스케일링 환자들의 정기적인 스케일링과 비정기적인 스케일링의 구강건강행동지수와 구강건강지수 비교

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Comparison of Oral Health Behavior and Oral Health Indexes between Patients Undergoing Scaling Regularly and Those Undergoing Scaling Irregularly

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<Abstract>

Objectives : The objective of this study was to compare oral health behaviors and oral health indices between regular scaling group and irregular scaling group. **Methods** : This study was performed at M Dental Clinic in Busan on 352 dental patients treated between January 2014 and June 2015 using V6.0 software and medical interviews. The 352 patients were divided into 3 groups and oral health behavior (OHB) and oral health indices were compared. **Results** : The OHB scores significantly differed among Groups C and A. Group C had the lowest number of "Bad" scores for the Simplified Debris Index (S-DI), Simplified Calculus Index (S-CI), and Simplified Oral Hygiene Index (S-OHI). Groups B and A had the lowest number of "Excellent" scores. Group C had the lowest bleeding on probing (BOP), calculus rate (CR) and decayed teeth (DT). Furthermore, Group C had the highest number of missing teeth (MT) and filled teeth (FT). **Conclusions** : Patients who underwent regular scaling had the highest OHB and oral health index scores. This emphasizes the importance of regular scaling for prevention and early detection of oral disease.

Key Words : Oral Health Behavior, Oral Health Care, Periodontal Index, Ultrasonic Scaler

Ⅰ. Introduction

In July 2013, the Ministry of Health and Welfare of South Korea decreed that scaling should be covered by the National Health Insurance scheme. Consequently, the number of patients requiring scaling treatment increased sharply, and the number of potential patients grew. In 2013, periodontitis ranked as the second most prevalent disease in South Korea, and medical expenses related to the condition are increasing every year[1].

In the annual reports on medical use by regional groups in 2014, the annual increase in patients with periodontal disease was 4.4%, and an emerging increase in its prevalence was evident in young people[2].

Periodontitis is an inflammatory disease that develops slowly. Gingival bleeding, swelling, periodontal pocket formation, and alveolar bone destruction are the main causes of tooth loss related to the condition.[3] Periodontitis can be overlooked as it is not accompanied by pain and discomfort. In fact, 63.5% people incorrectly believe that their oral health is good.[4] Hence, precise recognition of periodontal disease during regular check-ups is necessary in order to improve their oral health. There are a number of causes of periodontitis, but biofilm formation and dental calculus deposition are the main culprits. Biofilms, which comprise of gelatinous microbial communities based on soft deposits, are known to underlie dental caries and periodontitis[5].

Only 40% of biofilms are removed by brushing, making professional biofilm control necessary.[6] The typical method for removing calculus is scaling. Scaling is performed by experts to ameliorate the main causes of periodontitis, such as biofilms, calculus, and exogenous stains, which are difficult to remove using toothbrush alone[7]. In addition, professional biofilm control prevents the wastage of health insurance finance through the prevention and early detection of other oral diseases. Therefore, regular scaling is strongly recommended[8].

However, most South Koreans avoid scaling because of a preconceived idea that it is painful[9]. In South Korea, fear of scaling is greater than that of attending a dental clinic, so dental hygienists to be kind, competent, and offer pain relief. Additionally, they should assist patients to recognize the need for preventive scaling through continuous education[10].

For the prevention of periodontitis and periodontal health maintenance, it is essential to set up a visit cycle based on an individual's oral health condition and oral health-care skills, with follow-up visits for scaling[11].

In this study, we examined how scaling affects the oral health conditions using three groups: group A comprised dental patients who had not undergone scaling in the preceding 3 years; group B comprised dental patients who had not undergone scaling in the preceding 2 years; and group C comprised dental patients who underwent regular scaling. We measured and compared oral health behavior (OHB) and the oral health index, which indicates oral health condition, among patients who underwent regular and irregular scaling to assess the effect

on oral disease.

II. Methods

1. Study subjects

This study was performed at M Dental Clinic in Busan on 352 dental patients treated between January 2014 and June 2015, using V6.0 software and medical interviews. The 352 patients were divided into 3 groups and their oral health behavior (OHB) and oral health indices were compared. Group A comprised 156 people who had not undergone scaling in the preceding 3 years; Group B comprised 159 people who had not undergone scaling in the preceding 2 years; and Group C comprised 150 people who underwent regular scaling every year. Participants with systemic disease or those who had undergone dental treatment other than dental first aid or check-ups were excluded.

2. Study method

The dentist and dental hygienist were in charge of performing oral examinations, surveys, and checking oral hygiene conditions. The study was approved by the Inje University Busan Paik Clinic IRB (No. 13-191, 2014-01-07).

1) Oral health behavior questionnaires

Oral hygiene behavior as assessed by YAB Buunk-Werkhoven et al.[12] was measured using the new index for OHB (8 items with respect to tooth brushing, interdental cleaning and tongue cleaning). For example, the item "I brush my teeth as follows" was supported by pictures showing different brushing methods. After the item scores were assigned weights, the item values were calculated and a sum score was computed. The sum OHB score for this index could range from 0 to 16. A high sum score indicated a high level of self-care oral hygiene behavior. Cronbach's α of OHB was .749.

2) Oral health indices

Food debris, biofilms, and calculus on the dental surface were identified on the maxillary first molars (buccal), incisors (labial), and mandibular first molar (lingual) using the Greene and Vermillion Simplified Oral Hygiene Index (S-OHI). bleeding on probing (BOP) was recorded to determine the stage of progress of periodontal disease. Bleeding after measuring pocket depth, was assigned a score of 1 point, whereas no bleeding scored 0 points. BOP was calculated as a percentage of the total bleeding[13].

Calculus rate (CR) was converted into a percentage after checking all teeth buccally, lingually, mesially, centrally, distal supragingivally, and subgingivally, using a #11/12 explorer. Decayed-Missing-Filled Teeth index (DMFT) was used as an indicator of the caries present in permanent teeth. Missing teeth (MT) and filled teeth (FT) were confirmed by clinical examination and radiographic evaluation, whereas the progression of caries in decayed teeth (DT) was confirmed using a Qraycam Oral Camera (Seoul, 14-53, Copyright, All In One Bio, QRC 15030008, 2015).

3. Statistical analysis

Statistical analysis of the regular and irregular scaling groups was performed with IBM SPSS version 21.0 (IBM Corp., Armonk, NY, USA).

OHB and oral health index in groups defined based on scaling frequency were subjected to statistical analysis using the chi-square test and one-way analysis of variance with Scheffé's post-hoc test; the significance level was $p = 0.05$.

Ⅲ. Results

1. Comparison of oral health behavior among the three groups.

Sex distribution was similar in all groups, and the mean age was 30.88 <Table 1>.

We compared OHB among the three groups. The eight items compared were frequency of tooth brushing, time of tooth brushing, measure of force of tooth brushing, duration of tooth brushing, method of tooth brushing, fluoride toothpaste use, interdental cleaning, and tongue cleaning <Table 2>. There were differences in the eight items examined among the three groups. "Bass method" (a method wherein the brush is held at an angle of 45° with the teeth and moved back and forth with short strokes), "fluoride toothpaste use," and "interdental cleaning" showed the highest scores in Group C. In the OHB total score, C and B groups were significantly different from A group (p<0.05).

<Table 1> General characteristics of participants (N=465)

Variables		Group A (N = 156)	Group B (N = 159)	Group C (N = 150)
Sex	M	71 (37.2)	57 (29.8)	63 (33)
	F	85 (31.0)	102 (37.2)	87 (31.8)
Age (years)	< 30	105 (36.2)	117 (40.3)	68 (23.4)
	≥ 30	51 (29.1)	42 (24)	82 (46.9)

Group A : no scaling during the preceding 3 years
Group B : no scaling during the preceding 2 years
Group C : scaling every year

2. Comparison of Simplified Oral Hygiene index among the three groups

We compared S-OHI scores among the three groups. The Simplified Debris Index (S-DI) and Simplified Calculus Index (S-CI) were confirmed, and subjected to statistical analysis with the data derived from the S-OHI <Table 3>. Group C showed the fewest "Bad" scores for the S-DI, S-CI, and S-OHI. In contrast, Groups B and A exhibited the fewest "Excellent" scores. There were significant differences in the S-DI, S-CI, and S-OHI among the three groups (p<0.05).

3. Comparison of oral health index among the three groups.

We compared the oral health index among the three groups. We performed a statistical analysis of the data obtained for BOP, CR, and DMFT <Table 4>. BOP, CR, and DT were the lowest in Group C. Conversely, MT and FT were the highest in Group C. The oral health index differed significantly among the three groups (p<0.05).

<Table 2> Comparison of oral health behavior among the three groups (N=465)

Variables		A (156)	B (159)	C (150)	p value
Frequency of tooth brushing	'Not every day'	0 (00.0)	0 (00.0)	5 (3.3)	
	'Once a day'	16 (10.3)	6 (3.8)	14 (9.3)	.003
	'Twice a day' or 'More than 2 times a day'	140 (89.7)	153 (96.2)	131 (87.3)	
Time of tooth brushing	Once a day(any time)	36 (23.1)	30 (18.8)	36 (24.0)	
	Twice a day(did not include before bedtime)	49 (31.4)	45 (28.3)	55 (36.7)	.006
	Three times or more a day(included before bedtime)	71 (45.5)	84 (52.8)	59 (39.3)	
Measure of force of tooth brushing	Forcefully ('6, 7')	71 (45.5)	75 (47.2)	40 (26.7)	
	Softly/Forcefully ('4, 5')	46 (29.5)	45 (28.3)	46 (30.7)	.000
	Softly ('1, 2, 3')	39 (25.0)	39 (24.5)	64 (42.7)	
Duration of tooth brushing	Shorter than 'One minute'	54 (34.6)	30 (18.9)	32 (21.3)	
	'Longer than three minutes' or 'One minute'	39 (25.0)	63 (39.6)	65 (43.3)	.001
	'Two minutes' or 'Three minutes'	63 (40.4)	66 (41.5)	53 (35.3)	
Method of tooth brushing	'Vertical movement' or 'Circular movement'	37 (23.7)	27 (17.0)	20 (13.3)	
	'Horizontal movement' or 'Combination of methods'	100 (64.1)	108 (67.9)	77 (51.3)	.000
	'Bass-method'	19 (12.2)	24 (15.1)	53 (35.3)	
Fluoride toothpaste	'Toothpaste without fluoride' or other alternatives	137 (87.8)	129 (81.1)	103 (68.7)	
	'Toothpaste with fluoride	19 (12.2)	30 (18.9)	47 (31.3)	.000
Interdental cleaning	'Never' interdental cleaning	121 (77.6)	96 (60.4)	83 (55.3)	
	'Not every day' interdental cleaning	22 (14.1)	42 (26.4)	31 (20.7)	.000
	'At least once a day' floss and/or tooth sticks and/ or interdental brushes	13 (8.3)	21 (13.2)	36 (24.0)	
Tongue cleaning	'Never'	5 (3.2)	6 (3.8)	21 (14.0)	
	'Sometimes'	24 (15.4)	36 (22.6)	10 (6.7)	.000
	'Every day'	127 (81.4)	117 (73.6)	119 (79.3)	
†OHB tot		9.85±2.46[a]	10.57±2.01[b]	11.10±2.70[b]	.000

p-values determined by chi-squared test (p<0.05). OHB: Oral Health Behavior.
†p-values determined by analysis of variance (p<0.05) with Scheffé's post-hoc test.
a, b Different letters indicate statistically significant differences.

<Table 3> Comparison of S-OHI among the three groups (N=465)

Variables		A(156)	B(159)	C(150)	p value
S-DI	1	70 (44.9)	84 (53.5)	34 (22.7)	.000
	2	71 (45.5)	63 (40.1)	111 (74.0)	
	3	15 (9.6)	12 (6.4)	5 (3.3)	
S-CI	1	51 (32.7)	36 (22.9)	25 (16.7)	.011
	2	77 (49.4)	88 (56.1)	82 (54.7)	
	3	28 (17.9)	35 (21.0)	43 (28.7)	
S-OHI	1	64 (41.0)	69 (43.9)	44 (29.3)	.002
	2	82 (52.6)	76 (48.4)	79 (52.7)	
	3	10 (6.4)	14 (7.7)	27 (18.0)	

p-values determined by chi-squared test (p<0.05)
S-DI, S-CI : 1: Bad(1.9-3.0), 2: Good(0.7-1.8), 3: Excellent(0.1-0.6)
S-OHI : 1: Bad(3.1-6.0), 2: Good(1.3-3.0), 3: Excellent(0.0-1.2)

<Table 4> Comparison of oral health index among the three groups (M±SE)

Variables	A (156)	B (159)	C (150)	p value
BOP	41.56±34.09^a	38.43±33.49^a	25.71±32.28^b	.000
CR	53.91±27.04^a	42.11±23.17^b	41.24±27.50^b	.000
DT	45.73±36.51^a	31.58±35.99^b	26.84±32.94^b	.000
MT	2.19± 9.48^a	2.51± 6.74^a	5.55±11.73^b	.003
FT	48.56±36.64^a	58.40±37.88^b	64.28±35.33^b	.001
DMFT	32.87±17.23^a	34.36±19.28^a	39.11±19.34^b	.010

p-values determined by analysis of variance (p<0.05) with Scheffé's post-hoc test.
a, b Different letters indicate statistically significant differences.

Ⅳ. Discussion

As the social and economic environments have improved, medical technology has advanced. The importance of medical quality has increased because of consequent improvements in the quality of lives of people and average lifespans[14]. Concurrently, the importance of oral health has also increased, and prevention is becoming a priority to improve oral health status. However, clinics are more concerned with cure than prevention in South Korea compared with in the United States. The problem of periodontitis is especially serious[2].

The Ministry of Health and Welfare of South Korea reported that periodontitis with asspmpanying tooth loss was a chronic disease in population over 40 years of age in 2007[15]. The Korea National Health and Nutrition Examination Survey reported that half of the individuals aged over 65 years had periodontitis in 2009[16]. Therefore, prevention of the progression of periodontitis is critical. With reference to clinical and epidemiologic study involving humans and animals conducted over 40 years ago, Loe[17] reported that the most

effective treatment for periodontal disease control is biofilm removal. Thus, scaling to remove biofilms is essential. Only 26.6% of elderly people believe that they need regular scaling, this indicates that education regarding the necessity of scaling is imperative. To significantly improve awareness about oral health and attitudes to oral hygiene, continuous oral health education is needed[18].

Preventive habits are essential for oral health, and dental clinic visits with regular scaling individually tailored to the patients' requirements are important for oral health.[21] According to Wilson et al.[19] patients who do not attend appointments at dental clinics have an incidence of tooth loss three times higher than those who attend regularly. In a study by Checchi et al.[20] this incidence was reported to be 5.6 times higher.

Regular scaling is a rudimentary and effective process for both the cure and prevention of periodontitis, and preventive scaling has increased accordingly[21]. Regarding the level of observance in South Korea, individuals who attended appointments for 7 years consecutively numbered 1471 in 2007 but just 225 in 2008－a decrease of 84.1%.

However, revisits for scaling have remained steady at just below this level since 2009[22]. Individuals aged over 20 years who are health insurance subscribers can undergo scaling once a year for 14,000 Won (clinic standard). Thus, revisits for preventive scaling can be expected to increase.

The findings of this study confirm the importance of regular scaling and check-ups. We compared and analyzed OHB and the oral health index in three groups categorized on the basis of regularity of their attendance to scaling appointments. Of the eight measures of OHB examined, we found that Bass method, fluoride toothpaste use, and interdental cleaning were the highest among patients who underwent regular scaling.

The total OHB scores were significantly different between Group C and Groups B and A, implying that regular scaling has a positive effect on OHB. Regarding how oral health habits affect oral conditions, Group C showed the least "Bad" scores for S-DI, S-CI, and S-OHI. Conversely, Groups B and A had the least "Excellent" scores. The S-DI, S-CI, and S-OHI scores differed among the three groups.

Therefore, in Group C, S-OHI score and oral health conditions were good. According to a study by Axselsson & Lindhe[23] S-OHI scores in patients who do not receive continuous care remain at 50%, but the S-OHI scores of patients who receive continuous care show a 10-20% maintained decrease. Thus, scaling, which can remove biofilms, is needed regularly as a part of oral health care to prevent the progress of oral diseases. Group C also exhibited the lowest scores for BOP, CR, and DT, and the highest scores for MT and FT, reflecting a more complete treatment. According to a study by Oh,[24] BOP and CR were improved in the oral care groups, which showed the same results as this study. These results represent the early detection, cure, and prevention of oral diseases. In this respect, it is important to increase patient compliance with scaling revisit again. According

to a study by Han, the decision of patient satisfaction and Intent to revisit was related to the kindness of dental hygienist[25]. To improve the patients' understanding, dental hygienists need sufficient explanation and effort. Dental hygienists must continue to learn scaling as well as effective communication techniques, to improve patients compliance towards regular scaling. In future studies, we aim to assess oral health conditions using objective indices such as experience of scaling and dental treatment to eliminate these problems.

In summary, this study highlights the importance of regular scaling based on the confirmation and comparison of OHB and oral health indices in the regular and irregular scaling groups. Our results demonstrate that education about the necessity of regular scaling is needed to improve attendance to dental follow-up appointments and dispel negative beliefs about scaling. Concomitantly, dental hygienists should try to improve their technical ability in scaling and communication skills. The future direction for medical care is prevention. therefore dentistry is no exception.

Prevention can be achieved with correct tooth brushing technique and scaling in the dental clinic, by reducing tooth damage caused by scaling, and by improving communication with patients as oral health educators. Dental hygienists must continue to study on endeavors and methods to receive regular scaling for prevent oral disease.

V. CONCLUSION

This study showed the importance of regular scaling and check-ups. We compared and analyzed oral health indices and OHB in three groups based on their regularity of scaling and determined the following:

There were differences in the eight measures of OHB examined among the three groups. "Fluoride toothpaste use" and "interdental cleaning" were the highest in Group C. The total OHB score

differed among Group A and the other groups.

Group C had the fewest "Bad" scores for the S-DI, S-CI, and S-OHI, whereas Groups B and A had the fewest "Excellent" scores. The S-DI, S-CI, and S-OHI scores differed significantly among the three groups ($p < 0.05$).

BOP, CR, and DT were the lowest, and MT and FT were the highest in Group C. Oral health index differed significantly among the three groups ($p < 0.05$).

Our results show that OHB and the oral health index were improved in patients who underwent scaling every year. Therefore, regular scaling is important for the early identification and prevention of oral diseases.

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