

Findings from an 11-year cohort study assessing the impact of electric toothbrushes on oral health

Reference: Pitchika V, et al. Long-term impact of powered toothbrush on oral health: 11-year cohort study. *J Clin Periodontol*, 2019. DOI: 10.1111/jcpe.13126.

KEY FINDINGS

During the 11-year observational period:

- Electric toothbrush users showed significantly lower progression for mean probing depth (22.0%), clinical attachment loss (21.0%), and decayed/missing/filled surfaces (17.7%) compared to manual toothbrush users (Table 1).
- Electric toothbrush users retained 19.5% more teeth compared to manual toothbrush users (Table 1).
- Usage of electric toothbrushes increased from 18% to 37%.

Table 1. Rate of change over 11 years for electric and manual toothbrush users (after adjusting for confounders).

Characteristic (mean)	Manual Brush Rate of Change	Electric Brush Rate of Change	% difference (electric vs. manual)	P-value*
Probing Depth	0.41	0.32	-22.0%	P<0.05
Clinical Attachment Loss	0.93	0.74	-21.0%	P<0.05
Decayed/Missing/Filled Surfaces	7.43	6.11	-17.7%	P<0.05
Number of teeth present	1.86	1.50	19.5%	P<0.05

* Mixed-effects linear regression model

Table 2. Characteristics of cohort at Baseline and Year 11.

Characteristic (mean ± SD)	Electric toothbrush users	Manual toothbrush users	P-value**
Baseline age (years)	46.3 ± 12.4	53.4 ± 14.5	<0.001
Probing Depth (mm)			
Baseline	2.13 ± 0.57	2.34 ± 0.76	<0.001
Year 11	2.38 ± 0.45	2.55 ± 0.65	<0.001
Clinical Attachment Loss (mm)			
Baseline	1.62 ± 1.31	2.38 ± 1.78	<0.001
Year 11	2.21 ± 1.13	2.76 ± 1.59	<0.001
Decayed/Missing/Filled Surfaces			
Baseline	28.6 ± 14.3	34.1 ± 16.7	<0.001
Year 11	32.6 ± 14.3	38.1 ± 16.4	<0.001

** Student's t-test; Baseline = SHIP-1

OBJECTIVE

To evaluate the longitudinal effects of electric toothbrushes on periodontal health, coronal caries and tooth retention based on 11-year data from an adult cohort study in Pomerania, Germany.

METHODS

- 11-year data from adult participants in a Study of Health in Pomerania (SHIP) were evaluated. 2,819 participants were included in the model presented in this paper;

2,304 in the manual toothbrush group and 515 in the electric toothbrush group. See Table 2 for characteristics of the cohort.

- The SHIP study was initiated between 1997-2001 (SHIP-0), but information about toothbrush usage was not obtained until 5 years into the study (SHIP-1). Therefore this evaluation included data from SHIP-1 (2002-2006), SHIP-2 (2007-2011) and SHIP-3 (2012-2016).
- The study involved dental examinations, interviews and medical examinations by trained/calibrated personnel.
- Mixed effects linear regression models were constructed to analyze the data. Data were adjusted for baseline covariates including age, gender, body mass index, education, physical activity, smoking, diabetes status/HbA1c, frequency of toothbrushing and dental visit(s) in last 12 months. Analyses were conducted using Stata/SE 14.2.

CLINICAL COMMENT

These 11-year data from an observational study provide important insights about the oral health benefits associated with electric toothbrush usage. This analysis is based on subject-level data, reflecting comparisons over time on an individual, in their real-world setting. Participants using an electric toothbrush had better periodontal health, as evidenced by slower progression of Probing Depth and Clinical Attachment Loss, and greater natural tooth retention compared to manual toothbrush users. These results are consistent with clinical data, epidemiological data from the recent 5th German Oral Health Study,¹ and systematic reviews indicating electric toothbrushes remove more plaque and provide greater gingivitis reductions than manual toothbrushes.² While the type of electric toothbrush technology used by participants was not assessed, the Oral-B oscillating-rotating electric toothbrush technology has been the category market leader in the region for over a decade. Clinical studies have shown oscillating-rotating electric toothbrushes provide statistically significantly greater plaque and gingivitis reductions versus manual toothbrushes and several other electric toothbrushes.²⁻¹² Collectively, these 11-year data in conjunction with other published findings strongly support use of electric toothbrushes for long-term maintenance of periodontal health.

References

1. Jordan RA, et al. The Fifth German Oral Health Study (Fünfte Deutsche Mundgesundheitsstudie, DMS V) – rationale, design, and methods. *BMC Oral Health* 2014; 14:161
2. Yaacob M, et al. Powered versus manual toothbrushing for oral health. *Cochrane Database of Systematic Reviews* 2014, Issue 6. Art. No.: CD002281. DOI: 10.1002/14651858.CD002281.pub3
3. Ccahuana-Vasquez R, et al. An 8-week clinical comparison of an oscillating-rotating electric rechargeable toothbrush and a sonic toothbrush in the reduction of gingivitis and plaque. *J Clin Dent* 2018;29:27-32.
4. Ccahuana-Vasquez R et al. An eight-week clinical evaluation of an oscillating-rotating power toothbrush with a brush head utilizing angled bristles compared with a sonic toothbrush in the reduction of gingivitis and plaque. *J Clin Dent* 2015;26:80-85
5. Klukowska M, et al. A randomized 12-week clinical comparison of an oscillating-rotating toothbrush to a new sonic brush in the reduction of gingivitis and plaque. *J Clin Dent* 2014;25:26-31.
6. Klukowska M, et al. Six-week clinical evaluation of the plaque and gingivitis efficacy of an oscillating-rotating power toothbrush with a novel brush head utilizing angled CrissCross* bristles versus a sonic toothbrush. *J Clin Dent* 2014;25:6-12.
7. Grender J, et al. Plaque removal efficacy of oscillating-rotating power toothbrushes: review of six comparative clinical trials. *Am J Dent* 2013; 26(2):68-74.
8. Klukowska M, et al. A randomized clinical trial evaluating gingivitis and plaque reduction of an oscillating-rotating power brush with a new brush head with angled bristles versus a marketed sonic brush with self-adjusting technology. *Am J Dent* 2014;27:179-184.
9. Klukowska M, et al. A 12-week clinical comparison of an oscillating-rotating power brush versus a marketed sonic brush with self-adjusting technology in reducing plaque and gingivitis. *J Clin Dent* 2013;24:55-61.
10. Klukowska M, et al. 12-week clinical evaluation of a rotation/oscillation power toothbrush versus a new sonic power toothbrush in reducing gingivitis and plaque. *Am J Dent* 2012;25:287-292.
11. Williams KB, et al. Comparison of rotation/oscillation and sonic power toothbrushes on plaque and gingivitis for 10 weeks. *Am J Dent* 2009;22:345-349.
12. Goyal CR, et al. A randomized 12-week study to compare the gingivitis and plaque reduction benefits of a rotation-oscillation power toothbrush and a sonic power toothbrush. *J Clin Dent* 2009;20:93-98.