

Localized Necrotic Ulceration Gingivitis, in Orthodontic Patient, Treated with Non- Surgical Periodontal Therapy and with Probiotics (L. Reuteri)

Giovanna Mosaico¹, Antonia Sinesi², Matteo Fanuli³,
Micol Casalino⁴, Giovanni Mautarelli⁵, Cinzia Casu⁶

¹RDH, Freelancer, Brindisi, Italy; ²RDH, Freelancer, Canosa di Puglia, Italy; ³RDH, Department of Biomedical, Surgical and Dental Sciences, University of Milan, Italy; ⁴RDH, Freelancer, Genova, Italy; ⁵DDS, Private Practice, Brindisi, Italy; ⁶DDS, Private Dental Practice, Cagliari, Italy

ABSTRACT

Acute Necrotic Ulcerative Gingivitis constitute a group of aggressive semi-reversible periodontal disease usually linked to deep microbiome alterations (*Treponema sp.*, *B. melanogenicus ssp. intermedius* and the *Fusobacterium sp*) and difficult plaque removal. Patients undergoing in fixed orthodontic treatment could have higher risk in periodontal/gum disease development. Therapy for resilient and resistant ANUG is usually represented by pocket debridement and additional systemic therapies (often Metronidazole). In recent years patients resistance to antimicrobial therapies has strongly increased, so probiotic represent a new incoming approach in non surgical periodontal diseases treatment. The aim of this work is to report a case of orthodontic patient with refractory ANUG successfully treated with topical probiotic L. Reuteri. A 16-year-old female with a necrotic ulceration gingivitis reported to our private practice. The patient was submitted to local antiseptics and periodontal debridement for several months without improvement. We had decided to associate a treatment with topical probiotics *Lactobacillus reuteri* DSM 17938 and *Lactobacillus reuteri* ATCC PTA 5289 to the non-surgical periodontal therapy. The solution of probiotic was injected into the pockets until the spill, for 3-5 minutes and at the end the patient did not rinse the mouth and was advised not to eat and drink for about an hour. The use of topical probiotics in the treatment of gingivitis and ANUG could be considered a valid alternative to conventional treatments for refractory cases in orthodontic patients. Further studies, especially randomized clinical trials, must be performed to confirm this starting result. (*Int J Biomed Sci* 2018; 14 (1): 41-47)

Keywords: Local probiotics; localized necrotic ulceration gingivitis; non- surgical periodontal therapy; *Lactobacillus Reuteri*

BACKGROUND

Preventive dentistry has lead to new important achievements in last decades, involving caries control, reduction in traumatic intervention and teeth extractions.

Despite these important results, periodontal and gum disease are far to be effectively reduced and prevalence rises every year with bad future predictability. According

Corresponding author: Cinzia Casu, DDS, Private Dental Practice, Cagliari, Italy. E-mail: ginzia.85@hotmail.it.

Received July 31, 2018; **Accepted** September 5, 2018

Copyright: © 2018 Giovanna Mosaico et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/2.5/>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

to these significant findings, in recent years aesthetic and functional request increases quickly and strongly connect with minimum invasive therapies and fast results (1).

Orthodontic is set in this way due to its incredible adaptability, wide age range adaptation and faster results-gaining techniques. As orthodontic treatments are widely found to be effective, careful preventive guidelines need to be provide to dental clinicians and patients. Periodontal and gum diseases, represent a widespread alteration during orthodontic fixed treatment due to patients difficult manual debridement and deplaquing ability. Acute Necrotic Ulcerative Gingivitis constitute a group of aggressive semi-reversible periodontal disease usually linked to deep microbiome alterations and difficult plaque removal (2). ANUG develop a particular and specific microbiological pattern, according to many authors from 1897 nowadays.

Plaut and Vincent were among the first in 1894 and 1899 to describe ANUG biological aspect and to determine that this pathological condition often has specific bacterial etiology. Loesche *et al.* in 1981 discover a specific linkage between -NUG conditions and specific microflora. A constant flora appears to be pathognomonic in NUG and major representative species include the various *Treponema sp.*, *B. melaninogenicus ssp. intermedius* and the *Fusobacterium sp* (3).

Analysis of dental plaque samples by fluorescent in situ hybridization (FISH) was conducted later, in 2012 by Baumgartner *et al.* Authors postulates a possible role of *Synergistetes ssp.*, a novel gram- bacterial phylum which is postulated to be involved in many inflammatory and cronical infective disease (4). Findings demonstrates that association between the presence of *Spirochaetes* and *Synergistetes* bacteria in NUG. Possible synergic relationship could involve *Porphyromonas gingivalis* and *Actinomyces gerencseriae* (5).

Stevens *et al* in 1984 were among the first to describe and analyze prevalence and incidence in American population sample (1) and evaluated that 58% of the patients with ANUG were under 25 years of age as compared to 31 % under 25 in the general clinic population. Globally, 76% of the ANUG group had a high school education or less with 67 % having less than \$5,000 annual income. ANUG showed higher prevalence in lower income population and younger people.

Patients undergoing in fixed orthodontic treatment could have higher risk in periodontal/gum disease development.

Gupta *et al.* in 2017 reported a consistent higher prevalence

of periodontal disease among 500 patient underwent on orthodontic treatment versus non treated patients, showing a 18.1% score in test group (1).

ANUG usually show peculiar pathogenic characteristics.

It has an acute clinical presentation with the distinctive characteristics of rapid onset of interdental gingival necrosis, gingival pain, bleeding, and halitosis. Systemic symptoms such as lymphadenopathy and general sickness could be also found (1). There are various predisposing factors such as stress, nutritional deficiencies, and immune system dysfunctions (HIV, transplant therapy, immunosuppression) (1).

Dufty *et al.* in 2016 reported a substantial higher prevalence in stressed military population. A prevalence rate for NUG of 0.11 % was determined and patient underwent on causal therapy for gingival disease treatment (1).

The diagnosis of NUG must be made fundamentally according to the presence of primary clinical symptoms; the gingival necrosis was often described as removable and erythematous/erosive bleeding area.

Therapy for resilient and resistant ANUG is usually represented by causal therapy and chemical antimicrobial additional systemic therapies (often Metronidazole combined therapy). Plaque home control represent a fundamental aspect of treatment phase that could possibly be associated with surgical topography correction interventions (1, 2, 6-9). In recent years patients resistance to antimicrobial therapies has strongly increased due to a systematic and non-targeted extensive and massive use (10, 11). By that, new substitutive therapies need to be found and adequately tested. Probiotic represent a new incoming approach in periodontal diseases treatment even in non surgical protocols (12).

The aim of this work is to report a case of orthodontic patient with refractory ANUG successfully treated with topical probiotic *L. Reuteri*.

CASE PRESENTATION

A 16-year-old female reported to our private practice. Anamnesis was positive for celiac disease, and the patient observes a gluten-free diet, but does not eat fruit and vegetables. She was in orthodontic treatment and she developed a particular gingivitis and reported strong gingival pain, spontaneous gingival bleeding and persistent halitosis. The onset of gingivitis occurred after a few months from the beginning of orthodontic treatment. No radiographic lesions were appreciable. A clinical diagnosis of necrotic

ulceration gingivitis was performed (Fig. 1 and Fig. 2). The patient was submitted to local antiseptics, without improvement, so the dentist has prescribed antibiotic therapy but the patient has never performed this therapy. We therefore had tried to treat this condition with periodontal debridement every 3 months, for several months but we had not a total remission and episodes of exacerbation were present. This fact confirms even more the diagnostic hypothesis that it is not a classical gingivitis. We had decided to associate a treatment with topical probiotics *Lactobacillus reuteri* DSM 17938 and *Lactobacillus reuteri* ATCC PTA 5289 to the non-surgical periodontal therapy. The treatment was performed in 4 appointments. In the first session, recording of periodontal clinical parameters, debridement and topical application of probiotics in suspension were made. Systemic probiotics of *Lactobacillus Reuteri* taken at home 2 times a day was prescribed. The probiotic used was a 5 ml suspension in drops; after having aspirated the solution from the bottle, about 1 ml with the sterile syringe, the needle was changed with another not pointer of 0.5 × 30 mm. The solution was injected into the pockets until the spill, for 3-5 minutes and at the end the patient did not rinse the mouth and was advised not to eat and drink for about an hour.

The probiotic tablet has to be dissolved slowly in the mouth after oral hygiene for four weeks of treatment.

In the second session, photos (Fig. 3 and Fig. 4), topical application of suspended probiotics and hygiene motivation was performed. At this appointment the patient presented plaque, but despite this, improvement was visible with reduction of the bleeding.

In the third and fourth session, the patient was submitted to another topical application in suspension of probiotics, and photos were taken (Fig. 5 and Fig. 6).

At 6 weeks the patient healed and orthodontic appliance was removed (Fig. 7 and Fig. 8). At 4 months a follow up visit was performed (Fig. 9 and Fig. 10). The clinical parameters before and after probiotic therapy confirm the result (Fig. 11 and Fig. 12).

DISCUSSION

During orthodontic treatment, patients often have gum problems. In a study of patients in the age group between 10 and 30 years, it was seen that gingivitis was presented regardless of age in 62% in males, in 37% in females. But at a more careful analysis the majority of incidence (48%) occurred in the age group ranging from 10 to 19 years (13).

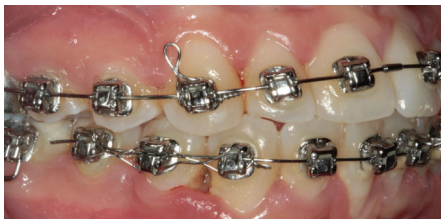


Figure 1.

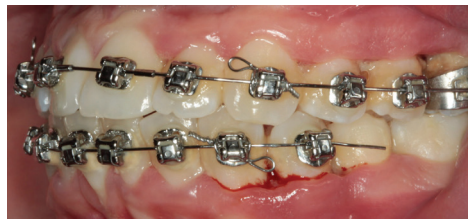


Figure 2.

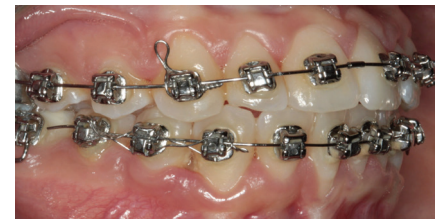


Figure 3.



Figure 4.



Figure 5.



Figure 6.



Figure 7.



Figure 8.



Figure 9.



Figure 10.

LOCAL PROBIOTICS FOR ANUG

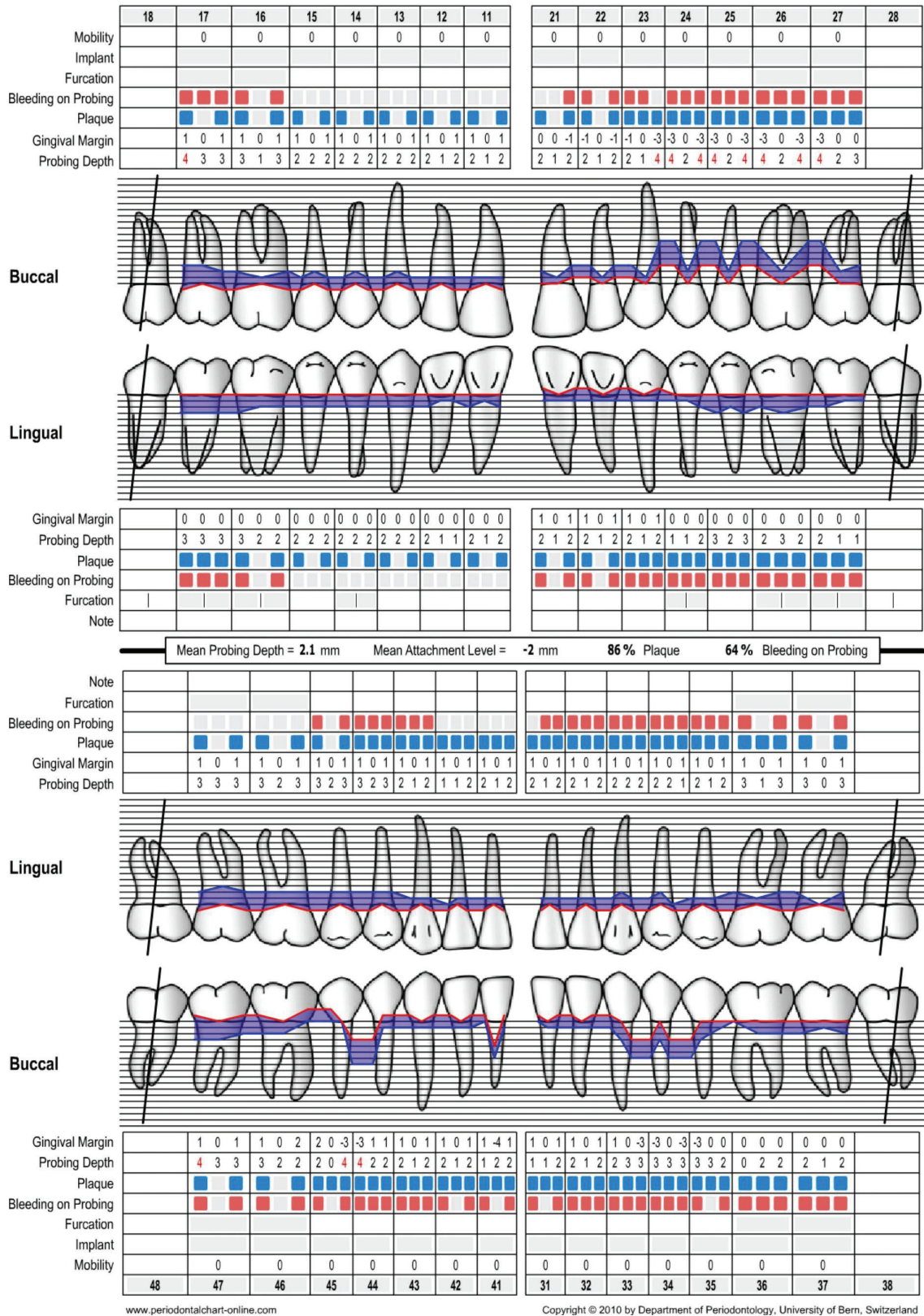
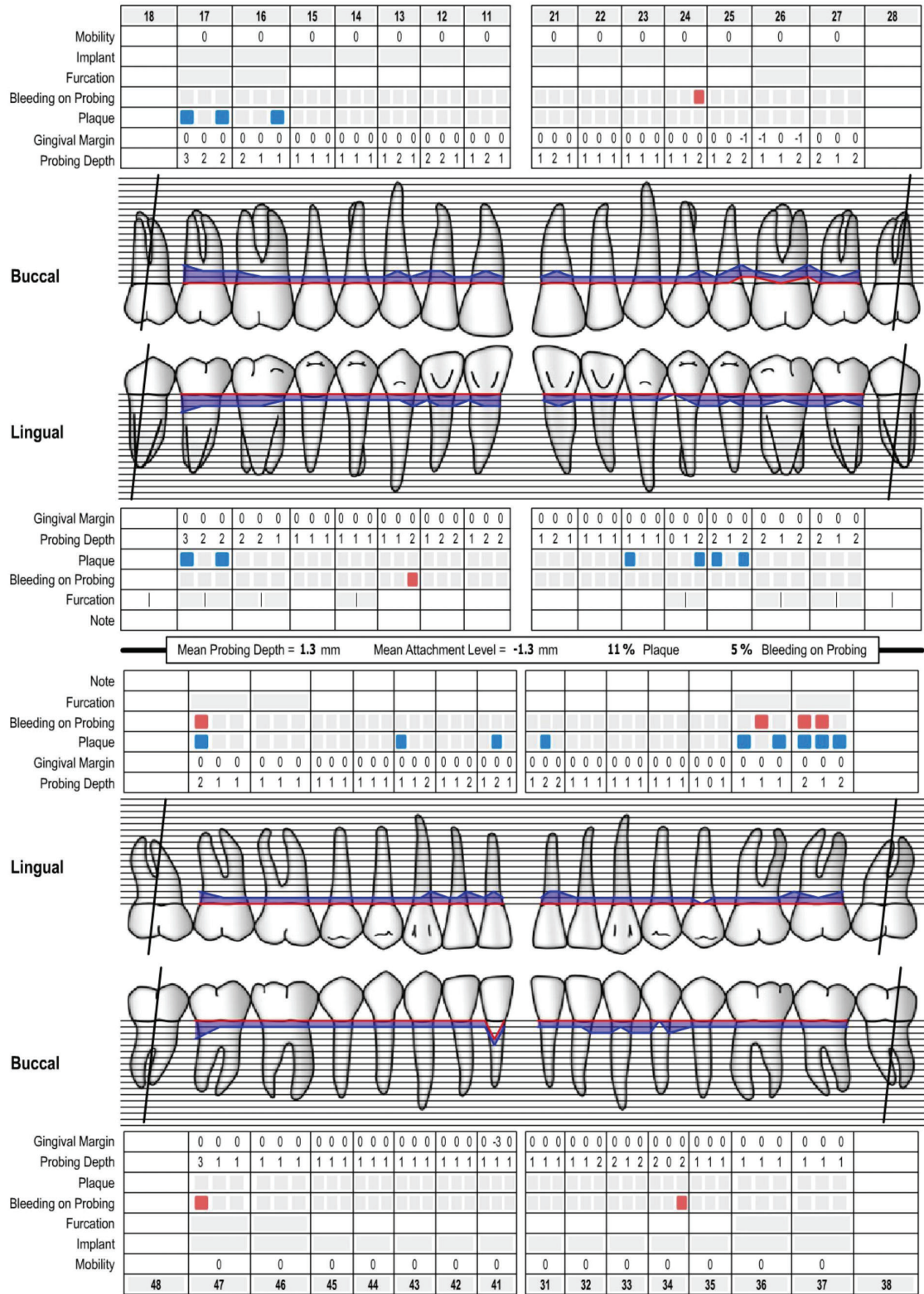


Figure 11.

LOCAL PROBIOTICS FOR ANUG



www.periodontalchart-online.com

Copyright © 2010 by Department of Periodontology, University of Bern, Switzerland

Figure 12.

This may also be due to a lack of compliance by adolescents on hygiene maneuvers during orthodontic treatment, for this reason is important to find others non invasive treatments, such as the probiotics.

Food and Agriculture Organization and the World Health Organization defined probiotics in 2001 as “live microorganisms which when administered in adequate amounts confer health benefits on the host.” In 1994, World Health Organization deemed probiotics to be the next most important immune defense system when commonly prescribed antibiotics are rendered as useless by antibiotic resistance. These incidences of antibiotic resistance opened the door for a new concept of probiotics in medicine and dentistry. (12,14) In dentistry, studies with *Lactobacillus Rhamnosus* GG, and *Lactobacillus Reuteri* have defined their potential role in interacting with *Streptococcus Mutans* by reducing the number of this caries pathogen, thus suggesting a role of probiotics in caries prophylaxis. Similarly, researchers found that probiotic administration reduced oral *Candida* counts in the elderly finding that might offer a new strategy for controlling oral yeast infections. Yet, there is a lack of information regarding the contributions of probiotics in oral health (15, 16). In various researches, it has been suggested that probiotic bacteria could also be beneficial to oral health. Species of *Lactobacillus* and *Bifidobacteria* inhibit the growth of streptococci and *Candida* species. (17). The mechanism of action of probiotic by which they exert their effects may involve from modifying pH, antagonizing pathogens through production of antimicrobial compounds, competing for pathogen binding and receptor sites, stimulating immune modulatory cells to production of lactase. It is also showed that they have the influence to the immune system through several molecular mechanisms. A 14-day intake of *L. Reuteri* led to significant reduction of gingivitis and plaque in patients with moderate to severe gingivitis (17). This mechanisms of action of *L. Reuteri* could be explained via three possible mechanisms. They are: First, *L. Reuteri* secretes bacteriocins, reuterin, and reutericyclin that inhibit the growth of a wide variety of pathogens; second, *L. reuteri* has a strong capacity to adhere to the host tissues, and thus competing with pathogenic bacteria; and third, the anti-inflammatory effects of

L. reuteri and its property to inhibit the secretion of cytokines could be the reason of this bacterium to have beneficial effects on people with periodontal disease (18). The existence of probiotics in the indigenous oral microflora of humans warrants exploration because these bacteria offer the advantage of being perfectly adapted to the human oral

ecosystem (18). In the literature very few works are present for the use in orthodontic patients in the treatment of gingivitis and caries (19, 20). The most common antibiotic therapy for ANUG is Metronidazole (1, 4-9), but adverse events are documented connected with its use. A case report in which metronidazole have caused ototoxicity was reported (21). Other adverse effects of this drugs could be, loss of sight, vertigo, ataxia, and headache (22). No collateral events are documented for the use of Probiotics.

CONCLUSION

The use of topical probiotics in the treatment of gingivitis and ANUG could be considered a valid alternative to conventional treatments for refractory cases in patients in orthodontic therapy, for their effectiveness and safety. Further studies, especially randomized clinical trials, must be performed to confirm this starting result.

CONFLICT OF INTEREST

The authors declared no conflict of interest.

REFERENCES

1. Marty M, Palmieri J, Noirrit-Esclassan E, Vaysse F, *et al.* Necrotizing Periodontal Diseases in Children: A Literature Review and Adjustment of Treatment. *J. Trop. Pediatr.* 2016; 62 (4): 331-337.
2. Stevens AW, Cogen RB, Cohen-Cole S, Freeman A. Demographic and clinical data associated with acute necrotizing ulcerative gingivitis in a dental school population (ANUG-demographic and clinical data). *J. Clin. Periodontol.* 1984; 11 (8): 487-493.
3. Loesche WJ, Syed SA, Laughon BE, Stoll J. The Bacteriology of Acute Necrotizing Ulcerative Gingivitis. *J. Periodontol.* 1982; 53 (4): 223-230.
4. Godon JJ, Moriniere J, Moletta M, Gaillac M, *et al.* Rarity associated with specific ecological niches in the bacterial world: the ‘Synergistes’ example. *Environ. Microbiol.* 2005 Feb; 7 (2): 213-224.
5. Baumgartner A, Thurnheer T, Helga Luethi-Schaller H, Gmur R, *et al.* The phylum Synergistetes in gingivitis and necrotizing ulcerative gingivitis. *J. Med. Microbiol.* 2012 Nov; 61 (Pt 11): 1600-1609.
6. Gupta A, Singh K. Assessment of Oral Health Problems in Patients Receiving Orthodontic Treatment. *Dentistry.* 2015; 5: 280.
7. Malek R, Gharibi A, Khlil N, Kissa J. Necrotizing Ulcerative Gingivitis. *Contemp. Clin. Dent.* 2017; 8 (3): 496-500.
8. Kato H, Imamura A. Unexpected Acute Necrotizing Ulcerative Gingivitis in a Well- controlled HIV-infected Case. *Intern. Med.* 2017; 56 (16): 2223-2227.
9. Dufty J, Gkraniias N, Petrie A, McCormick R, *et al.* Prevalence and treatment of necrotizing ulcerative gingivitis (NUG) in the British Armed Forces: a case-control study. *Clin. Oral. Investig.* 2017 Jul; 21 (6): 1935-1944.
10. Kouidhi B, Al Qurashi YM, Chaieb K. Drug resistance of bacterial dental biofilm and the potential use of natural compounds as alternative for prevention and treatment. *Microb. Pathog.* 2015 Mar; 80:

- 39-49.
11. Oberoi SS, Dhingra C, Sharma G, Sardana D. Antibiotics in dental practice: how justified are we. *Int. Dent. J.* 2015 Feb; 65 (1): 4-10.
 12. Allaker RP, Stephen AS. Use of Probiotics and Oral Health. *Curr. Oral Health Rep.* 2017; 4 (4): 309-318.
 13. Eid HA, Assiri HA, Kandyala R, Togo RA, Turakya Vs. Gingival enlargement in different age groups during fixed Orthodontic treatment. *J. Int. Oral Health.* 2014; 6 (1): 1-4.
 14. Boden EK, Snapper SB. Regulatory T cells in inflammatory bowel disease. *Curr. Opin. Gastroenterol.* 2008; 24: 733-741.
 15. Kraft-Bodi E, Jorgensen MR, Keller MK. Effect of probiotic bacteria on oral Candida in frail elderly. *J. Dent. Res.* 2015; 94: 181-186.
 16. Meurman JH. Probiotics: Do they have a role in oral medicine and dentistry? *Eur. J. Oral Sci.* 2005; 113: 188-196.
 17. Krasse P, Carlsson B, Dahl C, Paulsson A, *et al.* Decreased gum bleeding and reduced gingivitis by the probiotic *Lactobacillus reuteri*. *Swed Dent. J.* 2006; 30: 55-60.
 18. Alok A, Singh ID, Singh S, Kishore M, *et al.* Probiotics: A New Era of Biotherapy. *Adv. Biomed Res.* 2017 Mar 7; 6: 31.
 19. Koroushi M, Kachuie M. Prevention and Treatment of White Spot Lesions in Orthodontic Patients. *Contemp. Clin. Dent.* 2017 Jan-Mar; 8 (1): 11-19.
 20. Ritthagol W, Saetang C, Teanpaisan R. Effect of Probiotics Containing *Lactobacillus paracasei* SD1 on Salivary Mutans Streptococci and Lactobacilli in Orthodontic Cleft Patients: A Double-Blinded, Randomized, Placebo-Controlled Study. *Cleft Palate Craniofac J.* 2014 May; 51 (3): 257-263.
 21. O'Donnel KL, Barker D. Metronidazole and tinnitus: A potential side effect? *Br. Dent. J.* 2016 Mar 25; 220 (6): 289-291.
 22. Kafader I, Moustafa F, Yalcin K, Klc BA. A rare adverse effect of metronidazole: nervous system symptoms. *Pediatr. Emerg Car.* 2013 Jun; 29 (6): 751-752.