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Smoking habits among Swedish dental hygienists: a 15-year perspective (1987–2002)

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Abstract: *Objectives:* The aim of the study was to explore the smoking habits of Swedish dental hygienists over a 15-year period from 1987 through 2002, and compare these with the smoking habits of Swedish women in general during the same period. *Methods:* Random samples of dental hygienists in the age range 20–65 years representing 95% of the Swedish work force were collected based on professional membership. Smoking prevalence data for Swedish women in the general population were retrieved from national statistics. *Results:* The overall prevalence of current smokers among dental hygienists was 14.9%, 13.4% and 11.2% in 1994, 1998 and 2002, respectively, suggesting a slight decline during the period. The corresponding prevalence for Swedish women in general was 28.2%, 24.8% and 20.9% respectively. The observations indicate a considerably lower prevalence for dental hygienists than for women in general. For Metropolitan areas, the prevalence of current smokers among dental hygienists was 25.3%, 18.1%, 14.9% and 15.6% in 1987, 1994, 1998 and 2002, respectively, compared with 32.4%, 28.1%, 22.8% and 20.0%, respectively, of Swedish women in general, confirming a lower prevalence among dental hygienists. A vast majority of dental hygienists smokers consented to smoke a maximum of 10 cigarettes per day; a consumption that remained stable over the years studied. *Conclusion:* The prevalence of current smokers among Swedish dental hygienists was considerably lower than the corresponding prevalence among Swedish women in general during the years 1987 through 2002. A continuous decline in smoking prevalence was observed among dental hygienists as well as among women in general.

Key words: cigarettes; dental hygienist; epidemiology; prevalence; smoking; tobacco

Introduction

The relationship between tobacco smoking and periodontal illness is well documented (1, 2). In fact, the Surgeon General concludes that there is sufficient evidence to infer that smoking is a causative factor for periodontal disease (3). Dental professionals can be assumed to be well aware of smoking associated oral health risks (4) and also to have a unique position to inform patients who smoke about oral health risks and assist in smoking cessation counselling as they have frequent contacts with large proportions of the population. In particular, dental hygienists have an important role in smoking hazards information and actions aiming at motivating smoker patients to quit smoking, as their education is focused on oral disease prevention (5). It has been shown that the dental professionals' own smoking habits are important to their reliability and willingness to take actions to promoting smoking cessation among patients (6). Consequently, it is of interest to explore to what extent dental hygienists themselves are smokers. The smoking habits of dental hygienists, however, have been but little investigated in the past and little is known about possible changes in their smoking habits over time. One previous study in Sweden reported a smoking prevalence of 17% among dental hygienists in 1991 (7).

There has been a considerable drop in smoking rates in Sweden over the past 10–15 years, which is believed to be the result of increased awareness of smoking associated health risks. According to the latest census in 2005, 14% of men and 17% of women were smokers (http://www.scb.se). We hypothesized that the smoking rate among dental hygienists has dropped in recent years along with the general downward trend due to the increased awareness of the smoking-related health hazards in general and a better understanding of the smoking–periodontal disease relationship in particular. In order to further explore the smoking habits of Swedish dental hygienists and possible changes in these over time we have compiled data covering the years 1987 through 2002. The study aimed at elucidating the smoking pattern of dental hygienists in comparison with that of Swedish women in general.

Materials and methods

The present study is based on the selection of members of the Swedish Dental Hygienists' Association, covering 95% of the dental hygienist labour force in Sweden. Random samples of dental hygienists in the age range 20–65 years employed in private or public health service were carried out in 1994, 1998 and 2002 (8–10). Out of 471, 575 and 577 members invited in 1994, 1998 and 2002, respectively, 364 (77%), 495 (86%) and 411 (71%) responded. Female proportion was 97–100%. Smoking prevalence data for Swedish women in the general population for the same years were found from the Swedish Board of Health and Welfare (Statistics Sweden, http://www.scb.se). Weighted means for 5-year age strata from 20 through 65 years were used.

In addition, all dental hygienists residing in the Stockholm Metropolitan area were invited in 1987 to take part in a questionnaire study about their smoking habits (11). Out of 325 members invited 265 (82%) responded. To match this 1987 Metropolitan sample, also Metropolitan residents of the 1994, 1998 and 2002 samples were sub-sampled. These latter subsamples, however, included dental hygienist residents of the three major cities of Sweden (Stockholm, Göteborg and Malmö). The number of participants in the 1994, 1998 and 2002 Metropolitan sub-samples were 105, 175 and 109, respectively. For comparison, data for Swedish women of Metropolitan areas in general were compiled using weighted means of age strata 16–24, 25–44 and 46–65 years. The rationale of separately evaluating Metropolitan areas was the opportunity to have a long-term perspective of 15 years. As the smoking habits differ in various parts of Sweden (http://www.scb.se), it could not *a priori* be assumed that the prevalence estimates of Metropolitan areas would be the same as those of the nation as a whole.

Assessments

Postal questionnaires were used including questions about age, gender, smoking habits and size of community where working or living. The question related to smoking habits was phrased 'Do you smoke cigarettes or other tobacco products?' The following response categories were applicable: (1) 'No, I have never smoked'; (2) 'No, I have stopped' and (3) 'Yes, I currently smoke.' Respondents reporting current or past smoking were asked to provide the number of cigarettes smoked per day. The data referring to smoking habits of the Swedish Board of Health and Welfare and Statistics Sweden (Surveys on Living Circumstances) were based on interview (7). The item on smoking was phrased 'Do you smoke daily?'.

Ethical approval

Ethical approval was obtained for each separate study from the ethics committee of the Karolinska University Hospital (no. 94–253; no. 98–091) and the regional ethics committees at Karolinska Institutet and Uppsala University (no. 02–092).

Statistics

Descriptive statistics were used to describe the nationwide and Metropolitan areas alone samples of Swedish dental hygienists according to smoker status (current, former and never), age and year of study. The age and current cigarette consumption of dental hygienist samples were expressed as mean and standard deviation (SD). The Pearson chi-square analysis was used to analyse frequency differences between groups. Yates correction was applied where appropriate. The SPSS 15.0.0 statistical software (Chicago, Illinois, USA) was used for the analyses. Statistical significance was accepted at $P < 0.05$.

Results

Smoking habits nationwide 1994–2002

The distributions of study participants providing data on smoking habits according to age and year of investigation are presented in Table 1. The mean (SD) age in 1994, 1998 and 2002 was 41.9 (8.7), 44.3 (8.9) and 45.5 (9.9) years, respectively. In 1994, 52% of participants belonged to the 41–65 years age bracket; in 1998 and 2002 the corresponding proportions were 65% and 68%, respectively. The differences between 1994 and 1998 and between 1998 and 2002 were statistically significant ($\chi^2 = 18.5$ and 7.7, respectively, $P < 0.01$).

The prevalence of current smokers among dental hygienists according to age is presented in Table 2. Overall, 14.9%, 13.4% and 11.2% were current smokers in 1994, 1998 and 2002, respectively. There was a trend towards a linear decline over the 8-year period ($\chi^2 = 3.4$, $P = 0.067$). The decline was consistent for all age strata except the 21- to 30-year stratum, where an increase was observed between 1998 and 2002. Regarding the 41- to 65-year age bracket, a significant decrease from 18.8% in 1994 to 11.6% in 2002 was observed ($\chi^2 = 4.5$, $P < 0.05$).

Table 1. **Distributions of dental hygienists providing data on smoking**

	1994		1998		2002	
Age (years)	*n*	%	*n*	%	*n*	%
21–30	32	8.8	42	8.5	41	10.0
31–40	137	37.7	114	23.0	66	16.1
41–50	127	35.0	215	43.4	172	41.8
51–65	62	17.1	108	21.8	106	25.8
Valid	358	98.6	479	96.8	385	93.7
Missing	5	1.4	16	3.2	26	6.3
Total	363	100.0	495	100.0	411	100.0

Number (*n*) and percentage (%) of participants according to age and year of investigation. Nationwide samples.

Table 2. **Prevalence of current smokers among dental hygienists**

	1994		1998		2002	
Age (years)	*n*	%	*n*	%	*n*	%
21–30	1	3	0	0	5	13
31–40	18	13	10	9	6	9
41–50	25	20	33	15	23	13
51–65	10	16	21	20	9	9
Total	54	14.9	64	13.4	43	11.2

Number (*n*) and percentage within age group (%) according to age and year of investigation. Nationwide estimates.

The smoking prevalence of Swedish women in the general population was 28.2% in 1994, 24.8% in 1998 and 20.9% in 2002. The differences between dental hygienists and Swedish women in general were throughout statistically significant ($\chi^2 = 30.8$, 32.4, 21.7, respectively, $P < 0.001$). The observations, therefore, suggest that the smoking rates of dental hygienists were lower than the rates of Swedish women in general by approximately 10 percentage units during the period investigated.

The cigarette consumption of dental hygienist current smokers is presented in Table 3 according to age and year of investigation. The majority reported a consumption of 10 cigarettes per day or less. This proportion of low-to-moderate consumption smokers was 64.3% in 1994, 84.1% in 1998 and 80.4% in 2002. The difference between the years 1994 and 1998 was statistically significant ($P < 0.05$). The estimated mean (SD) consumption in 1994 was 9.8 (6.3) cigarettes per day as against 7.9 (5.1) cigarettes per day in 1998, and 9.7 (6.1) cigarettes per day in 2002. The differences were not statistically significant.

Smoking habits in Metropolitan areas 1987–2002

The prevalence of current smokers among dental hygienist residents of Metropolitan areas was 25.3%, 18.1%, 14.9% and 15.6% in 1987, 1994, 1998 and 2002, respectively, suggesting a

Table 3. **Cigarette consumption of dental hygienists**

	1994		1998		2002	
Consumption (cigarettes per day)	*n*	%	*n*	%	*n*	%
1–10	36	64.3	53	84.1	37	80.4
11–15	13	23.2	7	11.1	5	10.9
>15	7	12.5	3	4.8	4	8.7
Total	56	100.0	63	100.0	46	100.0

Number (*n*) of persons and percentage of total (%) according to cigarettes smoked per day and year of investigation. Nationwide estimates.

Table 4. **Distributions of dental hygienists according to smoking habit and year of investigation**

Smoker status	1987		1994		1998		2002	
	n	%	*n*	%	*n*	%	*n*	%
Current	67	25.3	19	18.1	26	14.9	17	15.6
Former	97	36.6	37	35.2	69	39.4	41	37.6
Never	101	38.1	49	46.7	80	45.7	51	46.8
Total	265	100	105	100	175	100	109	100

Metropolitan segment of population.

reduction over the 15-year period by approximately 10 percentage units (Table 4). The 1987 prevalence was significantly different from the 1998 prevalence ($\chi^2 = 6.9$, $P < 0.05$) and the 2002 prevalence ($\chi^2 = 4.2$, $P < 0.05$). It was further observed that the prevalence estimates of Metropolitan areas for the years 1994, 1998 and 2002 were increased in comparison with the nationwide estimates.

The prevalence of smokers among Swedish women of Metropolitan areas in general was 32.4%, 28.1%, 22.8% and 20.0% in 1987, 1994, 1998 and 2002, respectively. The differences between dental hygienists and Swedish women of Metropolitan areas were statistically significant in 1987, 1994 and 1998 ($\chi^2 = 5.6$, 3.8 6.2, respectively, $P < 0.05$) but not in 2002 ($\chi^2 = 1.2$, $P > 0.05$). The observations regarding Swedish Metropolitan areas confirm the nationwide observations that the smoking rates of dental hygienists were lower than those of Swedish women in general but that the gap tended to decrease in 2002. The long-term perspective of the smoking prevalence changes among dental hygienists and Swedish women in general is presented in Fig. 1, where the 1987 data refer to Metropolitan areas estimates and the 1994, 1998 and 2002 data refer to nationwide estimates.

The cigarette consumption among dental hygienist residents of Metropolitan areas was largely similar to the consumption observed nationwide, a majority reporting a consumption of 10 cigarettes per day or less. The mean values (SDs) were 9.8 (4.8), 10.7 (8.2), 7.0 (4.7) and 14.9 (6.9) cigarettes per day for 1987, 1994, 1998 and 2002, respectively.

Discussion

The objective of the present study was to investigate the smoking habits of dental hygienists in a long-term perspective. This was achieved by the use of repeated samples representing the profession nationwide over an 8-year period between 1994 and 2002, and, additionally, over a 15-year period between 1987 and 2002 regarding Metropolitan areas. The most striking observation was a considerably lower smoking

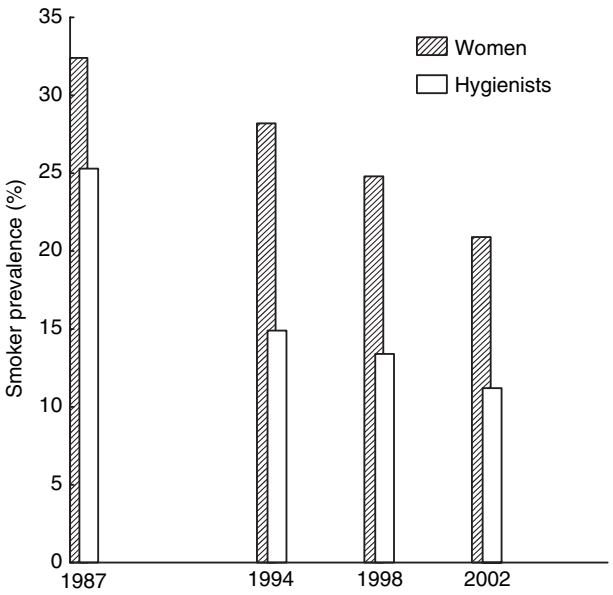

Fig. 1. Prevalence of current smokers among dental hygienists and Swedish women in the general population. 1987 data refer to Metropolitan areas estimates and 1994, 1998 and 2002 data refer to nationwide estimates.

rate among dental hygienists when compared with that of Swedish women in general throughout the years studied. This held true for the population at large as well as for Metropolitan areas. The nationwide data suggested a difference of approximately 10 percentage units and the data for Metropolitan areas somewhat less.

There has been a considerable decline in smoking rates over the past 10–15 years in Sweden, particularly among men but also among women. A further question to be elucidated, therefore, was whether or not smoking rates had changed also among dental hygienists. With reference to the nationwide data, the 8-year decline was approximately 4 percentage units among dental hygienists compared with approximately 7 percentage units among Swedish women in general. With reference to the Metropolitan areas data, the 15-year decline was approximately 10 and 12 percentage units among dental hygienists and Swedish women in general, respectively. Our observations, therefore, suggest that a decline had occurred also among dental hygienists, although of smaller magnitude than that among women in general.

A vast majority of dental hygienist smokers reported a daily consumption of 10 cigarettes or less, suggesting rather moderate smoking. Thus, our observations suggest that dental hygienists are not only comparably infrequent smokers but also comparably moderate smokers.

Studies about the smoking habits of dental hygienists are scarce, in Sweden as well as elsewhere. According to one

Swedish study, 17% of dental hygienists were daily smokers in 1991 (7). This smoking rate is well compatible with the present observations when extrapolated to that year. A recent study among English dental hygienists in 2005 reported a smoker prevalence of 4% (12), which is clearly less than the present observations, also when projected to that year. The reason for this discrepancy is not known.

The prevalence of daily smokers among healthcare professionals belonging to the Swedish Association of Health Professionals (nurses, midwifes and biomedical analysts) was 5–9% in 1999 and 7–11% in 2003 (http://www.vardforbundet.se). The prevalence of daily smokers among Swedish dentists in 1989 was 10% and that of physicians in 1999 and 2001 was 10% and 6%, respectively (6, 13). Compared to the smoking rates of these health professionals in Sweden the smoking rates of dental hygienists seem to be somewhat higher.

It has been stated that dental hygienists are well positioned to deliver smoking cessation advice to patients in dental practice (14). The effectiveness of dental hygienists as smoking counsellors, however, is not extensively studied although some reports indicate that dental hygienists or 'the dental team' may be modestly successful (15–17). A recent meta-analysis suggests that the effectiveness of smoking cessation interventions is roughly the same regardless of type of provider (18). Many barriers to the involvement of dental professionals in smoking cessation actions have been recognized (19). One factor of importance to the effectiveness of anti-smoking activities is the professionals' own smoking habits. According to our present observations about 10% of dental hygienists in Sweden are regular smokers. This circumstance will add to the previously identified barriers and negatively influence the effectiveness of the dental hygienist profession in actions to promoting smoking prevention and cessation in the dental setting. It is, therefore, a challenge to educators of dental hygiene to implement health aspects on smoking into the curricula not only to promote training in anti-smoking activities but also to influence the smoking behaviour of the students of dental hygiene.

Strengths and limitations

The present observations were based on random samples of members of the national dental hygienist association, which covers 95% of active professionals in Sweden. In addition, the response rates were throughout satisfactorily high and the national statistics data were based on large surveys. These facts assure high quality regarding nationwide data. The Metropolitan areas data, however, were based on relatively low participant numbers in the dental hygienist samples. Further, the 1987 data represented dental hygienists in Stockholm only, whereas data for 1994, 1998 and 2002 included residents of Göteborg and Malmö. Additionally, national statistics data for Metropolitan areas were based on comparably small sample sizes, rendering Metropolitan areas data of inferior quality compared with nationwide data. Moreover, age groupings for Metropolitan dental hygienist samples and population samples did not always completely match. These circumstances should be borne in mind when interpreting the observations referring to Metropolitan areas.

Conclusion

The prevalence of current smoking among Swedish dental hygienists was considerably lower than the corresponding prevalence among Swedish women in general during the 15-year period from 1987 to 2002. Although a declining smoking rate over the period was observed also in dental hygienists, the decline was smaller than that of Swedish women in general, and still more than 10% of dental hygienists in Sweden are regular smokers. This circumstance may modify the effectiveness of the profession in actions towards smoking information, prevention and intervention within the dental setting.

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