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Efficacy of the Spin Brush™ Battery Toothbrush

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Objective

To compare the Dr. Johns Spin Brush Classic (Fig. 1) (Dr. Johns Products Ltd., Bedford Heights, OH, USA) with an ADA reference manual adult toothbrush (Fig. 2) (ADA, Chicago, IL, USA). The Spin Brush has a brush head equivalent in size to a conventional manual brush head, but it is divided into an anterior oscillating/rotating round portion and a posterior potion of fixed bristles.

Fig. 1 a/b: Dr. Johns Spin Brush™

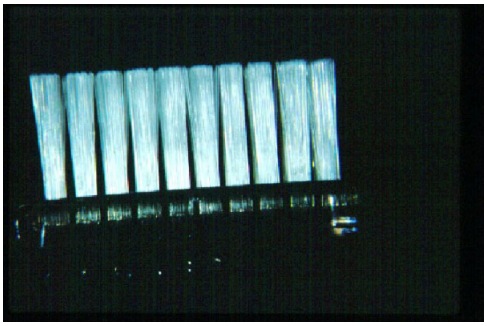

Fig. 2: ADA reference toothbrush

Material and Methods

Study populations
Volunteers for the studies were healthy adult subjects recruited from general popula-tions. To be included, subjects had to be between 18 and 65 years of age with a mini-mum of 20 scorable teeth (excluding third molars, crowns and orthodontic applian-ces). Volunteers abstained from oral hygiene for 48 hours prior to baseline measure-ments of plaque. Exclusion criteria included among others any physical limitation to normal toothbrushing, excessive caries, periodontal conditions that would require treatment or follow-up and the use of antibiotics/anti-inflammatory drugs in the last month.

Study design
The study utilised a single-use, single-blind, cross-over design, where volunteers were randomly allocated to use either the manual or the power brush at Visit 1, and the alternate toothbrush at Visit 2. A washout period of 10 to 12 days separated the two visits, during which time subjects returned to their normal methods of oral hygiene. At each visit, following 48 hours of no oral hygiene, oral hard and soft tissues were examined pre- and post-brushing to monitor for safety.

A total of 76 subjects were entered into the study. At each visit, following the safety examination, subjects had their teeth disclosed with Mira-2-Tone (Hager and Werken GmbH and Co. KG, Duisburg, Germany) after which plaque was assessed for all scorable teeth at six sites per tooth (mesio-buccal, buccal, disto-buccal, disto-lingual, lingual, and mesio-lingual), using the Turesky-Gilmore-Glickman modification of the Quigley and Hein plaque index. The index has a six-point scale (0-5) to describe the amount of plaque. A tooth surface was considered non-gradeable if there was a crown, an extensive cervical restoration or a hypoplastic surface that could interfere with cleaning or cause plaque accumulation. Any surface graded as non-gradeable was not included in the data analysis. Subjects were then given their allocated toothbrush together with Blend-a-med Classic Toothpaste (Blendax, Mainz, Germany) and instructed to brush for a timed one minute. Brushing was carried out without the use of a mirror. A safety examination was next conducted after which the teeth were redisclosed and plaque again scored. Following a washout period, this procedure was repeated using the alternate toothbrush.

Statistical analysis
Data for each subject were entered into the statistical package SPSS (SPSS Inc., U.S.A. Chicago) for calculation of the plaque index values and the statistical analysis. The statistical unit was the single subject. Power analysis was performed using the statistical software package Sample Power (SPSS Inc., U.S.A. Chicago). Plaque removal was expressed as a percentage reductions in plaque index, and the significance level was set at $p = 0.05$. Due to the ordinal nature of the Quigley Hein Index scale, data were analyzed using the non-parametric Wilcoxon test independent from their normal distribution.

Results

76 subjects completed the two phases of this cross-over study (34 males and 42 females - mean age 24.2±7.3 years, range 18 to 62 years) and were included in the analysis of efficacy. No changes in hard or soft tissues were reported post-brushing and no adverse events occurred.
Whole mouth plaque scores were reduced significantly in both groups from pre- to post-brushing ($p<0.001$), as shown in Table 1. In the power toothbrush group plaque was reduced by 35.6% compared with 38.9% in the manual toothbrush group. This difference between the two groups was statistically significant ($p<0.047$) indicating that the manual toothbrush was more effective than the power toothbrush. Table 1 also shows that the difference between the manual and the power toothbrush was significant for buccal surfaces ($p<0.042$). Plaque removal from lingual surfaces was very low with both brushes (power brush 2.7%, manual 6.6%) which might be partially explained by low initial pre-brushing plaque scores. Table 2 shows plaque scores for mesial, central, distal and approximal (mesial + distal) surfaces. For each surface the manual toothbrush was again more effective than the power toothbrush, the difference being statistically significant for mesial and approximal surfaces. Further analysis of results for the individual six sites per tooth examined and for individual teeth revealed a similar pattern of plaque reduction, with the manual toothbrush generally being more effective than the power toothbrush (data not shown). Statistically significant differences in favor of the manual brush were observed, but in no case was the power toothbrush significantly more effective than the manual brush. The statistical power to detect a difference of delta 1% was higher than 99.9%; i.e. the risk of overlooking an existing difference was less than 0.001.

Surfaces	Brush	Pre-brushing	Post brushing	Absolute reduction	p-value	% reduction
Whole mouth	Power	1.77±0.59	1.11±0.39	0.66±0.41	<0.001	35.6±16.0
	Manual	1.76±0.62	1.05±0.40	0.71±0.41	<0.001	38.9±14.9*
Buccal	Power	2.40±0.85	1.16±0.46	1.24±0.70	<0.001	49.8±17.0
	Manual	2.41±0.92	1.09±0.48	1.32±0.69	<0.001	53.5±15.1*
Lingual	Power	1.14±0.54	1.06±0.54	0.08±0.26	0.015	2.7±27.0
	Manual	1.11±0.51	1.01±0.51	0.10±0.26	0.002	6.6±26.7

Table 1: Whole mouth, buccal and lingual pre- and post-brushing Quigley and Hein plaque scores for the Dr. Johns Spin Brush™ and the ADA toothbrush

* Statistically significant difference between groups, $p<0.05$

	Brush	Pre-brushing	Post-brushing	Absolute reduction	p-value	% reduction
Mesial	Power	1.83±0.59	1.20±0.42	0.63±0.40	<0.001	33.0±15.5
	Manual	1.83±0.61	1.11±0.40	0.72±0.38	<0.001	37.8±13.6*
Central	Power	1.60±0.62	0.88±0.39	0.72±0.49	<0.001	42.4±19.0
	Manual	1.60±0.66	0.85±0.41	0.75±0.49	<0.001	44.7±20.8
Distal	Power	1.85±0.57	1.23±0.43	0.62±0.40	<0.001	32.2±16.1
	Manual	1.82±0.60	1.17±0.43	0.66±0.39	<0.001	34.9±15.7

Approximal	Power	1.85±0.58	1.22±0.41	0.63±0.38	<0.001	32.7±14.6
	Manual	1.83±0.61	1.15±0.41	0.69±0.37	<0.001	36.3±13.7*

Table 2: Mesial, central, distal and approximal (mesial+distal) pre- and post-brushing Quigley and Hein plaque scores for the Dr Johns Spin BrushTM and the ADA manual toothbrush

* Statistically significant difference between groups, p<0.05

Conclusion

This investigation demonstrated that, using a single-use study design, the battery powered Dr Johns Spin Brush Classic is not more effective than a standard flat trim manual toothbrush. These results indicate that not all power toothbrushes are necessarily more effective than a manual toothbrush.

This Poster was submitted by Dr. med. dent. Eric von Bethlenfalvy.

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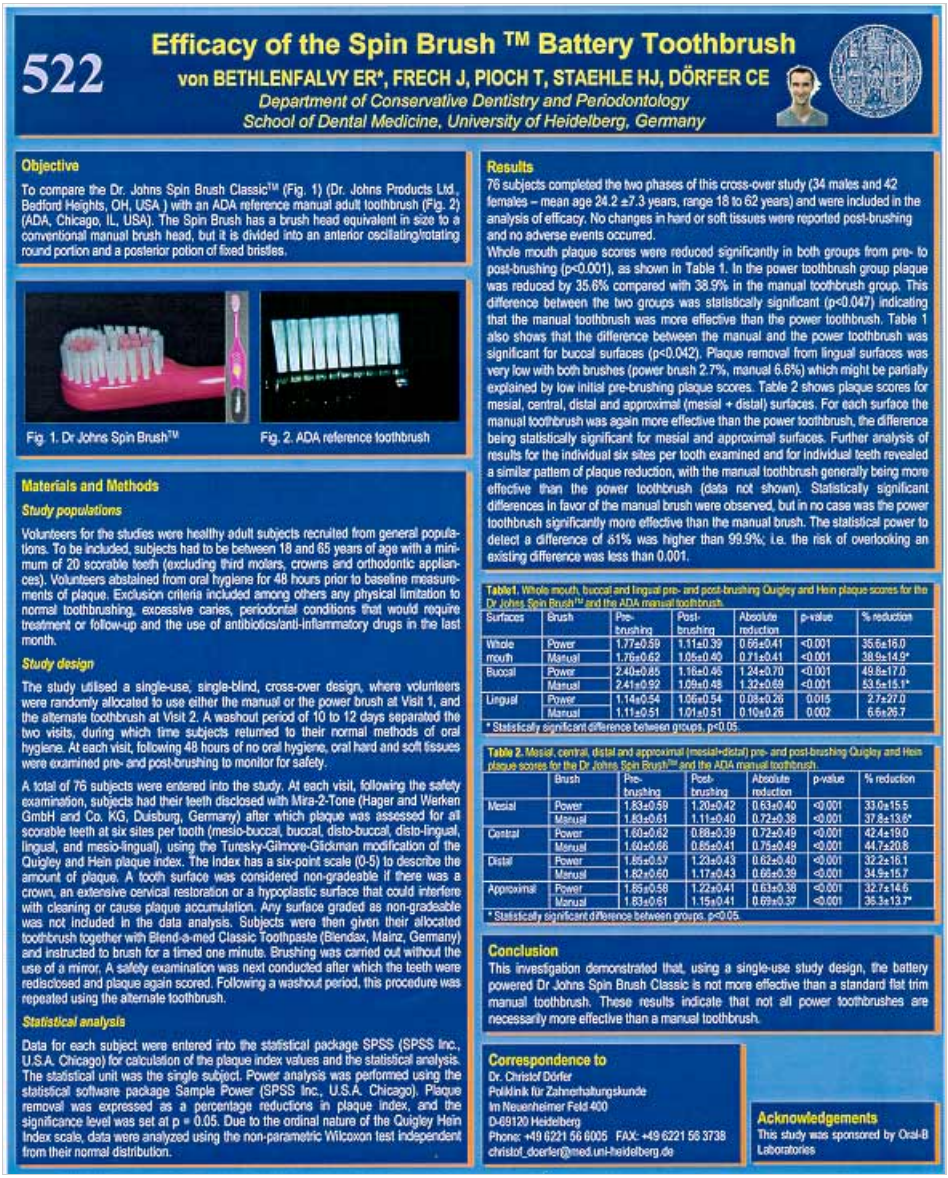

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Fig. 1. Dr Johns Spin Brush™ Fig. 2. ADA reference toothbrush

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