



Plaque Removal from a Power Toothbrush with Novel Brush Head

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H.-C. TIMM¹, N. SHARMA², J. QAQISH², M. KLUKOWSKA³, J. GRENDER³, J. ROONEY³, P. HOKE³, and P. CUNNINGHAM³

¹Procter & Gamble, Kronberg im Taunus, Germany, ²Biosci Research Canada Ltd, Mississauga, ON, Canada, ³The Procter and Gamble Company, Mason, OH

ABSTRACT

Objectives: This clinical study was conducted to evaluate the plaque removal efficacy of oscillating-rotating rechargeable power brush with novel brush head design compared to a manual toothbrush. **Methods:** This study was a randomized, examiner-blind, 4-period crossover design, which examined plaque removal of two toothbrushes: ADA manual (brush as you normally do) or Oral-B Professional Care 1000 with newly designed PrecisionClean brush head (manufacturer's instruction), following two repeated single uses with each brush in 40 completed subjects. Subjects were randomized to one of four treatment sequences. Plaque was scored before and after brushing using the Rustogi Modification of the Navy Plaque Index. Statistical analyses were carried out using an analysis of covariance for a crossover design. **Results:** Baseline whole mouth plaque scores were 0.632 and 0.625 for the power brush and manual toothbrush treatments, respectively. The adjusted mean plaque reduction (baseline minus post-brushing) was 0.554 (87.7% reduction vs. baseline) for the power toothbrush and 0.430 (68.8%) for the manual toothbrush. Between treatment comparisons showed that the power brush provided statistically significantly higher plaque reduction (28.8%) than the ADA brush (p<0.001). With respect to gingival margin, the power toothbrush delivered 79.2% and manual 54.9% percent plaque reduction with 44.3% greater reduction (p<0.001) favoring the power brush. With respect to interproximal surfaces, the power toothbrush showed 97.2% and manual 80.5% percent plaque reduction with 20.7% greater reduction (p<0.001) for the power brush. **Conclusion:** Oscillating-rotating rechargeable power brush with novel brush head design removed statistically significantly more plaque (whole mouth, and marginal and interproximal areas) as compared to a manual toothbrush control. Both brushes were well tolerated.

MATERIALS AND METHODS

Study design

This was a replicated single use, 2 (two) treatment, examiner-blind, randomized, 4 (four) period crossover design. A total of 41 subjects were enrolled in the study.

Clinical examinations (4 periods)

The Rustogi Modification of the Navy Plaque Index (RMNPI) was used to measure the pre- and post-brushing plaque level by an experienced plaque examiner.

Product Usage

The study involved a one week acclimation period where the subjects were given an Oral-B Professional Care 1000 toothbrush with previous Oral-B PrecisionClean brush head and Crest Cavity Protection (CCP) paste and brushing instructions (per manufacturer's usage instructions). They were instructed to use their acclimation products for 2 to 3 days and to switch back to their usual toothbrush product 48 hours prior to the start of Period 1. During the treatment periods subjects brushed with the power toothbrush (Oral-B Professional Care 1000 with newly designed PrecisionClean brush head) for 2 minutes per manufacturer's instructions or as they normally do with the ADA manual toothbrush according to their randomization schedule.

Statistical Analysis

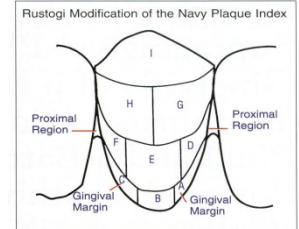
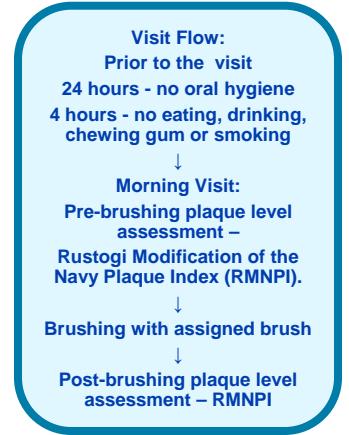
The adjusted mean plaque removal scores (pre- minus post-brushing) for each treatment were analyzed for statistical significance from zero using a t-test (0.05 level of significance) on the adjusted treatment mean score differences from the mixed model analysis of covariance for a crossover design.

RESULTS

A total of 41 subjects were enrolled in the study and all but one was randomized. All 40 subjects who were randomized completed all four treatment periods and were included in the statistical analysis. There were 28 (70%) females and 12 (30%) males; and the subjects ranged in age from 20-69 years with an average age of 42.3 years.

The mean difference from baseline for all RMNPI endpoints for each brush were statistically significant (p<0.001). Specifically, the mean % reduction from baseline for the oscillation/rotation powerbrush with novel brushhead for Whole Mouth, Gingival Margin and Interproximal RMNPI scores were 87.7%, 79.2% and 97.2%, respectively. Similarly for the manual toothbrush, the mean % reductions were 68.8%, 54.9% and 80.5%, respectively.

For Whole Mouth RMNPI, Gingival Margin RMNPI, and Interproximal RMNPI, the oscillating-rotating powerbrush with novel brushhead had statistically significantly higher plaque reduction compared to the manual brush (p<0.001). The % treatment differences ranged from 20.7% and 44.3% higher plaque reduction scores for the oscillating-rotating powerbrush with novel brushhead as compared to the manual brush.



Subset	Toothbrush	n	Pre-Brushing Scores Mean	Reduction in Plaque Index			
				Mean ± SE	% Reduction ²	% Difference ³	Significance [*]
Whole Mouth	Oscillating-Rotating Powerbrush ¹	40	0.632	0.554 ± 0.0054	87.7%	28.8%	p<0.001
	ADA Manual Toothbrush	40	0.625	0.430 ± 0.0054	68.8%		
Gingival Margin	Oscillating-Rotating Powerbrush ¹	40	1.0	0.792 ± 0.0135	79.2%	44.3%	p<0.001
	ADA Manual Toothbrush	40	1.0	0.549 ± 0.0135	54.9%		
Interproximal	Oscillating-Rotating Powerbrush ¹	40	1.0	0.972 ± 0.0096	97.2%	20.7%	p<0.001
	ADA Manual Toothbrush	40	1.0	0.805 ± 0.0096	80.5%		

Table 1: Summary of the Pre- and Post Brushing Plaque Scores

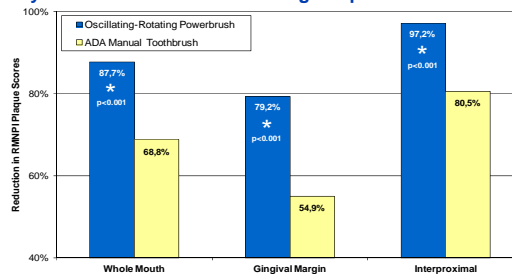


Fig. 1: Percent Plaque Removal After Single Brushing

* Statistically Superior Plaque Removal

¹ Oral-B® Professional Care 1000 (D20) rechargeable toothbrush (Procter & Gamble Company).

² Reduction between the pre- and post-brushing plaque scores, expressed as a percentage of the pre-brushing score.

³ Difference between pre- to post brushing reductions in plaque, expressed as a percentage of the reduction for the ADA Manual Toothbrush.

* Significance of treatment difference using a mixed model analysis of covariance for a crossover design with terms in the model for subject, treatment, period, and pre-brushing scores as the covariate.

CONCLUSIONS

- ❖ The rotating/oscillating Oral-B power toothbrush with novel brushhead was found to remove statistically significantly more plaque (whole mouth, marginal and interproximal areas) compared to a manual toothbrush as control.
- ❖ Both brushes were well tolerated.