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Prevalence and incidence of dental caries and related risk factors in 70- to 76-year-olds

CECILIA N. JOHANSON[1], TOR ÖSTERBERG[1,2], BERTIL STEEN[2] & DOWEN BIRKHED[1]

[1]*Department of Cariology, Institute of Odontology and* [2]*Geriatric Medicine, Sahlgrenska Academy, University of Gothenburg, Sweden*

Abstract

Objective. The prevalence of caries and various risk factors was studied cross-sectionally in two cohorts of 72-year-olds over the course of 20 years. Incidence was also studied over a period of 6 years. ***Material and Methods.*** Samples of two dentate subjects from cohorts of 70 to 72-year-olds were included; cohort III ($n=135$), born 1911–12, and cohort VI ($n=139$), born 1930. Cohort III was also examined at 70 years of age and re-examined after 6 years. An interview and clinical examination, including DMFS, plaque and gingival bleeding indices, pocket depth, and secretion rate for stimulated whole saliva, were carried out. ***Results.*** The mean numbers of teeth in cohorts III and VI were 14 and 21, respectively. On average, 2.1 tooth surfaces were decayed (DS) in cohort III compared with 1.3 in cohort VI ($p<0.05$). 49% of the individuals in cohort III did not develop any new DS, while 19% developed ≥ 3 DS during the 6-year follow-up period. The prevalence of caries was related to plaque and gingival bleeding indices, as well as a pocket depth of ≥ 4 mm, at ages 70 and 72. Moreover, the incidence of caries was related to the same factors. ***Conclusions.*** The numbers of remaining teeth increased and the prevalence of caries decreased over the 20-year period. The incidence of caries over the follow-up period of 6 years was moderate. The results indicate that the prevalence of plaque, gingival bleeding, and a pocket depth of ≥ 4 mm are predictive factors for both prevalence and incidence of caries.

Key Words: *Cross-sectional, elderly, epidemiology, longitudinal, population study*

Introduction

Life span is increasing in many industrialized countries [1–3] and survival rate after 65 years has risen markedly in the past decade. In the Swedish population, the survival rate is expected to increase even more until the year 2050 [4]. Several studies have shown that the percentage of dentate persons is also rising [5–7], as well as the number of remaining teeth [8–10]. The increasing survival rate, the new health-care policies (with fewer elderly people living in institutions), and the large number of dentate elderly people are making it increasingly important to investigate the elderly from a cariological point of view. Multiple dysfunctions, both physical and mental, can be expected to increase the risk of dental caries at high ages. In this context, it is interesting not only to study the effects of aging on dental caries but also to estimate the need for dental care and prevention, including the early identification of caries-related risk factors.

Many epidemiological studies of the elderly have been carried out in institutionalized individuals [11,12]. During the past decade, there has been an increase in population studies of both caries prevalence [13–17] and incidence [18–23]. Several factors have been studied in relation to dental caries in the elderly. A number of studies have reported that poor oral and general health are correlated to caries in old age [24,25] as well as previous experience of caries [24–26]. Lundgren et al. [27] and Guivante-Nabet et al. [12] found that low salivary buffering capacity was related to root surface caries. In addition to these factors, removable partial dentures also increase the risk of root caries [18,28]. After studying middle-aged and elderly people, Fure & Zickert [13] concluded that the risk factors for root surface caries were similar to those for coronal caries.

This study was part of the gerontological and geriatric population studies conducted in Göteborg,

Correspondence: Cecilia Johanson, Department of Cariology, Institute of Odontology, Box 450, SE-405 30 Göteborg, Sweden. E-mail: cecilia.n.johanson@vgregion.se

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Sweden (H70). These examinations started in 1971, more than 35 years ago, and they enable both cross-sectional and longitudinal analyses. The aim of the present investigation was to compare the prevalence of dental caries in dentate subsamples of two cohorts of 72-year-old city populations in a 20-year perspective, and secondly, to study the incidence of caries in one of the cohorts over a 6-year period. A third aim was to relate dental caries to various oral risk factors from cross-sectional and longitudinal points of view.

Materials and methods

Study population

Cross-sectional studies. Gerontological and geriatric population studies have been conducted in Göteborg, Sweden, since 1971. From five 70-year-old cohorts, representative samples (I, II, III, V, and VI) born in 1901/02, 1906/07, 1911/12, 1921/22, and 1930/31, have been investigated. The procedure and sampling methods have been described in detail previously [29–32]. The present study was based on cohorts III and VI, born in 1911/12 and 1930/31, respectively. In cohort III, an intervention study "Intervention Elderly in Gothenburg" (IVEG) was added. The investigation was multidisciplinary and included medical, odontological, psychological, sociological, and dietary examinations. The total sample of 70-year-old subjects comprised 806 persons in cohort III and 780 in cohort VI. The response rates were 77% and 62%, respectively, and 619 subjects from cohort III and 484 from cohort VI were included in the main study. The non-responders in cohort III did not differ from the responders. Only minor differences were found in terms of factors such as the prevalence of cancer, myocardial infarct, diabetes, drug treatment for high blood pressure, and smoking habits between non-participants and participants in cohort VI [31,32]. From cohort III, 581 took part in the odontological examination at 70 years of age and 380 were dentate. Of those within the control group (chosen because they received no intervention) who participated in the odontological examination at both 70 and 72 years of age, 135 were compared with 139 dentate responders from cohort VI. These 139 individuals represent all out of the 187 consecutively selected subjects from the total sample of 484 in cohort VI who attended the odontological examination for the present study. Comparisons between the two cohorts were made during the examinations carried out at the age of 72 in both cohorts.

Longitudinal studies. Of the 185 subjects from the control group in cohort III examined at 70 years of age, 135 also took part in the second examination at the age of 72. For the longitudinal study, we selected the 111 individuals (61 F and 50 M) who took part in both the first and third examinations. In women, the response rate at 76 years of age was higher than that in men, i.e. a higher mortality rate among the men, 16% versus 10%. Responders and non-responders showed no difference in the prevalence of caries at the age of 70, while those who died between the two examinations differed from the others in both the number and percentage of decayed surfaces (DS) at 70 years.

Odontological examination

The examinations in cohort III were carried out by one of the authors (C.J.) and another experienced dentist. For calibration, the two dentists examined the first 57 subjects simultaneously at the age of 70 years. Inter-observer variation was analyzed by comparing the mean values of all registrations (for both caries and periodontal status); no significant differences were found. In cohort VI, all registrations were carried out by C.J.

The odontological studies were based on interviews and a clinical examination. In the interview, questions about dental health, hygiene, and the utilization of dental care were asked. The clinical registration included dental status, oral mucosa, mandible function, and salivary secretion rate. In the present study, only dental status, salivary secretion rate, and utilization of dental care are reported.

Caries on enamel and root surfaces was registered when a cavitation was diagnosed with a mirror and explorer [33]. Decayed (DS), filled (FS), and sound (SS) tooth surfaces were registered separately, as well as primary decayed (DpS), secondary decayed (DsS), and root surface caries (RDS). Dental plaque was scored by a visible plaque index (VPI) and gingivitis by a gingival bleeding index (GBI) [34]. All exposed root surfaces were registered, as well as deep pockets ($\geq$4 mm), on all mesial, buccal, distal, and lingual surfaces.

A paraffin-stimulated whole saliva sample was collected as described previously [35]. In cohort III, the sample was taken in the morning between 0800 and 0900 h after an overnight fast [35]. In cohort VI, the saliva was collected during daytime, with no eating, toothbrushing or tobacco use in the 1 h before examination. The secretion rate was calculated in ml/min. Buffer capacity was measured using the Dentobuff chairside test [36] in cohort III and the method described by Ericsson [37] in cohort VI. Information about the utilization of dental care was based on the question from the interview: "When did you last visit a dentist?"

Statistics

Differences in mean values between two groups were tested with the *t*-test. Confidence intervals for means

were calculated using the formula for normally distributed data. Tests of correlation between factors were performed by testing partial correlation coefficients adjusted for the number of tooth surfaces. The change in mean value between the ages of 70 and 76 was checked by paired one-sample *t*-tests. Predictors in a multivariate setting of prevalence of caries were evaluated in ordinary least squares linear regression models. For cohort differences, an asymptotic permutation *t*-test was used. Factors included in the partial correlation and the regression models were stimulated salivary secretion, buffer capacity, VPI, GBI, pocket depth of ≥ 4 mm, exposed root surfaces, and visits to the dentist.

Results

Cross-sectional comparison of dental status

The mean number of teeth was significantly higher ($p < 0.001$) in cohort VI, 21 teeth (22.1 in women and 20.2 in men), compared to 14.1 teeth (14.7 in women and 13.4 in men) in cohort III (Table I). The number of dentate subjects with 1–9 remaining teeth changed from 32% in cohort III to 4% in cohort VI, while the percentage of subjects with ≥ 20 teeth changed from 30% to 70% (data not shown). Distribution of the remaining surfaces between the different tooth types is given in Table II; the mean number is significantly higher in cohort VI compared with cohort III for all the different tooth types. The percentage of surfaces of molars and premolars is higher in cohort VI, but significantly lower for incisors and canines. Differences for the remaining teeth in the lateral and frontal segments are more pronounced in the lower jaw than in the upper jaw (Figure 1). Differences between the cohorts are more marked in the upper jaw than in the lower jaw. A small number of teeth in the maxilla are intact, while in the mandible approximately 50% of the frontal teeth are intact. In this respect, there are fewer cohort differences when it comes to intact teeth.

On average, 2.1 surfaces per subject were decayed in cohort III (Table I): 1.9 in women and 2.3 in men. The corresponding figures in cohort VI were 1.3, i.e. 1.4 in women and 1.2 in men. The difference between the cohorts was significant in men ($p < 0.05$). The mean number of sound, filled, and exposed root surfaces was higher in cohort VI ($p < 0.05$–0.001), while the mean number of surfaces with primary and root caries was higher in cohort III ($p < 0.05$–0.01). Periodontal status, gingivitis, and plaque index were higher in cohort VI ($p < 0.001$); furcation defects were approximately twice as high. Gingival pocket depth was about the same in both cohorts.

A higher percentage of sound surfaces was found in men in cohort VI ($p < 0.05$), while women had a higher percentage of filled surfaces ($p < 0.05$) (Table III). The most significant difference between women and men related to primary caries in cohort III, 1% versus 3%. The mean values (%) of DpS, DsS, and RDS in cohort VI were significantly lower compared with cohort III ($p < 0.01$– < 0.001).

In cohort III, no caries was found in 28% and, in cohort VI, no caries was found in 58%, both women and men ($p < 0.001$) (Figure 2). The majority of individuals with caries had 1–4% DS and approximately twice as many men as women in both cohorts had $\geq 5\%$. In cohort III, 10% had a high percentage of DS $\geq 15\%$, while the corresponding figure in cohort VI was only 1% (data not shown).

In cohort III, 73% (82% women and 63% men) had visited a dentist within the previous year, while

Table I. Cohort differences regarding tooth variables (mean value (SD)). Adjusted for total number of tooth surfaces, except number of teeth, and gender.

	Cohort III (n = 135)		Cohort VI (n = 139)
Number of teeth	14.1 (7.1)	***	21.0 (5.7)
Number of tooth surfaces			
Total	62.0 (32.6)		94.0 (27.0)
Sound	25.0 (21.1)	*	38.1 (24.2)
Filled	36.3 (21.6)	*	55.5 (22.2)
Number of exposed root surfaces	21.6 (14.4)	***	36.4 (19.0)
Decayed tooth surfaces			
Secondary caries	1.4 (2.1)		1.1 (2.2)
Primary caries	0.7 (1.7)	**	0.2 (0.7)
Root caries	1.5 (2.2)	*	0.7 (1.6)
Number of tooth surfaces with			
Gingivitis	25.4 (20.1)	***	51.7 (23.0)
Visible plaque	29.8 (19.8)	***	55.1 (23.8)
Furcation defects	2.1 (2.6)		4.2 (3.6)
Gingival pocket depth			
≥ 4 mm	13.0 (11.8)		17.1 (12.4)
≥ 6 mm	2.3 (4.2)		2.7 (4.8)

*p < 0.05, **p < 0.01, ***p < 0.001.

Table II. Distribution of number and proportion of remaining surfaces according to different tooth types (mean values (SD)).

	Number of surfaces			Proportion of remaining surfaces (%)		
	Cohort III (n = 135)		Cohort VI (n = 139)	Cohort III (n = 135)		Cohort VI (n = 139)
Incisors/Canines	33.2 (14.0)	***	43.5 (7.8)	59 (19)	***	49 (11)
Premolars	18.4 (12.5)	***	29.2 (9.8)	28 (14)	*	31 (6)
Molars	10.4 (10.7)	***	21.3 (13.4)	13 (11)	***	20 (10)
Total	62.0 (32.6)	***	94.0 (27.0)			

*p <0.05, **p <0.01, ***p <0.001.

the corresponding figure for cohort VI was 91% (95% and 88%, respectively). The difference between the cohorts, as well as between genders, was significant ($p < 0.05$). The pooled data (cohort and gender) showed that the number of tooth surfaces ($p < 0.01$) and FS ($p < 0.001$) was higher in those who had visited a dentist during the previous year compared with those who had not. They also had a lower total percentage of DS ($p < 0.05$) and RDS ($p < 0.05$) and a lower percentage of surfaces with plaque ($p < 0.01$), gingivitis ($p < 0.01$), and exposed root surfaces ($p < 0.01$), together with a higher salivary secretion rate ($p < 0.01$). The differences in dental status between visitors to the dentist during the previous year and non-visitors were most marked in men and in cohort VI.

The relationship between dental caries and oral factors, with adjustments for cohort, gender, and number of surfaces, is given in Table IV. A large number of surfaces with plaque or gingivitis was related to a significantly larger number of surfaces with caries, DsS, RDS, and DS ($p < 0.05$–0.001). The prevalence of gingivitis was correlated to DpS, while a pocket depth of ≥ 6 mm was only correlated to a larger number of decayed root surfaces. The salivary secretion rate was negatively associated with secondary caries ($p < 0.05$).

The stepwise regression models reveal that the percentages of DpS (%) and DS (%) were significantly lower in cohort VI than in cohort III, independently of gender, oral factors, and visits to the dentist (Table V). Gingivitis was positively associated with DpS (%) and DS (%), but negatively with the percentage of sound surfaces, independently of other covariates. The subjects who had visited a dentist during the previous year had a significantly smaller number of sound surfaces and DpS and a larger number of filled surfaces.

Changes in dental status between the ages of 70 and 76

Among the dentate individuals at 70 years of age, fewer than 4% became edentulous during the 6-year period. The mean number of tooth surfaces decreased from 65.1 at 70 years of age to 59.2 at 76 years; from 70 to 63.2 in women and from 59.1 to 54.4 in men ($p < 0.001$) (data not shown). Sound surfaces also decreased during this period from a mean of 27.7 to 21.8, i.e. from 29.9 to 24.7 in women and from 25.0 to 18.4 in men ($p < 0.001$). The prevalence of caries decreased between the ages of 70 and 76, from 3.0 DS to 2.0 ($p < 0.05$). There was no significant change in women (3.0 to 1.8) or in men (2.9 to 2.3) when analyzed separately.

Table VI indicates that there was a significant decrease in the percentage of sound surfaces (SS) between the ages of 70 and 76 in both genders (women from 40% to 36% and men from 40% to 30%); a significant increase in filled surfaces was therefore seen in the same range. The secretion rate increased between 70 years and 76 years in both women and men ($p < 0.05$) and the visible plaque index decreased ($p < 0.01$). The difference was significant in both genders.

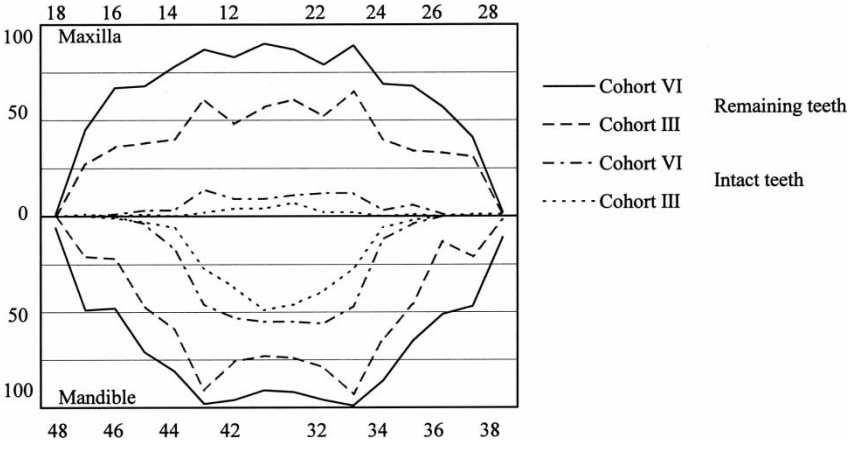

Figure 1. Frequency and distribution of remaining and intact teeth in each cohort.

Table III. Differences between genders and cohorts regarding the proportion (%) of various tooth variables (mean values (SD)).

Surfaces	Cohort III				Cohort VI				Cohort differences adjusted for gender
	Women (n = 73)		Men (n = 62)	Total (n = 135)	Women (n = 58)		Men (n = 81)	Total (n = 139)	
Sound	38 (24)		37 (25)	37 (24)	34 (22)	*	41 (21)	38 (22)	
Filled	61 (24)		60 (28)	61 (26)	65 (23)	*	58 (22)	61 (22)	
Primary caries	1 (2)	**	3 (8)	2 (6)	0 (0)		0 (2)	0 (1)	***
Secondary caries	4 (6)		2 (4)	3 (5)	1 (3)		1 (2)	1 (2)	**
Decayed	5 (7)		6 (9)	5 (8)	2 (3)		2 (3)	2 (3)	***
Root caries	3 (6)		4 (8)	4 (7)	1 (2)		1 (3)	1 (3)	***
Exposed root surfaces	45 (25)		45 (27)	45 (26)	42 (21)		46 (22)	45 (22)	

*p < 0.05, **p < 0.01, ***p < 0.001.

Figure 3 shows the incidence of caries as the percentage of individuals whose sound or filled surfaces at the age of 70 years had decayed at 76 years of age. Forty-nine percent of all participants did not develop any new decayed surfaces (53% for women and 44% for men) and 11% developed ≥5 DS, about the same in women and men. Almost 20% of the individuals had only one new decayed surface. Figure 3 also shows the incidence of DpS; about 60% developed new primary caries, evenly divided between 1, 2, 3–4 and ≥5 decayed surfaces. During the 6-year period, about 50% developed root surface caries, 23% only one new RDS, while 27% developed ≥2 RDS.

Gingivitis and a pocket depth of ≥4 mm at the age of 70 correlated with MS, DS, and RDS, while the visible plaque index only correlated with MS, during the 70–76 age interval (data not shown). When testing these predictive factors for the incidence of caries in a multiple regression model, it was found that the percentage of gingival pocket depth of ≥4 mm was a predictive factor for the incidence of MS, DS, and RDS. With a large amount of dental plaque, there is a significantly higher incidence of DpS. A higher buffer capacity was associated with a lower incidence of RDS.

Discussion

The reduction in edentulism in our study 1981–2000 was 27%, and exceeds the oral health goal of the World Health Organization [38]. The number of remaining teeth changed during the 20 years between the two cohorts and compared with previously examined cohorts [32]. This trend has also been described for the entire country [5] and for Scandinavia [1]. Nordström et al. [39], on the other hand, noted a decrease in the number of teeth in two 70-year-old cohorts examined in 1981 and 1990 in a city population in the north of Sweden. There is a large cohort difference in this study of dentate subjects when it comes to remaining teeth. This

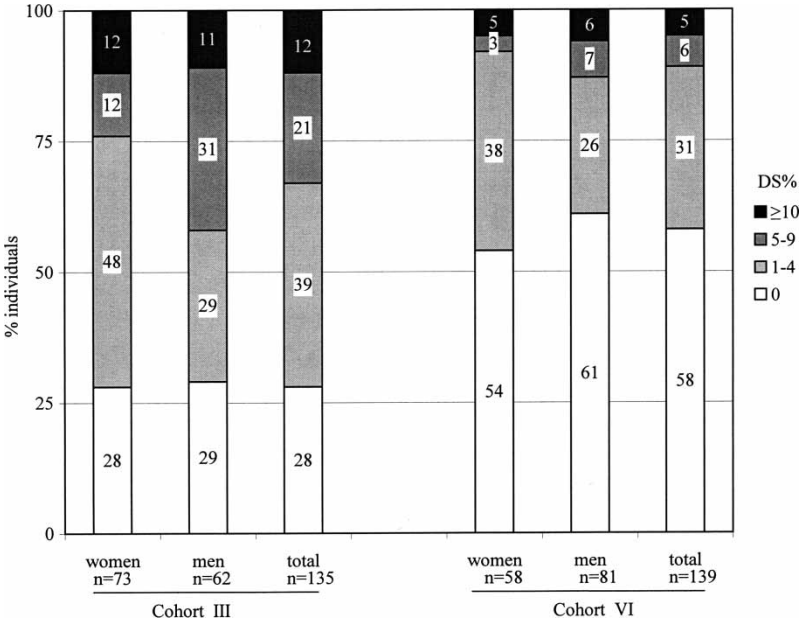

Figure 2. Distribution of individuals in terms of percentage of decayed surfaces (DS%). The figures within bars are expressed as percentages.

Table IV. Oral factors and visit to dentist last year in relation to number of sound, filled, and decayed tooth surfaces in 274 women and men. Correlation coefficient is given with significance level. Adjusted for cohort, gender and number of tooth surfaces.

	Sound	Filled	Secondary caries	Primary caries	Root caries	Total caries
Tooth surfaces with						
Plaque			0.29***		0.24***	0.31***
Gingivitis			0.26***	0.14*	0.24***	0.30***
pocket depth						
≥6 mm					0.15*	
Exposed root surfaces	0.19**	−0.20***				
Secretion rate (1 SD)			−0.14*			
Visit to dentist last year	−0.15*	0.15*				

*p <0.05, **p <0.01, ***p <0.001.

increased from 14 teeth in cohort III to 21 teeth in cohort VI, which is higher than Fure & Zickert reported [21], but the same as in other studies [40,41]. This fulfills the number of teeth required for satisfactory oral health according to Käyser [42]. The tooth survival patterns are similar to those in other studies [13,16,22]. The difference between the cohorts regarding remaining teeth is greater in the maxilla than in the mandible. Both men and women lost approximately one tooth between the ages of 70 and 76 years, which is in agreement with Fure & Zickert [21] in their study of elderly and middle-aged subjects.

The prevalence of decayed surfaces in the present population was quite low in both cohorts, which is the same as found by Krustrup & Petersen [15]. Twice as many participants in cohort VI had no caries compared with cohort III, while three times as many individuals in cohort III compared with cohort VI had a large percentage of decayed surfaces, ≥5 DS%. Men had more DS than women in cohort III, but slightly fewer in cohort VI. Women in both cohorts had more FS, which is in agreement with Fure & Zickert [13] and Hämäläinen et al. [40]. This was probably due to the fact that women visit a dentist more frequently. Root caries was found in 58% of the individuals in cohort III and in only 33% in cohort VI. This is slightly higher than in another population [14]. Both number of remaining teeth and prevalence of caries are comparable to the results for middle-aged people [6,13].

The prevalence of DS was significantly lower at the age of 76 compared with the level at 70 years of age, and both the number and the percentage of FS had increased. This may be explained by the fact that the first examination could have had an interventive effect. During the same period of time, the incidence of caries was fairly low and slightly higher in men. Other studies report a higher incidence of caries, even over a shorter time. MacEntee et al. [24] found 67% with new DFS during one year among subjects over 65 years of age; approximately 10% more in institutionalized subjects compared with an independent group. In our study, 15% of all intact surfaces at 70 years were filled or decayed at the age of 76. Fifty-one percent developed one or more RDS, compared with 27% in the study by Locker [18] during a period of 3 years, in a population aged 50 and older. Lawrence et al. [19] reported an incidence of RDS in 45% of people ≥65 years of age over 5 years.

Both VPI and GBI were significantly higher in cohort VI; this group also had more furcation defects than cohort III, depending on the fact that they had more molars and premolars left. The fact that VPI but not GBI decreased, between 70 and 76 years of age, may be explained by earlier participation in examinations. These subjects are more aware of what is examined and probably improve their oral hygiene before the visit.

Salivary secretion rate may decrease as a result of an increase in drug intake. This rarely causes extreme mouth dryness, but it can increase the risk of caries. The mean secretion rate increased significantly between the ages of 70 and 76 in both women and men ($p < 0.05$), explainable perhaps by the fact that the participants are used to the environment and have done the test before [43].

Table V. Significant factors for proportion of sound, filled and decayed tooth surfaces, in 274 women and men. Tested by stepwise linear regression. Regression coefficient (95% CI) and significance level are given.

	Sound	Filled	Secondary caries	Primary caries	Total caries
Cohort VI			−1.32 (1.12)*		−2.59 (1.64)**
Number of tooth surfaces	0.29 (0.11)***	−0.17 (0.09)***	−0.05 (0.02)***	−0.03 (0.02)***	−0.09 (0.03)***
Number of tooth surfaces with-gingivitis	−0.18 (0.14)*		0.04 (0.03)**		0.07 (0.04)***
Secretion rate (1 SD)			−0.58 (0.48)*		
Visit to dentist last year	−11.93 (8.33)**	12.44 (8.75)**		−1.74 (1.49)*	

*p <0.05, **p <0.01, ***p <0.001.

Table VI. Percentage (mean (SD)) of sound, filled or decayed surfaces, GBI, VPI, pocket depth and mean values (SD) of salivary secretion rate and buffer capacity at the age of 70 and 76. Adjusted for surfaces and gender.

	Women (n = 61)		Men (n = 50)		Total (n = 111)	
	70	76	70	76	70	76
Sound surfaces	40 (24) ***	36 (23)	40 (26) ***	30 (25)	40 (25) ***	33 (24)
Filled surfaces	59 (24) ***	63 (23)	57 (29) ***	68 (27)	58 (26) ***	66 (25)
Primary decayed surfaces	1 (2)	1 (1)	3 (7)	2 (3)	2 (5)	1 (2)
Secondary decayed surfaces	4 (9)	3 (6)	3 (4)	4 (6)	4 (7)	3 (6)
Decayed surfaces	5 (9)	4 (7)	6 (9)	5 (7)	6 (9)	4 (7)
Decayed root surfaces	4 (10)	3 (6)	5 (9)	5 (7)	5 (9)	4 (6)
Stimulated secretion rate (ml/min)	0.95 (0.59) *	1.08 (0.66)	1.30 (0.69) *	1.44 (0.67)	1.11 (0.66) **	1.24 (0.69)
Buffer capacity	5.21 (1.07)	5.18 (1.15)	4.96 (0.90)	5.08 (0.95)	5.09 (1.00)	5.13 (1.06)
Gingivitis (GBI)	55 (28)	51 (29)	56 (33)	55 (32)	56 (30)	53 (30)
Visible plaque index (VPI)	66 (24) **	54 (31)	74 (26) **	63 (32)	70 (25) ***	58 (32)
Gingival pocket depth ≥4mm	22 (17)	23 (21)	25 (23)	27 (21)	23 (20)	25 (21)
≥6mm	4 (7)	4 (8)	6 (9)	5 (9)	5 (8)	4 (8)

*p <0.05, **p <0.01, ***p <0.001.

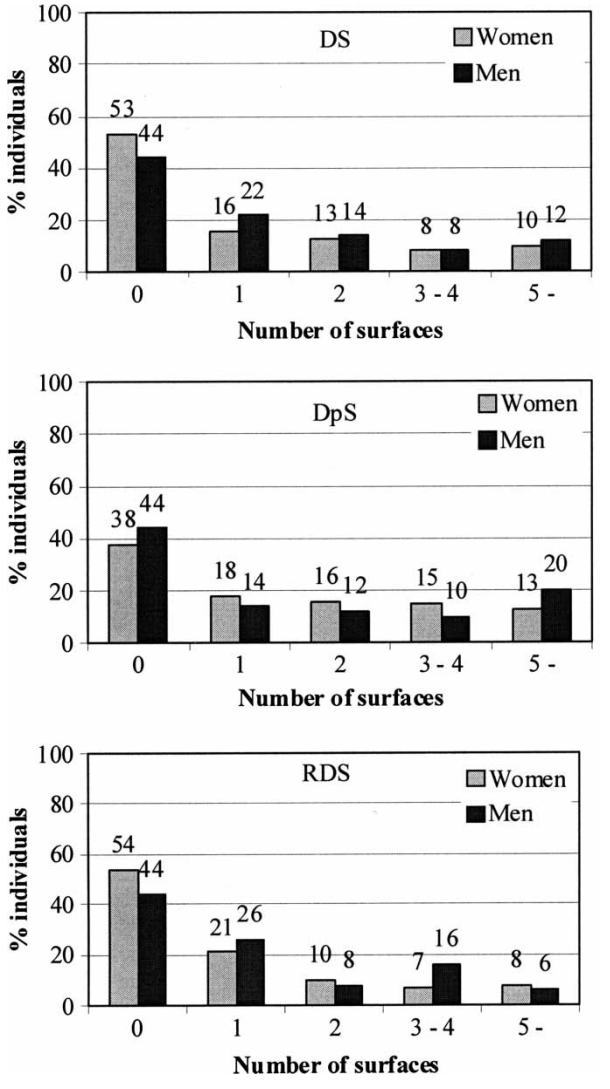

Figure 3. Incidence of caries between 70 and 76 years of age. The top figure shows sound and filled surfaces at 70 that were decayed at 76. The central figure shows sound surfaces at 70 that were filled or decayed at 76. In the lowest figure, new decayed root surfaces at 76 are shown.

The best predictors of loss of teeth were GBI, VPI, and a pocket depth of ≥4 mm. Furthermore, the incidence of DS and RDS correlated to deep pockets. A lower prevalence of DsS was seen with a higher secretion rate. There was also a correlation between buffer capacity and RDS, which has been reported by Guivante-Nabet et al. [12] and by Lundgren et al. [27]. A high buffer capacity produced a lower incidence of RDS during the 6-year period.

Women visited a dentist more frequently than men, which has been found previously [13]. In the first cohort, examined in 1972, Österberg et al. [32] reported that 71% only went to the dentist for emergency treatment. In this study, the contrary situation was found, i.e. 73% had visited a dentist during the previous year in cohort III and as many as 91% in cohort VI, and they did so on a regular basis. There is a similar increase in regular dental visits throughout the country [5,44].

The improved dental health we found in this study is probably due in part to the improvement in living conditions between the two cohorts, including an improvement in economy, education, and housing. There has also been an improvement in nutrition and general health. Cohort VI received more organized dental care at school and were able to benefit to a greater extent from the Swedish national dental insurance scheme, which was introduced in 1974. Improved oral hygiene, the use of antibiotics and, above all, fluoride, but also an increase in regular dental care, can probably explain most of the improvement in dental health. Besides these factors, there has been a change in treatment over time, with a decrease of extractions.

It is impossible to describe the exact incidence of caries, as we were unable to check the treatment during the period between 70 and 76 years of age. Filled surfaces may have been refilled once or even more frequently during these years due to caries.

However, the incidence was moderate, and aging in this age group does not appear to be such a dominant risk factor for dental caries.

There will be an increase in the number of elderly people in the future and they will live longer, resulting in a larger number of very old people. The majority, 90–95% of those who are 65 years of age or older, will be dentate and are expected to keep their teeth longer [5], as we found in this study. Health will improve [45], but we can assume that there will be an increase in the number of elderly people with dysfunctions, both physical and mental, including dementia. Some will be institutionalized, but many will still live at home. This will be a challenge for the dental care services, which will have to find a way to identify the groups at risk of dental disease. The need for regular dental care will remain, or even increase, and more individualized prophylactic efforts will be required.

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