How Do Routines of Daily Activities and Flexibility of Daily Activities Affect Tooth-cleaning Behavior?

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Abstract

Objectives: *The aims of this study were: (1) to investigate the level of routines and flexibility of people's daily activity and to identify how tooth cleaning fits into these activities; and (2) to evaluate the impact of different levels of routines and flexibility in daily living on pattern (frequency of tooth cleaning), structure (range of items used in tooth cleaning), performance (relative effectiveness of tooth cleaning) and the outcome of performance (gingival bleeding on probing) in tooth cleaning.* ***Methods:*** *A convenience sample of 471 Brazilians aged 24 to 44 years was selected from factories, offices, banks, shops, and hospitals. Behavioral, socioeconomic, and clinical data were collected through structured interviews. Dental plaque and gingival bleeding were assessed by clinical examination. Data were analyzed by means of logistic regression.* ***Results:*** *A highly significant relationship was observed between routines of daily activities and tooth-cleaning pattern (OR=2.3; 95% CI=1.34, 3.92) after adjusting for age, sex, marital status, and socioeconomic status. No significant associations were observed between routines of daily activities and gingival bleeding. A significant association was observed between tooth-cleaning frequency (OR=1.6; 95% CI=1.07, 2.49), performance (OR=2.7; 95% CI=1.77, 4.14), outcome (OR=2.3; 95% CI=1.31, 3.18), and flexibility of daily activities. Those who had more flexibility of daily activities had lower gingival bleeding scores.* ***Conclusion:*** *People who have a less routinized and more flexible day have higher tooth-cleaning frequency than those who have a less flexible and more routinized day. In this study, those with a more flexible day also cleaned their teeth more effectively than those who had a less flexible day, and had reduced gingival bleeding. [J Public Health Dent 2000;60(3):154-8]*

Key Words: toothbrushing behavior, routines, flexibility, dental plaque.

Toothbrushing is the most common way to clean teeth and is accepted as a universal social behavior in industrialized countries. Reviews on oral hygiene practices indicate that the most common toothbrushing frequency described in these studies was two times per day. Women brushed more regularly than men, irrespective of age, type of patient, or culture. Toothbrushing frequency decreased with age, increased with income, and was related to other oral hygiene activities (1).

A variety of influences can help explain the adoption of personal oral hygiene behaviors. They include sociodemographic and psychological factors. None, however, have been judged adequate in explaining oral health behavior, particularly in adults. More decisively, they do not cast light on the availability and adoption of preventive dental measures (2). Nor do they give adequate explanations for oral health behaviors. They therefore are of limited value because they do not address behaviors such as tooth cleaning, which are habitual and automatic in nature.

Health-related behaviors are built into daily activities in a routine way. This characteristic means that they are habitually performed, a part of the flow of daily life, and tend to fall into predictable and relatively stable individual patterns (3). Thus, their vulnerability to planned health education and health promotion programs is reduced. Cullen and Phelps (4) found that most of the activities performed on a daily basis by a group of urban working class people were characterized by respondents as part of inflexible routines. Activities associated with getting up and going to bed were the least flexible and could not be replaced by other activities. They also were the least location flexible and could not be performed elsewhere. Graham (5), studying British families, showed that mothers described most of their daily activities as routine. Considering a context where conflicting pressures and shortage of resources exist, family welfare may depend on routines in which individual health is shaped. For many families, routines can be considered the health choices that keep the family going.

Croucher (6) demonstrated that tooth-cleaning behavior is part of daily routines placed in a sequence of activities, timings, and locations. These routines are based on two features: primary socialization—what was learned as a child; and lifestyle—where tooth cleaning is fitted into daily activities of people having competing social, economic, and structural constraints (7). Croucher (6) showed a gap between what dentists and hygienists were teaching about oral health care and what patients were doing in their everyday lives. Patients were not following the advice they received from the dental professionals. Complying with dental advice was seen as conflicting with what they had learned as children and intruding on family life (8).

A better understanding of the social constraints that prevent people from improving their tooth-cleaning behavior is required. To gain broader in-

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sights into the factors affecting tooth-cleaning behaviors, a study was planned in which the objectives were: first, to investigate the level of routines and flexibility of people's daily activity and to identify how tooth cleaning is fitted into these activities; and second, to evaluate the impact of different levels of routines and flexibility in daily living on pattern (frequency of tooth cleaning), structure (range of items used in tooth cleaning), performance (relative effectiveness of tooth cleaning), and the outcome of performance (namely, gums bleeding on probing) in tooth cleaning.

Method

This cross-sectional study was conducted in the city of Porto Alegre, Southern Brazil, in 1993. A convenience sample of adults was drawn from organized groups, such as factories, offices, banks, shops, and hospitals. Using quotas, participants were assigned to a category depending upon their sex, social class, and the degree of flexibility of their daily activities. We attempted to have a sample composed of eight groups: men and women of high or low social class, each group comprising individuals with high or low flexibility in daily activities. Our aim was to recruit at least 50 volunteers for each group. A total of 471 subjects were recruited, 91 percent of the number who were invited to participate. Forty subjects declined to participate, and a further seven were excluded from the study either because they fell outside the age limits for recruitment or they were edentulous. The final sample consisted of 234 women and 237 men.

Because socioeconomic factors play an important role in oral health behaviors, the subjects were divided into two socioeconomic groups, namely, higher and lower social class, based on ABA-ABIPEME (9) social criteria. The ABA-ABIPEME socioeconomic classification is based on a group of specific socioeconomic indicators. These indicators can be divided into two categories: resources (TV, radio, bathroom, car, maid, vacuum cleaner and washing machine) and educational level (none, primary school [4 years], primary school [8 years], secondary school [12 years], and university). For resources, points are assigned according to the number of each of the seven resources available in the home. Education levels are assigned according to the number of years of schooling for the head of the family. The points obtained in each category are then summed up to derive a final socioeconomic score. Those with the highest socioeconomic status were coded as class A in order of decreasing socioeconomic status by classes B, C, D, and E. In this study, higher social class included people classified as A and B. The lower social class group included people classified as C and D. Class E was not included because these individuals are not easy to contact. They are mainly composed of homeless people and usually have temporary jobs.

The data collected were of three types: clinical, socioeconomic, and behavioral. They were collected using clinical dental examinations combined with structured interviews. People were questioned on activities of a typical work day, followed by questions on work characteristics and dental health behavior. Interviews took an average of 30 minutes. Levels of dental plaque and bleeding periodontal tissues were measured in the oral examination. The reliability of exams was assessed throughout the field work.

A modification of the Plaque Index devised by Silness and Löe (10) was used for the assessment of the amount of plaque. Buccal and lingual gingival areas of each tooth (instead of four areas) were assigned a score ranging from 0 to 3. Scores from the two areas of the tooth were summed and divided by 2 to give the Plaque Index for the tooth. A Plaque Index for the subject was obtained by summing individual tooth scores and dividing by the number of teeth scored.

The assessment of the presence or absence of teeth with periodontal bleeding after probing was done using the first category of the Community Periodontal Index of Treatment Needs (11). For the purpose of this study, buccal and lingual surfaces of all teeth present in the mouth were examined and scores recorded. Examinations took place at the participant's work place, and were conducted using a head lamp to provide standard illumination. All examinations were carried out with the examiner positioned in front of the subject, who was seated in a chair. Every 10th subject (n=48) was reexamined to assess intraexaminer consistency. Cohen's unweighted kappa coefficient of agreement ranged from 0.95 to 1.00 for the presence or absence of bleeding, and from 0.90 to 1.00 for the presence or absence of dental plaque.

The flexibility and routines of daily activities were measured using rating scales. Commonly employed in social sciences surveys, rating scales elicit a judgment from respondents in terms of a set of ordered categories. The response categories, or quantifiers, and their numerical codes reflect the intensity of the particular judgment involved (12). The following question, or rating scale, adapted from Croucher (6), was used to measure routines of daily activities: "In general, thinking about all your daily activities (all the things you do from when you first get up until you go to bed), how routinized do you think your daily activities are?" Each routine category was given a numerical code to represent the level of the response category, as follows: very routinized=5, routinized=4, quite routinized=3, not very routinized=2, and not at all routinized=1. The variable was dichotomized so that an odds ratio could be calculated for those who had the highest score (response=5) versus the remainder with lower scores (response=1–4).

A measure of flexibility of daily activities also was adapted from Croucher (6). The question asked: "In general, thinking about all your daily activities (all the things you do from when you first get up until you go to bed), to what degree are your daily activities flexible in terms of timing?" A numerical code represented the intensity of the response given by the subjects: very flexible=1, flexible=2, quite flexible=3, not very flexible=4, and not at all flexible=5. The flexibility of daily activities score was stratified into two categories, low flexibility (responses=4 or 5), and high flexibility (responses=1, 2, or 3).

The study set out to assess the association between social and behavioral factors and pattern of tooth-cleaning behaviors (toothbrushing frequency), structure (range of items used to clean the teeth), performance (relative effectiveness of tooth cleaning), and the outcome of performance (gums bleeding after probing). To measure tooth-cleaning pattern, subjects were asked how often they cleaned their teeth. Possible responses included: more

than three times a day (code=1), three times a day (code=2), two times a day (code=3), once a day (code=4), and less than once a day (code=5). The variable was divided into two categories: those with tooth-cleaning frequency ≤2, which was below the median, and those with tooth-cleaning frequency ≥ 3, which was at or above the median. For the regression analysis, the variable was coded 0 for those subjects who had tooth-cleaning frequency ≥3 and 1 for those who had a tooth-cleaning frequency value <3.

Tooth-cleaning structure was measured by asking respondents about the range of oral hygiene aids they used to clean their teeth. The five response categories included: toothbrush, toothpaste, dental floss, wood stick, and mouthwash. Four groups were constructed from answers to this question: individuals who only used toothbrush and paste (code=1); individuals who used brush, paste, and floss (code=2); individuals who only used brush, paste, and toothpick (code=3); and individuals who used brush, paste, floss, and toothpick (code=4). Only a few subjects (9.3%) reported using a mouthwash, so it was not included in the analysis. The use of toothpicks, which was quite high in this study (54.6% of the subjects reported using them) is not always aimed at cleaning teeth, particularly in Brazilian culture, where it is acceptable behavior in public.

Dental floss, which also was high in this study (used by 67.5 percent of the subjects), clearly is used to clean the teeth. Because dental floss use is specific to oral hygiene, and its use requires an appropriate place and more time than the other behaviors, it was used to define structure. Structure of tooth-cleaning behavior was dichotomized as less structure (values=combining 1 and 3; recoded as 1 for regression analysis) and more structure (values=2 and 4; recoded 0 for regression analysis).

The modified Plaque Index was employed to assess tooth-cleaning performance. Because Plaque Index is not considered a continuous variable, two categories were created from the mean subject scores. Those with mean Plaque Index scores ≤2 were considered to have a "low level" of dental plaque (code=0), and those with mean Plaque Index scores >2, a "high level" of dental plaque (code=1). The presence or absence of any teeth with bleeding periodontium after probing was adopted as the indicator of the outcome of tooth-cleaning performance.

Data were analyzed using logistic regression. Statistical significance was considered when $P<.05$, and confidence limits for relative risks were determined at the 95 percent level.

Results

Values for the variable measuring daily tooth-cleaning pattern were high, with a median and mode of 3. Sixty-eight percent of the subjects reported cleaning their teeth three or more times per day, while only 5 percent cleaned their teeth once a day. Women reported cleaning their teeth more frequently than men. With respect to tooth-cleaning structure, 33 percent reported a low structure (brush and paste only), and 67 percent a high structure (brush, paste, and floss). Sixty-three percent of the sample had a Plaque Index score between 1 and 2 and a further 36 percent had a score of greater than 2.

The relationships among routines of daily activities, flexibility of daily activities, and tooth-cleaning pattern, structure, performance, and the outcome of performance were determined using logistic regression. These analyses were adjusted for age, sex, socioeconomic status, and marital status.

Results showed a significant relationship between both routines of daily activities ($P<.01$) and flexibility of daily activities ($P<.05$) and tooth-cleaning frequency (Table 1). Subjects with high routines of daily activities were 2.3 times (OR=2.3; 95% CI=1.34, 3.92) more likely to clean their teeth two or less times per day compared to

TABLE 1
Distribution of Tooth Cleaning Frequency According to Routines of Daily Activities and Flexibility of Daily Activities (n=471)

	Tooth Cleaning Frequency		Odds Ratio	
Variable	Low: ≤2 n (%)	High: >2 n(%)	Unadjusted (95% CI)	Adjusted (95% CI)
Routines of daily activities				
High	36 (47.4)	40 (52.6)	2.2	2.3
Low	114 (28.9)	281 (71.1)	(1.35, 3.66)	(1.34, 3.92)
Flexibility of daily activies				
Low	99 (38.1)	161 (61.9)	1.9	1.7
High	51 (24.2)	160 (75.8)	(1.29, 2.89)	(1.10, 2.57)

Adjusted for age, sex, socioeconomic status, and marital status.

TABLE 2
Distribution of Level of Dental Plaque According to Routines of Daily Activities and Flexibility of Daily Activities (n=471)

	Dental Plaque		Odds Ratio	
Variable	Low: ≤2 n (%)	High: >2 n (%)	Unadjusted (95% CI)	Adjusted (95% CI)
Routines of daily activities				
High	44 (57.9)	32 (42.1)	1.4	1.1
Low	258 (65.3)	137 (34.7)	(0.83, 2.26)	(0.64, 1.89)
Flexibility of daily activies				
Low	138 (53.1)	122 (46.9)	3.0	2.7
High	164 (77.7)	47 (22.3)	(2.04, 4.60)	(1.77, 4.14)

Adjusted for age, sex, socioeconomic status, and marital status.

subjects with low routines of daily activities. Similarly, subjects with low flexibility in daily activities were 1.7 times less likely to clean their teeth two or less times per day than those with high flexibility (OR=1.7; 95% CI=1.10, 2.57) (Table 1).

The association between flexibility of daily activities and performance (Plaque Index score) was highly significant ($P<.001$) (Table 2). Subjects with low flexibility in their daily activities were 2.7 times (OR=2.7; 95% CI=1.77, 4.14) more likely to have higher levels of dental plaque compared to those with high flexibility in their daily activities. The relationship between routines of daily activities and level of dental plaque was not significant.

The association between routines of daily activities and range of items used to clean the teeth was only of borderline statistical significance (Table 3). After adjusting for age, sex, social class, and marital status, routines of daily activities did not remain significantly related to the outcome variable. Nor was flexibility of daily activities significantly associated with the outcome variable.

The relationship between flexibility of daily activities and teeth with periodontal bleeding after probing was significant ($P<.01$) and was not confounded by age, sex, social class, or marital status (Table 4). People with low flexibility in their daily activities were 2.3 times (OR=2.3; 95% CI=1.31, 3.18) more likely to have gums bleeding after probing, when compared to those with high flexibility in daily activities.

Discussion

This study provides strong evidence for a relationship between both routines and flexibility of daily activities and toothbrushing pattern. A strong relationship was observed between routines of daily activities and tooth-cleaning pattern. Other studies also have linked health-related behaviors to daily routines. Graham (5) showed that for many people, on a day-to-day level, much health-related behavior exists at a routine level. Croucher (6) postulated that Graham's finding could be applied to tooth-cleaning pattern. In Croucher's study, tooth cleaning was part of routines that were placed in a sequence of activities, timings, and location (6). In addition, he demonstrated that tooth-cleaning pattern formed "a stable and tightly organized system," and had to be fitted into daily activities where there are competing demands derived from different lifestyles (7).

Little research has been conducted to assess the effects of daily routines and flexibility on health-related behaviors, particularly tooth-cleaning behavior. Tooth-cleaning behavior has been associated with socialization, where the strongest influence is that of the mother (13,14). As children grow up, their tooth-cleaning behavior is influenced more by peer groups (15). During the process of socialization, children learn and internalize forms of behavior that become habits. If they fit into daily routines, these habits might be preserved for a long time. The results of the present research indicate that subjects who had low routines in carrying out their daily activities had higher tooth-cleaning frequencies than those who had high routines, suggesting the organization of everyday life plays an important role in patterns of tooth-cleaning behavior. Health-related behaviors are built into everyday activities in a routine way and tend to fall into predictable and relatively stable patterns (3). This study suggests that what applies to other health-related behaviors also applies to tooth-cleaning behavior.

Many families have little flexibility in their daily routines and activities (4,5), a finding corroborated by this research. Flexibility affected the pattern of tooth-cleaning behavior. Subjects who had low flexibility of daily activities had a lower frequency of tooth cleaning compared to those who had high flexibility in their daily activities.

The highly significant association between flexibility of daily activities

TABLE 3
Distribution of Oral Hygiene Aids Used According to Routines of Daily Activities and Flexibility of Daily Activities (n=471)

	Oral Hygiene Aids		Odds Ratio	
Variable	Fewer n (%)	More n (%)	Unadjusted (95% CI)	Adjusted (95% CI)
Routines of daily activities				
High	32 (42.1)	44 (57.91)	1.6	1.3
Low	121 (30.6)	274 (69.4)	(1.00, 2.72)	(0.78, 2.35)
Flexibility of daily activies				
Low	98 (37.7)	162 (62.3)	1.7	1.4
High	164 (77.7)	47 (22.3)	(1.15, 2.55)	(0.92, 2.17)

Adjusted for age, sex, socioeconomic status, and marital status.

TABLE 4
Distribution of Teeth with Periodontal Bleeding After Probing According to Routines of Daily Activities, and Flexibility of Daily Activities (n=471)

	No Bleeding	Bleeding	Odds Ratio	
Variable	n (%)	n (%)	Unadjusted (95% CI)	Adjusted (95% CI)
Routines of daily activities				
High	21 (27.6)	55 (72.4)	0.9	0.6
Low	100 (25.3)	295 (74.7)	(0.51, 1.54)	(0.33, 1.17)
Flexibility of daily activies				
Low	47 (18.1)	213 (81.9)	2.4	2.3
High	74 (35.1)	137 (64.9)	(1.60, 3.74)	(1.31, 3.18)

Adjusted for age, sex, socioeconomic status, and marital status.

and performance of tooth cleaning suggests that flexibility of daily activities is an important determinant of how well people clean their teeth. As mentioned previously, on a day-to-day level, many people have little flexibility in their activities (4,5). However, flexibility in people's daily activities varies, and these different levels clearly affected tooth-cleaning performance in this study. People who reported a high level of flexibility in daily activities had a better cleaning performance (as measured by levels of dental plaque) than those who had a low level of flexibility. Routines of daily activities were not associated with tooth-cleaning performance, possibly because of the high correlations between routines and tooth-cleaning pattern and between the two explanatory variables—namely, tooth-cleaning pattern and performance.

The present study is the first to link routines and flexibility of daily activities with tooth-cleaning behavior. The results showed the importance of these variables in tooth-cleaning behavior. If experimental studies support our findings, they can be taken into consideration by health educators when planning dental health education. It appears from this work that the choices related to oral health behaviors are contoured by the routines and flexibility of daily life activities. They perhaps mark the limit of choice available to people in different social and economic circumstances (5).

Clearly, the level of routines and flexibility of an individual's day depend on a wider social context that cannot be altered easily. With this constraint in mind, the task of health educators and health professionals is to reduce these barriers by making dental health behavior easier. A number of practical ways can be used to do this. The scrub technique of toothbrushing is effective in plaque removal and is easier to carry out than other methods. For this reason it should be the method of choice (16). It also is the most popular method of toothbrushing (17), which might demonstrate that the public wants a simple, quick, and effective way of cleaning teeth. However, some dental health professionals still recommend the roll method and other more complicated techniques that are generally difficult to follow and are not carried out effectively. The result is poorer tooth-cleaning performance. Health educators and dental health professionals should respond to growing evidence that the public cannot be expected to carry out difficult and time-consuming recommended oral hygiene methods.

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