

ORIGINAL ARTICLE

Changes in reported orofacial symptoms over a ten-year period as reflected in two cohorts of fifty-year-old subjects

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Abstract

Objective. The study presents changes in reported orofacial symptoms over the course of a 10-year period. It was hypothesized that there was an increase of temporomandibular disorder (TMD) and orofacial pain symptoms during the period concurrent with social and demographic changes. **Material and Methods.** All 50-year-old subjects living in two Swedish counties were asked to answer a mail questionnaire in 1992 and 2002. In the two cohorts, 6,343 and 5,798, respectively, responded (response rate 71.3% and 70.2%). **Results.** Striking differences in demographic, occupational, general, and oral health conditions were found. General health was reported to be less good, utilization of dental care decreased, whereas number of teeth increased. The prevalence of a number of intra-oral symptoms and orofacial symptoms increased significantly between 1992 and 2002. Reported bruxism increased from 18% in 1992 to 28% in 2002. **Conclusion.** The observed increase in reported orofacial pain symptoms during the 10-year period, concurrent with changes in society, deserves further attention by society and the dental community.

Key Words: *Bruxism, epidemiology, orofacial pain, questionnaire, temporomandibular disorders*

Introduction

Society is changing rapidly. Every day various media report on developmental trends in working life, economy, health care, etc., with considerable consequences for many people. It is often maintained that these changes are more rapid now than they were just a few decades ago and may be having implications for the oral health situation. It is well established that there is a close relationship between dental health and socio-economic factors [1,2]. After years of positive development of dental health in many countries, anecdotal reports of for example increasing rates of caries and oral symptoms, as well as decreasing dental care, are being heard in some localities. It has been suggested that signs and symptoms of temporomandibular disorders (TMDs) and orofacial pain have increased in prevalence owing to their possible relationship with psychosocial factors and accelerating stress levels in

society [3–6]. There is, however, a remarkable lack of systematic studies verifying such statements. Anecdotal reports require controlled studies if they are to be corroborated.

Epidemiological studies repeated after some time may demonstrate whether the presumed changes are statistically significant. In the Swedish counties of Örebro and Östergötland, an extensive study of the oral health of 50-year-old subjects was performed in 1992 [7] and 10 years later was repeated on a sample of subjects who were 50 years old in 2002.

The purpose was to present prevalences of symptoms of TMD and orofacial pain in the two cohorts against a background of changes in demographic and general health factors between 1992 and 2002. It was hypothesized that there was an increase in TMD and orofacial pain symptoms from the 1992 to the 2002 cohort of 50-year-old subjects concurrent with some social and demographic changes.

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Material and methods

This study compares two cohorts of 50-year-old subjects examined 10 years apart. In 1992, a questionnaire was sent to all 50-year-olds in two counties in Sweden, Örebro and Östergötland, a total of 8,888 persons, of whom 6,343 responded. The response rate (71.3%) was the same in both counties (8). When including only those who answered the questions about symptoms related to TMD and bruxism/oral parafunctions and excluding internal non-response, the number of participants was 6,043 (68.0% of the population). Analysis of the non-response performed in the 1992 cohort demonstrated some minor deviation from a random distribution, e.g. an over-representation of women and individuals with low education and fewer teeth [9].

After 10 years, in 2002, the same procedure was repeated in the two counties with a new cohort of 50-year-old subjects (born in 1952). This time, questionnaires were sent to 8,271, of whom 5,798 responded, giving a response rate of 70.2%. After exclusion of internal non-response, the number of participants in the second cohort was 5,400 (65.2% of the population). Only gender and county could be controlled among the non-responders. There was no significant difference between non-respondents as regards county. In the total population, there were 50.6% men and 49.4% women. However, there was an overrepresentation of women who answered the questionnaire, i.e. 46.2% men and 53.8% women ($p < 0.001$). Thus, some caution is advisable in interpreting the data.

Questionnaire

The questionnaire comprised 53 questions, with altogether 123 items. It was designed in six different sections: 1) general socio-economic conditions (e.g. age, gender, occupation), 2) general health (e.g. physician visits, tobacco habits, drug consumption), 3) oral conditions (e.g. satisfaction with teeth, oral problems, oral hygiene habits, number of teeth), 4) a series of attitude questions concerning oral function and appearance of teeth, 5) experience and use of dental care, and 6) most recent visit to a dentist. The questions have been described previously [7].

Data registration and method error

Clinical data were recorded by dental personnel in 1992. An automatic scanning device was used to enter the responses from the questionnaire into the computer. A clinical examination was performed in a randomly selected subgroup of the 1992 cohort (457 men and 484 women) to validate and quantify the responses regarding reported number of remaining teeth and jaw opening capacity. The good congruence between self-reports and clinical registrations did not

differ significantly between men and women [10]. The complete questionnaire design and methodological aspects have been discussed previously [7].

Statistics

All statistical analyses were performed using the Statistical Package for Social Sciences (SPSS, Release 12.0) on an IBM personal computer. The chi-square test and odds ratios (OR) were used to analyze differences between the cohorts and between men and women.

Results

Demographic data

When comparing the cohorts of 50-year-old subjects examined in 1992 and 2002, some demographic changes were evident (Table I). The proportion of individuals born outside Sweden in the two counties had increased, indicating continuing immigration. The counties' populations living in densely populated areas had increased by 5% units. A major change in educational level had occurred between the two cohorts. The ratio of those with only elementary school had almost halved, while those with university education had increased from 20% to 30%.

The rate of unemployment increased by 2% units and was 9.3% for the 50-year-old women in 2002. Among employed people, a marked change in distribution of working hours occurred during the decade investigated. The rate of women working full time (≥ 35 h a week) increased, whereas it decreased for the men, the changes being statistically significant for both genders ($p < 0.001$). Shift work among the 50-year-old subjects increased during the 10-year period, mostly so among women (Table I).

The prevalence of 50-year-old subjects who did not consider themselves healthy had increased by 4% units. An impairment of general health was also reflected in a substantially increased use of medications during the final 14 days (Table II). The rate of sick leave during the final 3 months was greater in 2002 than in 1992. The proportion of individuals who visited a medical doctor more than once during the final 3 months increased slightly between 1992 and 2002.

The use of tobacco showed a changed distribution between the two cohorts. The prevalence of daily smoking decreased, whereas taking snuff (smokeless tobacco) doubled (in the women there was a 10-fold increase from 0.2% to 2.0%) (Table II).

Use of dental service

In 1992, 89.9% of the 50-year-old subjects reported that they visited a dentist at least once a year. In 2002, this figure had decreased to 80.0%. The

Table I. Percentage distribution of some demographic data in two cohorts of 50-year-old subjects; one examined in 1992, the other in 2002

	1992			OR (CI)	2002		
	F	M	T		F	M	T
Place of birth							
Sweden	94.2	92.8	93.5	1.19* (1.03–1.37)	92.0	92.7	92.3
Nordic country	5.8	7.2	6.5		8.0	7.3	7.7
Other							
Residence							
Densely populated area	40.1	38.6	39.3	0.81*** (0.75–0.87)	45.0	44.1	44.6
Village	59.9	61.4	60.7		55.0	59.9	55.4
Countryside							
Marital status							
Married/cohabiting	81.2	82.0	81.6	1.01 ^{N.S.} (0.92–1.11)	81.6	81.2	81.4
Unmarried	18.8	18	18.4		18.4	18.8	18.6
Working hours							
Work ≥35 h/week	53.8	93.4	73.6	0.93 ^{N.S.} (0.86–1.01)	62.8	89.0	75.0
Work 15–34 h/week							
Work <15 h/week	46.2	6.6	26.4		37.2	11.0	25.0
Unemployed							
Shift work (yes)	9.3	10.2	9.7	0.68*** 0.61–0.76	15.0	12.2	13.7
Education							
Elementary school	41.6	48.2	44.9	2.7*** (2.51–2.96)	21.6	24.8	23.1
High school							
College	58.4	51.8	55.1		78.4	75.2	76.9
University							

*** $p \leq 0.001$; ** $0.001 < p \leq 0.01$; * $0.01 < p \leq 0.05$; N.S. = $p > 0.05$.

OR denotes the comparison between the total figures in 1992 and 2002.

OR = odds ratio, CI = 95% confidence interval.

question “Do you regularly visit your dentist?” was answered negatively by 9.7% in 1992 and by 16.3% in 2002. There was a substantial change in the provision of dental care between private practice and the national dental service: in 1992, 73.3% consulted private dentists, while in 2002 the figure was 60.5%. The percentage of subjects who reported dissatisfaction with received dental care increased from 5.8 to 7.8 during the 10-year period.

Dental state

Dentition in the 50-year-old subjects underwent great changes between 1992 and 2002. The prevalence of subjects who reported that they had all natural teeth increased from 22.3% to 36.3%. Edentulousness decreased from 1.9% to 0.3%. The proportion dissatisfied with their teeth in general, as well as discontented with their dental appearance, increased in both cases from 19% to 22%.

Fewer subjects had experienced anterior tooth loss caused by trauma in the 2002 than in the 1992 cohort. The decrease was more marked among the men (from 20.8% to 14.7%).

Intra-oral symptoms

A marked increase was noted in prevalence of both toothache during the last year and tooth sensitivity. Other intra-oral symptoms increased too, but to a lesser extent (Table III).

Symptoms related to the function of the masticatory system

Pain in the temporomandibular joint (TMJ) region was experienced by approximately 4% units more subjects in 2002 than in 1992. This increase was greater among women than among men (Table IV). Reported difficulty in opening the mouth wide increased as well as annoying TMJ sounds. A considerable increase from 18% to 28% was reported for grinding and/or clenching of teeth and there was a small increase of those who thought they had less good or poor chewing efficiency, i.e. from 3.5% to 4.3% ($p < 0.05$).

Discussion

There were considerable differences between the two cohorts of 50-year-old subjects examined 10 years

Table II. Percentage distribution of answers to questions related to general health in two cohorts of 50-year-old subjects; one examined in 1992, the other in 2002

	1992			OR (CI)	2002		
	F	M	T		F	M	T
Do you consider yourself healthy?							
Yes, absolutely	87.7	90.6	89.1	1.46*** (1.35–1.63)	83.1	86.9	84.9
Yes, a great deal							
No, not particularly	12.3	9.5	10.9		16.9	13.1	15.1
No, absolutely not							
Use of medicine last 2 weeks							
Yes	39.3	28.8	34.0	0.64*** (0.59–0.69)	49.7	39.0	44.7
No	60.7	71.2	66.0		50.3	61.0	55.3
Sick-listing in last 3 months							
Yes, more than a week	19.9	14.7	17.3	0.86** (0.78–0.94)	22.6	16.1	19.6
Yes, some days							
Yes, once							
No	80.1	85.3	82.7		77.4	83.9	80.4
Can't remember							
Contact with medical doctor in last 3 months							
Yes, several times	16.6	12.8	14.7	0.91N.S. (0.82–1.00)	17.7	14.0	16.0
Yes, sometimes							
Yes, once							
No	83.4	87.2	85.3		82.3	86.0	84.0
Can't remember							
Smoking							
Daily smoking	28.1	28.2	28.2	1.47*** (1.35–1.60)	23.3	18.4	21.0
Others	71.9	71.8	71.8		76.7	81.6	79.0
Smokeless tobacco							
Daily use	0.2	10.4	5.3	0.48*** (0.43–0.56)	2.0	19.8	10.4
Others	99.8	89.6	94.7		98	80.2	89.7

*** $p \leq 0.001$; ** $0.001 < p \leq 0.01$; N.S. = $p > 0.05$.

OR denotes the comparison between the total figures in 1992 and 2002. OR = odds ratio, CI = 95% confidence interval.

apart regarding both social and demographic conditions and general and oral health. The ongoing rapid transformation of society was reflected in changes in the working situation and educational level. The results might be representative of the total group of 50-year-olds in Sweden and probably also of other industrialized countries [7].

A harder climate in working life was indicated by increases in working hours, shift work, and unemployment, especially among women. The often discussed impairment of the general health of people in Sweden (and in many other countries) was corroborated by an increasing reported prevalence of those who considered themselves not healthy and on sick leave. In this regard, it has been shown that self-perceived health is a good indicator of an individual's health status [11]. The intake of medicines was also higher in 2002 than in 1992. The simultaneously reported increase of a variety of intra-oral symptoms may be a reflection of an association between general and oral health, and corroborates the locution "the mouth is a mirror of the body".

The reported use of dental services changed during the observation period. Fewer 50-year-old subjects regularly consulted their dentist in 2002 than in 1992. This may to some extent explain the increased prevalence of toothache and other dental pain. Another possible reason for the increased toothache and sensitive teeth is that there are more teeth at risk of incurring these problems. There might also be a change in pain tolerance over time. When oral health is improved, minor disturbances that previously were unnoticed might become problems to report. This is suggested in some international studies on prevalence of toothache [12–14]. The prevalence of toothache during the last year in the 1992 cohort (12.7%) was similar to that reported from an extensive study in the USA covering the last 6 months (12.2%) [12]. In a more recent study from the USA, the 2-year incidence of toothache was 31% [13]. In a large study on perceived toothache among Finnish adolescents examined between 1977 and 1997, the 2-year incidence varied from 25% to 37%. There was no tendency for the prevalence to decline over the study period despite the decrease in caries

Table III. Percentage distribution of answers to questions related to intra-oral problems in two cohorts of 50-year-old subjects; one examined in 1992, the other in 2002

	1992			OR (CI)	2002		
	F	M	T		F	M	T
When did you last experience toothache?							
During the past 3 months	12.6	12.8	12.7	0.74*** (0.67–0.83)	15.9	16.9	16.4
During the past year							
> 1 year ago							
Have never had toothache	87.4	87.2	87.3		84.1	83.1	83.6
Cannot remember							
Sensitive teeth							
No problems	60.5	69.7	65.1	1.70*** (1.57–1.83)	47.7	57.9	52.4
Some problems							
Rather many problems	39.5	30.3	34.9		52.3	42.1	47.6
Great problems							
Do you have dry mouth during daytime?							
Yes, often	26.2	17.9	22.0	0.90* (0.82–0.98)	28.0	19.1	24.0
Yes, sometimes							
No, rarely	73.8	82.1	78.0		72.0	80.9	76.0
No, never							
Do you have dry mouth during night?							
Yes, often	29.9	26.7	28.3	0.83*** (0.77–0.91)	33.2	30.6	32.1
Yes, sometimes							
No, rarely	70.1	73.3	71.7		66.8	69.4	67.9
No, never							
Wounds or blisters in the mouth							
No problems	83.0	80.3	81.7	1.1* (1.01–1.21)	80.0	80.3	80.1
Some problems							
Rather many problems	17.0	19.7	18.3		20.0	19.7	19.9
Great problems							
Burning mouth							
No problems	94.7	95.9	95.3	1.01 N.S. (0.85–1.20)	94.9	95.7	95.3
Some problems							
Rather many problems	5.3	4.1	4.7		5.1	4.3	4.7
Great problems							
Change of taste							
No problems	91.9	93.2	92.5	1.1 N.S. (0.95–1.26)	91.1	92.8	91.9
Some problems							
Rather many problems	8.1	6.8	7.5		8.9	7.2	8.1
Great problems							

*** $p \leq 0.001$; $0.01 < p \leq 0.05$; N.S. = $p > 0.05$.

OR denotes the comparison between the total figures in 1992 and 2002. OR = odds ratio, CI = 95% confidence interval.

experience [14]. This might be taken as support for changed pain sensitivity over time, as suggested above.

An encouraging improvement of dental status occurred between the first and second cohorts. The prevalence of edentulism had fallen to 0.3% among 50-year-old subjects in 2002, which is very low seen in a global perspective [15]. The prevalence in the two counties is similar to figures presented in a Swedish national survey [1], suggesting that the present samples are comparable with the total Swedish population.

With respect to the reported improved dental status, it was surprising that self-assessed chewing ability was worse, not better, in the second cohort. A similar finding has been reported in a Swedish study of five cohorts of 70-year-old subjects examined between 1971 and 2001: chewing ability demonstrated only minor variation despite dramatic improvement of dental state over three decades [Österberg et al., 2005, unpublished observations]. It was also unexpected that subjects in the second cohort were less satisfied with their teeth in general and with their dental appearance. An explanation

Table IV. Percentage distribution of answers to questions related to dysfunction of the masticatory system in two cohorts of 50-year-old subjects; one examined in 1992, the other in 2002

	1992			OR (CI)	2002		
	F	M	T		F	M	T
Pain in TMJ region							
No problems	87.8	93.1	90.4	1.47*** (1.31–1.66)	82.7	91.0	86.5
Some problems							
Rather many problems	12.2	6.9	9.6		17.3	9.0	13.5
Great problems							
Clicking/crepitations from TMJ							
No problems	82.9	87.5	85.2	1.33*** (1.20–1.47)	77.7	85.4	81.3
Some problems							
Rather many problems	17.1	12.5	14.8		22.3	14.6	18.7
Great problems							
Difficult to open the jaw wide							
No problems	88.6	91.3	90.0	1.22*** (1.09–1.38)	85.9	90.6	88.0
Some problems							
Rather many problems	11.4	8.7	10.0		14.1	9.4	12.0
Great problems							
Grinding/clenching of the teeth							
No problems	79.1	84.1	81.6	1.75*** (1.60–1.91)	67.6	76.6	71.7
Some problems							
Rather many problems	20.9	15.9	18.4		32.4	23.4	28.3
Great problems							

*** $p \leq 0.001$.

OR denotes the comparison between the total figures in 1992 and 2002. OR = odds ratio, CI = 95% confidence interval.

could be that people have raised standards and now make greater demands on dental appearance and oral function than they did 10 years ago.

The reported prevalence of symptoms of TMDs and bruxism, as well as a number of intra-oral symptoms, also increased during the decade under study. This may seem astonishing with respect to the improved dental health. However, the etiology of TMD symptoms today is considered less related to occlusal conditions and more to psychosocial and other factors [16]. The same is true for bruxism [17,18]. Increased stress in society and working life has often been suggested to be associated with increased levels of bruxism and orofacial pain. Recent studies support such associations [6,19].

Even though the relationship between bruxism and TMD has not been fully clarified, significant associations between functional disturbances in the masticatory system and the clenching and grinding of teeth have been demonstrated [4,5,20–22].

The reported demographic and health-related differences observed between the two cohorts of 50-year-old subjects reflect remarkable changes in society during a 10-year period. It is tempting to suggest that these changes have also influenced the oral health situation. Possible associations between the societal and orofacial pain symptoms are being

analyzed and the results will be presented in a forthcoming article. The results of the present study indicate that both society and the dental care system should pay heed to the increased prevalence of several orofacial pain symptoms over such a relatively limited time period as a decade.

The results of the study are based on two large population samples of 50-year-old subjects in two Swedish counties in 1992 and 2002. Acknowledging this limitation, the following conclusions are warranted. Substantial changes have occurred in working life in the period 1992 to 2002. Impairment of general health occurred between 1992 and 2002. Regular use of dental care service decreased during the 10-year period. Dental state improved, and in 2002 only 0.3% of the 50-year-old subjects were edentulous compared to 1.9% in 1992. The prevalence of subjects reporting tooth clenching/grinding increased markedly from 1992 to 2002. The prevalence of several intra-oral symptoms as well as symptoms related to dysfunction of the masticatory system increased from 1992 to 2002. The observed increase of orofacial pain symptoms during the 10-year period, concurrent with changes in society, deserves further attention by society and the dental community.

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