

## COMPARATIVE STUDY OF THE EFFECT OF TWO DIFFERENT DENTIFRICES ON THE DENTAL PLAQUE DEPOSIT

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### INTRODUCTION

Periodontal disease is one of the most widespread and chronic diseases of human beings<sup>1)</sup>.

The etiology of periodontal disease still remains unknown, however, the evidence that bacterial plaque is the major etiological agent in human periodontal disease has considerable documentation in recent literature<sup>2, 3, 4, 5)</sup>.

One of the most effective plaque elimination methods is known as tooth brushing. Being abreast with the development of various tooth brushing methods types of tooth brushes, many kinds of dentifrice were used.

Korean people have used salt powder as a dentifrice, and therapeutic agent for periodontal disease and tooth mobility since ancient times. But no literature has been found which deals with the effect of salt on periodontal disease.

Therefore, the purpose of this investigation was to find the effect of salt as a dentifrice compared with the Lucky dentifrice on sale in the aspect of plaque.

### METHODS & MEASUREMENTS

The investigation was conducted with 20 S.N.U. dental college students selected from a group of senior volunteers.

The 16 tooth surfaces (8 teeth) selected for examination include; the facial and lingual surfaces of tooth number 22, 23, 24, 25, 26, 27, and the buccal and palatal surfaces of teeth number 3, 14,

Substitution of adjacent teeth (eg; tooth 14 for 15) was permitted when the tooth of first choice was missing, crowned, or otherwise unsuitable for scoring.

Each subject was given two kinds of dentifrice; Lucky dentifrice on sale and the Hwanin salt dentifrice.

At the beginning of the study, each of the subjects received a thorough dental prophylaxis (day 0), and then instructed to use the Hwanin salt dentifrice for 28 days, with the usual tooth brushing method.

During the experimental period, all subjects brushed twice each day, in the morning after breakfast and before retiring.

Plaque was assessed on day 0, before the prophylaxis, and on days 1, 5, 14, 21, and 28.

A well-trained examiner assessed the plaque stained with 2% Malachit green disclosing solution, using Son and Muhlemann's plaque index.

The criteria for Son and Muhlemann's plaque index is as follows:

Degree 0: No plaque

1: Amount of stained plaque is less than 1/6 of tooth surface

2; Amount of stained plaque is less than 1/4 of tooth surface

3: Amount of stained plaque is less than 1/3 of tooth surface

4: More than degree 3

After day 28, all of the subjects again received a prophylaxis and instructed to use the Lucky dentifrice for another 28 days with the usual tooth brushing method.

And then the same procedures were repeated for these 28 days.

## RESULTS

Although the Hwanin salt dentifrice achieved lower plaque scores than the Lucky dentifrice (table 1.3), there was no significant difference in plaque scores between two dentifrices.

On the 1st day the plaque scores were statistically significant for the Hwanin salt dentifrice users ( $P < 0.05$ ) (table 2).

On the 5th and 10th day the plaque scores were lower for the Hwanin salt dentifrice users, but not statistically significant (table 2).

On the 14th day the plaque scores were statistically significant for both dentifrices users. (table 2.4).

On the 28th day the plaque scores were statistically significant for both dentifrices users ( $P < 0.05$ ) (table 2.4).

## DISCUSSION

At present plaque is most effectively eliminated by mechanical means such as brushing and flossing.

However, effective plaque control by these means is time consuming and is generally achieved only by patients who are above average in dental knowledge, motivation, and manual dexterity.

So the needs of chemotherapeutic agent for plaque control have been considered urgently.

Published reports have indicated that many therapeutic agents were used for

Table 1. Plaque scores for Hwanin salt dentifrice users

Subject	0-day	1st-day	5th-day	10th-day	14th-day	21th-day	28th-day
1	1,563	1,063	1,188	1,125	2,188	2,188	2,000
2	1,313	0,688	0,875	0,875	0,875	0,500	0,375
3	2,875	1,813	1,313	1,438	1,313	1,438	1,688
4	2,000	1,125	1,438	1,500	2,313	2,063	2,250
5	1,063	1,000	1,000	1,000	1,000	1,000	1,000
6	1,625	1,500	1,500	1,313	1,188	1,188	1,063
7	0,438	0,500	0,438	0,563	0,625	0,625	0,500
8	1,000	1,000	1,000	1,000	1,000	1,000	1,000
9	0,875	0,875	1,000	0,875	0,813	0,813	0,625
10	1,750	1,500	1,313	1,375	1,125	1,313	0,875
11	1,750	0,625	1,000	0,938	1,000	0,875	0,750
12	0,750	0,625	1,000	0,938	1,000	0,875	0,750
13	1,250	1,188	1,250	1,250	1,375	1,438	1,563
14	1,438	1,563	1,500	1,313	1,563	1,375	1,063
15	1,125	1,063	1,125	1,063	1,000	1,000	1,313
16	0,500	0,750	0,375	0,750	0,875	0,938	0,688
17	2,688	1,688	1,438	0,813	1,375	0,750	1,375
18	1,250	1,000	1,000	1,188	1,430	1,188	0,813
19	1,188	1,250	0,938	0,875	0,875	0,813	0,750
20	<b>2,563</b>	<b>1,000</b>	<b>2,313</b>	<b>2,438</b>	<b>2,125</b>	<b>1,938</b>	<b>1,250</b>
mean	1,4502	1,1158	1,18145	1,169	1,2783	1,2003	1,12205

mean % change \* between 0 day and 28th day 22.63%

$$* \frac{a-b}{a} \times 100$$

Table 2. Hwanin salt dentirrice

	0-day	1st-day	5th-day	10th-day	14th-day	21th-day	28th-day
mean	1.45020	1.11580	1.18145	1.16900	1.27830	1.20030	1.122050
variance	0.457921	0.1256052	0.1772684	0.1686842	0.2243842	0.2195263	0.2457052
S. D.	±0.6766986	±0.3544082	±0.4210325	±0.4107118	±0.4736920	±0.4685363	±0.4956865
S. E.	±0.1513144	±0.0792480	±0.0941457	±0.0918379	±0.1059207	±0.1047679	±0.1108388

significance test

	t	p
O-day and 1st-day	2.0	<0.05**
O-day and 5th-day	1.5	<0.10
O-day and 10th-day	1.6	<0.10
O-day and 14th-day	0.9	<0.25
O-day and 21th-day	1.4	<0.10
O-day and 28th-day	1.7	<0.05**

\*\* Difference is significant

Table 3. plaque scores for Lucky dentifrice users

Subject	0-day	1st-day	5th-day	10th-day	14th-day	21th-day	28th-day
1	1,438	1,313	1,813	1,500	1,125	1,000	1,313
2	0,875	0,875	0,750	0,625	0,688	0,750	0,688
3	1,688	1,563	1,688	1,625	1,625	1,250	1,313
4	1,313	1,250	1,313	1,375	1,313	1,313	1,188
5	1,125	1,063	1,063	1,000	1,000	1,000	1,000
6	1,000	1,000	1,000	0,938	0,938	0,938	0,875
7	1,063	0,813	0,875	0,875	0,875	0,750	0,875
8	1,000	1,000	1,000	1,000	1,000	1,000	1,000
9	0,938	0,625	0,875	0,875	0,938	0,875	0,875
10	0,938	1,000	0,938	0,875	0,875	1,000	0,813
11	1,688	1,000	1,313	1,438	1,125	1,813	1,563
12	0,875	0,938	0,875	1,000	1,188	1,125	0,938
13	1,438	1,063	0,875	1,188	0,813	0,688	1,125
14	1,250	1,250	1,375	1,375	1,063	1,313	1,313
15	1,125	1,000	1,188	1,000	1,063	1,000	1,000
16	0,938	1,250	1,188	1,188	1,188	1,188	1,125
17	1,563	1,125	1,313	1,313	0,813	0,813	0,938
18	1,000	0,938	1,000	1,063	1,188	1,063	1,188
19	1,000	0,813	0,750	0,750	0,750	0,688	0,625
20	<b>1,813</b>	<b>1,688</b>	<b>1,125</b>	<b>1,125</b>	<b>1,375</b>	<b>1,563</b>	<b>1,375</b>
mean	1,2034	1,07835	1,11585	1,1064	1,0475	1,0565	1,0565

mean % change \* between 0 day and 28th day 12.21%

$$* \frac{a-b}{a} \times 100$$

Table 4. Lucky Dentifrice

	0-day	1st-day	5th-day	10th-day	14th-day	21th day	28th-day
mean	1.20340	1.07834	1.11585	1.1064	1.04715	1.05650	1.05650
variance	0.090500	0.0637052	0.0780105	0.0699473	0.0520047	0.0842894	0.0587789
S.D.	±0.3008321	±0.2523988	±0.2793035	±0.2644755	±0.2280453	±0.2903263	±0.2424436
S.E.	±0.0672681	±0.056438	±0.0624541	±0.0591385	±0.0509924	±0.0649189	±0.054212

significance test

	t	P
O-day and 1st-day	1.4	<0.10
O-day and 5th-day	1.0	<0.25
O-day and 10th-day	1.1	<0.25
O-day and 14th-day	1.9	<0.05**
O-day and 21th-day	1.6	<0.10
O-day and 28th-day	1.7	<0.05**

\*\* Difference is significant

plaque control such as chlorhexidine<sup>9)</sup>, alexidine<sup>7)</sup> vancomycin<sup>8,9)</sup>, and organic fluorides<sup>10,11)</sup> as components of dentifrice and mouth rinse.

But these agents have many limitations in use, lack of long-term study, and undesirable side effects such as total suppression of oral microflora, systemic side effects which caused by alternation of body's bacterial flora, brown extrinsic stain on the teeth or tongue etc<sup>12)</sup>.

Huh Jun<sup>13)</sup> reported in Dong Eui Bo Gam, about four hundred years ago that salt was effective to treat or improve the periodontal problems.

According to Dong Eui Bo Gam, he divided salt into white and blue.

The white one was used to subside the gingival swelling by rubbing on the gingiva, and to reduce the tooth mobility by rinsing with hot salt water 100 times a day.

And the blue one was effective the tooth pain by rubbing and rinsing.

The present study was designed to test which dentifrice was more effective in plaque control for the duration of a 28-day period per each dentifrice.

The effect of the Hwanin salt dentifrice was statistically significant on 1st day and 29th ( $p < 0.05$ ) (table 2).

It was because not only the effect of the Hwanin salt dentifrice but also the attitude of the experimental subjects.

Which dentifrice was used first seemed to play an important role.

If we used the Lucky dentifrice first, it might bring us a different result because of the human nature factor.

In the case of the Lucky dentifrice, it also decreased the plaque scores but not more than the Hwanin salt dentifrice.

But statistically it was significant on 14th day and 28th day ( $p < 0.05$ ) (table 4).

Hence we must recognize how greatly the result might be affected by the attitudes and environments of the experimental subject. For one reason, during the experimental period, there were periodic examinations two times, that is, intermediate and final in 1st semester.

In the case of Hwanin salt dentifrice, before and after the 14th day of experimental period, there was an intermediate examination and before and after 5th and 10th day there was a final examination in case of Lucky dentifrice.

From these facts we assumed that the experimental subjects (dental college students) neglected their oral hygiene procedure, so the plaque score was increased than we expected.

After the each examination, the plaque score was decreased again, not only because they oral hygiene procedure but also because the examiner urged and stimulated then to brush more diligently and earnestly.

And the lower plaque scores on 28th day of experimental period were statistically significant ( $p > 0.05$ ).

It seemed that so-called the concept of completion influenced the experimental

subjects intensely.

At the end of the study, all of the subjects were questioned concerning the cleanliness, taste and desirability of using Hwanin salt dentifrice.

All subjects expressed the opinion that the Hwanin salt dentifrice had an intense of saltiness for dentifrice.

But they felt refreshment in the mouth and tightness (or firmness) of the gingiva after brushing with Hwanin salt dentifrice.

So further investigation will be needed concerning the effects of the salt on the gingiva as well as the plaque control.

## SUMMARY

An experimental study was conducted on the effect of the Hwanin salt dentifrice on the plaque control compared with the Lucky dentifrice on sale.

20 dental students used two kinds of dentifrice-28 days per dentifrice.

The Hwanin salt dentifrice achieved lower plaque scores than Lucky dentifrice (22.63% to 12.21%, mean percentage between 0 day and 28th day) but it was not significant difference.

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## 두 종류의 치약이 치태침착에 미치는 영향에 관한 비교연구

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서울대학교 치과대학 4학년 학생 20명을 대상으로 상악 좌우측제 1대구치 협, 구개면 하악 좌우측 중절치, 측절치, 견치의 순설면의 치태 침착 여부를 시판중인 렉키치약과 환인소금치약의 치태침착 억제 효과를 1일, 5일, 10일, 14일, 21일, 28일째 Son and Mühlemann plaque index로 조사한 결과 환인소금치약이 렉키치약에 비해 낮은 치태지수를 얻었지만 (실험첫날과 마지막날의 치태지수의 감소백분율로 보면 환인소금치약의 경우 22.63%, 렉키치약의 경우 12.21%를 얻었다) 통계학적으로 별다른 의미를 찾을 수 없었다.

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