Compliance in use of electric toothbrushes

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This study investigates the frequency of use of electric toothbrushes in relation to time of possession and social background variables. A questionnaire was sent to 129 patients who had acquired an electric toothbrush within 36 months. They were patients at the Department of Clinical Periodontology and at general dental clinics in Örebro. Response rate was 96%. The brush was used daily by 62%, whereas 3% had ceased to use them. Frequency of use and encountered problems were related only for those who had had the brush for 3 years or more. Logistic regression on the frequency of use with the variables age, gender, marital status, education, time of possession, and received instruction showed no associations except in two cases. For patients at general dental clinics, only brush type, and for patients at the department, only encountered problems had explanatory value. The conclusion is that compliance level was high and unrelated to social factors. □ *Powered toothbrush; questionnaire; socioeconomic factors*

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Sales of electric toothbrushes have increased in recent years (Rotadent Inc, Braun Inc., personal communication). Although opinions diverge as to whether they are better than manual toothbrushes with regard to effectivity of plaque removal, many dentists and dental hygienists recommend use of electric toothbrushes (1–4). There are indications that patients with a history of inadequate plaque control improve their dental hygiene by using electric toothbrushes (5). Compliance in the prolonged use of the electric toothbrush then becomes important. Baab & Johnson (6) found that only 41% (11 of 27 patients) used their electric toothbrushes daily in a 6-month follow-up; however, they did not analyze reasons for discontinued use. The aims of the present study were therefore to investigate how frequency of use of an electric toothbrush is related to time of possession, encountered problems, and social background variables.

Subjects and methods

At the Department of Periodontology, Örebro County Council, and at four general public dental clinics in Örebro county, all patients treated by dental hygienists during 1992 were asked whether they had acquired an electric toothbrush during the past 36 months. Affirmative responses were received from 129 patients, 62 at the Department of Periodontology and 67 at the general clinics.

A questionnaire was mailed to the patients at the end of 1992. Those who did not respond within 2 weeks received a reminder. Those who still had not responded after another 2 weeks received another reminder with a new questionnaire form. After that, no further effort was made to get additional responses. There were 124 responses (96%). In view of the high response rate, no analysis of non-response was done. In some questionnaires there was a small internal non-response, showing in some variation in n values in the tables.

The questionnaire contained questions about the following variables: brand name of electric toothbrush (open-ended question); duration of ownership (in years); manner of acquisition (purchase by dental personnel, purchase in drug store, in general stores, gift or similar, other); frequency of use of the electric toothbrush (daily, several times a week, once a week, seldom, never); use of other dental aids (manual toothbrush, interdental cleansers); encountered problems (no problems, technical problems, hard to get brushes, pain in the mouth, cumbersome in use, other); instruction in use of electric toothbrush (none, directions for use, dental personnel, friends/colleagues, other); marital status (married/co-habitant, single); number of children living at home (number); and education (primary school, junior high school, high school, college, other).

The data from the questionnaire, plus information about age and gender collected from the records, were bivariately analyzed in contingency tables. Multivariate analysis was performed using logistic regression with frequency of use as dependent variable (daily versus non-daily use). In the regression models the risk of multicollinearity was considered by not including internally correlated independent variables. Type of brush and manner of acquisition correlated strongly ($r_{xy} = 0.54$), as did instruction from dental personnel with type of brush ($r_{xy} = 0.46$). We included type of brush as independent variable in the models to retain

Table 1. Frequency of use of electric toothbrush in relation to length of possession

Frequency of use	Length of possession (years) <1 (*n*)	1–1.9 (*n*)	2–2.9 (*n*)	≥3 (*n*)	Sum
Daily	14	30	18	12	74(62%)
Less than daily	4	14	11	4	33(28%)
Seldom or never	1	6	2	3	12(10%)
Sum	19 (16%)	50 (42%)	31 (26%)	19 (16%)	119 (100%)

Five missing data; chi-square = 3.45; $p = 0.75$.

the aim of the study. The analyses were performed in SPSS.

Results

The study population consisted of 68 women and 56 men with an average age of 48 years, evenly distributed between the two types of clinics (51% and 49%, respectively). More than half of the study population (60%) used a rotary-type brush (Rotadent), whereas 40% had conventional electric toothbrushes (mainly Braun). The subjectively stated actual use of the toothbrushes was high, according to Table 1. No significant difference in frequency of use between patients at the two types of clinics was found. There was clearly no relation between time of possession of an electric toothbrush and the frequency of its use. In addition to the electric toothbrush, 52% of the patients used a manual toothbrush, 38% of them in combination with daily use of the electric toothbrush and 77% of them with less than daily such use.

In the use of their toothbrushes, almost two-thirds of the patients reported no problems, whereas one-third had experienced some type of problem. Of these, almost half had encountered technical problems with their brush, whereas 12% of those with problems stated that they had had pain in their mouth. There was no statistically significant relation between frequency of use and encountered problems ($p = 0.09$). Controlling for time of possession, we found a significant relation ($p = 0.01$) between frequency of use and encountered problems for those with more than 3 years of possession, but the relation was non-significant for shorter times.

The size of the material did not permit contingency table analysis of explanatory factors behind the use of the electric toothbrush. Instead, multivariate analysis

Table 2. Logistic regression models with frequency of use of electric toothbrushes (daily, less than daily) as dependent variable. Multivarate odds ratios and 95% confidence intervals for a set of independent variables for patients at the periodontal clinic and at the general dental clinics

Independent variables	Periodontal clinic Odds ratio	95% confidence interval	General dental clinic Odds ratio	95% confidence interval
Age (continuous)	1.09	1.01–1.19	1.02	0.97–1.08
Gender				
Men (ref. cat.)	—	—	—	—
Women	1.50	0.24–9.43	0.70	0.21–2.36
Marital status				
Married (ref. cat.)	—	—	—	—
Unmarried	0.12	0.01–1.20	0.27	0.04–1.82
Education				
≤Junior high school (ref. cat.)	—	—	—	—
High school or more	1.16	0.22–6.12	1.26	0.35–4.53
Time of possession				
<2 years (ref. cat.)	—	—	—	—
≥2 years	0.91	0.19–44.40	0.73	0.20–2.59
Brush type				
Rotary (ref. cat.)	—	—	—	—
Other	0.32	0.04–2.33	6.22	1.23–31.41
Encountered problems				
No problems (ref. cat.)	—	—	—	—
Problems	0.18	0.04–0.85	1.91	0.44–8.19
	−2LL = 47.40, $p = 0.42$		−2LL = 62.63, $p = 0.03$	
	Model chi-square = 16.41, $p = 0.02$		Model chi-square = 9.15, $p = 0.24$	
	Predictive value, 81.5%		Predictive value, 67.3%	

(logistic regression) was used, with frequency of use as dependent variable. The results of the analyses are stated in Table 2.

Separate models were constructed for the two patient categories. For the patients at general dental clinics type of brush was the only variable with a statistically significant relation to frequency of use. Using a rotary-type brush was negatively associated with daily use. This multivariate analysis further showed that encountered problems had no relation to frequency of use, when controlling for the set of independent variables. For the patients at the Department of Periodontology the encountered problems were associated with less than daily use.

Discussion

The main result of this study was that the compliance level in the use of electric toothbrushes was surprisingly high. Only 3% of the patient group had completely ceased to use them, whereas 62% used theirs daily, considerably more than in the Baab & Johnson study (6). Comparing patients at the two types of clinics, there were no differences in frequency of use. However, for patients at the general dental clinic, use of a rotary brush was related to impaired compliance, whereas encountered problems was the only impairing factor for the patients at the Department of Periodontology. Compliance was unrelated to socioeconomic background variables for patients from both types of clinics.

There are of course strengths and weaknesses in this study. One advantage was that the study had retrospective design. The patients did not know that they would be part of the study when acquiring and using their toothbrushes. On the other hand, a cross-sectional design can lead to an overestimation of total compliance. Those patients with continuous use become over-represented. This may explain the great differences in compliance levels in this study in comparison with the results in Ref. 6, which had a prospective design.

The response rate in the present study was very high. On the other hand, with the questionnaire method, there is always a risk of high prestige bias in the responses, especially when representatives for dental care issue the questionnaire. The absolute rates of compliance in the material are possibly exaggerations of the true compliances. There was no way in the present study to assess the importance of this bias. On the other hand, there is no reason to expect that this bias would be different for the two patient categories. They showed the same compliance levels.

Considering these problems, the present study should be regarded as a first exploration of compliance in the use of electric toothbrushes. The material was small, limiting analysis. In conclusion, the study indicates that compliance is high in the use of electric toothbrushes and that it is unrelated to socioeconomic factors.

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