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ORIGINAL ARTICLE

Is there a trend of decreasing prevalence of TMD-related symptoms with ageing among the elderly?

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Abstract

Objective. Older adults have not been studied as much as younger ones regarding prevalence of TMD-related symptoms. The aim was to assess the prevalence of TMD-related symptoms in two population samples, 70 and 80 years old. ***Materials and methods.*** Identical questionnaires were in 2012 sent to all subjects born in 1932 and 1942 living in two Swedish counties. The response rate was 70.1%, resulting in samples of 5697 70- and 2922 80-year-old subjects. The questionnaire comprised 53 questions. Answers to questions on problems regarding TMD-related symptoms and awareness of bruxism were analysed. ***Results.*** Twelve per cent of the women and 7% of the men in the 70-year-old group reported some, rather great or severe problems regarding TMD pain. In the 80-year-olds the prevalence was 8% and 7%, respectively. Subjects who had problems with TMJ sounds reported difficulty to open the jaw wide 6-times and TMJ pain 10–13-times more frequently than subjects without such problems. Changes of taste and awareness of bruxism were the only variables significantly associated with TMD symptoms in both age groups. Number of teeth was not significantly associated with any of the TMD-related symptoms. ***Conclusions.*** Most of the elderly subjects had no severe problems with TMD-related symptoms, but 12% of the 70-year-old women reported some, rather great or severe problems. The marked gender difference at age 70 had disappeared in the 80-year-old group. The prevalence was lower among the 80- compared with the 70-year-old subjects of both sexes. The results support the comorbidity between TMD-related symptoms and general health problems.

Key Words: *bruxism, burning mouth, orofacial pain, population study, questionnaire*

Introduction

An increasing prevalence over two decades of symptoms and signs indicative of temporomandibular disorders (TMD) has recently been reported [1,2]. The studies were based on repeated cross-sectional examinations in a Swedish city from 1983–2003 in age groups from 20–70 years. Another Swedish epidemiological study found an increase with time of TMD and orofacial pain symptoms in two cohorts of 50-year-old subjects 10 years apart, thus supporting a time trend of increasing prevalence [3]. In contrast to these cross-sectional studies, a longitudinal study of 50-year-old subjects found that the prevalence and symptom severity of TMD-related symptoms changed only little over 20 years [4]. This was true also for the cross-sectional data in the same study.

These somewhat inconsistent findings may depend on differences between age groups. Older adults have not been studied as much as younger age groups and there are inconclusive results regarding the prevalence of TMD symptoms in elderly people [4,5]. Studies have shown that elderly people tend to report less TMD symptoms when they get older, in spite of the fact that the severity of TMD signs in general increase with ageing [2,6–11]. In a study of 65- and 75-year-old subjects, the older women reported less TMD symptoms than the younger ones, whereas there were

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no significant differences between the two age groups of men [5].

There are only a few studies on TMD symptoms among older adults. It is, therefore, the aim of this study to assess the prevalence of TMD-related symptoms in two population samples of 70 and 80 years of age. The hypothesis was that the prevalence of reported TMD symptoms and self-reported bruxism would be lower in the older compared with the youngest of these age groups.

Materials and methods

Population and response rate

Identical questionnaires were in 2012 sent to all subjects born in 1942 (n = 7889) and in 1932 (n = 4407) living in the Swedish counties Örebro and Östergötland. The response rate was 72.2% for the 70-year-old subjects and 66.4% for the 80-year-old subjects, with an average of 70.1% for both samples. The sex and age distribution of the 8619 participants are presented in Table I.

Questionnaire

The questionnaire comprised 53 questions, with altogether 123 items, and has been described and discussed previously [12]. The questions were divided into socio-economic conditions (e.g. age, gender, occupation), general health (e.g. physician visits, tobacco habits, drug consumption) and oral conditions (e.g. satisfaction with teeth, oral problems, oral hygiene habits, number of teeth). In this study answers to three questions on TMD-related symptoms and one to awareness of bruxism were analysed. The questions were as follows: Do you have problems with: (a) Pain from the TMJ region, (b) clicking or crepitation from the TMJs (in the following called TMJ sounds), (c) difficulties in wide opening and (d) grinding/clenching of teeth (in the following called bruxism)? The four response categories were (1) no problems, (2) some, (3) rather great or (4) severe problem. The questionnaire also included the 8-item 'oral impacts on daily performance' (OIDP) [13].

The Ethics Committee in Uppsala, Sweden, approved the 2012 study (Dnr 2011/336).

Statistical methods

All statistical analyses were performed using the IBM SPSS Statistics 21 (IBM Corporation, one New Orchard Road, Armonk, New York) on a Dell Personal Computer. Statistical significance has been presented as $p < 0.05$, $p < 0.01$, $p = 0.001$ or $p < 0.001$. Pearson's chi-squared test was used to analyse differences between groups. Logistic regression was performed to investigate associations between presence of TMD-related symptoms and different background variables. In the regression model, the following criteria were used for selection of independent variables: (1) theoretical relevance; and (2) variables showing significant associations between TMD symptom and background factors according to a Spearman correlation analysis [14,15]. The dichotomizations of the independent variables included in the logistic

Table I. Percentage distribution of reported problems with symptoms related to TMD and awareness of bruxism in two cohorts of men and women examined at age 70 and 80 years, respectively.

Reported symptom	Category	70 year old women (n = 2896)	70 year old men (n = 2801)	80 year old women (n = 1594)	80 year old men (n = 1328)
TMJ pain	No problems	88.2	92.9	91.5	93.2
	Some	9.8	5.9	7.3	6.0
	Rather great	1.4	1.0	0.8	0.5
	Severe	0.5	0.2	0.3	0.3
Difficulty in jaw opening	No problems	88.2	91.6	89.4	91.7
	Some	9.0	7.1	8.2	7.0
	Rather great	1.6	0.8	1.5	1.1
	Severe	1.2	0.5	0.9	0.3
TM joint sounds	No problems	82.7	88.7	87.7	89.2
	Some	15.0	10.0	11.2	9.9
	Rather great	2.0	1.1	0.7	0.6
	Severe	0.3	0.2	0.4	0.3
Bruxism	No problems	79.0	83.5	87.9	89.4
	Some	17.0	14.0	10.3	8.3
	Rather great	3.0	1.8	1.4	1.9
	Severe	1.0	0.7	0.4	0.4

Table II. Dichotomization of the independent variables used in the logistic regression.

Variable	Dichotomization
Gender*	1. Man
	2. Woman
Social contact during a normal week*	1. >3 people
	2. 0–2 people
Place of birth*+	1. Sweden
	2. Nordic/other country
Education	1. Elementary school/High school/college
	2. University
Are you healthy*+	1. Yes/on the whole
	2. No/absolutely not
Marital status	1. Married, co-habiting
	2. Unmarried/divorced/widowed, etc.
Use of medicine in last 2 weeks*	1. No
	2. Yes
Smoking	1. Daily smoking
	2. Remaining
Chewing all kind of food*+	1. Very good
	2. Rather good, not so good, bad
When did you last experience toothache?*+	1. >1 year ago/have never had toothache/cannot remember
	2. During the last 3 months/during the last year
Number of teeth*+	1. All teeth left/single missing
	2. Rather many missing/almost none left/edentulous
Removable partial or complete denture*	1. Yes
	2. No
Dry mouth - daytime*+	1.Yes sometimes, no seldom, never
	2. Yes often
Dry mouth - night-time*+	1.Yes sometimes, no seldom, never
	2.Yes often
Problems with (a) wounds or blisters in the mouth*+, (b) burning mouth*+, (c) change of taste*+, (d) sensitive teeth*+, (e) bruxism*+	1. No 2. Some problems/rather great/severe problems
Satisfied with teeth*+	1. Very satisfied/overall satisfied
	2. Not particularly satisfied/absolutely not satisfied
Refrain from dental visit due to high cost during the last year*+	1. No
	2. Yes, one or more times
Satisfaction with dental care*+	1. On the whole and very satisfied
	2: Rather and very dissatisfied
Keeping teeth for life time*+	1.Yes absolutely and probably
	2.No, probably not and absolutely not
Oral health related problems measured by OIDP*+†	1. Never problem
	2. Sometimes problem

*Significantly correlated with dependent variable according to Spearman correlation analysis (70-year olds).
+Significantly correlated with dependent variable according to Spearman correlation analysis (80-year olds)
The dependent variable was (1) individuals having some or no problems with TMJ pain, opening difficulties or TMJ sounds and (2) individuals with severe or rather great problems regarding TMJ pain, opening difficulties or TMJ sounds.
†Oral Impact on Daily Performance.

Table III. Cross-tabulation (%) of answers to two questions on troublesome TMD related symptoms with respect to troublesome TMJ sounds in two age cohorts.

		Problems to open the jaw wide*		Pain in TMJ region*	
		70-year-olds (n = 516)	80-year-olds (n = 220)	70-year-olds (n = 476)	80-year-olds (n = 171)
Problems with TMJ sounds	No[a]	5.8	6.0	4.2	3.2
	Yes*	35.0	35.7	40.4	41.0

*Some, rather great and severe problems.
[a]All four comparisons between No and Yes are significantly different ($p < 0.001$).

regression model are presented in Table II. The dependent variable was (1) individuals having some or no TMD pain, opening difficulties or TMJ sounds (n_{70} = 5115; n_{80} = 2435) and (2) individuals with severe or rather great problems regarding TMD pain, opening difficulties or TMJ sounds (n_{70} = 190; n_{80} = 61).

Results

Analysis of non-response

In the 70-year-olds there was no significant difference between the response and non-response groups regarding gender, whereas there was a higher proportion of women who did not respond among the 80-year-old subjects ($p = 0.001$). In both age groups the response rate was higher for those with higher education, who were born in Sweden and were married ($p < 0.001$).

Cross-sectional data

Twelve per cent of the women and 7% of the men in the 70-year-old group reported some, rather great or severe pain in the TMJ regions ($p < 0.001$). The corresponding prevalence for the 80-year-old women and men was 8% and 7%, respectively ($p > 0.05$; Table I). The prevalence of difficulty in jaw opening and problems with TMJ sounds were also significantly higher among the women than among the men in the 70-year-old group ($p < 0.001$), but there were no significant gender differences in the 80-year-old group ($p > 0.05$). The greatest differences between the age and gender groups were shown for bruxism. For example, the 70-year-old women reported twice as high prevalence of problems with bruxism (21%) compared with the 80-year old men (10%; $p < 0.001$; Table I). The prevalence of rather great and severe problems was below 3% for all symptoms, except for bruxism in 70-year-old women (4%).

Associations between various symptoms

Subjects in both age groups who had problems with TMJ sounds reported difficulty to open the jaw wide 6-times more frequently than subjects without such problems. The association between TMJ sounds and TMJ pain was even more striking. Those with problems with TMJ sounds, compared to those without, reported pain in the TMJ regions 10- and 13-times more often in 70- and 80-year-old subjects, respectively ($p < 0.001$; Table III).

Subjects in both age groups who had problems with bruxism reported 3–6-times higher prevalence of TMD symptoms than those who were not aware of bruxism ($p < 0.001$). The differences were slightly greater in the older age group (Table IV). The prevalence of a complete set of natural teeth was lower in the 80- compared to the 70-year-olds, whereas it was an opposite situation for the rate of edentulism (Figure 1). The presence of removable dentures was almost twice as great in the older (21%) compared to the younger group (11%).

Table IV. Cross-tabulation (%) of answers to three questions on troublesome TMD-related symptoms with respect to problems with reported/awareness of bruxism in two age cohorts.

		Problems to open the jaw wide*		Pain in TMJ region*		Problems with TMJ sounds*	
		70-year-olds (n = 513)	80-year-olds (n = 219)	70-year-olds (n = 479)	80-year-olds (n = 176)	70-year-olds (n = 724)	80-year-olds (n = 260)
Problems with bruxism	No[a]	7.4	7.0	5.3	4.9	10.4	8.8
	Yes*	21.3	28.7	27.2	28.4	30.0	30.6

*Some, rather great and severe problems.
[a]All six comparisons between No and Yes are significantly different ($p < 0.001$).

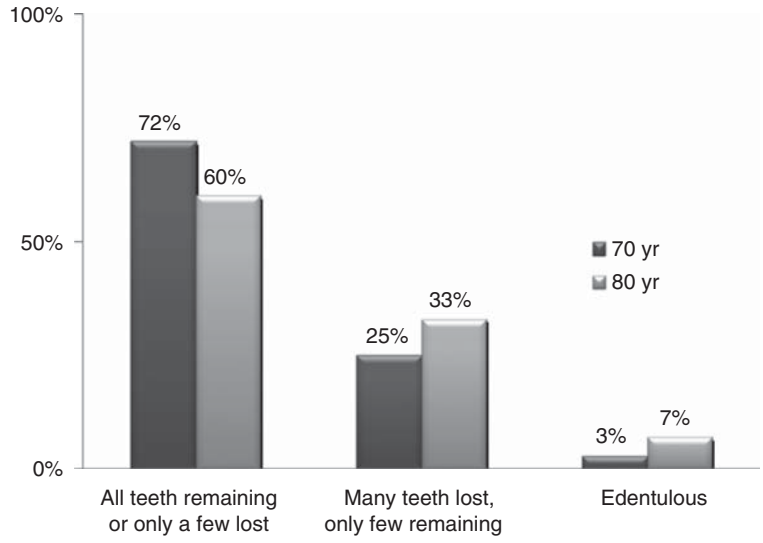

Figure 1. Dental status. Percentage distribution of number of teeth in 70- (n = 5405) and 80-year-old (n = 2659) individuals.

Logistic regression

Bivariate analyses were conducted and many of the independent variables were found in Spearman correlation analysis to be significantly correlated with the dependent variable: 21 among the 70-year-old and 17 among the 80-year-old subjects (Table II). However, according to the logistic regression only few of them showed a significant association with the dependent variable, i.e. TMD related symptoms (Table V). In the 70-year-old group only awareness of bruxism had an OR above 3, whereas three of the four significantly independent variables in the older group showed OR above 3. Changes of taste and self-reported bruxism were the only variables that were significantly associated with the dependent variable in both age groups (Table V).

Number of teeth and the presence of removable dentures were not significantly associated with any of the TMD-related symptoms.

Discussion

Even if the great majority of the examined elderly subjects had no severe problems with TMD-related symptoms, 12% of the 70-year-old women reported some, rather great or severe problems with both pain in the TMJ region and difficulty to open the mouth wide. The prevalence was lower in men as well as in the 80-year-old subjects of both sexes. In the older age group the prevalence did not differ significantly between women and men. Many, but not all, epidemiological and clinical studies have reported a greater prevalence of TMD-related symptoms in women than in men [4]. The great majority of previous studies have dealt with young and middle-aged adults. Our results suggest that the often-reported gender differences regarding TMD symptoms may be reduced among older adults.

The hypothesis that the prevalence of TMD-related symptoms would be lower in the older than in the

Table V. Significantly associated independent variables according to logistic regression (forward conditional method). The dependent variable was (1) individuals having some or no problems with TMJ pain, opening difficulties or TMJ sounds (n_{70} = 5115; n_{80} = 2435) and (2) individuals with severe or rather great problems regarding TMJ pain, opening difficulties or TMJ sounds (n_{70} = 190; n_{80} = 61).

			95% CI for OR		
	Variable	Significance	OR	Lower	Upper
70 years*	Burning mouth	0.031	2.2	1.1	4.6
	Change of taste	0.004	2.8	1.4	5.5
	Awareness of bruxism	<0.001	4.0	2.3	5.5
80 years**	Not feeling healthy	0.002	7.5	2.0	27.1
	Change of taste	0.003	5.1	1.7	14.8
	Awareness of bruxism	0.026	3.4	1.2	10.0
	Oral health problems measured with OIDP	0.001	2.6	1.5	4.6

*Nagelkerkes R^2 = 0.18; **Nagelkerkes R^2 = 0.31.

younger age group was verified. Similar results of decreasing prevalence of TMD symptoms with ageing have been reported previously [1,6,7]. These differences with respect to age and sex were true also for self-reported bruxism and in agreement with previous studies [1,7]. This is in some contrast to a study over 20 years of 50-year subjects finding a relatively stable prevalence both longitudinally and cross-sectionally from age 50–70, both for TMD-related symptoms and awareness of bruxism [4]. This difference may be partly due to the fact that the present study deals with two different age groups, whereas the other study followed one cohort over time.

Self-reported bruxism was associated with higher prevalence of all registered TMD-related symptoms (Table IV). This has been demonstrated in several previous epidemiological studies. In this study bruxism was associated with TMD symptoms in general among both the 70- and 80-year-old subjects (Table V). The complex relationship between bruxism and TMD has been discussed extensively during the last few years, but without conclusive results [1,5,15–18].

Based on epidemiological research, the associations, comorbidity, between TMD and general health problems, various diseases and conditions have been emphasized in the discussion of the etiology of TMD [1,19–27]. Among the 80-year-old subjects 'not feeling healthy', taste changes, awareness of bruxism and oral health-related problems measured with oral impacts on daily performance (OIDP) were the only factors significantly associated with TMD symptoms. Most of them are probably related to the individuals' impaired general health. The mechanism behind the comorbidity between TMDs and general health problems is not fully known, but common underlying pathophysiological and psychosocial issues have been discussed [11,20,26,27].

With respect to the controversial opinions on the possible importance of occlusal factors on TMD [28] it is noteworthy that there was no significant relationship between dental conditions (number of teeth, presence of removal dentures) and TMD symptoms. Some previous studies have also found such a lack of association between TMDs and state of dentition at the population level [4,5,11,19,24,29]. The results in the literature concerning the prevalence of TMD-related symptoms in subjects with removable dentures are not conclusive. Some studies have found higher prevalence of TMD signs and symptoms in complete denture wearers, others have not [2,10,19].

This study is based on large population samples and the response rate was on average 70%, which would seem acceptable for an epidemiological investigation at present. A trend of decreasing response rates in similar studies has been noticed during the last decades [30,31]. The higher proportion of women among non-responders, especially in the 80-year group, might have an influence on the results. However, the gender differences shown in Tables I and II would rather be strengthened; i.e. the differences shown in the tables are probably slightly smaller than they would be without this bias.

In an early study in this series of investigations using the same methods and questionnaire, clinical examination was performed in 941 randomly selected subjects of the total sample in order to validate and quantify the responses regarding reported number of remaining teeth and jaw opening capacity. There was good congruence between self-reports and clinical registrations [14]. The OIDP inventory has been validated among different samples in several countries [13,32,33].

The strengths and weaknesses of the study design and conduct have been discussed at length in a related study using the same methods as this one [5]. It must be acknowledged that the questionnaire asked about 'problems with' various TMD related symptoms and bruxism. To make the reading easier, the longer term has not always been used in the text, but only the respective symptom; in the Abstract, Conclusion and Tables, however, the longer terms have been used.

Conclusions

The great majority of the examined elderly subjects had no severe problems with TMD-related symptoms, but 12% of the 70-year-old women reported some, rather great or severe problems. The prevalence was lower in men as well as in the 80-year-old subjects of both sexes. The hypothesis of a lower prevalence of TMD-related symptoms in the older than in the younger age group was confirmed. The results support previous findings of the comorbidity between TMD-related symptoms and general health problems as well as bruxism, whereas there was no significant association with number of teeth and presence of removable dentures.

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