

## **STUDY OF RELATIONSHIP BETWEEN DEPTH OF PERIODONTAL POCKETS, ANAEROBIC BACTERIA AND INFLAMMATORY CELLS IN PERIODONTITIS**

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**Key words:** *Periodontitis, Anaerobic bacteria, periodontal pocket*

### **Abstract**

In this study 100 cases of advanced periodontitis were compared with a control group of 100 persons. The parameters were the depth of the periodontal pockets, radiographic images, presence of inflammatory cells and different types of anaerobic bacteria in the pockets. The depth of pocket was measured by a sterile probe and the presence of inflammatory cells were determined through sterile curettage. The smears were stained by Gimsa and Gram methods. For the purpose of microbiological studies, subgingival plaque samples were taken on paper points and were plated on brucella agar medium supplemented with rabbit blood, hemin and vitamin K<sub>1</sub>. The results indicated that with increasing depth of the pocket, the number of mixed anaerobic infections increases, and the presence of inflammatory cells especially polymorphonuclears is more prominent in comparison to the control group. As the pocket depth increases the conditions become more favorable for anaerobic bacteria and in consequence the incidence of isolation of these bacteria increases. On the other hand as the number of anaerobic bacteria and inflammatory cells and the secretion of destructive enzymes increases, the resultant injury to periodontal tissue increases.

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## Introduction

Periodontitis is an inflammatory process that extends beyond the soft tissues and into the alveolar bone, periodontal ligament, and cementum. Generally, the connective tissue fibers surrounding the teeth and connecting the teeth to alveolar bone are disrupted and in the process of dissolution (12).

The primary bacteria found in subgingival pockets in periodontitis patients are Gram negative anaerobic bacilli, *Actinobacillus actionomycetemcomitans*, *Capnocytophaga* and *Peptostreptococcus* (1-4,6,9,10,13-26).

In the presence of subgingival plaque, the inflammatory process in the hard tissues around the teeth may result in marked osteoclastic activity, and the progressive extension results in alveolar bone destruction (12).

This study has investigated the relationship between depth of periodontal pocket, anaerobic bacteria and inflammatory cells.

## Materials and methods

100 patients referred to the Department of Periodontology, Faculty of Dentistry, Medical Sciences of Tehran University, for treatment of advanced periodontal disease, participated in the study. None of them had any known history of systemic disease. None of the patients had received periodontal and antibiotic treatment during 2 months. Some of patients had more than one site of periodontal pocket. A total 160 sites with pockets  $\geq 4$ mm were used for sampling. A total 160 samples were taken from 100 healthy persons as controls (6,9,18,21).

Supragingival plaque was removed from the sampling site using cotton swab. The depth of pocket was measured by a sterile probe. For the purpose of microbiological studies, subgingival plaque samples were taken on paper points and were transferred to transport medium (Thioglycollate broth). The vials containing the sample and transport medium were thoroughly shaken in a mixer and diluted to  $10^{-2}$  and  $10^{-3}$  in thioglycollate broth medium. A volume of 0.1 ml from each dilution as well as from the undiluted sample was distributed on the surface of a brucella agar medium supplemented with rabbit blood, hemin and vitamin K1 (5,7,8,11,13,23). After aerotolerance test for each colony, anaerobic bacteria were isolated and were determined based on Gram staining, morphology and biochemical tests.

The presences of inflammatory cells were determined through sterile curettage. The smears were stained by Gimsa and Gram methods and inflammatory cells were counted (17).

Significant differences in the frequency of various groups of anaerobic bacteria and inflammatory cells between patients and controls were determined by  $X^2$ . Relationship between depth of periodontal pockets and count of inflammatory cells and anaerobic bacteria were determined by linear regression.

### Results and discussion

A total of 296 anaerobic bacterial species were detected from patient samples (Table 1) 244,9,9, and 34 species were identified as Gram negative bacilli, Gram positive bacilli, Gram negative cocci and Gram positive cocci, respectively. A total of 116 anaerobic species were detected from control samples, 87,12,5 and 15 species were identified as Gram negative bacilli, Gram positive bacilli, Gram negative cocci and Gram positive cocci, respectively.

From 160 periodontal pockets, average depth of pockets without anaerobic bacteria was 4.5mm and averages depths of pockets with one type, two types, three types and four types of anaerobic bacteria were 5.5mm, 5.85 mm, 6.76mm and 7.8mm, respectively. The frequency of pockets without anaerobic bacteria was 10.6% and frequency of pockets with one type, two types, three types and four types of anaerobic bacteria were 16.25%, 46.25%, 21.9% and 5%, respectively.

Linear regressions were 0.7 and 0.76 for relationship between depth of periodontal pockets and counts of anaerobic bacteria and inflammatory cells, respectively.

The results indicate that Gram negative anaerobic bacilli and Gram positive anaerobic cocci were significantly isolated from patients samples. Also, with increasing depth of periodontal pockets, the count of anaerobic bacteria and the presence of inflammatory cells, especially polymorphonuclears, are more prominent in comparison to the control group. In the deep pocket, conditions for growth of anaerobic bacteria is favorable, in conclusion the incidence of isolation of anaerobic bacteria increases. On the other hand, as the count of anaerobic bacteria and inflammatory cells and secretion of destructive enzymes increases, the resultant injury to periodontal tissue increases (15).

Table 1- Frequency of different groups of anaerobic bacteria in patients with periodontitis and normal controls

Groups of anaerobic bacteria	Frequency	
	Periodontitis	Controls
Gram negative bacilli	244*	87
Gram positive bacilli	9	12
Gram negative cocci	9	5
Gram positive cocci	24*	12
Total	296	116

\* Significant difference

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