

Researcher : Ei Ei Aung (Affiliation : Department of Oral Health Promotion,
Graduate school of medical and dental sciences, Tokyo Medical and
Dental University)

Research Title : Effect of various kinds of oral hygiene procedures on
oral malodor

Objective :

To assess the effects of different oral hygiene procedures such as tooth brushing, mouth washing, and tongue cleaning as well as combination of those on the reduction of VSCs in periodontally healthy people.

Subjects and Methodology :

A. Subject

Forty eight male Myanmar monk volunteers were screened to assess whether they were matched with the inclusion criteria of this study. After the screening, final subjects in this study were 30 males aged 18–30 years (mean age : 20.18 ± 2.8 years).

B. Study design and procedures

This study had a randomized, single blind, 5-week parallel design. Subjects were randomly divided into two groups (A and B, 15 subjects in each group). Both groups were instructed to brush their teeth with a scrubbing method in the first week to assess the effect of tooth brushing on oral malodor. Subsequently, group A used 12 mL of chlorine dioxide, CLO₂ Fresh[®] mouthwash (Bio-Cide International, Inc., Oklahoma, USA and Pine Medical Co., Tokyo, Japan), for 30 seconds 2 times per day, and group B performed tongue cleaning 2 times per day with a small tooth brush, in addition to tooth brushing for the next 3 weeks. After that, both groups practiced all 3 oral hygiene regimens : tooth brushing, tongue cleaning and mouthwash, for the next one week.

C. Measurements

(1) Oral health status

Dentition status such as decayed teeth (DT), filled teeth (FT) and missing teeth (MT) was examined excluding third molars. The amount of plaque was evaluated with Debris index of Oral Hygiene Index (OHI). Gingival bleeding was recorded if bleeding on probing was detected after the measurement with a periodontal probe. Tongue coating was evaluated by a modified Winkel tongue coating index and the tongue coating score was calculated by adding score of all nine areas, which it ranged from 0 to 18.

(2) Oral malodor evaluation

The amount of total VSCs was measured by a portable sulfide monitoring device Breathron® (Yoshida, Tokyo, Japan). Subjects with the level of total VSCs more than 250 ppb were categorized as oral malodor present. Total VSCs were examined at the baseline and weekly for the next 5 weeks by a principal investigator who was blinded to the belonging of the subject's group.

Results and Discussion :

(1) *Baseline characteristics of the subjects*

The mean age in group A was 19.8 ± 2.9 years and that in group B was 21.1 ± 3.5 years. Mean values of total VSCs (ppb) in group A and B were 345.5 ± 87.4 and 468.7 ± 244.4 , respectively. Mean numbers of present teeth, DT, FT and MT in group A and B were 27.6 ± 0.51 and 27.9 ± 0.34 , 0.13 ± 0.35 and 0.00 ± 0.00 , 0.07 ± 0.26 and 0.00 ± 0.00 , and 0.40 ± 0.51 and 0.13 ± 0.34 , respectively. Mean values of tongue coating score in group A and B were 12.4 ± 4.19 and 11.5 ± 3.21 . There were no significant differences in baseline characteristics between group A and B.

(2) *Change of oral malodor*

There were no significant reductions of total VSCs in both groups at the 1st week examination compared with the baseline (Figure 1). In both group A and B, the mean value of total VSCs level was above 250 ppb, and there was no significant difference in the total VSCs between 2 groups.

From the 2nd to 4th week examination, the total VSCs in both groups made a significant decline compared with the baseline, and all mean values were lower than 250 ppb. Group A showed significantly lower total VSCs values than group B.

At the 5th week examination, the total VSCs were significantly lower than those at the baseline as well as previous weekly examinations in both groups. The mean total VSCs in each group decreased to 111.8 ppb in group A and 118.6 ppb in group B. Moreover, there was no significant difference in the total VSCs between the 2 groups at the 5th week examination.

The change of the percentage of the subjects with oral malodor was shown in Figure 2. At the 1st week examination, more than 50% of the subjects still had oral malodor in both groups. The percentage of subjects with oral malodor in group A decreased to 6.7% since the 2nd week examination and that in group B declined to 20.0% at the 4th week examination. At the 5th week examination, all subjects in both groups had no oral malodor.

The result in this study showed that both groups had significant improvement of oral malodor. Previous studies demonstrate that mouthwash containing chlorine dioxide, ClO₂ can reduce the oral malodor significantly by oxidizing and anti-microbial activities. Tongue cleaning can improve the oral malodor by reducing the amount of tongue coating. This study confirmed that chlorine dioxide, ClO₂, was effective mouthwash for the reduction of oral

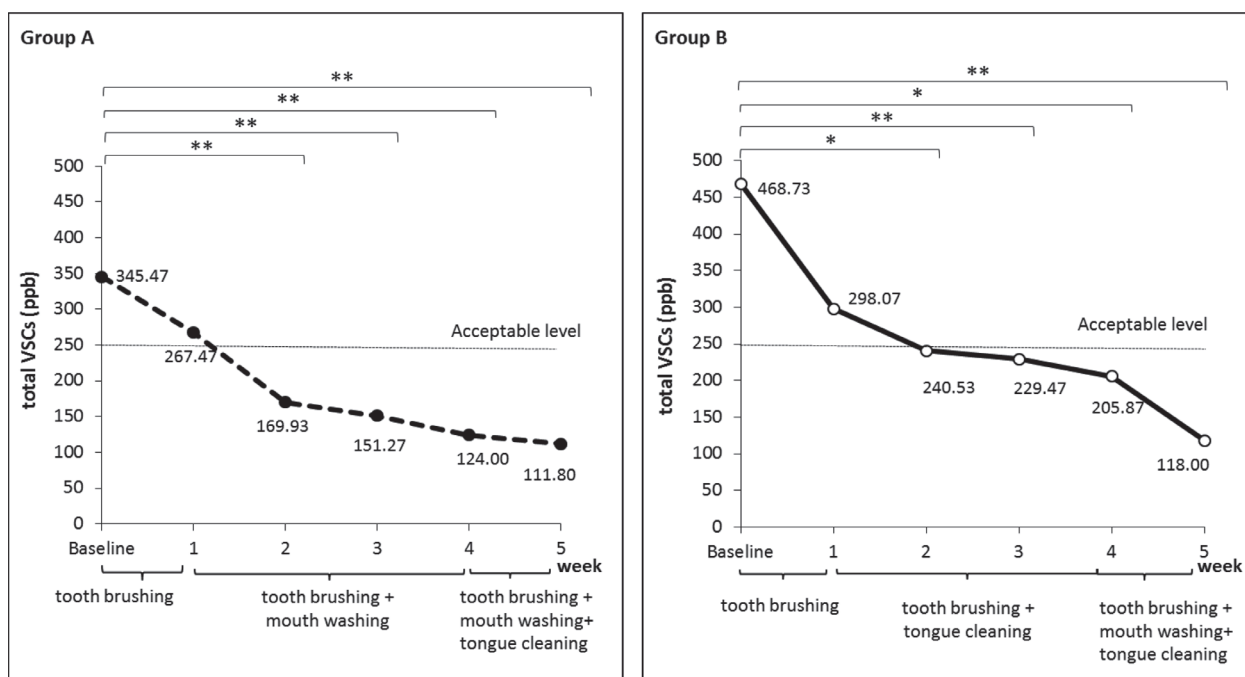


Fig. 1 Change of mean total VSCs (ppb) in group A and B.

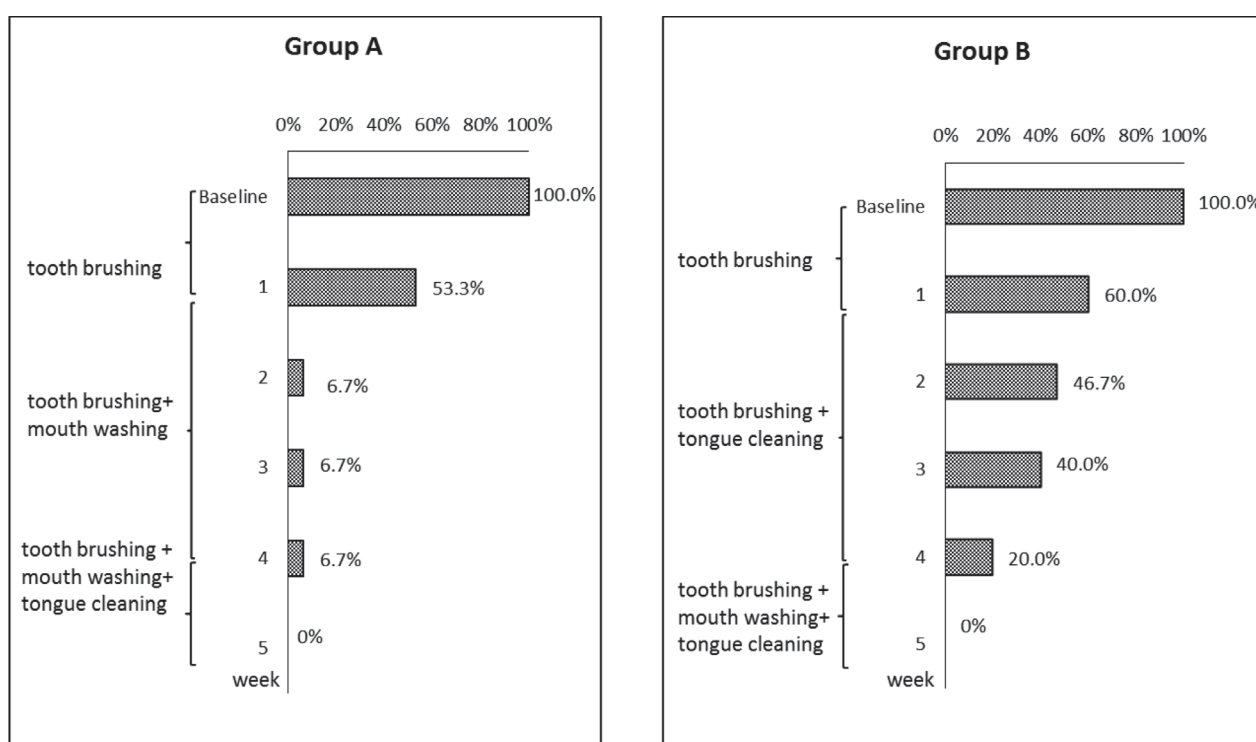


Fig. 2 Change of the percentage of subjects with oral malodor.

malodor and tongue cleaning also improved oral breath. Moreover, the combination of the mechanical and chemical procedures was the most effective regimen for the reduction of oral malodor in the periodontally healthy subjects.

Presentation :

Findings will be presented at conferences inside and outside Japan.

I already presented the finding at the following conference.

2nd Meeting of the International Association for Dental Research-Asia Pacific Region in Bangkok, Thailand, from 21st to 23rd August, 2013.

I will also present the finding at the following conference.

63rd General Meeting of Japanese Society for Dental Health in Kumamoto, from 29th to 31st May 2014.