



The profile of pathogenic bacteria isolated from dental plaque-induced gingivitis

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ABSTRACT

Gingivitis is an inflammatory destructive disease mainly caused by microbial plaques. Gram-positive and gram-negative bacilli or cocci have been isolated from dental plaque and gingivitis. This study was going to isolate and characterize the pathogenic bacteria from gingival of 100 patients with oral gingivitis. Enriched and specific media used for isolation of bacteria. Identification of isolated bacteria performed via gram staining and biochemical tests. 361 strains comprising 55.98% Streptococci, 2.62% *Staphylococcus aureus*, 4.22% gram-negative cocci, 26.38% gram-positive bacilli, 0.03% gram-positive filamentous bacteria, 1.3% gram-negative bacilli, 1.3% yeasts, and 1.3% gram-negative filamentous bacteria were isolated. *Streptococcus sanguis*, *Streptococcus mitis*, and *Streptococcus mutans* were the most frequent species among isolated streptococci. The results of present study indicate that a wide range of pathogenic bacteria are responsible for destructions of gingival among Iranian patients. Because of the communication ability of these infections, the diagnosis and treatment of the patients is necessary according to the public health care systems.

1. Introduction

Gingivitis is the most common form of oral diseases, which is often caused by poor oral hygiene. It can progress to the destruction of bone and loss of teeth (Page, 1986; Brown and Loe, 1993). The bacterial accumulations in dental plaques, which can develop to gingivitis have been investigated by some researchers (Loe et al., 1965; Pourhashemi et al., 2007). The gram-positive bacteria proliferate and the number of

gram-negative bacteria increases in the first two days of plaque formation during gingivitis. After 2-4 days, fusobacteria and filamentous bacteria are added to the previous population. Vibrio like organisms and spirochaetes are then added to the complex after 4-9 days (Loe, 1981)

The aim of the present study was to isolate and characterize the pathogenic microbial populations collected from the upper regions of dental plaques of patients with oral gingivitis in Iran.

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2. Material and methods

A total of 100 patients (40 women and 60 men) with plaque-induced gingivitis were randomly selected for this study. Specimens obtained from infectious areas of upper gingival of the patients at Isfahan Dentistry Clinic from January 2006 to February 2009. The specimens cultured on 5% sheep blood agar medium mainly for isolation of staphylococci and streptococci. Chocolate agar was used for isolation of gram-negative cocci such as *Neisseria*. The cultured media were incubated at 37°C for 18-24 hours in the presence of 5% CO₂. Isolated organisms were stored in 10% skim milk at -80°C. Identification of bacteria was performed by the standard methods (Baron and Finegold, 1990).

3. Results

In this study, six Streptococci species including *S. salivarius*, *S. sanguis*, *S. mitis*, *S. mutans*, *S. intermedius*, and *S. pneumoniae*, three Staphylococci species including *S. aureus*, *S. epidermidis* and *S. saprophyticus*, as well as gram-negative cocci, gram-negative and gram-positive bacilli, filamentous bacteria and yeasts were isolated and identified from gingivitis specimens. The results obtained from biochemical tests for identification of streptococci and Staphylococci species isolated from gingivitis specimens are shown in table 1 and table 2, respectively.

Table 1
Biochemical identification of Streptococci isolated from gingivitis Specimens

Biochemical tests	Isolated Species					
	<i>S. salivarius</i>	<i>S. anguis</i>	<i>S. mitis</i>	<i>S. mutans</i>	<i>S. intermedius</i>	<i>S. pneumoniae</i>
Growth in 6.5% NaCl	-	-	-	-	-	-
α-haemolysis	+	+	+	+	-	+
β-haemolysis	-	-	-	-	-	-
Skulin hydrolysis	-	-	-	-	+	ND
sensitivity to optochin	-	-	-	-	-	+
sensitivity to Bacitracin	-	-	-	-	-	+
Bile solubility	-	-	-	-	-	+
Catalase	-	-	-	-	-	-
Fermentation of sugars						
Manitol	-	-	-	+	-	ND
Inolin	+	+	-	+	-	ND
Lactose	+	+	-	+	+	ND
Sorbitol	-	-	-	+	-	ND
Colony formation in Saccharose agar						
Mucoidal	+	-	-	-	-	ND
Rough	-	+	-	+	-	ND

(+) Positive result (-) Negative result (ND) Not detected

Table 2
Biochemical identification of staphylococci isolated from gingivitis Specimens

Biochemical tests	Isolated Species		
	<i>S. aureus</i>	<i>S. epidermidis</i>	<i>S. saprophyticus</i>
Catalase	+	+	+
Coagulase	+	-	-
Growth on Manitol salt agar	Yellow (manitol positive)	Pink (manitol negative)	Pink (manitol negative)
Resistance to Novobiocin	-	-	+
Growth on 6.5% NaCl	+	+	+

(+) Positive result (-) Negative result

A total of 361 strains were isolated from patients with acute gingivitis symptoms. The identification characteristics and the frequency of isolated bacteria are shown in table 3.

Table 3
The number and frequency of isolated bacterial strains

Isolated strains	Gram-positive cocci		Gram-negative cocci	Gram-positive bacilli	Gram-negative bacilli	Gram-positive filamentous bacteria	Gram-negative filamentous bacteria	Yeasts
	Streptococci	<i>S. aureus</i>						
Number	204	10	16	100	5	5	5	26
Frequency (%)	56.5	2.62	4.22	26.38	1.3	1.3	1.3	6.9

As shown in table 3, 56.51% of isolated strains were streptococci. The results obtained from the identification of this isolates are shown in table 4.

Table 4
The number and frequency of the isolated streptococci

Isolated strains	<i>S. pneumoniae</i>	<i>S. sanguis</i>	<i>S. mutans</i>	<i>S. salivarius</i>	<i>S. mitis</i>	<i>S. intermedius</i>
Number	4	100	40	10	45	5
Frequency (%)	1.05	26.4	10.7	2.63	12.93	1.31

4. Discussion

The objective of this study was to determine the number and frequencies of bacterial populations associated in dental plaques among Iranian patients with gingivitis. Some other studies have also been conducted to profile the pathogenic bacteria isolated from gingivitis plaques among different groups of populations in different cities of Iran (Sirafi and Moghaddas, 1988; Pourhashemi et al., 2007). Salari and kadhoda (2004) isolated the periodontopathologic bacteria from subgingival chronic periodontitis in Iran. Based on their findings the highest proportions of microbial population were *Actinobacillus actinomycetemcomitans*, *Porphyromonas gingivalis*, *Capnocytophaga sputigena* and *Eikenella corrodence*. However, in current study, a broad spectrum of bacteria including streptococci (55.98%), *Staphylococcus aureus* (2.62%), gram-negative cocci (4.22%), gram-positive bacilli (26.38%), gram-positive filamentous bacteria (0.03%), gram-negative bacilli (1.3%), yeasts (1.3%) and gram-negative filamentous bacteria (1.3%) were found as the predominant microbial populations in the upper parts of gingival specimens. The differences

observed between these results can be addressed to the area of sampling on the gingival plaques. The result obtained by this study is consistent with those reported by Leo (1981) and Moening (1989) who emphasized the importance of gram-positive cocci in the initiation of dental plaque formation, leading to the gingivitis. In conclusion, the results of present study indicate that a wide range of communicable pathogenic bacteria are responsible for gingivitis and its progression among Iranians. Therefore, to ensure a high level of public health protection, the diagnosis and treatment of the patients with gingivitis is necessary.

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