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Research Article

CLINICAL EFFECTS OF ENROFLOXACIN AND OFLOX-ORNIDAZOLE ON PERIODONTAL DISEASES IN DOGS

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ABSTRACT

A total of ten dogs suffering from periodontal disease were randomly divided in two equal groups (I, II). After recording initial history and general clinical examination, all the dogs were anaesthetized for complete mouth examination, dental radiography followed by dental scaling and polishing. In follow-up, tooth brushing and chlorhexidine mouth wash was recommended in both the groups. Additionally, enrofloxacin tablet (@ 5 mg/kg, p.o.) and combination of ofloxacin (@10 mg/Kg)-ornidazole (@ 25 mg/kg, p.o.) tablet was given in group I and II, respectively, twice a day for one week. Blood samples were collected before treatment, at 7th day, 14th day and 21st day after treatment for hematological and biochemical analysis. Dogs of group I showed significant improvement in clinical and hemato-biochemical parameters than group II. In conclusion, oral supplementation of enrofloxacin is recommended with dental scaling and polishing for dogs suffering from periodontal disease.

Keywords: Dental Radiography, Enrofloxacin, Ornidazole, Supragingival scaling, Periodontal disease

Periodontal disease (PD) is considered as one of the most common undertreated and underestimated condition in pet dogs. Occurrence of periodontal disease increases with age and by two years of age nearly 80% pet dogs are suspected to have been affected (Kortegaard *et al.*, 2008). Small toy breeds are reported to be more affected with periodontal disease (DeBowes, 2010). Periodontal disease is defined as an inflammatory condition of gingival and nearby tissues. It leads to tooth loss and causes serious systemic health problems related to liver, kidney and heart in pet dogs (Kim and Amar, 2006). Primary reason of periodontal disease is dental plaque. Other factors like soft diet, oral unhygienic condition, metabolic diseases and immunodeficiency leads to formation of dental plaque (Tatakis and Kumar, 2005). In treatment of periodontal disease, supragingival dental scaling and polishing is common practice by veterinary dentists in India with advice to follow up with an antibiotic, chlorhexidine mouthwash and tooth brushing. Pet owners are usually advised for adding fiber in diet, avoiding soft food and cleaning of mouth after each feeding. But till date, there are no specific scientific recommendations regarding prescription of specific antibiotic for periodontal diseases in Indian condition. So, a study was planned to compare the efficacy of enrofloxacin and ofloxacin-ornidazole treatment of periodontal disease in dogs.

MATERIALS AND METHODS

Ten dogs suffering from periodontal disease reported with the complaint of halitosis, loose teeth, bleeding gums and in some cases, in appetance, were randomly divided into two equal groups irrespective of age, breed and sex. On clinical examination, all the dogs were free from any preexisting systemic illness. All the dogs were fasted overnight and water was with held for two hours prior to anaesthesia. After pre medication with atropine sulphate @ 0.022 mg/kg intramuscular, a combination of Xylazine @ 1.0 mg/kg and Ketamine @ 5.0 mg/kg intramuscular was given for induction of anaesthesia. Dental radiography was performed in all the dogs using OraDect Pro® DDX 1500 Intra Oral RVG Sensor (Evolve Technologies & Services Pvt. Ltd., J-531, MIDC, Bhosari, Pune, Maharashtra, India) on the day of reporting (0th day) and 21st day after treatment.

The blood samples were collected from cephalic or recurrent tarsal vein on day 0 (before anesthesia), 7th day, 14th day and 21st day after dental scaling into EDTA and heparinized vials for haematological and biochemical analysis, respectively. Hemoglobin (Hb g/dL), Total Leukocyte Count (TLC thousand cells/µl), Packed Cell Volume (PCV %), Platelet count (Platelet/mm^3), Mean Corpuscular Hemoglobin (MCH pg) and Mean Corpuscular Hemoglobin Concentration (MCHC %) were done using haematological automatic analyzer MS4® (Melet Schloesing Laboratoires - 9 Chaussee Jules Cesar-Evalic 402-95520 OSNY, France.). However, the sera separated from heparinized vials were used for biochemical analysis using Erba 200® (Transasia, Mumbai, India) automatic chemistry analyzer.

Ultrasonic dental scaler (Khera Instruments Private Limited, Delhi, India) was used for rapid removal of plaque and calculus from the tooth surface. The process of scaling took almost 5 seconds on each affected tooth. Dental scaling was followed by polishing using dental polisher (Khera Instruments Private Limited, Delhi, India). Polishing took almost 15 seconds on each affected

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tooth. Oral lavaging was done with chlorhexidine gluconate.

Tablet enrofloxacin was prescribed @ 5 mg/kg body weight, twice daily, for 7 days, for the dogs of group I. While dogs of group II were prescribed tablet Ofloxacin-Ornidazole (@ 10 mg/kg body weight as ofloxacin and @ 25 mg/kg body weight as ornidazole) twice daily for 7 days. In both the groups, pets' teeth were brushed at the frequency of thrice weekly followed by chlorhexidine mouthwash. Data obtained were analyzed using two way analysis of variance (ANOVA) and Duncan multiple range test (DMRT).

RESULTS AND DISCUSSION

The mean age of animals reported was 7 years 9 months; with 10 years, and 5 years 6 months in group I and II, respectively. This indicates that older dogs were more commonly affected with periodontal disease. Kortegaard *et al.* (2008) have also demonstrated a positive correlation between age, prevalence and severity of periodontal disease. The highest number of periodontal disease affected dogs were Mongrel (40%), followed by Spitz (20%), Labrador Retriever (20%), Pug (10%) and Rottweiler (10%). Mongrels form the highest population among the reported breeds for different conditions, however, even being lesser representation in population of toy breeds like spitz and pug, 30% of cases from these small breeds suggest their predisposition for PD. Out of 10 dogs, 6 affected were male dogs while rests 4 were females. No correlation between sex predisposition and periodontal disease has been reported. Sisodiya (2005) also reported a greater prevalence of periodontal disease in male dogs (58.82%) than females (41.18%). This may be due to the preference of local population for rearing male dogs than female dogs. Five dogs of group I and four dogs of group II, had halitosis and deposition of bilateral calculus. On clinical examination, 40% dogs came with broken/abraded incisors, especially mandibular incisors. Canine tooth (in 80% dogs) alongwith 3rd and 4th premolar teeth (in 95% dogs) were most commonly affected in all the animals (Table1).

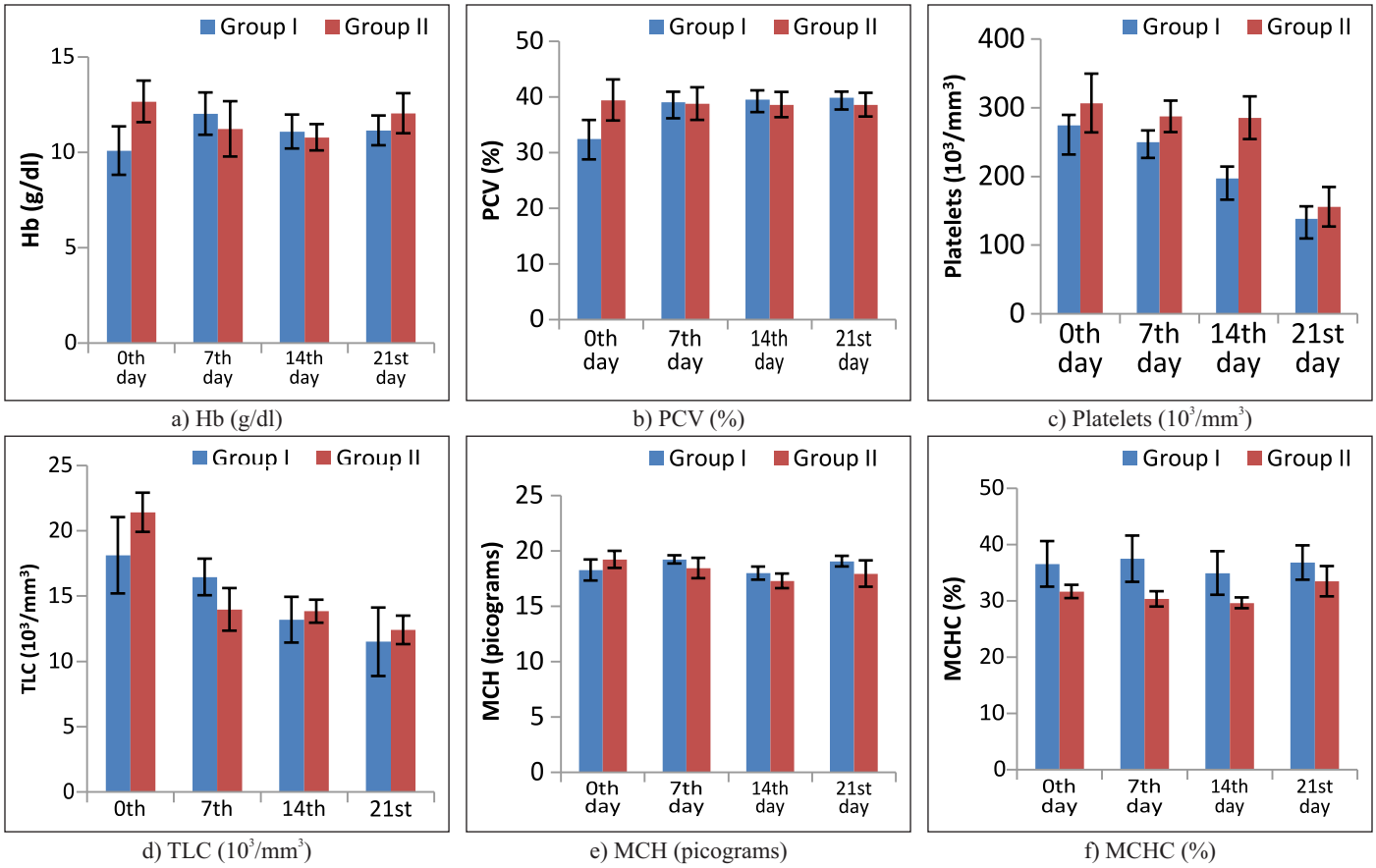
All the animals were apparently healthy, but blood parameters like Hb and PCV near lower side of normal range revealed that periodontal disease has negative impact on the animal's haemogram as these were more prone for anaemia (Fig. 1). The pre-treatment PCV and Hb improved non-significantly with treatment in both groups but improvement was more in group I dogs compared to group II. Santosh *et al.* (2016) also reported improvement in Hb and PCV of dogs with periodontal disease after treatment. The platelets count in both group decreased significantly ($p<0.05$) from day 0th to 21st day. The decrease in platelet count at day 14th was significantly more in group

Table 1

Clinical signs and affected teeth of dogs

Group	Animal	Maxillary teeth*	Mandibular teeth*	Halitosis	Radiographic findings
Group I	E1	C + All PM	C + All PM	Yes	Alveolar bone loss, Combination of horizontal and vertical bone loss, Root fracture.
	E2	All teeth affected	All teeth affected	Yes	Alveolar bone loss, Furcation, Combination of horizontal and vertical bone loss, Loss of lamina dura.
	E3	All teeth affected	All teeth affected	Yes	Alveolar bone loss, Horizontal bone loss, Loss of lamina dura.
	E4	All I + C + All PM + 1 M	C + All PM + 1 M	Yes	Furcation, Combination of horizontal and vertical bone loss, Root resorption, Loss of lamina dura.
	E5	C + 3,4 PM	C	Yes	Furcation, Horizontal bone loss, Combination of horizontal and vertical bone loss, Root fracture.
Group II	O1	All I + C + 4 PM	All I + 3,4 PM	No	Alveolar bone loss, Furcation, Root resorption, loss of lamina dura.
	O2	4 PM + 1 M	3,4 PM	Yes	Alveolar bone loss, Combination of horizontal and vertical bone loss, Right mandibular canine tooth missing.
	O3	C + 3,4 PM	2,3,4 PM	Yes	Alveolar bone loss, Vertical bone loss.
	O4	All I + C + All PM + 1 M	All I + C + 3,4 PM	Yes	Alveolar bone loss, Combination of horizontal and vertical bone loss, Root resorption.
	O5	All I + C + All PM + 1 M	All I + C + 3,4 PM	Yes	Furcation, Horizontal bone loss.

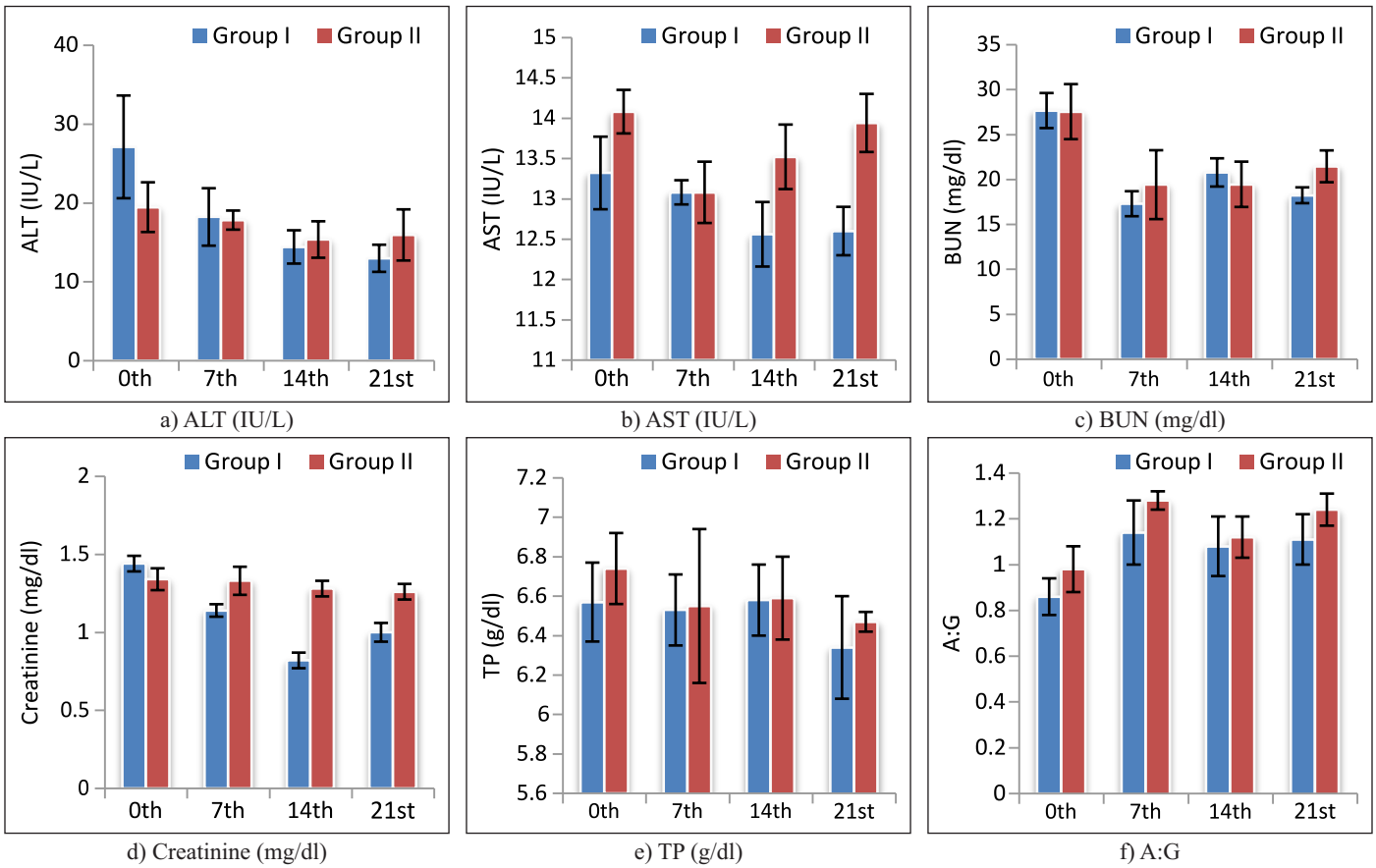
*(I-incisor; C-canine; PM-pre-molar; M-molar)



a) Hb (g/dl) b) PCV (%) c) Platelets (10^3/mm^3)

d) TLC (10^3/mm^3) e) MCH (picograms) f) MCHC (%)

Fig. 1. Effect of different treatments on Hb, PCV, Platelets, TLC, MCH and MCHC level in dogs suffering with periodontal disease (Mean ± SE)



a) ALT (IU/L) b) AST (IU/L) c) BUN (mg/dl)

d) Creatinine (mg/dl) e) TP (g/dl) f) A:G

Fig. 2. Effect of different treatments on ALT, AST, BUN, Creatinine, TP and A; G level in dogs suffering with periodontal disease (Mean ± SE)

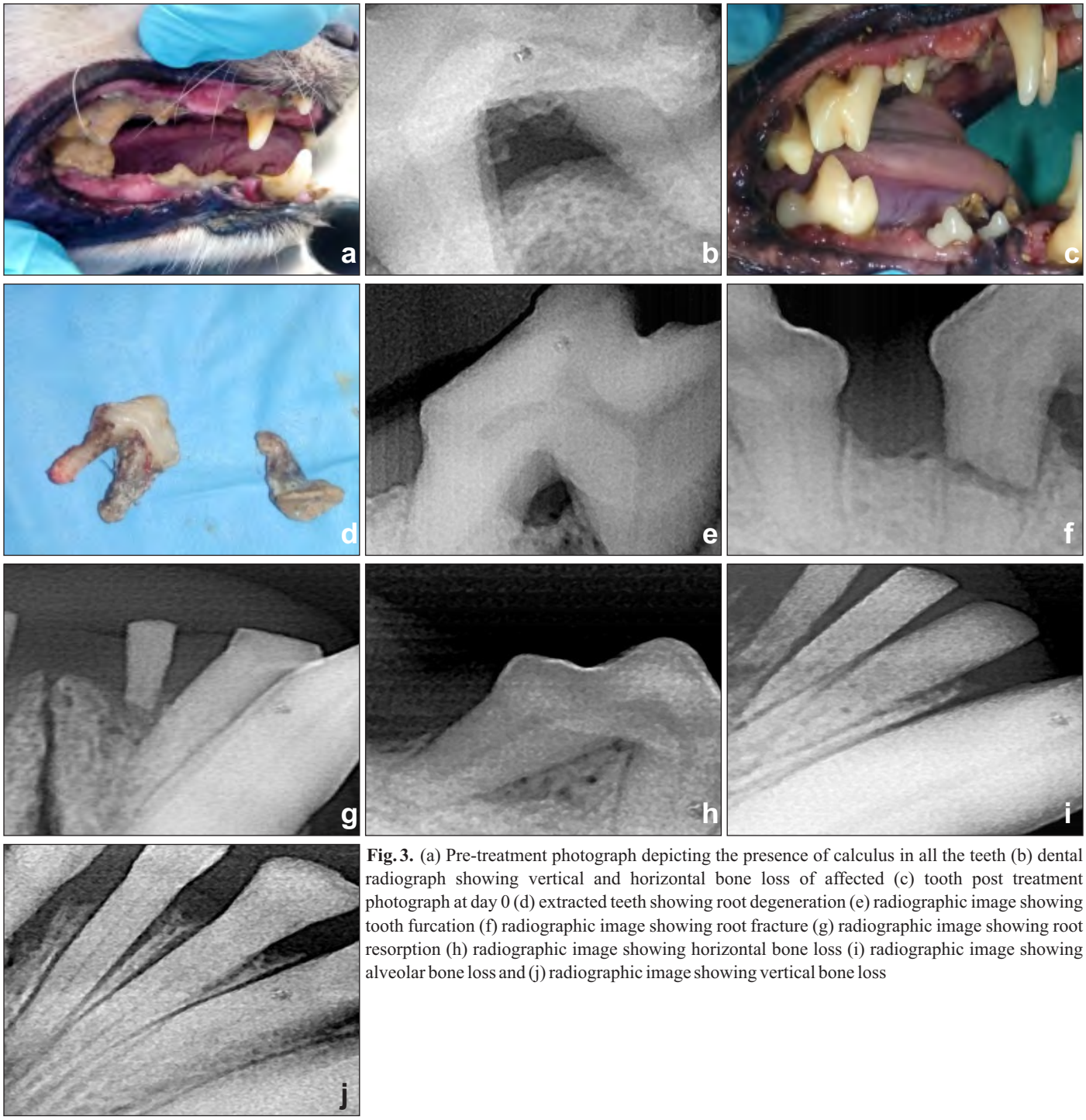


Fig. 3. (a) Pre-treatment photograph depicting the presence of calculus in all the teeth (b) dental radiograph showing vertical and horizontal bone loss of affected (c) tooth post treatment photograph at day 0 (d) extracted teeth showing root degeneration (e) radiographic image showing tooth furcation (f) radiographic image showing root fracture (g) radiographic image showing root resorption (h) radiographic image showing horizontal bone loss (i) radiographic image showing alveolar bone loss and (j) radiographic image showing vertical bone loss

I than group II. Periodontal disease has been associated with elevated numbers of platelets, as these are essential participants in both thrombotic and inflammatory reactions across the vasculature (Weyrich *et al.*, 2004) and after therapy of PD, platelet numbers decrease (Christan *et al.*, 2002). Papapanagiotou *et al.* (2009) also reported increased platelet activation in periodontitis patients and its severity was positively associated with the elevated levels of sP-selectin. There were no significant variations in the values of MCH and MCHC within and between the groups (Gokhale *et al.*, 2010). The TLC (total leucocytes count) decreased in both the groups but it was more in group I than group II. Kalsi *et al.* (2017) also reported a decrease in total average of TLC for 60 patients which was 6455/mm^3 at baseline visit to 415/mm^3 three weeks after scaling.

The level of serum ALT (Alanine aminotransferase), and BUN (Blood urea nitrogen) were in higher side of normal range before treatment which decreased significantly in both the groups after one week of dental

scaling but the decreases in ALT and BUN were more in group I than group II (Fig 2). Santosh *et al.* (2016) also reported a high mean ALT among the periodontal disease affected dogs (43.81+ 5.39 IU/L). There was no significant difference in AST (Aspartate aminotransferase) level before and after the treatment in both the groups. Bedi *et al.* (2011) also reported a similar finding. The BUN concentration after treatment indicates a decrease in catabolic activity on proteins due to less production of microbial toxin and decrease in self-generated immune reactions in response to periodontal disease after treatment. The serum creatinine decreased non-significantly from pretreatment level, though in the normal range suggested normal renal function in all the dogs. Santosh *et al.* (2016) also reported that BUN among the periodontal disease dogs ranged from 5 mg/dl to 35mg/dl with a mean of 15.27 + 0.70 mg/dl.

It has been widely accepted that radiographs play an important role in the diagnosis of periodontal disease (Tugnait and Carmichael, 2005). In present study, out of 10 animals, 7 had alveolar bone loss, 5 had tooth furcation, 3 had horizontal bone loss, 1 has vertical bone loss and 6 had combination of both horizontal and vertical bone loss. Additionally, some dogs had tooth fracture, root resorption, loss of lamina dura and missing tooth (Fig. 3).

Non-surgical periodontal therapy (Fig. 3c) helped to decrease the number of microbes and thereby reduced the inflammation of oral tissue. The change in haematological and biochemical parameters after therapy indicated decreased inflammatory and thrombogenic activity in both the groups but it was more in group I than group II dogs. The clinical outcomes of therapy were also better in group I than group II on the basis of gross examination, as well as radiography. Hence, oral administration of enrofloxacin was more effective than ofloxacin-ornidazole in dogs with periodontal disease after dental scaling and polishing along with tooth brushing and chlorhexidine lavage.

REFERENCES

Bedi, H., Chandrashekar, K.T. and Prakash, H. (2011). Effect of neem extract on periodontal status & AST levels in chronic periodontitis: A clinical & biochemical study. *J. Pierre. Fauchard. Acad.* **25**: 55-61.

Christan, C., Dietrich, T., Hagewald, S., Kage, A. and Bernimoulin, J.P. (2002). White blood cell count in generalized aggressive periodontitis after nonsurgical therapy. *J. Clin. Periodontol.* **29**: 201–206.

DeBowes, L.J. (2010). Problems with gingiva. In: Small Animal Dental, Oral and Maxillofacial Disease. Niemiec, B.A. (Edt). Manson publishing/veterinary press, London. pp. 160–176.

Gokhale, S.R., Sumanth, S. and Padhye, A.M. (2010). Evaluation of blood parameters in patients with chronic periodontitis for signs of anemia. *J. Periodontol.* **81(8)**: 1202-1206.

Kalsi, D.S., Sood, A., Mundi, S. and Sharma, V. (2017). Effect of scaling and root planing on blood counts in patients with chronic generalized periodontitis. *Indian J. Dent. Sci.* **9**: 109-113.

Kim, J. and Amar, S. (2006). Periodontal disease and systemic conditions: a bidirectional relationship. *Odontology.* **94(1)**: 10-21.

Kortegaard, H.E., Eriksen, T. and Bælum, V. (2008). Periodontal disease in research Beagle dogs–an epidemiological study. *J. Small. Anim. Pract.* **49(12)**: 610-616.

Papapanagiotou, D., Nicu, E.A., Bizzarro, S., Gerdes, V.E., Meijers, J.C., Nieuwland, R., van der Velden, U. and Loos, B.G. (2009). Periodontitis is associated with platelet activation. *Atherosclerosis.* **202(2)**: 605-611.

Santosh, P.S., Yathiraj, S., Ramesh, P.T., Upendra, H.A., Ansar, K.C., Rathnamma, D. and Suguna, R. (2016). Hematological and biochemical changes associated with periodontal disease in dogs. *World J. Pharm. Res.* **5**: 1857-1861.

Sisodiya, J.H. (2005). Use of ultrasonic dental scaler for prevention and treatment of periodontal disease in dogs (canis domestica). M.V.Sc. thesis submitted to the Anand Agricultural University, Anand, Gujarat, India.

Tatakis, D.N. and Kumar, P.S. (2005). Etiology and pathogenesis of periodontal diseases. *Dental Clinics.* **49(3)**: 491-516.

Tugnait, A. and Carmichael, F.(2005). Use of radiographs in the diagnosis of periodontal disease. *Dental Update*. **32(9)**: 536-542.

Weyrich, A.S., Lindemann, S., Tolley, N.D., Kraiss, L.W., Dixon, D.A., Mahoney, T.M., Prescott, S.P., McIntyre, T.M. and Zimmerman, G.A. (2004). Change in protein phenotype without a nucleus: translational control in platelets. Seminars in Thrombosis and Hemostasis. **30**: 491–498.