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The Comprehensive Risk of Oral Bacteria Test and Oral Disease in Women in Their 60s: Case Study

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Abstract

Objectives: This study is an oral management study through saliva gene analysis and analyzes the types of harmful bacteria and quantitative figures in saliva. The worse the oral clinical indicators, the more 7 types of bacteria are detected. In the future, it will be used in clinical practice to contribute to the improvement of public oral health.

Methods: In July 2024, it was conducted on women in their 60s. Dax Medi Oral biome Check Next Generation PCR test was performed. After saliva collection, pretreatment, DNA extraction, and DNA quantitative analysis were performed, and a customized solution was provided.

Results: In the detailed results of the primary and secondary oral harmful bacteria of female subjects in their 60s, the primary detection amount of Pg was 42.321 and the secondary was 38.256. The primary and secondary detection amounts of Td, Cr, and Sm are all 2. The primary detection amount of Tf was 59.799, and the secondary was 56.231. The primary detection amount of Pi is 558.950, the secondary is 545.336, and Fn is 160.082 and the secondary is 130.001

Conclusions: When physical dental plaque control methods such as brushing, tongue brushing, and dental floss are performed for dental disease-causing bacteria in this study, there is a decrease in oral harmful bacteria levels for dental caries-related bacteria such as S. mutans, Fusobacterium nucleated periodontal disease-related bacteria *P. gingivalis, T.forsythia, T. denticola*, Provocateur Intermedia, and Campylobacter rectus.

Keywords: Bacteria P; Gingivalis T; Denticola; Provocateur Intermedia; Tooth decay; Gum disease; Bad breath; Toothbrush

Introduction

Biofilms in the oral cavity are composed of various types of bacteria, and oral diseases occur due to changes in the bacterial composition of the biofilm in the oral cavity [1,2]. Acids produced by dental caries-causing bacteria in the dental plaque demyelinating minerals in the hemorrhoids cause tooth caries, and some anaerobic bacteria in the dental plaque produce toxins harmful to the periodontal tissues, causing periodontal diseases. In addition, dental plaque that is not removed and left unattended is tartarized through calcification, which can further accelerate periodontal diseases and deteriorate oral health [3]. An oral disease caused by bacteria in the oral cavity includes dental caries and periodontal diseases, which are caused by bacteria such as Streptococcus mutans, Streptococcus sobrinus and Lactobacillus acidophilus [4,5]. It causes tooth destruction by producing organic acids such as lactic acid, a metabolite of bacteria in the dental plaque. Bacteria related to periodontal disease are Porphyromonas gingivalis, Prevotella intermedia, and Tannerella Gram-negative bacteria such as forsythia are associated, and the destruction of periodontal tissue is caused by periodontal disease-causing bacteria and toxins [6]. In the past, red complexes such as P. gingivalis, T. forsythia and Treponema denticola, orange complexes such as Pintermedia, Fusobacterium nucleatum, Prevotella nigrescens and Aggregatibacter actinomycetemcomitans were known to affect [7], but recently Actinomyces Israeli has been reported to affect chronic marginal gingivitis [8]. The oral refresher is a substance used as a representative chemical dental plaque control method [9] and is largely used for various purposes such as prevention of oral

diseases, treatment of oral diseases, reduction of bad breath [10]. Recently, there is an increasing number of oral refresher agents containing substances having antibacterial effects against bacteria that cause oral diseases [11]. Chlorhexidine, a cationic antibacterial substance, is the most widely used as a representative ingredient used as an oral disease prevention substance [12]. Long-term use has been reported to cause side effects such as staining in the oral cavity and impaired taste [13]. Methylpyridinium chloride (CPC) is the same cationic antibacterial substance as chlorhexidine and has antibacterial effects when combined with negative charges on the bacterial surface [14,15]. In this study, the next generation pcr test of one patient with Na00 is conducted [16] to check the current oral condition and to check the secondary test level by thoroughly managing the oral cleaning. The study was started to compare the 1st and 2nd oral condition values to help improve the oral health of the whole people in the future.

Study Subjects and Methods

Study subjects

In July 2024, one woman in her 60s was tested for the next generation pcr (Korea, Ilsan) of Dax Medi Oral biome check. Na00 brushed her teeth 3 times a day and used a toothbrush without brushing her tongue. She had chronic periodontal disease, showed gum degeneration from No. 17 to No. 47, ceramic crown remnants from No. 27, ceramic crown bridges from No. 34 to No. 3, and implants from No. 37. There is a first-class malocclusion, an abnormality in the mandibular anterior teeth, and the median line is twisted (Figure 1).

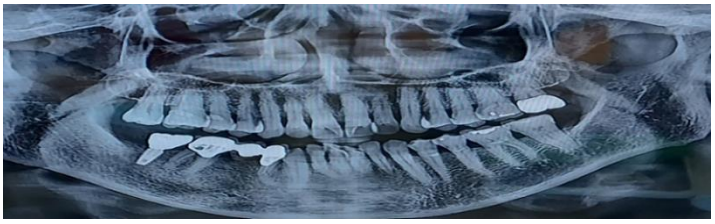

Figure 1: *Panorama photographs of the subject.*

Variable Setting

In July 2024, Daxmedi Oralbiome Check Next Generation Pcr (Korea, Ilsan) test was conducted on women in their 60s. Saliva is collected, pretreated, DNA extraction is performed, DNA quantitative analysis is performed, and when the data analysis result is derived, a customized solution is provided. The number of harmful bacteria detected in the oral cavity of the subjects with oral clinical indicators was analyzed, and the results were scored accordingly. It was confirmed that as the oral clinical indicators were not good to a certain level, more 7 types of bacteria were detected, and on the contrary, it was confirmed that the detection of the bacteria decreased as the indicators were good. Therefore, it was interpreted that the number of harmful bacteria detected in the mouth could affect oral health, and based on these clinical indicators, the risk was calculated by converting the detection level of oral microorganisms into Daxmedi's formula [16] (Table 1).

Data Analysis

The statistical significance test was compared between primary and secondary oral hazard test means using IBM SPSS Statistics 24.0 (IBM Inc., Armonk, New York, USA).

Ethical Considerations

This study was approved by the Institutional Review Board (IRB) of HONAM University (IRB No: 1041223-202303-HR-01).

Results

Comprehensive risk of oral diseases of subjects

The first and second oral harmful bacteria test indicators of the subjects showed 27 good conditions in the 37 low-risk group (Table 2).

Table 1: *Indicators of the unconstitutionality of oral harmful bacteria*

Figure	0~30	31~50	51~75	76~100
State	good quality	That danger group	a medium-risk group a dangerous group	a high-risk group

Table 2: *The primary and secondary oral harmful bacteria test indicators of the subject*

Results of the first oral hazard examination	2nd oral hazard test result
37	28

In the risk index for each disease in the first and second oral harmful bacteria tests of the subjects, the risk of periodontitis and peri-implantitis was 46 at low risk in the first round and 25 was good in the second round. The risk of tooth decay is also good in both the first and second rounds. In terms of the risk of bad breath, the risk of medium risk 54 was shown in the first round and the risk of low risk 35 was shown in the second round. (Table 3) In the detailed results of the primary and secondary oral harmful bacteria of the subject, the primary detection amount of Pg was 42.321 and the secondary was 38.256. The primary and secondary detection amounts of Td, Cr, and Sm are all 2. The primary detection amount of Tf was 59.799, and the secondary was 56.231. The primary detection amount of Pi is 558.950, the secondary is 545.336, and Fn is 160.082 and the secondary is 130.001 (Table 4).

Consideration

Oral diseases are bacterial diseases and can be largely divided into dental caries and periodontal diseases. To remove bacteria that cause oral diseases, toothpaste or oral refresher containing antibacterial power is being developed, and for this reason, the antibacterial power of oral products is becoming important. Oral refresher must be effective in preventing dental plaque deposition and suppressing inflammatory substances in the oral cavity, and for this purpose, it must penetrate the oral tissue and maintain the efficacy concentration as long as possible in the oral cavity [17]. Antimicrobial substances that can chemically inhibit the growth and proliferation of bacteria that cause oral diseases are being used in parallel with physical dental plaque control methods such as brushing, tongue brushing, and flossing to prevent diseases (Table 2).

Table 3: *Risk Index by Disease in the 1st and 2nd oral harmful bacteria tests of the subjects.*

Good disease/condition	Good primary	Low-risk primary	Medium Risk Primary	high-risk primary	Good second order	Low-risk secondary	Medium risk secondary	high-risk secondary
Risk of periodontal inflammation and peri-implant inflammation		46			25			
Risk of tooth decay	12				12			
Risk of bad breath			54			35		

Table 4: *Detailed results of primary and secondary oral harmful bacteria of the subject.*

Bacterial Name	Disease Impact	Primary Amount Of Detection	Secondary Amount Of Detection
Pg (P. Gingivalis)	Gum Inflammation Alveolar Bone Destruction	42.321	38.256
Td (T. Denticola)	Production of Harmful Factors in the Oral Cavity	2	2
Tf (T, Forsythia)	Induce Intractable Periodontitis	59.799	56.231
Pi (Provocateur Intermedia)	Periodontal Inflammation, Causing Complex Infections	558.950	545.336
Cr (Campylobacter Rectus)	Inducing An Oral Abscess	2	2
Fn (Fusobacterium Nucleatum)	Biofilm Formation	160.082	130.001
Sm (Streptococcus Mutans)	Tooth Decay	2	2

Chlorhexidine, essential oil, and cetylpyridinium chloride are used as representative ingredients, and products using toothpaste, spray-type detergent, and gargle-type brushing solutions are continuously developed and sold [18]. According to previous studies, chlorhexidine, which has strong antibacterial properties against bacteria that cause oral diseases, is difficult to use for a long time due to various side effects [19]. Compared to chlorhexidine, which has side effects such as taste disorders when colored and used for a long time, cetylpyridinium chloride has been reported to be usable for a long time due to low concentration of residues in the oral cavity [20], and the commonly used concentration is 0.025 to 0.1% [21]. It is reported to be effective in relieving gingivitis along with promoting antimicrobial action through the negative charge on the surface of the terria and positive charge of cetylpyridinium chloride molecule [22]. In previous studies, P. gingivalis weakens the keystone pathogen alveolar bone, weakens inflammation around the implant, weakens the alveolar bone around the implant, tends to penetrate the human body's immune cells or antibiotics, can have systemic effects through secondary infection, is detected in blood clots in the brain or cardiovascular system of people who died of dementia, and can increase the risk of stomach cancer in the esophagus by more than 50% and worsen oral cancer, colon cancer, and pancreatic cancer [23]. In this study, peri-implant salt management-related harmful bacteria P. gingivalis, T. denticola, T, and forsythia were found, and harmful bacteria that destroy gum tissue and gum bones were reproduced No. 37 showed peri-implant inflammation and the risk of peri-perioditis implant is 46 points, which is low risk Intensive care between teeth, gum treatment, and regular checkups were recommended as prevention methods (Tables 2-4). In addition, S. mutans from this study is attached to the surface of the tooth, and biofilm composed of more than 600 types of microbial communities promotes and corrodes the

formation, is found inside the heart valve and arterial blood vessels of patients with cardiovascular disease and is accompanied by vasopathy and endocardial infections. The risk of dental caries was good at 12 points, and correct brushing habits, use of fluoride toothpaste, sugar intake agents, and regular checkups were recommended. Then, in the breath management of this study, bacteria of P. gingivalis, T, forsythia, T. denticola, and Provocateur Intermedia appeared, and oral harmful bacteria overgrowth, gum disease cavities, sinusitis, reflux esophagitis, gastritis, diabetes, etc. were considered, and the risk of bad breath was 54 points, and the prevention method was prescribed by oral harmful bacteria test, scaling, and regular checkups (Tables 2-4). When physical dental plaque control methods such as brushing, tongue brushing, and dental floss are performed for oral disease-causing bacteria, there is a decrease in oral harmful bacteria levels for dental caries-related bacteria such as S. mutans, Fusobacterium nucleatum periodontal disease-related bacteria P. gingivalis, T, forsythia, T. denticola, Provocateur Intermedia, and Campylobacter rectus (Tables 2-4). The limitations of this study were the lack of a clear data base through more than 300 cases and the difficulty of suppressing bacteria only by using oral products. In the future, by securing more than 300 cases of data, we will study the results of lowering the level of harmful bacteria in the oral cavity with physical dental plaque control methods such as brushing, tongue brushing, and flossing.

Conclusion

When physical dental plaque control methods such as brushing, tongue brushing, and dental floss are performed for oral disease-causing bacteria, there is a decrease in oral harmful bacteria levels for dental caries-related bacteria such as S. mutans, Fusobacterium nucleatum periodontal disease-related bacteria P. gingivalis, T, forsythia, T. denticola, Provocateur Intermedia, and Campylobacter rectus.

Author Contributions

Author MAE, NHJ approved and agreed to the final version of this manuscript prior to submission. The integrity of the questions responsible for all aspects of the work, questions related to accuracy or accuracy, or any part of the work was handled appropriately. MAE, NHJ was designed, searched, selected, analyzed and interpreted. NHJ contributed to drafting, concept and design of manuscripts, MAE to search and selection, analysis and interpretation, and NHJ to critically modified manuscripts. MAE, NHJ contributed to concept, design, analysis and interpretation, and contributed to critically modified manuscripts.

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Conflict of Interest

All authors declare no conflict of interest.

Data Availability statement

Research data are not shared.

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