

Antibiotics in Periodontal Therapy: To Use or Not To Use?

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Mini Review

Volume 3 Issue 4

Received Date: November 01, 2018

Published Date: November 12, 2018

DOI: 10.23880/oajds-16000206

Abstract

Periodontal disease is a group of multifactorial and multimicrobial conditions that if left untreated will lead to deterioration of periodontal health and tooth loss. Classical way to treat periodontal disease usually starts with oral hygiene instruction and mechanical debridement, which could be followed by surgical intervention in severe cases. Prescription of antibiotics in combination with periodontal treatment is a routine practice nowadays especially in treating aggressive periodontitis or acute periodontal conditions. Growing knowledge about the undesirable side effects, bacterial resistant and the potential of antibiotics to compromise beneficial oral flora, in addition to accumulating evidence that suspect their actual role as integral method to support periodontal treatment. This necessities the search for safer more biologically compatible approach to support conventional periodontal treatment.

Keywords: Periodontal disease; Photodynamic therapy

Abbreviations: WHO: World Health Organization; SRP: Scaling and Root Planing; PDT: Photodynamic Therapy.

Introduction

Discovery of antibiotics at early 20th century was a great breakthrough in treatment of bacterial infections previously considered fatal conditions [1]. Scientific community, during 1960s, was optimistic to a degree that researchers at that era predicted that human body would be pathogenic bacteria-free towards the end of 20th century [2]. Unfortunately, drawbacks of antibiotics started to emerge due to extensive use of these drugs use either directly as medical prescriptions or indirectly in our food from cattle and poultry vaccination. With time, bacteria managed gradually to evade the effect of

antibiotics by developing resistance against these drugs [1]. Furthermore, drug-resistant mechanism in bacteria evolved to a terrifying degree that certain species nowadays cannot be treated even with the most potent antibiotics such as Colistin [3]. According to World Health Organization (WHO), the cost of hospitalization due to antimicrobial resistance in USA is about \$20 billion each year [4]. Despite efforts of WHO to limit consumption of antibiotics; however, doctors around the world still heavily prescribe antibiotics [5]. In addition, anti-bacterial drugs suffered from other disadvantages such as undesirable side-effects and contraindication in certain cases including renal failure, pregnancy and patients suffering from impaired immune defense which further limits their use [6]. Thus, the aim of current paper was to review the cons and pros of antibiotics use in periodontal therapy and the potential alternatives for these drugs.

Systemic Antibiotics in Combination with Periodontal Therapy

Periodontal disease include group of inflammatory conditions affecting attachment apparatus of the teeth [7], normally treated by scaling and root planing (SRP) which aims towards removal of dental biofilm that consider as a primary etiologic agent responsible for initiation and progression of inflammation [6]. Minimizing bacterial load in periodontal pockets helps to restore health status of periodontal tissues. However, in certain cases, such as aggressive periodontitis, the indication of antibiotic as adjunctive treatment is unavoidable to eliminate pathogenic bacteria deeply invading connective tissue that potentially re-colonize root surface resulting in recurrence of disease [8]. Historically, systemically administered penicillin was the first antibiotic used in treatment of periodontal disease. Later, amoxicillin was used for its effect on several key-periodontal pathogens [9]. At early 1960s, metronidazole was introduced after showing strong effect against Gram-negative bacteria such as *P. gingivalis*. While use of tetracycline became popular at 1970s due its broad-spectrum activity against pathogenic bacteria and low toxicity [9]. The complexity of dental biofilm at advanced stages of periodontal diseases consider as a major obstacle for the action of antibiotics as these drugs will only affect the most superficial layer of the biofilm that form a well-organized solid mass that provides a shelter for bacteria at deeper layer [10]. For this reason, antibiotic cannot be used alone as dental biofilm should be disrupted by mechanical methods prior to administration of antimicrobial drugs [11].

Meta-analysis about prescription of antibiotics, namely Augmentin, ibuprofen and tetracycline, as adjunctive to surgical treatment of deep periodontal pockets reported that more gain of clinical attachment was associated with these antibiotics than control group [12]. Further, systematic review on use of systemic antibiotics in periodontal practice indicated their beneficial effect in term of attachment level gain [13]. However, other studies contradict these findings. One of these is a meta-analysis about the use of metronidazole in combination with periodontal treatment over 3 months follow-up period, did not show any additional benefit over SRP alone [14]. Similarly, another meta-analysis conducted by Hayes et al did not show any noticeable effect of using tetracycline as adjunctive to SRP [15]. Further, Herrera et al did not find enough evidence for the advantage of using antibiotics with periodontal surgical intervention [16].

Generally, most of studies could not answer essential questions such as which antibiotic regimen, is the most effective adjunctive to periodontal therapy, what is the exact dose, time of administration and duration, what are the potential side-effects and the consequence for developing bacterial resistant [17]. In addition, Haffajee, et al. indicated that most of previous studies lack sufficient sample size and despite the findings were significant in association with systemic antibiotic use; nevertheless, significant level was consistently borderline in comparison to SRP alone [13]. Recent studies have highlighted the importance of benign microflora and pathogenic bacteria in health and disease state of periodontium [18]. These data strike an alarm for thinking twice before prescribing broad-spectrum, non-specific antibiotics in combination to periodontal treatment that could compromise beneficial microflora of oral cavity.

Can Other Treatment Modalities Substitute Antibiotics?

Recently, many attempts emerged to substitute antibiotics with other treatment modalities. One of these methods is photodynamic therapy (PDT) which is minimally-invasive treatment modality that can eliminate bacteria, viruses, and fungi [19]. Non-surgical periodontal treatment together with single session of PDT resulted in significant reduction in bleeding scores compared with sites treated with SRP [20]. In addition, meta-analysis of several studies showed beneficial effect of PDT in treatment of aggressive periodontitis [21]. Popularity of lasers in periodontal treatment start to grow nowadays, use of soft laser in disinfecting periodontal pocket after SRP showed encouraging results in reducing population of periodontal pathogens that represent an attractive choice to replace prescription of antibiotics [22]. Another treatment modality based on the use of vitamins and antioxidants. Diet including sufficient amount of these factors may prevent onset of periodontal disease [23]. Antioxidants play crucial role in maintaining integrity of epithelium, cell signaling and host defense mechanism [24]. Despite of limited data about use of antioxidants as adjunctive periodontal therapy; however, available studies suggest promising results to use these agents for the prevention and treatment of periodontal diseases [25,26].

In conclusion, the use of antibiotics, despite of many drawbacks, remains the most popular and effective adjunctive to mechanical periodontal treatment. However, the charm of using these drugs starts to fade due to their undeniable disadvantages and limitations. This requires

the search for other adjunctive treatments of periodontal therapy based on better understanding of the nature and etiology of periodontal diseases.

References

- Davies J, Davies D (2010) Origins and evolution of antibiotic resistance. *Microbiol Mol Biol Rev* 74(3): 417-433.
- Lattimore T, Szepesvári C (2016) The end of optimism? An Asymptotic Analysis of Finite-Armed Linear Bandits Technical report.
- Neu HC (1992) The crisis in antibiotic resistance. *Science* 257(5073): 1064-1074.
- (2014) Untreatable: Report by CDC details today's drug-resistant health threats.
- Zaman SB, Hussain MA, Nye R, Mehta V, Mamun KT, Hossain N (2017) A review on antibiotic resistance: alarm bells are ringing. *Cureus* 9(6): 1-9.
- Winkelhoff AJV, Rams TE, Slots J (1996) Systemic antibiotic therapy in periodontics. *Periodontol* 2000 10(1): 45-78.
- Taubman MA, Valverde P, Han X, Kawai T (2005) Immune response: the key to bone resorption in periodontal disease. *J Periodontol* 76(11 Suppl): 2033-2041.
- Prakasam A, Elavarasu SS, Natarajan RK (2012) Antibiotics in the management of aggressive periodontitis. *J Pharm Bioallied Sci* 4(Suppl 2): 252-255.
- Kapoor A, Malhotra R, Grover V, Grover D (2012) Systemic antibiotic therapy in periodontics. *Dent Res J* 9(5): 505-515.
- Mombelli A (2003) Periodontitis as an infectious disease: specific features and their implications. *Oral Dis* 9(1): 6-10.
- Rajesh S, Koshi E, Philip K, Mohan A (2011) Antimicrobial photodynamic therapy: An overview. *J Indian Soc Periodontol* 15(4): 323-327.
- Haffajee A, Dibart S, Kent R, Socransky S (1995) Clinical and microbiological changes associated with the use of 4 adjunctive systemically administered agents in the treatment of periodontal infections. *J Clin Periodontol* 22(8): 618-627.
- Haffajee AD, Socransky SS, Gunsolley JC (2003) Systemic anti-infective periodontal therapy. A systematic review. *Ann Periodontol* 8(1): 115-181.
- Elter JR, Lawrence HP, Offenbacher S, Beck JD (1997) Meta-analysis of the effect of systemic metronidazole as an adjunct to scaling and root planing for adult periodontitis. *J Periodontol Res* 32(6): 487-496.
- Hayes C, Antczak-Bouckoms A, Burdick E (1992) Quality assessment and meta-analysis of systemic tetracycline use in chronic adult periodontitis. *J Clin Periodontol* 19(3): 164-168.
- Herrera D, Alonso B, León R, Roldán S, Sanz M (2008) Antimicrobial therapy in periodontitis: the use of systemic antimicrobials against the subgingival biofilm. *J Clin Periodontol* 35: 45-66.
- Mani A, Dalvi A, Mani S (2015) To Prescribe or Not To: Systemic Antibiotics in Treatment of Periodontal Infections. *International Journal of Science and Research* 4(9): 1902-1904.
- Hajishengallis G, Darveau RP, Curtis MA (2012) The keystone-pathogen hypothesis. *Nat Rev Microbiol* 10(10): 717-725.
- Kornman KS, Page RC, Tonetti MS (1997) The host response to the microbial challenge in periodontitis: assembling the players. *Periodontol* 2000 14(1): 33-53.
- Christodoulides N, Nikolidakis D, Chondros P, Becker J, Schwarz F, et al. (2008) Photodynamic therapy as an adjunct to non-surgical periodontal treatment: a randomized, controlled clinical trial. *J Periodontol* 79(9): 1638-1644.
- Chatzopoulos GS, Doufexi AE (2016) Photodynamic therapy in the treatment of aggressive periodontitis: A systematic review. *Med Oral, Patol Oral Cir Bucal* 21(2): 192-200.
- Licht F (2014) Diode laser treatment as an alternative to antibiotic premedication. *European Scientific Journal* 10(33): 1-23.
- Chapple IL (2009) Potential mechanisms underpinning the nutritional modulation of periodontal inflammation. *The Journal of the American Dental Association* 140(2): 178-184.
- Dennison DK, Dyke TE (1997) The acute inflammatory response and the role of phagocytic

- cells in periodontal health and disease. *Periodontol* 2000 14(1): 54-78.
25. Mathur A, Mathur L, Manohar B, Mathur H, Shankarapillai R, et al. (2013) Antioxidant therapy as monotherapy or as an adjunct to treatment of periodontal diseases. *J Indian Soc Periodontol* 17(1): 21-24.
26. Bhuvanewari P (2014) Antioxidants in oral healthcare. *Sai Pavithra RJ Pharm Sci & Res* 6(4): 206-209.

