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Investigating the Efficacy of Intraoral Wet Sheets

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Objective: It is important that oral care is effective, efficient, and economical. Herein, we investigated the efficacy of intraoral wet sheets for oral care in comparison with sponge brushes.
Methods: We completed a Plaque Control Record (PCR) after observing intraoral plaque using a plaque disclosure test in healthy volunteers. After the teeth were cleaned for 3 minutes using a wet sheet, the test was repeated and the PCR was completed. The same method was performed using a sponge brush on the same subject under the same conditions 1 week later. The t test was used to analyze PCR findings.
Results: Ten healthy subjects were enrolled (mean age, 28.6 years). The PCR values improved from 44.0% before to 30.9% after use of the wet sheet. The post-cleaning PCR was significantly lower. The PCR values improved from 55.0% before to 50.2% after use of the sponge brush.
Conclusions: The PCR improvement was greater when using the wet sheet. In all cases, the wet sheet was highly effective at smoothing tooth surfaces. Intraoral wet sheets may be an option for oral care performed by nurses and caregivers. Compared to the sponge brush, the intraoral wet sheet can save time and reduce costs.

Key words: Oral care, oral hygiene, wet sheet, sponge brush, low cost

INTRODUCTION

As we move toward a super-aging society, we will be faced with the problems of how to ensure adequate numbers of nurses and caregivers, how to improve their working environments, and how to manage the costs of nursing with the increase in the number of people requiring care. The importance of oral care is widely known in the oral health field, but it is also important to ensure that oral care is not only effective but also efficient and economical [1-3].

Regarding clinical implications, an understanding of the nature and pathophysiology of dental biofilm is important when implementing proper management strategies. Although the dental biofilm cannot be eliminated, it can be reduced and controlled through daily oral care [4]. Brushing is the basis of oral care and is extremely important and effective for plaque control. Sponge brushes and the like are widely used as auxiliary products for oral care. However, the use of sponge brushes and wet sheets is not common, nor is it reported in the literature. In recent years, oral care using intraoral wet sheets has gained popularity [5]. There is no report in the PubMed on the use of intraoral wet sheets versus a sponge brush for oral care. Thus, we investigated the effectiveness of intraoral wet sheets as an option for oral care compared to sponge brushes.

PATIENTS AND METHODS

All procedures were approved by the Ethics Committee of the University of Tokyo Hospital (ethics permission number: 3960). The investigation conforms with the principles outlined in the Declaration of Helsinki. Healthy volunteers were recruited from the University of Tokyo. The research was conducted from February 2017 to March 2017. O'Leary, Drake, and Naylor's Plaque Control Record (PCR) was completed after disclosing intraoral plaque using a two-tone plaque stain test (Heraeus Kulzer, Hanau, Germany). Then, the volunteers' teeth were cleaned for 3 minutes using a wet sheet (OKUCHIKIREI Wet Sheet®, TAMAGAWA, Tokyo, Japan) (Fig. 1A). All the present teeth were considered. The wet sheet was used as illustrated in Fig. 1B and the surface of the sheet was changed appropriately, when it was stained. The plaque disclosure test was used again, and the PCR was completed. The same examiner conducted the test on the same subject to reduce bias as much as possible. The same method was performed using a sponge brush (TAMAGAWA, Tokyo, Japan) on the same subject and under the same conditions after 1 week.

Data obtained from the PCRs were analyzed using t tests, in Microsoft Excel (Microsoft Co., Bellevue, WA, USA). The results are expressed as means ± standard deviations. Furthermore, we measured the percentages of improvement in the scores by dividing the intraoral area into the mesial, distal, buccal, and lingual surfaces.

RESULTS

The study enrolled a total of 10 healthy subjects, consisting of five men and five women (mean age, 28.6 ± 3.3 years). Intraoral cavity photographs obtained before and after use of the wet sheet are shown

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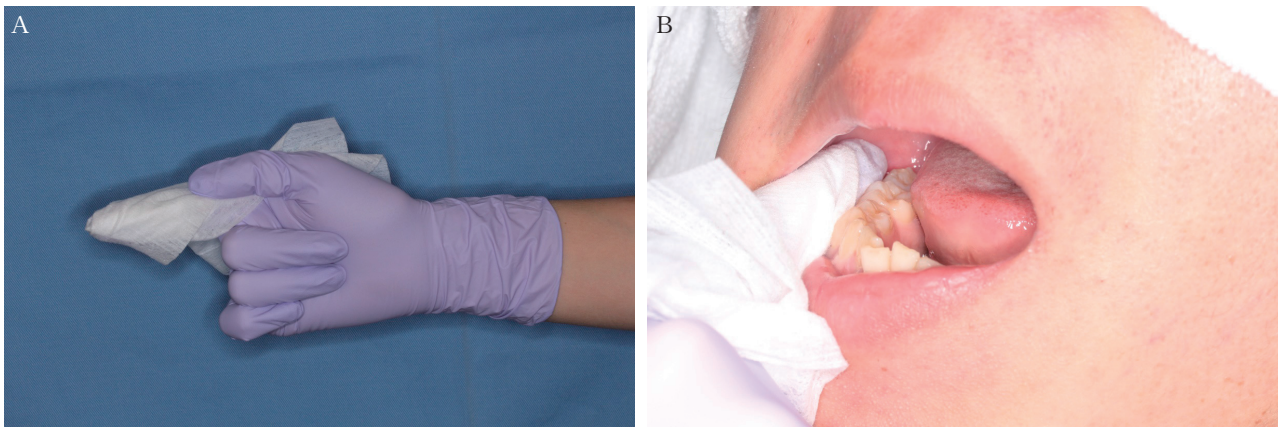

Fig. 1 Method for intraoral wet sheet usage
A: Technique for holding the wet sheet
B: Technique for using a wet sheet for intraoral care

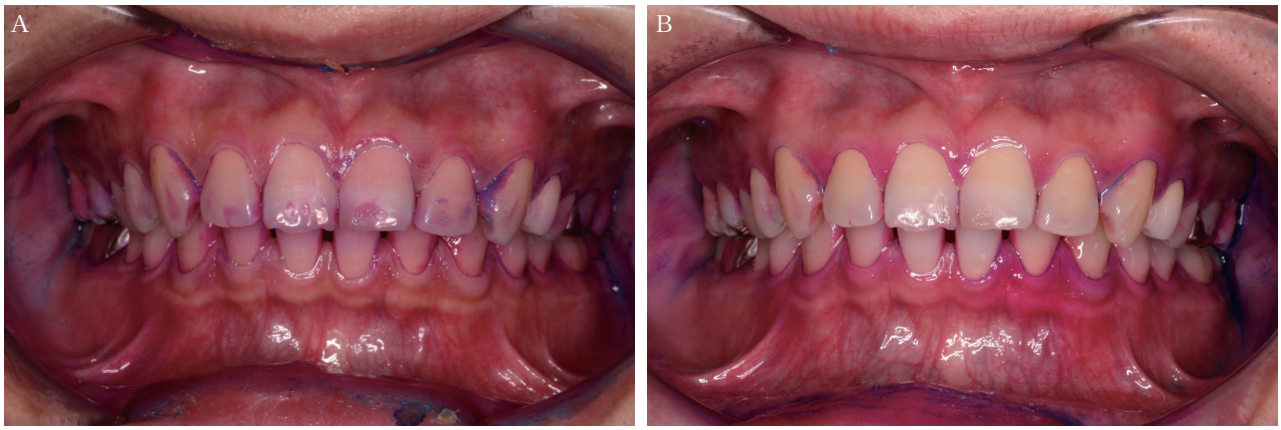

Fig. 2 Intraoral cavity photographs before and after cleaning with an intraoral wet sheet
A: Plaque disclosure test before cleaning
B: Plaque disclosure test repeated after cleaning with an intraoral wet sheet

in Fig. 2. The PCR values improved from 44.0% before to 30.9% after use of the wet sheet (Fig. 3A). The post-care PCR values were significantly lower. The PCR values for the tooth surfaces were as follows: the mesial surface, improved from 70.2% to 61.6%; distal surface, improved from 61.3% to 44.6%; buccal surface, improved from 26.3% to 7.8%; and lingual surface, improved from 18.1% to 9.7% (Fig. 3B). There were significant improvements on all tooth surfaces other than the mesial surface, and there was also a significant improvement overall.

Intraoral cavity photographs obtained before and after use of the sponge brush are shown in Fig. 4. The PCR values improved from 55.0% before to 50.2% after use of the sponge brush (Fig. 5A). The PCR values for the tooth surfaces were as follows: the mesial surface, improved from 84.9% to 77.6%; distal surface, changed from 72.8% to 78.8%; buccal surface, improved from 29.2% to 18.2%; and lingual surface, improved from 33.2% to 26.0% (Fig. 5B). There was a significant improvement for only the buccal surface.

DISCUSSION

Presently, nurses and caregivers mainly use brushing to perform oral care for individuals in reasonably good general health. However, if the patient's awareness and cognition deteriorate, if they are at risk of aspiration, or if they have severe dry mouth, oral care is performed using a sponge brush as well [6]. If a sponge brush is dampened and then used, it is generally possible to remove ingrained sputum and food residue, and thus the sponge brush is indispensable in the oral care of those who are unable to adequately brush their teeth [7, 8]. Care with a sponge brush also involves the use of a paper cup, water, and suction. While suction is not always needed, the sponge brush requires the use of water; if moisturizing agents and so on are used, then these substances may foam in the mouth, hence, suction is often needed after cleaning to prevent aspiration and to ease intraoral discomfort. The cost of using a sponge brush for intraoral care amounts to approximately 80 yen per cleaning, with the sponge brush costing around 50 yen and the suction catheter costing approximately 30 yen. The preparation prior to initiating the procedure and the post-procedure clean-up require time; hence, around 10 minutes are needed per person each time the procedure is implemented, including the time required for oral care. If this procedure is provided for the ideal number of times, namely 3 times a day after meals, the consumables alone will cost approximately 240 yen. Furthermore, it consumes approximately 30 minutes of time of the person implementing the oral care; hence, if we consider the associated labor cost, the procedure is an expensive undertaking. Specifically, according to the information from the Ministry of Health, Labor, and Welfare, based on the job category, for a nurse whose mean hourly rate is approximately 2,340 yen

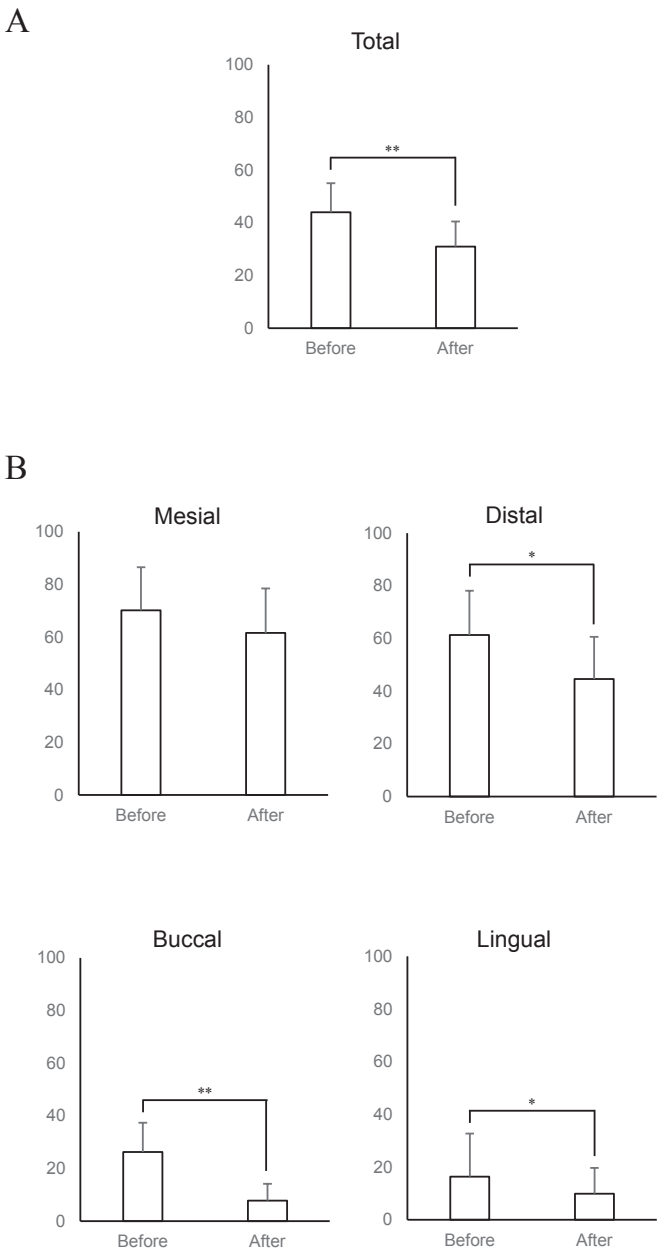

Fig. 3 Plaque Control Record for the wet sheet
A: Overall results
B: The results for the mesial, distal, buccal, and lingual surfaces are shown. The vertical axis shows the percentage. All values are presented as the mean and standard deviation from 10 samples. Statistics were assessed using the *t* test (**P < 0.01, *P < 0.05 vs. baseline)

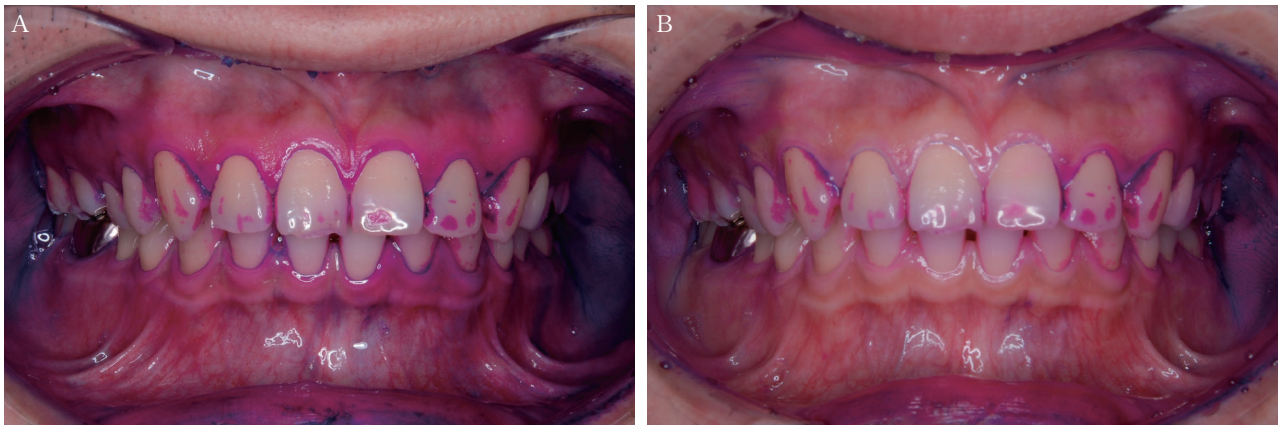

Fig. 4 Intraoral cavity photographs before and after cleaning with an intraoral sponge brush
A: Plaque disclosure test performed before cleaning
B: Plaque disclosure test repeated after cleaning with an intraoral sponge brush

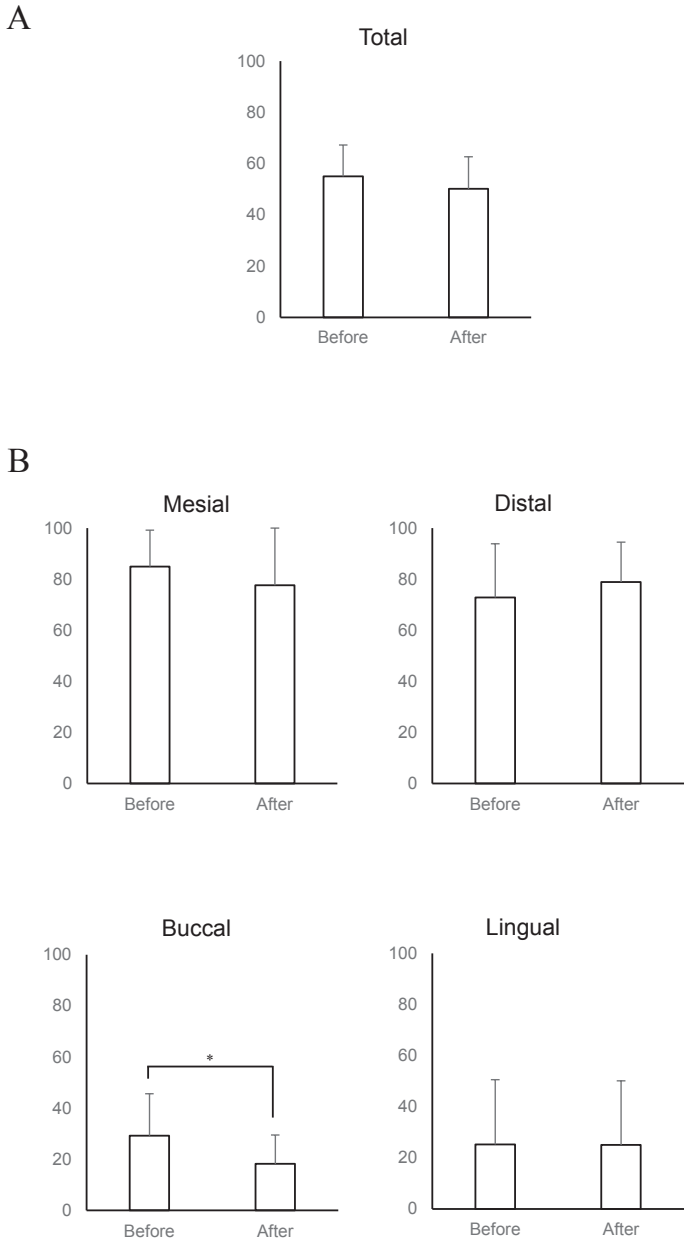

Fig. 5 Plaque Control Record for the sponge brush
A: Overall results
B: The results for the mesial, distal, buccal, and lingual surfaces are shown. The vertical axis shows the percentage. All values are presented as the mean and standard deviation from 10 samples. Statistics were assessed using the *t* test (*P < 0.05 vs. baseline)

[9], the cost for 30 minutes equates to approximately 1,170 yen. If the cost of the material is added, then the cost per day for oral care alone is 1,410 yen. In other words, while oral care using a sponge brush is effective, this method exhibits the disadvantages of the associated high costs and the risk of aspiration.

Conversely, the method using an intraoral wet sheet does not involve water, hence, there is little risk of aspiration, and reports show that it is as effective as conventional oral care during emergencies such as natural disasters [10]. The cost per sheet is also approximately 10 yen, and no other material is needed other than the wet sheet. Moreover, the intraoral wet sheet not only cleans the surfaces of the teeth, but also enables palpation by involving touching the inside of the mouth, ensuring a more accurate ascertainment of the intraoral condition. Using this method also results in massaging of the gums. Gum massage has been reported to be beneficial [11, 12], which may increase the quality of care.

It is difficult to clean between the teeth with an intraoral wet sheet, as is the case with the sponge brush; however, it cleans the surfaces of the teeth better than a sponge brush (Figs. 2, 4). Twisting the sheet into a string shape enables cleaning between the teeth to a certain extent. Furthermore, this method allows cleaning of the tongue surface and simple cleaning of the removed dentures. On the other hand, cleaning the lingual surface with an intraoral wet sheet is difficult in patients who have difficulty opening their mouths, including patients with disturbances in consciousness and cognitive disorders. Specifically, there should be

enough space to insert a finger, and there is also the risk of fingers being bitten. During the care of patients with severe dry mouth, the wet sheet may adhere to the mucosa in the mouth, which makes cleaning difficult. Moreover, cleaning of the oral cavity using wet sheets is not suitable for patients with oral cavity mucosal injury such as that occurring owing to anticancer chemo- or radiation therapy. Therefore, the combined use of brushing for cleaning the teeth and sponge brushing for moisturizing the mucosal injury is desirable; in these cases, using a sponge brush is considered more effective. The basic tool for oral care is a toothbrush, which can mainly be used for cleaning teeth. Furthermore, a sponge brush or an intraoral wet sheet may be used to clean the oral mucosa.

The improvement rate on the PCR was better using the wet sheet method compared to the sponge brushing method. Additionally, in all cases, the intraoral wet sheet was highly effective at smoothing the surfaces of the teeth (Fig. 3). Therefore, the intraoral wet sheet may be an option for oral care performed by nurses and caregivers, and compared to the sponge brush, the intraoral wet sheet can save time needed for oral care preparations, and can also easily reduce the cost of oral care. It is essential to investigate the use of this method at a variety of clinical sites to establish more effective usage methods and to better target patients requiring care.

CONFLICTS OF INTEREST

none

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