dental diseases in dogs

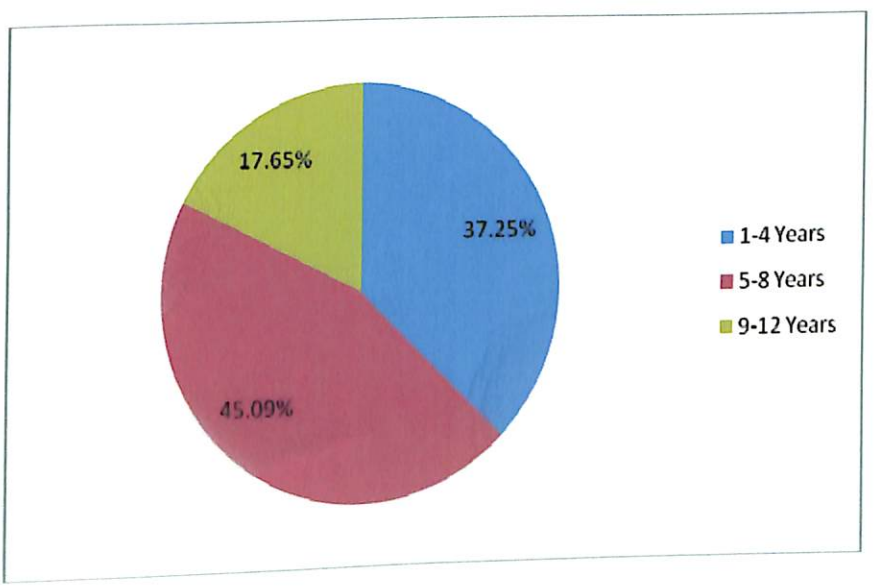


Fig. 3: Breed - wise incidence of dental diseases in dogs

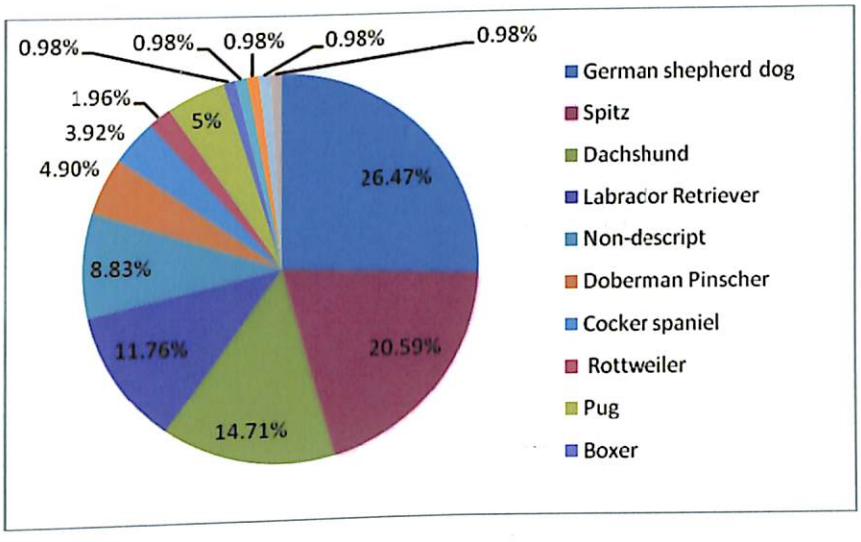


Fig. 4: Sex - wise incidence of dental diseases in dogs

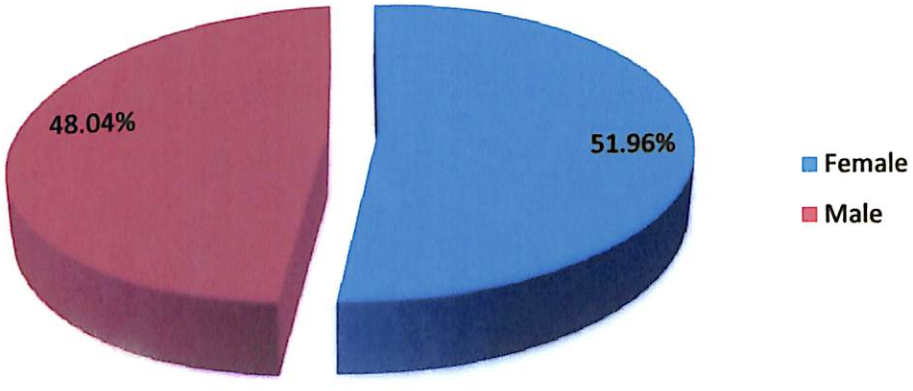
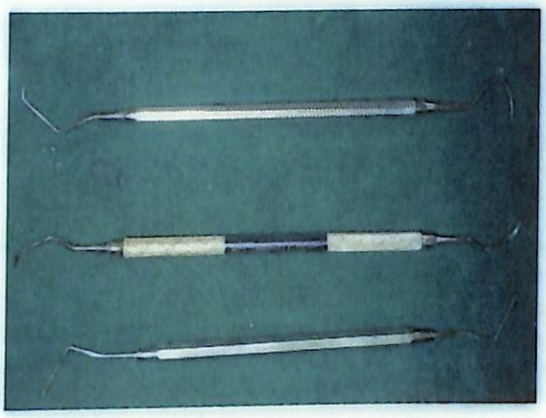


Plate 1a: Evaluation and treatment of dental diseases



A. Dental explorer, dental curette and periodontal probe

B. Measuring the gingival sulcus depth using periodontal probe

C. Intra oral radiography using bisecting angle technique

Plate 1b: Evaluation and treatment of dental affections

A. Intraoral dental films

B. Ultrasonic dental scaler

C. Compressor

Plate 2: Dental and Periodontal diseases

A. Dental tartar

B. Epulis

C. Dental attrition

D. Oral ulcer

Plate 3: Ultrasonic dental scaling in Dog No. D_{14}

A. Before scaling

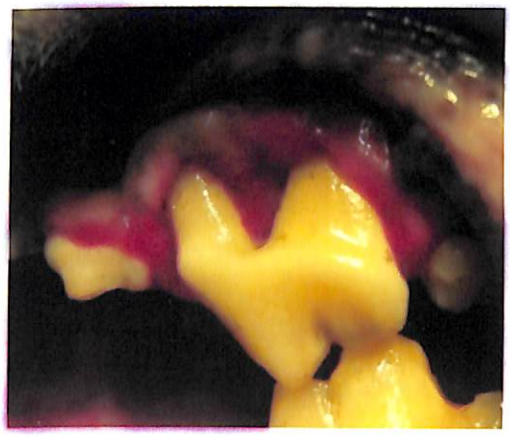
B. During scaling using ultrasonic dental scaler

C. After scaling

Plate 4: Ultrasonic dental scaling in Dog No. D_4

A. Severe gingivitis and receding of gingiva

B. Receded gingiva and exposure of tooth root- after scaling



C. One week after scaling

D. Two week after treatment

Plate 5: Exodontia in Dog No: D_2

A. Severe gingivitis and exposure of tooth root of first molar tooth

B. Exodontia of first molar tooth using extraction forceps

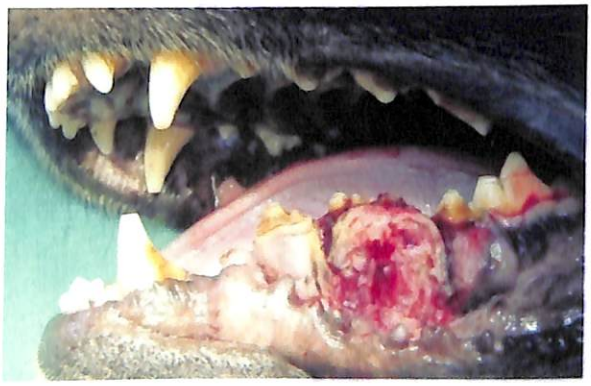
C. Immediately after exodontia

D. One week after exodontia

Plate 6: Surgical excision of tumor of gum in Dog No: D_{20}

A. Tumor of the gum

B. Skiagram (lateral view) of dental arcade showing rarefaction of mandible and displacement of tooth root



C. After surgical excision and cryodestruction

DISCUSSION

5. DISCUSSION

5.1. SCREENING OF CASES FOR DENTAL AFFECTIONS

All the dogs belonging to both sexes and various age and breed presented to Veterinary College Hospital, Mannuthy and Kokkalai during the period from April 2008 to December 2008 were screened for dental affections and found that 102 dogs were found affected with dental or periodontal problems. A high prevalence of dental affections to the tune of 97% was reported in dogs by Gad (1968). Kyllar and Witter (2005) found 348 dogs out of 408 were affected with dental problems. Vani *et al.* (2007) could identify 173 dogs affected with dental problems out of 355 cases examined. But Haws and Antony (1996) reported only 10 to 12% of oral diseases in the general case load.

5.1.1. Prevalence of dental diseases

Among of the 102 dogs affected, 91 dogs (89.22%) had dental tartar, followed by epulis in five (4.9%), oral ulcer in four (3.92%) and dental attrition in two (1.96%). Various epidemiological studies on periodontal disease in dogs were conducted and revealed maximum incidence of dental tartar followed by periodontitis and other diseases (Lund *et al.*, 1999, Vani *et al.*, 2007 and Kumar *et al.*, 2008). Isogai *et al.* (1989) reported the highest incidence of periodontitis in Mongrel dogs.

5.1.2. Age-wise incidence of dental diseases

Incidence of dental affections was more in dogs in age group of five to eight years (45.09%) followed by dogs between one and four years of age (37.25%) and dogs between nine and 12 years (17.65%). Vani *et al.* (2007) studied the age-wise incidence of dental problems, reported a highest incidence of 36.4% in dogs of four to eight years of age. Gad (1968), Sorensen *et. al.* (1980), Hamp *et al.* (1984), Isogai *et al.* (1989), Hoffman and Gaengler (1996), Kyllar and Witter (2005), Kortegaard *et al.* (2008) and Kumar *et al.* (2008) also acknowledged the increasing incidence of dental

affections in older dogs. According to Harvey (1998), Klein (2000) and Holmstrom *et al.* (2005), most of the dogs above two years had one or other dental affection.

5.1.3. Breed-wise incidence of dental diseases

In the present study, the incidence of dental problems in different breeds in descending order was, German Shepherd Dog (26.47%), Spitz (20.59%), Dachshund (14.71%), Labrador Retriever (11.76%), Non-descript (8.82%), Doberman Pinscher (4.90%), Cocker Spaniel (3.92%), Rottweiler and Pug (1.96%) each and Boxer, Great Dane, Basset hound, Lhasa Apso and Miniature Pinscher (0.98%) each. The prevalence in different breeds may be greatly influenced by the distribution of dog population in different geographical areas. Vani *et al*. (2007) found highest prevalence in mongrels, while Kumar *et al. (*2008) reported greatest incidence among Pomeranians. Higher incidence of dental affections among smaller breeds was reported by Sarkiala *et al.* (1993), while a familial hyperplastic lesion of gingiva was reported in Boxer by Dubielzig (1982) and Lobprise (2000a).

5.1.4. Sex-wise incidence of dental disease

Incidence of dental affections in female dogs and male dogs were 51.96 % and 48.04 % respectively. Though the incidence was slightly high among female dogs, the difference was not significant. Gad (1968) could not find any sex difference in incidence of periodontal disease. But studies conducted by Vani *et al*. (2007) and Kumar *et al*. (2008) revealed slightly higher incidence of dental affections in male dogs than female dogs.

5.1.5. Diet and incidence of dental affections

Majority of the owners (90%) were giving homemade food for their pets and only a few were giving commercial food (4%) or both together (6%). The incidence of dental affections was found higher in those dogs fed with soft diet like homemade food (71.1%) and lower among those fed only with commercial food

(50%). These observations were in compliance with the findings of Vani *et al.* (2007) and Kumar *et al.* (2008). The abrasive effect of dry food was found to reduce the incidence of dental calculus and gingivitis in dogs (*Golden et al.*, 1982 and Eisner, 1989a). Texture of diet was significant in production of dental calculus as suggested by Lage *et al.* (1990), Gorrel (1998), Carmmichael (2006b) and Holmstrom (2006). Increased size of pellets of food and coating of pellets with polyphosphates were found to reduce dental calculus formation (Hennet *et al.*, 2007).

Among all the dogs screened, 40.67% were fed with purely non-vegetarian diet and 5.33% with vegetarian diet. Both non-vegetarian and vegetarian foods were included in the diet in 54% of the dogs. Among the dogs fed purely on non-vegetarian diet, the incidence of dental affection was 62.3% and it was 37.5% among those fed with vegetarian diet and 75.31% in those fed with both.

Similarly among the 36.67% of dogs offered with titbits, the incidence of dental affections was found as high as 81.8 %. Among the dogs fed without tidbits (63.33%), the incidence of dental affection was 60.0%. Feeding titbits significantly increased the incidence of dental affections.

Among the dogs fed with bones daily, the incidence of dental affections was 44.68 %, it was 74.50% among those fed bones weekly and 100% among those fed monthly. Among the dogs which were not fed with bone, the incidence of dental affection was 78.72%. A comparatively lower incidence of dental diseases was noticed in those dogs fed with bones regularly than those fed occasionally or not at all. This may be because of the abrasive effects of the bone on chewing, which prevented accumulation of plaque. The texture of food was found important in the deposition and development of dental calculus (Gorrel, 1998).

5.2 SELECTION OF CASES

Out of 102 dogs with dental affections, 24 cases to various age, breed and of both sexes were selected at random for detailed investigation and serially numbered from $D_1$to D_{24}.

5.3. MAIN ITEMS OF OBSERVATION

5.3.1. Signalment

In the present study the incidence of dental affections was more in dogs in the age group of five to eight years, with a mean age of 5.79 $\pm$ 0.66 years .This is in accordance with the study done by Vani *et al.* (2007), who reported maximum incidence of dental affection in dog of four to eight years of age.

Among the selected dogs Spitz was the most commonly affected breed (25%). Sarkiala *et al.* (1993) opined that small breeds were more often affected with periodontitis than large breeds. Highest incidence of periodontal disease was reported in mongrels (56.64%) by Vani *et al.* (2007) and in Pomeranians (42.39%) by Kumar *et al.* (2008). The incidence of dental affections in a canine population may be affected by the preferences of the people rearing the dogs.

Out of the selected dogs 66.67% were females and 33.33 % were males, which was contrary to the observation in the population in which the prevalence of dental affections was studied. Vani *et al*. (2007) and Kumar *et al.* (2008) studied the sex-wise incidence of dental problems, revealed greater involvement of male than female.

In the present study majority of the dogs were presented with halitosis as the common complaint. Similar observation was made by Golden *et al*. (1982), Carmichael (2006b) and Kumar *et al*. (2008).

Out of the 24 dogs selected, incidence of dental tartar was found to be high *ie*, in 19 dogs (79.17%) followed by epulis in 3 (12.5 %) and oral ulcer in 2 (8.33%). This is in accordance with the findings of Lund *et al.* (1999), Vani *et al.* (2007) and Kumar *et al.* (2008).

5.3.2. Clinical examination

Detailed clinical examination was carried out in the 24 dogs selected.

5.3.2.1. General condition of the animal

The general condition was fair for Case Nos: D_2 and D_3 may be due to the presence of shaky tooth and pain on chewing which made then off feed; for Case Nos: D_{20} and D_{21}, in which tumours of the gum was present body condition was fair. Rest of the cases had a good body condition. Clinical signs like anorexia, ptyalism, weight loss, abnormal swallowing and oral pain was pointed out by Carmichael (2006b) in dogs affected with periodontal diseases.

5.3.2.2. Condition of the oral cavity

The oral cavity was assessed for colour of the gingival mucous membrane, nature of gum, halitosis, dental tartar, condition of tooth, gingival sulcus depth and grading was done based on the gingival sulcus depth. Kressin (2009) pointed out that oral examination was an integral part of every general physical examination for companion animals.

5.3.2.2.1. Colour of gingival mucous membrane

The colour of the gingival mucous membrane was congested for all the cases on the day of presentation and became pale roseate after the treatment. Congestion of the mucous membrane might be a sign of gingivitis. The inflammatory effects of the bacteria found in plaque combined with the host's defense reaction may be the cause for inflammation of the periodontal tissues (Eisenmenger and Zetner, 1985, Lobprise,

2000b and Rawlings *et al*., 1997). In all the cases the colour of the gingival mucous membrane became pale roseate, one week after the initiation of the treatment, except for the three cases were tumour was present.

5.3.2.2.2. Nature of gum

In three cases tumour was noticed in the gum and in rest of the cases there was gingivitis. After the treatment gum became normal in all cases except for tumour cases. Gingivitis was reported as a common sign of periodontal disease (Smith *et al.,* 1985 and Lund *et al.,* 1999) along with extreme ulceration (Lobprise, 2000a).

5.3.2.2.3. Halitosis

In the present study all the cases revealed halitosis as the common complaint. This is in accordance with the findings of Carmichael (2006b), Kumar *et al.* (2008), Golden *et al.* (1982), Bellows (2002) and DeForge (2004). Halitosis was absent on the observation in the first week after dental cleaning and medical therapy in all the cases, except the three cases with gingival tumour.

5.3.2.2.4. Dental Tartar

Dental tartar was present in all the selected cases. Various epidemiological studies on periodontal disease in dogs were conducted by Lund *et al*. (1999), Kyllar and Witter (2005), Vani *et al.* (2007) and Kumar *et al.* (2008) had revealed maximum incidence of dental tartar in pets. According to Eisenmenger and Zetner (1985) plaque deposited on the neck of the tooth resulted in the formation of gingival pockets, subgingival tartar and progression of tartar towards the root apex, with marked inflammation of the gingival, losing of gingival and alveolar bone and resulted in loosening of the tooth.

The teeth commonly affected with dental tartar were fourth premolars, first and second molars followed by canines on the buccal surface of the maxillary arcade.

Incisors were least affected. This was in compliance with the findings of Sorensen *et al.* (1980). Hennet *et al*., 2006a noticed that the teeth that were not naturally involved in food crushing like (incisors, canines, and small premolars) showed less dental deposits.

Dental tartar could be effectively removed by dental scaling and further development was not noticed till the end of the observation period.

5.3.2.2.5. Condition of tooth

Shaky teeth were present in four cases which consisted of right maxillary fourth premolar, Left maxillary first molar, left maxillary first incisor and right fourth premolar and first molar and right maxillary third premolar. Exposure of tooth root was found in three cases in the right maxillary fourth premolar, left maxillary first molar and in left maxillary first incisor.

In the present study shaky teeth and exposure of tooth root were found higher in the maxillary dental arcades mainly around fourth premolar and first molar. This was in accordance with the findings of Isagoi *et al.* (1989) and Morgan *et al.* (1990) on periodontal bone loss and formation of shaky tooth. Eisenmenger and Zetner (1985), Harvey (2005) and Carmichael (2006b) reported that inflammation and alveolar bone destruction associated with periodontal disease was initiated by bacterial plaque accumulating on the tooth surface which eventually may result in alveolar bone destruction and tooth loss.

5.3.2.2.6. Gingival sulcus depth

The gingival sulcus depth was taken using a periodontal marking probe. It was the most effective and common way to evaluate the progression of periodontal

disease. (Nieves *et al.*, 1997, Lobprise, 2000b, Carmichael, 2006a, Hoffman, 2006 and Holmstrom, 2005). The pocket depth measurements were obtained by lightly grasping the periodontal probe and the measurements were obtained at four sites (mesial, buccal, distal, and lingual/ palatal) on each tooth. (Tsugawa *et al.*, 2003, Lemmons and Carmichael, 2007). Role of formation of periodonatal pockets in the progression of periodontal disease was emphasized by Eisenmenger and Zetner (1985) and Glickman *et al.* (2009).

5.3.2.2.7. Grading of periodontal disease

Grading of the selected cases was done according to the measurement of the pocket depth and severity of the lesions following the system put forward by Oakes (2006). Five cases were graded under Grade IV as they were having a sulcus depth greater than 6 mm; three were graded under Grade III, since the pocket depth was from 3 to 6 mm; two under Grade II, since the pocket depth was from 2 to 3 mm and rest of the cases were Grade I, as the pocket depth was normal. The normal pocket depth could be up to 1 to 2 mm in the dog (Lobprise, 2000b). Other grading systems were also suggested by many authors (Eisner, 1989a, Klein, 2000, Bellows, 2002 and Carmichael, 2006b) to classify the periodontal disease in dogs.

5.3.3. Physiological parameters

There were no obvious signs of systemic illness in any of the animals as evidenced by the findings of physiological parameters. The rate of respiration, pulse rate and rectal temperature were within the normal range in all dogs in all the observations.

5.3.4. Hematological parameters

The hematological parameters such as haemoglobin concentration, volume of packed red cell, erythrocyte sedimentation rate, total leucocyte count and differential leucocyte count in the affected animals did not vary much from the normal range to indicate any underlying disease process (Feldman, 2000) in any of the observation.

5.3.5. Biochemical parameters

The biochemical parameters such as blood sugar, alanine amino transferase, aspartate amino transferase, blood urea nitrogen and creatinine in the affected animals did not vary much from the normal range to indicate any underlying disease process (Kaneko *et al*.1997).

Eisner (1989a), Carmichael (2006b) and Pavlica *et al.* (2008) suggested the possibility of association of periodontal disease with pathologies of distant organs like heart, liver and kidney. But Peddle *et al.* (2009) could not establish any association between periodontal diseases, oral procedures and bacterial endocarditis in dogs. Any consistent pattern of blood sugar concentration in dogs treated with periodontal disease was also not established according to the reports of Harvey (1998).

5.3.6. Diagnostic Radiographs

Radiographic evaluation of lateral view of dental arcade in one case affected with gingival tumour, epulis, revealed rarefaction of the mandible and displacement of teeth from the alveolar socket. Similar observation was made by Mills and Lewis (1981). Lord (1960) stated that epulis was a fibrous tumor of the gingiva usually seated on the periosteum of the jaw bone and in its development it might enveloped the teeth and caused a gross displacement of the tooth involved.

Intraoral radiographs were taken in two cases exposing mandibular incisors and canine teeth and right maxillary fourth premolar teeth. The tooth root and the alveolar bones were found normal in both the cases. Lemmons and Carmichael (2007) opined that intraoral radiography was superior to skull for assessing the periodontal tissues because it eliminated super imposition and had better resolution. The extent of the periodontal disease could be revealed by intraoral radiography (Hoffman, 2006). Importance of radiography to assess the bone loss in periodontal disease was also emphasized by Morgan *et al.* (1990), Nieves *et al.* (1997), Lommer and Verstraete (2000), Tsugawa and Verstraete (2000), DeForge (2004) and Niemiec (2007b).

5.3.7. Culture and sensitivity test of oral swabs

The most predominant bacteria isolated by the culture of gingival sulcus swabs were Gram-negative cocco-bacillary organisms in 71.43%, followed by Gram positive cocci in 28.57% of cases. The highest incidence of gram negative cocco- bacillary organism and gram positive cocci from the diseased gingival pockets were reported by Syed (1980) and Sarkiala *et al.* (1993). Porphyromonas was identified in gingival pockets by Elliot *et al.* (2005) and Harvey (2005).

Gram positive cocci were sensitive to amoxycillin, ampicillin, enrofloxacin, ciprofloxacin, gentamycin, doxycyclin and cefotaxime and were resistant to chloramphenicol. Gram negative cocco- bacillary organisms were sensitive to ciprofloxacin, enrofloxacin, cefotaxime, gentamycin and chloramphenicol and were resistant to sulphadiazine. Radice *et al*. (2006) found that anaerobic bacteria of oral origin were susceptible to amoxicillin - clavulanic acid combination, doxycycline and erythromycin; and for aerobic bacteria were sensitive to amoxicillin - clavulanic acid combination, erythromycin, gentamicin and sulfa-trimethoprim.

5.4. TREATMENT

Those cases with gingivitis and ulceration of gum were subjected to medical treatments and those with severe gingivitis, halitosis and dental calculus were subjected to ultrasonic dental scaling. Exodontia was performed in case of tooth which was shaky and with furcation exposure. Elimination of periodontal pockets, maintenance of functional gingival tissue, debridement of pockets and maintenance of contour and form of periodontium were the goals of periodontal therapy (Anthony, 2000 and Lobprise, 2000b). Golden standards in veterinary oral health as per Colmery (2005) were clinical pathological finding, general anaesthesia, radiology, operative dentistry oral medicine and homecare. Lindhe *et al.* (1975) opined that it was possible in dogs to establish and maintain a normal gingiva was by eliminating calculus and then subjecting the animals to daily repeated and carefully performed tooth cleaning.

5.4.1. Medical treatment

Two cases with gingivitis and ulceration of buccal mucosa were effectively treated with oral administration of amoxicillin – cloxacilin combination at the rate of 20mg/ kg thrice daily for seven days, metronidazole at the rate of 25mg/ kg twice daily for one week and local application of metronidazole oral gel. The treatment adopted effectively controlled the disease and both the dogs became healthy by first week of observation. Reed (1988) found that metronidazole was effective in preventing inflammation and development of the bacterial flora usually associated with the natural accumulation of plaque. Peak (2003) and Carmichael (2006b) suggested the effective treatment of periodontal disease with selective antibiotics mainly metronidazole, amoxicillin - clavulanate potassium and clindamycin together with anti-inflammatory agents. Use of mild chlorhexidine (0.12 to 0.05 %) solution for oral rinse was suggested to control plaque formation by Holmstrom (2005) and Carmichael (2006b).

In two of the three cases with gingival tumour, vincrystine sulfate was used at the rate of 0.025 mg/kg body weight intravenously at weekly interval for three weeks, but no improvement was observed. Werner (1981) reported the treatment of oral neoplasia using intravenous administration of vincristine sulfate at the rate of 0.02 mg/kg/2wks.

5.4.2. Surgical treatment

5.4.2.1. Anesthesia

The anaesthetic protocol adopted using ketamine hydrochloride with atropine sulphate and xylazine hydrochloride premedication was satisfactory and all animals had uneventful induction, maintenance and recovery. Colmery (2005) opined general anesthesia for oral procedures as one among the golden standards of veterinary oral health.

5.4.2.2. Ultrasonic dental scaling

The ultrasonic scaling was found as an effective tool for periodontal debridement and removal of dental tartar, which was the primary treatment for gingival and periodontal inflammation. This was in agreement with the opinions of Cleland (2000), Holmstrom (2005), Carmichael (2006b), Anoop (2007) Lemmons and Carmichael (2007) and Narayanan *et al*. (2008). Water spray onto the tip of the scaler was found effective in preventing overheating of tooth, which was in accordance with suggestions of Cleland (2000). Black *et al.* (1980) pointed that ultrasonic teeth cleaning was a commonly used method for the removal of dental plaque and calculus in both man and small animals. Eisner (1989a) and Harvey (2005) also suggested removal of plaque, calculus and stains from tooth surface and leaving tooth as smooth as possible to treat and prevent accumulation of tartar.

Lemmons and Carmichael (2007) suggested the use of dental explorer to detect irregularities in teeth such as fractures, caries, feline resoptive lesions, tooth mobility, tooth root fracture and neoplasia

5.4.2.3. Exodontia

Exodontia was performed in three cases where the tooth was shaky and with furcation exposure. Complete healing of gum was noticed after one week and animal started taking food normally. DeBowes (2005) pointed that for periodontal disease with significant attachment loss, extraction might be the best treatment option. Carmichael (2006) stated that the treatment for end stage periodontitis was dental extraction. Hoffman (2006) reported a case with severe periodontis cured after extraction of the tooth.

5.4.2.4. Surgical excision of tumor

Surgical excision followed by cryodestruction of the tumour mass was performed in one of the three cases with gingival tumour. But regeneration of tumor noticed after three weeks. Oral neoplasia in dogs especially benign tumors, comprised primarily of epulis, responded very well to cryosurgery but re-growth was reported in some cases. (Werner, 1981)

5.4.2.5. Postoperative care

Antibiotic therapy with amoxicillin - cloxacillin at the rate of 20 mg/ kg body weight thrice daily for seven days and metronidazole at the rate of 25mg/kg twice daily for seven days in six cases and with ciprofloxacin at the rate of 10 mg/kg body weight in 15 cases were found satisfactory in controlling the infection after scaling, exodontias and tumor excision. Sarkiala (1993) suggested administration of tinidazole in addition to dental scaling to produce long lasting improvement in periodontal conditions than scaling alone.

As a prophylactic measure to prevent development of periodontal diseases, feeding of dry foods and chews, diet designed to reduce dental deposits, daily tooth brushing, regular dental scaling and oral rinse with weak chlorhexidine solutions were suggested (Barrette, 1990, Rawling, 1997, Gorrel, 1998, Holmstrom, 2005 and Hennet *et al*., 2007).

SUMMARY

6. SUMMARY

Dogs presented to the Veterinary College Hospitals, Mannuthy and Kokkalai, from April 2008 to December 2008 were screened for dental affections. A detailed history regarding the age, breed, sex and food habits of all dogs were collected to assess any correlation between age, breed, sex, diet and the prevalence of dental affections.

Among the dogs screened for dental affections, 102 were affected with dental or periodontal diseases. Among the affected dogs 89.22% had dental tartar followed by epulis in 4.9%, oral ulcer in 3.92% and dental attrition in 1.96%. The incidence of dental affections was more in dogs of five to eight years of age (45.09%) followed by dogs between one and four years of age (37.25%) and dogs between nine and twelve years (37.25%) respectively. Among the different dog breeds with dental affections the incidence was maximum in German Shepherd Dog with 27 numbers (26.47%), followed by Spitz with 21 dogs (20.59%), Dachshund with 15 (14.71%), Labrador Retriever with 12 (11.76%), Non-descript dogs with nine (8.82%), Doberman Pinscher with five (4.90%), Cocker Spaniel with four (3.92%), Rottweiler and Chinese Pug with two each (1.96%) and Boxer, Great Dane, Basset hound, Lhasa Apso and Miniature Pinscher with one each (0.98%). It was found that female dogs (51.96 %) were affected more than male (48.04 %). Of all the dogs screened, 90% of the dogs were fed with homemade food alone and among them the incidence of dental affection was 71.1%. Among all the dogs screened, 40.67% were fed with purely non-vegetarian diet and 5.33% with vegetarian diet. Both non-vegetarian and vegetarian foods were included in the diet in 54% of the dogs. The incidence of dental affection was 62.3% in those fed purely on non-vegetarian diet and it was 37.5% among those fed with vegetarian diet and 75.31 % in those fed with both.

Titbits were fed to 36.67% pets, among them the incidence of dental affection was 81.8%. Incidence of dental affection was 60.0% among the dogs fed without titbits (63.33%). Among the dogs fed with bones daily (31.34%), the incidence of dental affections was 44.68%, it was 74.50% among those fed bones weekly (34%) and it was 100% among those fed monthly (5.33%). Among the dogs which were not fed with bone (29.33%), the incidence of dental affection was 78.72%.

From the dogs with dental affections, 24 cases were randomly selected for detailed investigation. The dogs belonged to various breeds like Spitz, Cocker Spaniel, Labrador Retriever, German Shepherd Dog and Non- descript, Doberman Pinscher, Dachshund, Boxer and Miniature pinscher. The dogs were of either sex (16 females and 8 males) with an average of 5.79± 0.66 years. The clinical condition included dental tartar (79.17%), epulis (12.5 %) and oral ulcer (8.33%).

All the animals selected for the study were examined for their general condition, condition of the oral cavity (colour of the gingival mucous membrane, nature of the gum, halitosis, dental tartar, condition of tooth and gingival sulcus depth), physiological parameters, hematological parameters and biochemical parameters. Diagnostic radiographs were taken using intraoral films as well as lateral views of dental arcade which ever cases required. Culture and sensitivity studies of oral swabs were carried out to select the antibiotic for therapy.

The general condition of all the animals was good except for four cases which had a fair condition due to tumour or shaky tooth and inanition. For all the selected cases the gingival mucous membrane was congested on the day of presentation and became pale roseate after treatment except for tumour cases where no remarkable change was noticed. For all cases except the tumor cases the gum was inflammed due to gingivitis on the day of presentation and was normal after treatment. No change in the condition of tumor noticed after treatment with anti neoplastic drug.

The condition of the oral cavity was examined in detail for all the selected cases. The colour of the gingival mucous membrane was congested for all the cases on the day of presentation and became pale roseate after the treatment. Congestion of the mucous membrane might be due to inflammation. Tumor was present in three cases and rest of the cases there was gingivitis. After the treatment gum became normal in all cases except for tumour cases. In the present study all the cases had halitosis as the common complaint and it was absent after dental cleaning in almost all the cases.

Dental tartar was present in all the selected cases. The teeth commonly affected with dental tartar were fourth premolar, first and second molars followed by canines on the buccal surface of the maxillary arcade. Incisors were least affected. Dental tartar could be effectively removed by dental scaling. Shaky teeth were present in four cases and exposure of tooth root was found in these three cases. In the present study shaky teeth and exposure of tooth root were found higher in the maxillary dental arcades in around fourth premolar and first molar.

The gingival sulcus depth was taken using a periodontal marking probe. The pocket depth measurements were obtained by lightly grasping the periodontal probe and the measurements were obtained at four sites (mesial, buccal, distal, and lingual/ palatal) on each tooth. Grading of the selected cases was done according to the measurement of the pocket depth. Five cases were classed under Grade IV, two cases each under Grade III and Grade II and rest of the cases were Grade I.

Any of the animals had shown no obvious sign of systemic illness as evidenced by the findings of physiological parameters. The rate of respiration, pulse rate and rectal temperature were within the normal range in all dogs during all the observations. The hematological parameters such as hemoglobin concentration, volume of packed red cell, erythrocyte sedimentation rate, total leucocyte count and differential leucocyte count in the affected animals did not vary beyond the normal

range to indicate any underlying disease process. The biochemical parameters such as blood sugar, alanine amino transfrerase, aspartate amino transferase, blood urea nitrogen and creatinine in the affected animals were within the normal range.

Radiographic evaluation with lateral view of dental arcade of a case affected with tumour revealed rarefaction of the mandible and displacement of teeth from the alveolar socket.

Culture and sensitivity test of gingival sulcus swabs was carried out in all cases to select the antibiotic for therapy. The most predominant bacteria isolated were Gram-negative cocco-bacillary organisms 71.43% followed by Gram positive cocci 28.57 %.Gram positive cocci were sensitive to Gram positive cocci were sensitive to amoxycillin, ampicillin, enrofloxacin, ciprofloxacin, gentamycin, doxycyclin and cefotaxime.Gram negative cocco- bacillary organisms were sensitive to ciprofloxacin, enrofloxacin, cefotaxime, gentamycin and chloramphenicol.

Two cases with gingivitis and oral ulceration were subjected to medical treatments and 19 cases those with severe gingivitis, halitosis and dental calculus were subjected to ultrasonic dental scaling. Exodontia was performed in three cases with shaky tooth and with furcation exposure. The cases with gingivitis and ulceration of buccal mucosa were effectively treated with oral administration of amoxycillin – cloxacilin combination at the rate of 20mg/ kg thrice daily for seven days, metronidazole at the rate of 25mg/ kg twice daily for one week and local application of metronidazole oral gel. The treatment adopted effectively controlled the disease and the dogs became apparently healthy by one week. For two cases with gingival tumour vincrystine sulfate at the rate of 0.025 mg/ kg was administered intravenously at weekly interval, but no improvement was found.

The anaesthetic protocol adopted for surgical treatment using ketamine with atropine sulphate – xylazine premedication was satisfactory and all animals had uneventful induction, maintenance and recovery. The ultrasonic scaler was found feasible in all cases for removing dental tartar. Exodontia was performed in three cases where the tooth was shaky and with furcation exposure, complete healing of gum was noticed after one week and animal started taking food normally. For a case of gingival tumour surgical excision followed by cryodestruction of the tumour mass was done, but recurrence of tumor noticed after three weeks.

Post operatively antibiotic therapy with amoxicillin - cloxacillin at the rate of 20 mg/ kg body weight thrice daily for seven days and metronidazole at the rate of 25mg/kg twice daily for seven days in six cases and with ciprofloxacin at the rate of 10mg/kg thrice daily for fifteen cases according to the culture and sensitivity test were found satisfactory in controlling the infection after scaling, exodontias and tumor excision.

From the present study the following conclusion could be arrived at

- Among the general population of dog, a considerable number of dogs had dental affection with or without the knowledge of the owner.
- Among the various dental affections, dental tartar was the commonest.
- The incidence of dental affections was more in dogs of age group five to eight years.
- German Shepherd Dog was the most commonly affected breed, among the screened lot of dogs.
- All the cases had halitosis as the common complaint.

- The incidence of dental affections was found high in those dogs fed with soft diet like homemade food and those offered with titbits and maintained without inclusion of bone in diet.
- Gingival sulcus depth measuring using periodontal marking probe was highly effective as a diagnostic tool and in assessing the progress of the disease condition.
- Culture and sensitivity test of the oral swab was effective in selecting the antibiotic therapy.
- Microbial culture indicated a high prevalence of Gram negative cocco- bacillary organisms followed by Gram positive cocci.
- The cases with gingivitis and ulceration of buccal mucosa could be effectively treated with medical management, with oral administration of antibiotics and oral application of antibiotic gels.
- The ultrasonic scaling along with systemic and local antibiotic therapy was found feasible in all cases for removing dental tartar, controlling the halitosis and to arrest the progression of periodontal diseases.
- Exodontia was effective in treating cases where the tooth was shaky and with furcation exposure and complete healing of gum was noticed in one week.
- Cases of epulis were refractory to course of vincrystine as well as surgical excision.

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EVALUATION AND MANAGEMENT OF DENTAL AFFECTIONS IN DOGS

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ABSTRACT

The prevalence of various dental diseases among dogs and its relation with age, breed, sex and food habits were studied in dogs presented to the Veterinary College Hospitals during a period from April 2008 to December 2008 and found that 102 were affected with dental and periodontal diseases.

Among of the 102 dogs affected, prevalence of dental affection noticed were dental tartar, epulis, oral ulcer and dental attrition in descending order. Incidence of dental affections was more in dogs in age group of five to eight years (45.09%), followed by one to four years (37.25%) and nine to twelve years (17.65%). The prevalence of dental disorders in different breeds were: German Shepherd Dog (26.47%), Spitz (20.59%), Dachshund(14.71%), Labrador Retriever (11.76%), Non-descript (8.82%), Doberman Pinscher (4.90%), Cocker Spaniel (3.92%), Rottweiler and Chinese Pug (1.96% each) and Boxer, Great Dane, Basset hound, Lhasa Apso and Miniature Pinscher (0.98% each). Females (51.96%) were found affected more than males (48.04%). Dental affections was found high in those dogs fed with soft diets like homemade food (71.1%), titbits (81.8%) and in those not fed bones (78.72%).

Out of 102 dogs with dental affections, 24 cases were randomly selected for detailed study. The dogs were belonged to various breeds like Spitz, Cocker Spaniel, Labrador Retriever, German Shepherd Dog, Non - descript, Doberman Pinscher, Dachshund, Boxer and Miniature pinscher of either sex (16 females and 8 males), with an average age of 5.79 ± 0.66 years. The clinical condition included dental tartar (79.17%), epulis (12.5 %) and Oral ulcer (8.33%).

The most predominant bacteria isolated by the culture of gingival sulcus swabs were Gram-negative cocco-bacillary organisms (71.43%) followed by Gram positive cocci (28.57%). The former were highly sensitive to ciprofloxacin, enrofloxacin, cefotaxime and the latter to amoxycillin, ampicillin and enrofloxacin.

Successful medical treatment was given for two cases with gingivitis and ulceration of buccal mucosa using an antibiotic, orally and intra oral application of metronidazole gel. Two cases of gingival tumour were treated with vincristine, but no response was noticed.

Surgical techniques included ultrasonic dental scaling, exodontia and surgical excision of tumour was performed under general anaesthesia. Dogs with severe gingivitis, halitosis and dental calculus were effectively treated with ultrasonic dental scaling followed by oral and local administration of antibiotics. Exodontia was performed in three cases in which the tooth was shaky and with furcation exposure. One case of gingival tumour case treated with surgical excision with cryodestruction, showed recurrence of tumor after three weeks.

APPENDIX

Annexure I

PERFORMA

Case No. Date:

1. Name & Address of owner Phone No:

2. Details of Animal:

Species	Breed	Sex	Age	Colour

3. Owners Complaint:

a. Halitosis: Yes No

b. Chewing disability; if any Yes No

c. Whether the owner aware of present dental disease: Yes No

4. Details of Diet :

a.Major diet Readymade food Homemade food Both

b.If homemade food Beef Chicken Fish Offals

c.The dog's preference for food: Non –veg. only Veg. only Both

d. Nature of consumption: Taken at a single time Finish in small quantities

e. No. of feeds/day:

f. Titbits, if any : Y N

If yes specify :

g. Feeding of bone : Y N

If yes, at what interval?

5. General condition:

6. Clinical data:

Respiration (/min.)	Pulse (/min.)	Temperature (^{0}C)

7. Condition of oral cavity:

a. Colour of gingival mucous membrane:

Pale roseate	Pale	Congested	Icteric

b. Nature of gum.

Normal	Ulcerated	Hypertrophied

c. Halitosis, if any:

d. Eruption status of teeth (in pups) & it's alignment:

e. Dental tartar: Present Absent

If present tooth affected

f. Shaky teeth, if any:

g. Caries: Present Absent

If present tooth affected:

h. Exposure of tooth roots:

i. Exposure of pulp cavity:

j. Presence of discharge from root canal:

k. Broken tooth:

l. Evenness of wearing: Even Uneven

m. Any other observation: