

Factors associated with Japanese dentists encouraging patients to use dental floss

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Objective The objective of this study was to clarify to what extent Japanese dentists recommend dental floss and what factors influence dentists in encouraging their patients to use dental floss. **Participants** The subjects in this study were 291 dentists who were directors of dental clinics, selected by stratified sampling by age. **Results** Dentists whose teachers at dental school had demonstrated dental flossing tended to recommend patients to use dental floss 2.2 (1.0–4.6; 95% CI) times more frequently compared with those who did not see demonstrations of flossing at dental school. Respondents who considered that using dental floss was very easy and easy, moderate, and difficult recommended patients to use dental floss 45.4 (11.2–183.9), 17.4 (6.6–45.8) and 5.9 (2.5–14.1) times more frequently, respectively, compared with those who considered it very difficult. Respondents who considered that using dental floss was effective, fairly effective or very effective in preventing dental caries recommended patients to use dental floss 3.8 (1.7–8.6), 3.8 (1.7–8.8) and 9.1 (3.6–23.0) times more frequently respectively, compared with those who considered it ineffective or only slightly effective. **Conclusions** The demonstration of the use of dental floss by teachers at their dental schools gave dentists a good impression and a positive opinion of dental flossing. This was closely associated with recommendations by dentists to their patients to use dental floss.

Key words: Dental floss, dentist, impression, opinions, questionnaire survey.

Introduction

Several studies have shown the usefulness of dental floss in maintaining oral health. For example, Wright *et al.* (1977) reported that frequent interdental flossing continued for over 20 months reduced the incidence of proximal caries in deciduous teeth. Biesbrock *et al.* (2006) concluded that two weeks flossing followed by tongue and tooth brushing decreased gingival bleeding. Al-Ansari *et al.* (2006) reported that halitosis is commonly generated in people who do not use dental floss. Based on these studies, both the American Dental Association (ADA) and the National Institutes of Health (NIH) have recommended the general public to conduct flossing more than once a day (American Dental Association, 1988). These studies suggest that frequent use of dental floss improves oral health. In the year 2000, the Japanese Ministry of Health, Labor and Welfare began a national health plan, “Healthy Japan 21”. In this strategy, one of the objectives was to improve the frequency of dental floss use or interdental brushing (Shinsho, 2001).

The results of the International Collaborative Study II, reported that 63% of 12 to 13 year-old children used dental floss in Baltimore, United States, whereas only 4% of children in Japan did so (Chen and Andersen, 1997). More than 15% of 11 year-old children were flossing their teeth daily in Canada, Norway and Northern Ireland. On the other hand, in the Slovak republic, Finland and Hungary, only a small proportion of schoolchildren use dental floss (Kuusela *et al.*, 1997). Kawamura *et al.* (1999)

reported that fewer than 5% of employees perform flossing daily in Japan. In Minnesota, USA, approximately 40% of the general public flosses daily (Bakdash, 1995). Approximately 30% of the general public flosses daily in Detroit, USA (Ronis *et al.*, 1994).

As stated above, the proportion of the general public that uses dental floss has been much lower in Japan than in the USA and some European countries. Thus increasing the frequency of dental floss usage is one of the most important issues for improvement of oral health in Japan. Sheiham pointed out that the issue of oral health education was not generated by a lack of knowledge by patients, but rather a consequence of inadequate explanations and poor recognition of the present low level of use of dental floss among the general public by dentists (Croucher, 1993). Individual dental practitioners are critical gatekeepers with a primary responsibility for transferring information and establishing preventive orientation and programmes for patients (Gift, 1993).

Thus, it is important for individual dentists to recommend their patients to use dental floss and to improve the frequency of dental floss usage by the general public. However, so far there are no studies to have investigated and reported on the relationship between the dentist’s attitude to dental floss and the frequency of advising patients to use dental floss by dentists. The objective of this study was to clarify to what extent Japanese dentists recommend dental floss and what factors affect dentists in encouraging their patients to use dental floss.

Methods

A questionnaire survey was conducted among a sample of 30-79 year-old dentists, members of the Dental Association in Aichi prefecture (3,215 men and 136 women) (Table 1). The participants in this study, 575 men and 25 women dentists, who were directors of dental clinics, were selected by stratified random sampling by age. The sample size was one-sixth of total number of dentists in Aichi Dental Association.

In the survey programme, the participants replied anonymously to a mailed self-administered questionnaire consisting of fourteen questions. The questions were grouped into five sub-themes as follows: (1) frequency of recommending (e.g. by verbal explanation, demonstration or using illustrations of patients using dental floss); (2) the number of full-time dental hygienists employed at their individual dental clinics; (3) education related to dental floss the participants had received during their dental school days; (4) impressions or opinions of the participants about dental floss (i.e., difficulty, pain, price, effectiveness in preventing dental caries, periodontal disease or halitosis, and necessity to popularize); (5) frequency of use of dental floss by the participants.

A multivariate logistic regression analysis was performed to examine what factors were associated with the dentist's positive attitudes to recommending their patients to use dental floss, after adjusting for age and gender. Recommendation scores were divided into recommending or not recommending: always, usually and occasionally, and rarely and never. All analyses were conducted using Statistical Package for the Social Sciences for Windows, Release 15.0J (SPSS, Chicago, IL) statistical software. P values <0.05 were considered to be statistically significant.

Results

Overall, 48.5% of respondents, 274 male and 17 female, were enrolled in the study. The numbers of 30-39, 40-49, 50-59, 60-69 and 70-79 year-old dentists were 39, 85, 123, 36 and 8, respectively (Table 1). The results were described separately, according to the following sub-themes:

Frequency to recommend their respective patients to use dental floss

The proportion of dentists who always, usually, occasionally, rarely and never recommended patients to use dental floss were 5.8, 20.3, 41.9, 20.3 and 8.2%, respectively.

Proportion of dentists who explain the effectiveness of dental flossing to patients

The proportions of dentists who explain the effectiveness of flossing in order to prevent periodontal disease, dental caries, halitosis, gingivitis and to remove plaque were 75.5, 83.1, 31.7, 5.2 and 83.8%, respectively.

Education given as a subject related with dental floss at dental school

The proportions of those who, as dental students, had learnt about dental floss by practice, demonstration by teachers and text books were 26.3, 20.5 and 47.8%, respectively. (Table 2) The respondents who had learnt about dental floss by demonstration tended to recommend patients to use dental floss by 2.2 (1.0-4.6: 95% confidence interval) times more frequently compared with those who had not seen demonstrations of dental floss use in their dental school days.

Number of full-time dental hygienists employed at individual dental clinics

The proportions of dental clinics that employed 0, 1, 2 and 3 or more full-time dental hygienists were 42.4, 30.7, 15.9 and 11.0%, respectively (Table 2). The dentists who employed three or more full-time dental hygienists were 3.4 (1.2-9.4) times more likely to recommend their patients to use dental floss compared with those who employed no hygienist.

Frequencies of use of dental floss

Thirty-eight percent of dentists used dental floss once a day or more and 36.8% of dentists did not use dental floss at all (Table 2). The respondents who use dental floss once a month, once a week, once a day and two or more times a day recommended patients to use dental floss 1.8 (0.7-4.9), 5.9 (2.4-14.5), 11.7 (4.6-39.7) and 7.7 (2.8-21.4) times more frequently, respectively, compared with those who do not use dental floss at all.

Impression or opinion of dentists about dental floss

The proportion of dentists who considered that using dental floss was very easy and easy were 6.5 and 10.3%, respectively (Table 3). The respondents who considered dental floss to be very easy and easy, moderate and difficult to use recommended patients 45.4 (11.2-183.9), 17.4 (6.6-45.8) and 5.9 (2.5-14.1) times more frequently to use dental floss, respectively, compared with those who considered it very difficult. Respondents who considered

Table 1. Numbers of subjects and respondents.

Age(years)	Numbers in initial strata		Numbers of participants	
	Male	Female	Male	Female
30-39	57	3	33 ¹⁾	6 ²⁾
40-49	188	9	83	2
50-59	227	10	117	6
60-69	80	2	34	2
70-79	23	1	7	1
Total	575	25	274	17

1) Including 3 persons in 20s

2) Including 2 persons in 20s

Table 2. Characteristics of dental practiced and dentists influencing patients to use dental floss.

			<i>n</i>	%	<i>Odds ratio</i>	<i>95%CI</i>
Learning through	practice	No	205	73.7	1	
		Yes	73	26.3	0.93	0.49-1.77
	demonstrations	No	221	79.5	1	
		Yes	57	20.5	2.16	1.01-4.62
	text books	No	145	52.2	1	
Yes		133	47.8	1.04	0.60-1.80	
Number of employed dental hygienists	0		123	42.4	1	
	1		89	30.7	1.75	0.98-3.11
	2		46	15.9	1.16	0.57-2.36
	3 or more		32	11.0	3.39	1.23-9.35
Frequency of using dental floss by dentists	None		107	36.8	1	
	Once a month		25	8.6	1.83	0.68-4.91
	Once a week		46	15.8	5.87	2.39-14.46
	Once a day		68	23.4	11.70	4.61-29.70
	2 or more times a day		41	14.1	7.70	2.77-21.43

CI confidence interval
Adjusted for age and gender.

Table 3. Dentists' opinions/attitudes towards dental floss and recommending patients to use dental floss

<i>Description</i>	<i>Category</i>	<i>n</i>	%	<i>Odds ratio</i>	<i>95%CI</i>
Difficulty of using dental floss	Very difficult	40	13.7	1	
	Difficult	106	36.4	5.94	2.51-14.06
	Moderate	88	30.2	17.37	6.59-45.79
	Easy/ Very easy	49	16.8	45.41	11.21-183.93
Pain in using dental floss	Extreme pain/ Severe pain/ Moderate pain	13	4.5	1	
	Slight pain	118	40.5	3.58	1.08-11.89
	No pain	149	51.2	4.41	1.35-14.38
Price of dental floss	Expensive	9	3.1	1	
	Slightly expensive	59	20.3	1.78	0.36-8.90
	Moderate	186	63.9	1.50	0.32-7.01
	Slightly cheap	16	5.5	1.86	0.28-12.51
	Cheap	13	4.5	7.47	0.58-96.15
Effectiveness of preventing dental caries	Ineffective/ Slightly effective	41	14.1	1	
	Effective	89	30.6	3.81	1.69-8.58
	Fairly effective	71	24.4	3.83	1.66-8.84
	Very effective	82	28.2	9.10	3.59-23.03
Effectiveness of preventing periodontal disease	Ineffective	9	3.1	1	
	Slightly effective	55	18.9	4.51	0.85-23.91
	Effective	91	31.3	8.85	1.69-46.35
	Fairly effective	59	20.3	10.14	1.86-55.39
	Very effective	68	23.4	14.21	2.57-78.57
Effectiveness of preventing halitosis	Ineffective	14	4.8	1	
	Slightly effective	65	22.3	4.76	1.32-17.24
	Effective	119	40.9	6.25	1.78-21.94
	Fairly effective	54	18.6	7.95	2.07-30.45
	Very effective	31	10.7	12.66	2.75-58.26
Necessity in spreading dental floss	Unnecessary/ Slightly necessary	53	18.2	1	
	Necessary	119	40.9	9.73	4.45-21.25
	Exceeding by necessary	50	17.2	11.41	4.32-30.14
	Absolutely necessary	60	20.6	25.73	8.70-76.14

CI confidence interval
Adjusted for age and gender.

that using dental floss was accompanied by no pain or slight pain recommended patients to use dental floss 4.4 (1.4-14.4) and 3.6 (1.1-11.9) times more frequently, respectively, compared with those who considered that using dental floss produced moderate, severe or extreme pain.

More than 80% of the dentists considered that using dental floss was effective, fairly effective or very effective in preventing dental caries. The respondents who considered that using dental floss was effective, fairly effective and very effective in preventing dental caries recommended patients to use dental floss 3.8 (1.7-8.6), 3.8 (1.7-8.8) and 9.1 (3.6-23.0) times more frequently, respectively, compared with those who considered it ineffective or only slightly effective.

Approximately 20% of the dentists considered that popularization of dental floss was absolutely necessary. The respondents who considered that popularization of dental floss was necessary, exceedingly necessary and absolutely necessary recommend patients to use dental floss by 9.7 (4.5-21.2), 11.4 (4.3-30.1) and 25.7 (8.7-76.1) times frequently, respectively, compared with those who considered it unnecessary or only slightly necessary.

Discussion

Gift suggested that professional dental care providers play an important role in teaching patients about oral hygiene techniques and in encouraging their use (Susan, 1993). However, in this study, only a quarter of the dentists always or usually recommended the use of dental floss to their patients. These results suggested that providing information on dental floss by dentists and hygienists to the public is inadequate in Japan. Increased information provision about dental floss by the dentists could contribute to making the use of dental floss more popular.

Ronis *et al.* (1994) reported that a substantial proportion (66.3%) of respondents mentioned the cleaning benefit of flossing. Only 19% mentioned prevention of dental caries or periodontal disease as the main benefit of flossing. In addition, the most frequently cited disadvantages of flossing were the cleaning time required (24.6%), soreness or potential damage to gums or teeth (11.2%) and the difficulty of using floss (4.5%). Our study revealed that the dentists explained to their patients the effectiveness of dental floss in cleaning the teeth, but also the preventive effect on dental caries and periodontal disease. The general public recognized only the cleaning effect. Explaining to the general public that using dental floss prevents oral diseases may be necessary to popularize use of dental floss.

Cortes *et al.* (2002) concluded that dental education may have influenced dental students' initiative in seeking and obtaining dental treatment. In this study, the respondents who had participated in demonstrations at dental school were more likely to recommend patients to use dental floss. Barenie and Ripa (1977) state that modeling has great potential for facilitating appropriate behavior and helping to eliminate fear and inhibition. Demonstrations of the use of dental floss may give dentists a more positive opinion of its use.

Gift (1993) reported that when dental hygienists are not employed as preventive auxiliaries, the dental practice appears to be placing less focus on prevention and health promotion, since the use of auxiliaries in practice is associated with the provision of higher levels of preventive services. Our study suggests that the dentists who employed three or more full-time dental hygienists recommended patients to use dental floss more often compared with those who did not employ any full-time dental hygienists. These findings suggest that dental hygienists fulfill an important function in increasing the use of dental floss.

Merchant *et al.* (2002) reported that 56.3% of dentists in the United States flossed at least once daily. In this study, 37.5% of dentists used dental floss once or more a day. These results show that the frequency of use of dental floss by dentists was low in Japan, and that improvement in the frequency of dentists recommending their patients to use dental floss would be encouraged by an increased frequency of use of dental floss by dentists.

Some limitations of our questionnaire survey are apparent. Firstly, we could not examine whether dentists educated patients with a correct flossing technique. Secondly, we could not examine whether the dentists' education influences the frequency of use of dental floss by patients.

Conclusions

The results of our survey on the general opinions of dentists about dental floss can be summarized in the following.

The dentists who had learnt about dental floss by demonstration tended to recommend patients to use dental floss more frequently compared with those who had not seen the technique demonstrated in their student days. The number of dental hygienists employed full-time at the clinics is strongly correlated with the frequency with which the directors of dental clinics recommended patients to use dental floss. In addition, dentists who recognized the need to popularize the use of dental floss, who regularly used dental floss, who believed dental floss to be effective in preventing dental caries, periodontal disease and halitosis, or who had the impression that dental floss is easy to handle and not painful to use, are more liable to recommend dental floss to their patients. Therefore, it is important to increase the proportion of dentists in Japan with these characteristics.

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