

Temporomandibular Disorder Pain and Related Factors in an Adult Population: A Cross-Sectional Study in Southern Sweden

Susanna Gillborg, DDS

PhD Student
Department of Orofacial Pain and
Jaw Function
Faculty of Odontology
Malmö University
Malmö, Sweden

Sigvard Åkerman, DDS, Odont Dr

Professor
Department of Orofacial Pain and
Jaw Function
Faculty of Odontology
Malmö University
Malmö, Sweden

Nina Lundegren, DDS, Odont Dr

Assistant Professor
Department of Oral Diagnostics
Faculty of Odontology
Malmö University
Malmö, Sweden

Ewa Carin Ekberg, DDS, Odont Dr

Professor
Department of Orofacial Pain and
Jaw Function
Faculty of Odontology
Malmö University
Malmö, Sweden

Correspondence to:

Susanna Gillborg
Department of Orofacial Pain and
Jaw Function
Faculty of Odontology
Malmö University
SE-205 06 Malmö, Sweden
Email: susanna.gillborg@mah.se

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Aims: To measure the prevalence of temporomandibular disorder (TMD) pain and examine its association with gender and other factors in an adult population in southern Sweden. **Methods:** In 2006, a questionnaire was sent to randomly selected individuals ($n = 10,000$) aged 20 to 89 years. Two specific questions were used to screen individuals with TMD pain, and an additional 16 questions were analyzed regarding the subjects' relation to TMD pain. The chi-squared test was used to compare the distribution of categorical variables, and factors possibly related to TMD pain were analyzed by using logistic regression models with a likelihood-ratio test. **Results:** The response rate was 63%. The prevalence of TMD pain (once a week or more) was 11.0% (95% confidence interval [CI]: 10.2% to 11.8%). Women reported experiencing TMD pain more frequently than men. Further, the prevalence of TMD pain increased significantly in adults < 50 years of age. Those with TMD pain reported headaches much more frequently than those without TMD pain, and individuals with TMD pain self-reported poorer general health than those without it. Individuals with TMD pain also had higher scores on the oral health impact profile (OHIP-14). Moreover, the TMD pain group was three times more likely to have had a dentist or hygienist comment on their tooth wear than the non-TMD pain group. **Conclusion:** The prevalence of TMD pain in the adult population in southern Sweden was 11%. Factors related to TMD pain were female gender, age < 50 years, headaches, self-reported poor general health, high scores on the OHIP-14, and tooth wear. Age was the only factor that showed a significant difference between genders for TMD pain. *J Oral Facial Pain Headache 2017;31:37–45. doi: 10.11607/ofph.1517*

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Pain localized in the oral and facial regions is classified as orofacial pain. Of all the chronic orofacial pain conditions, temporomandibular disorder (TMD) pain is the most common nonodontogenic condition.¹ TMD is a collective term embracing a number of disorders affecting the temporomandibular joint (TMJ), the masticatory musculature, and associated structures.² Persistent pain is the cardinal symptom of TMD² and is also the most common reason for seeking care.³

Because pain is a complex condition, there is no gold standard for investigating it. As such, epidemiologic researchers suggest using a reliable diagnostic method when screening for TMD pain.^{4,5} Most studies investigating the prevalence and intensity of TMD pain have used questionnaires to measure self-reported pain. These studies have reported a variety of prevalence values,⁶ which is partly due to variations in the screening questions. Therefore, to reduce variation so that results are consistent and more comparable, it is imperative to have international agreement and collaboration among investigators to produce a set of questions to evaluate the presence or absence of TMD pain. Moreover, there is a need for high-quality epidemiologic studies of orofacial pain in the general population.⁴

In 2000, a study of TMD pain and headaches in adolescents was performed in Sweden. Adolescents were considered to have TMD pain if they answered yes to one or both of the following questions⁷: (1) Do

you have pain in your temples, face, jaw joint, or jaws once a week or more? and (2) Do you have pain when you open your mouth wide or chew once a week or more? Two to 4 weeks later, an examiner blind to the results of the questions clinically examined the adolescents according to the Research Diagnostic Criteria for TMD (RDC-TMD).^{8,9} In the group with self-reported TMD pain, 80% had myofascial pain, compared to 3.3% in the control group. This showed the questions as having very good reliability and strong validity for screening TMD pain in adolescents.¹⁰

Identifying risk factors requires a prospective study that includes healthy individuals at baseline. When using a questionnaire to screen a population at a given point, it is possible to determine related factors. In the literature, epidemiologic studies on TMD pain have identified that being female and being young- or middle-aged are risk factors for TMD pain.^{5,11} Studies have also indicated that there are differences in the etiology of TMD between the two sexes due to biologic and psychosocial factors.^{12,13}

Case-control studies have consistently associated psychosocial factors with chronic pain in general and with TMD specifically.¹⁴ Studies have found impaired general health to be related to the development of TMD pain.¹⁵ TMD pain has also been found to have a strong association with poor oral health-related quality of life.¹⁶ Being an immigrant or being unemployed have also been found to be associated with TMD pain.¹⁷

Individuals with myofascial TMD pain are more prone to chronic daily headaches, migraines, and episodic, tension-type headaches.^{18,19} A high proportion of patients with headaches have significant disability due to chronic TMD pain.^{20,21} Historically, the association between bruxism and TMD pain has been assumed to be a strong one. However, recent studies are showing the opposite.^{15,22,23}

Many studies on TMD pain and related factors are performed in small groups, with the subjects being of a specific age or specific gender. There is a need for studies to be conducted with larger populations made of individuals who have been randomized into the study to confirm the quality of the data.

This study aimed to measure the prevalence of TMD pain in an adult population in southern Sweden by using the two screening questions validated by Nilsson et al.¹⁰ The study also aimed to examine its association with gender and other factors.

Using the two screening questions, the study's expectations were to find a prevalence of TMD pain similar to that reported in reviews.^{5,6} Women and individuals between 20 and 50 years of age were expected to have a higher prevalence. Immigrants from outside the Nordic countries and individuals who were unemployed or on sick leave were expected to

be risk groups with a higher prevalence of TMD pain. Self-reported bad general health, as well as headache at least once a week, were also expected to be related to a higher prevalence of TMD pain.

Materials and Methods

In 2006, an investigation of general oral health was performed in the county of Skåne in southern Sweden. A questionnaire was sent to randomly selected individuals ($n = 10,000$) aged 20 to 89 years who were registered as residing in the county during 2006. The sample was drawn from the Swedish Government's Personal Address Register (SPAR), together with background variables such as gender, address, and age (in 5-year intervals). After those individuals who had moved from the region, had an unknown address, or had died were excluded, a total of 9,690 individuals made up the final sample. The Ethics Board at the University of Lund in Lund, Sweden, approved the study (Daybook no. [Dnr] 103/2006).

The questionnaire contained 58 questions. It was delivered by mail in May 2006, and reminders were sent in June, August, and October of the same year, and in May 2007. All questions had multiple-choice answers.²⁴ Several of the questions used in the questionnaire had been validated and used previously in other questionnaires.^{10,20,25–29} Other questions were specially constructed for this particular questionnaire. Individuals who were not involved in the project and who had no knowledge of the subject matter evaluated the questionnaire for comprehensibility. The final questionnaire was adjusted according to the responses and comments from these testers. Of the 58 questions, the 2 following questions were intended to identify TMD pain³⁰:

1. Do you have pain in your face, jaw, temple, in front of the ear, or in your ear once a week or more often?
2. Do you have pain when you open your mouth or when you chew once a week or more often?

Individuals were regarded as having TMD pain if they answered yes to one or both of these questions.

After questions regarding caries, periodontitis, hygiene, esthetics, etc, were excluded, 16 of the 58 questions in the questionnaire were of special interest in relation to TMD pain. Of these, 13 were studied in more detail by using logistic regression analysis (LRA) to test their importance for the etiology of TMD pain. The three factors not included in the LRA were education, chewing difficulties, and alcohol consumption: first, education was excluded since it did not show any statistical relation to TMD pain in terms

of frequency; second, difficulties with chewing hard food were regarded as being a consequence of TMD pain and not an etiologic factor; and finally, the relation between alcohol consumption and TMD pain could not be explained because individuals with TMD pain drank less than individuals without TMD pain, and alcohol is a relaxing drug. Table 1 describes these questions and how the various answers were dichotomized in the LRA. The remaining three questions studied concerned the highest level of education attained (high school/college/university), alcohol consumption (daily/every week/every month/never), and difficulties chewing hard food (yes/no).

Descriptive statistics with means and standard deviations (SD) were used to characterize individuals with or without pain. The chi-squared test compared the distribution of categorical variables. Factors that were possibly related to TMD pain were analyzed by using logistic regression models to test for odds ratios. The related factors were as follows: gender, age, occupation, family situation, birth country, headaches, self-reported general health, self-reported oral health, oral health impact profile (OHIP-14), finding life less satisfying, missing teeth, tooth wear, and smoking. In the first model, TMD pain was tested by correcting for the related factors. In the second and third models, gender was tested for TMD pain by correcting for the related factors. Statistical calculations were performed by using the Statistical Package for the Social Sciences (SPSS 18 for Windows) with a significance level of 5% for all tests.

Results

The questionnaire was answered by 6,123 individuals, a response

Table 1 Description of the 13 Variables Tested in the Logistic Regression Analysis for Their Relationship to TMD Pain

Gender	0 = man 1 = woman
Age	0 = ≥ 50 y 1 = < 50 y
Occupation	0 = working/studying 1 = housewife/senior citizen/on parental leave 2 = unemployed/sick listed/early retired
Family configuration	0 = married/living with a partner 1 = single 2 = other family situation
Birth country	0 = Sweden or another Nordic country 1 = outside the Nordic countries
Headache (Have you had headache the last 6 months?)	0 = once per month or less 1 = once per week or more often
Self-reported general health (How do you experience your own general health compared to others of the same age?)	0 = the same or better 1 = worse
Self-reported oral health (How do you experience your own oral health compared to others of the same age?)	0 = the same or better 1 = worse
OHIP-14 (A 14-item questionnaire designed to measure self-reported functional limitation, discomfort, and disability attributed to oral conditions.)	0 = never 1 = hardly ever 2 = occasionally 3 = fairly often 4 = very often
Life less satisfying (Have you felt that life in general has been less satisfying because of problems with your teeth or mouth?)	0 = almost never or never 1 = sometimes or more often
Missing teeth	0 = ≤ 4 teeth 1 = ≥ 5 teeth
Tooth wear (Has your dentist or hygienist told you that you have tooth wear due to grinding?)	0 = no 1 = yes
Smoking (Do you smoke?)	0 = no 1 = yes

rate of 63%. The study sample consisted of 3,480 women (57%) and 2,643 men (43%). The distributions of both the randomly selected sample and the responding participants were similar to the general population.²⁴ Nonrespondents consisted of 3,567 individuals (37% of the final sample); nonrespondents were individuals who did not answer the questionnaire (97%) and those who were not interested in participating in the study, were too sick to fill in the questionnaire, temporarily lived abroad, or returned an empty envelope (3%). Therefore, the final sample may be regarded as generally representative of the area.

The prevalence of self-reported TMD pain, once a week or more often, was 11.0% (95% confidence interval [CI]: 10.2% to 11.8%). Table 2 shows the prevalence of TMD pain in relation to demographic factors. There were significant differences regarding gender and age in relation to TMD pain. Women had 1.4 times higher prevalence than men. Individuals younger than 50 years also had a significantly higher prevalence of TMD pain than the mean value. Individuals who were unemployed, on sick leave, or in early retirement reported significantly more TMD pain than those who were working, studying, or living at home by choice. No statistically significant difference was found regarding education in relation

Table 2 The Prevalence of Self-Reported TMD Pain According to Gender, Age, Occupation, Education, Family Configuration, and Birth Country in an Adult Population (n = 6,123)

	TMD pain (n = 648) %	95% CI	P value
Gender			
Male	9.1	8.0–10.2	.000
Female	12.4	11.3–13.5	
Age (y)			
20–29	14.1	11.7–16.5	.000
30–39	11.3	9.3–13.4	
40–49	13.3	11.3–15.4	
50–59	10.5	8.7–12.3	
60–69	8.5	6.8–10.2	
70–79	8.4	6.2–10.6	
80–89	8.5	5.4–11.7	
Occupation			
Working/studying	9.9	9.0–10.9	.000
Housewife/senior citizen/on parental leave	8.5	7.0–9.9	
Unemployed/sick listed/early retired	23.5	20.0–27.0	
Education			
Elementary school	10.8	9.3–12.2	.161
High school	11.8	10.5–13.1	
College/University	10.0	8.6–11.4	
Family configuration			
Married/Partner	9.9	8.9–10.8	.001
Single	13.2	11.4–15.0	
Other	13.1	9.6–16.6	
Birth country			
Sweden (n = 5,117)	10.1	9.3–11.0	.000
Other Nordic country (n = 161)	11.2	6.3–16.1	
Former Yugoslavia (n = 141)	22.0	15.1–28.9	
Former Soviet Union (n = 16)	37.5	10.9–64.1	
Western Europe (n = 94)	10.6	4.3–17.0	
Eastern Europe (n = 104)	15.4	8.3–22.4	
Iran/Iraq (n = 70)	21.4	11.6–31.3	
Asia (n = 84)	20.2	11.5–29.0	
Africa (n = 26)	23.1	5.7–40.4	
North/South America (n = 38)	10.5	0.3–20.7	

95% CI = confidence interval. Bold indicates significant value.

to TMD pain. There were significant differences related to familial structure; ie, those living with a partner had less TMD pain than those living alone or in other family configurations.

The prevalence of TMD pain among individuals born in Sweden was 10.1%, and the prevalence was 11.2% among those born in another Nordic country. Similar prevalences were found among those from Western Europe and North/South America, but higher prevalences were noted among other nationalities (Table 2).

Of all subjects, 21% reported having a headache once a week or more. Those who had TMD pain reported headaches significantly more frequently, reported significantly poorer general and oral health (worse than others of the same age) more often than those without it, and scored higher on the OHIP-14 (Table 3). A greater proportion of individuals with TMD pain compared to those without pain found life less satisfying because of problems related to their teeth or mouth.

Missing five teeth or more was significantly related to TMD pain. The TMD pain group reported comments about tooth wear from their den-

tist or hygienist three times more frequently than the non-TMD pain group. Considerably more individuals with TMD pain were smokers than individuals without TMD pain. Reports of alcohol consumption were significantly lower in the TMD pain group. Difficulties with chewing hard food were significantly more common in the TMD pain group than in the non-TMD pain group (Table 3).

After analyzing the prevalence of TMD pain in specific groups (Tables 2 and 3), LRA was performed to identify factors related to TMD pain (Table 4). Testing 13 variables, there were statistically significant relationships with TMD pain with the following: female gender, age < 50 years, headache, a self-report of worse general health than others of the same age, high scores on the OHIP-14, and comments about tooth wear from a dentist or hygienist. The same analysis was repeated with the factors divided by gender. Men and women showed the same related factors for TMD pain, except for age (Table 5).

Discussion

Screening of TMD Pain

Epidemiologic studies have found a wide range of prevalence of TMD pain. Population-based studies included in reviews have had notable differences in sample size, included only males or only females, and have had a population that could range from randomly selected individuals from a large area to the employees at a single company.^{4,5} Keeping that in mind, estimates have placed the prevalence of individuals with TMD pain at 10% in the adult population.⁶ The prevalence of TMD pain in the present study, 11%, corresponds well with this value and also with the prevalence of 3.7% to 12%, as reported in reviews.^{4,6} In addition to their study samples, the

measurement methods in epidemiologic studies have also differed. In 70 cross-sectional studies of TMD, 40 different questions have been used to ascertain the percentage of persons with self-reported TMD symptoms.⁴ Individual pain assessments are influenced not only by the measurement method but also by current weather, time of day, location, health status, and so on.³¹ The prevalence of TMD pain may, therefore, differ depending on when the study is performed and the population being studied. It is important to find a limited, comprehensible set of questions that successfully identifies the prevalence of TMD pain, regardless of the population being studied.

It seems that the two screening questions used in the present study may have captured the prevalence of TMD pain. The two questions in this study have been used in other studies with small semantic differences.^{7,32–36} To the authors' knowledge, only a few epidemiologic studies have tested the questions against a clinical examination. Two studies tested questions very similar or identical to the questions in the present study, with good validity.^{30,34} One of the studies sampled adolescents,³⁰ while the other study sampled adults referred to a specialist dental clinic.³⁴

A recent study has suggested a new screening instrument for TMD.¹⁸ The authors listed seven already existing validated screening instruments, and they commented that none used the three parameters of assessment recommended by the Standards for Reporting of Diagnostic Accuracy: operationalized criteria, examiners using a calibrated technique, and consensus diagnoses. Furthermore, the authors questioned the study validating the two screening questions used in the present study. Their opinion was that the self-report of TMD pain was biased in

Table 3 Distribution of Variables of Possible Importance for Self-Reported TMD Pain in an Adult Population

	TMD pain (%)	95% CI	No TMD pain (%)	95% CI	P value
Self-reported bad general health	33.4	29.7–37.1	9.1	8.3–9.9	.000
Self-reported bad oral health	36.7	33.0–40.4	12.1	11.2–13.0	.000
Life less satisfying	39.9	36.0–43.7	10.2	9.4–11.0	.000
Missing five teeth or more	28.0	24.5–31.5	17.4	16.4–18.5	.000
Tooth wear	30.2	26.7–33.8	10.6	9.8–11.4	.000
Smoking	30.9	27.3–34.5	18.9	17.9–20.0	.000
Alcohol consumption					
Daily	3.0	1.6–4.3	3.0	2.6–3.5	
Every week	31.2	27.6–34.8	44.1	42.7–45.4	.000
Every month	40.7	36.9–44.5	38.3	37.0–39.6	
Never	25.1	21.8–28.5	14.6	13.6–15.6	
Difficulty in chewing hard food	51.9	48.0–55.7	17.9	16.9–18.9	.000
Headache					
Daily	14.0	11.3–16.7	1.2	0.9–1.5	
Several times a week	27.2	23.7–30.6	5.1	4.5–5.7	
Once a week	27.0	23.5–30.5	9.5	8.7–10.3	.000
Once a month	19.6	16.5–22.7	35.9	34.6–37.2	
Never	12.2	9.7–14.8	48.2	46.8–49.5	

95% CI = confidence interval. Bold indicates significant value.

the validation study by Nilsson,³⁰ as the clinicians guided the patient by pointing out the areas of pain localization during the examination prior to the individual's self-report. To what degree this affected the result is unclear; and since the present study was performed with adults, a new validation study would be preferable. Gonzalez et al have suggested another set of questions in their study¹⁸; they validated the questions by testing them in already diagnosed individuals in comparison to controls without TMD pain.

TMD Pain and Demographics

Studies have indicated that there are differences in the etiology of TMD pain between male and female genders.^{12,13} Beside biologic factors, other factors more related to social life and personal experience may explain some of the differences. Men, in their occupational role or in their upbringing, could have experienced more pain than women, while women, as a result of a different upbringing than men, may communicate better about feelings regarding pain, which could explain why women are more prone to seek care.³¹ In the present study, TMD pain was 1.4 times more common among women than men. This is slightly less than the differences found in most studies, where TMD pain often has been reported to be twice as common in women than in men.^{4,11,31} An explanation for this difference might be greater gender equality in Sweden, where gender is a high-priority topic in politics, education, work, and private life.

The age span in which TMD pain was most prevalent was from 20 to 49 years. This finding is in line with earlier studies showing a clear pattern of age-specific prevalence, with a peak in the young and middle-aged.⁶ At these times of life, people are most often preoccupied with education, employment, pursuing a career, starting a family, and taking care of children, all of which can be associated with the difficulties of

Table 4 Logistic Regression Analysis of Factors Related to Self-Reported TMD Pain in an Adult Population

	Regression coefficient	Standard error	Odds ratio	95% CI	P value
Gender					
Female	0.280	0.111	1.324	1.065–1.645	.011
Age					
< 50 y	0.243	0.124	1.275	1.000–1.625	.049
Occupation (vs working/studying)					
Housewife/senior citizen/on parental leave	0.289	0.154	1.335	0.987–1.806	
Unemployed/sick listed/early retired	0.112	0.160	1.118	0.817–1.530	.172
Family configuration (vs married/partner)					
Single	0.040	0.125	1.041	0.815–1.329	.873
Other	0.097	0.211	1.102	0.729–1.665	
Birth country					
Outside the Nordic countries	–0.256	0.164	0.774	0.561–1.069	.115
Headache	1.998	0.108	7.374	5.967–9.112	.000
Self-reported bad general health	0.537	0.135	1.711	1.315–2.228	.000
Self-reported bad oral health	0.237	0.136	1.267	0.972–1.653	.083
OHIP-14 score	0.101	0.009	1.106	1.087–1.125	.000
Life less satisfying	–0.179	0.171	0.836	0.598–1.170	.295
Missing teeth					
Missing ≥ five teeth	–0.177	0.153	0.838	0.621–1.132	.248
Tooth wear	0.620	0.108	1.859	1.504–2.298	.000
Smoking	0.020	0.124	1.020	0.801–1.300	.870

95% CI = confidence interval. Bold indicates significant value.

Table 5 Factors Related to Self-Reported TMD Pain: A Comparison Between Genders in an Adult Population

	Male odds ratio	95% CI	P value	Female odds ratio	95% CI	P value
Age			.240			
< 50 y	1.300	0.837–2.020		1.254	0.934–1.683	.130
Occupation (vs working/studying)			.124			
Housewife/senior citizen/on parental leave	1.591	0.941–2.691		1.212	0.836–1.758	.436
Unemployed/sick listed/early retired	0.841	0.472–1.497		1.220	0.834–1.783	
Family situation (vs married/partner)			.511			
Single	1.254	0.816–1.927		1.001	0.742–1.352	.999
Other	1.290	0.653–2.548		1.014	0.601–1.714	
Birth country			.156			
Outside the Nordic countries	0.677	0.390–1.173		0.823	0.549–1.231	.337
Headache	8.261	5.746–11.878	.000	6.980	5.367–9.078	.000
Self-reported poor general health	1.584	1.013–2.477	.047	1.763	1.269–2.450	.001
Self-reported poor oral health	1.445	0.935–2.233	.102	1.195	0.853–1.674	.304
OHIP-14 score	1.103	1.074–1.134	.000	1.109	1.085–1.134	.000
Life less satisfying	1.133	0.676–1.900	.637	0.683	0.439–1.064	.090
Missing teeth						
≥ 5	1.010	0.623–1.638	.968	0.760	0.517–1.119	.161
Tooth wear	1.487	1.030–2.148	.036	2.057	1.582–2.675	.000
Smoking	1.062	0.698–1.616	.778	1.029	0.763–1.387	.853

95% CI = confidence interval. Bold indicates significant value.

obtaining a balance in life. Additionally, the high level of unemployment among young adults might result in uncertainty and a lack of confidence, both of which may negatively impact TMD pain.

Comorbidities

Having a headache once a week or more often was more frequent in individuals with TMD pain than in those without TMD pain. Several studies have shown

a comorbidity between TMD pain and headaches. Consequently, it is important to examine the masticatory system in individuals suffering from headache, as well as the necessity of a multidimensional approach.^{21,37,38}

Both poor general health and oral health have been reported as factors related to orofacial pain.¹⁷ Living with pain often affects quality of life, and individuals with TMD pain report reduced oral health-related quality of life.^{16,39} The OHIP-14 is an instrument measuring the impact of a disease on the subject's perceived oral health.^{28,40} In the present study, individuals who reported poor general health also reported more TMD pain. Individuals with TMD pain had worse self-perceived oral health than individuals without TMD pain; further, there was no difference when comparing genders for the OHIP-14 measures.

In the present study, individuals who were on sick leave, unemployed, or in early retirement had a higher prevalence of TMD pain. This relationship has also been found among 50-year-old subjects, for whom more than twice the proportion of unemployed subjects reported pain from the TMJ than subjects working full-time.¹⁷ In a study of 325 patients at a specialist clinic in Saudi Arabia, there were no statistically significant differences in the prevalence of TMD pain between married and unmarried individuals³⁴; however, in the present study, individuals living with a partner had a lower prevalence of TMD pain than those who were single. How family structure relates to TMD pain may depend on social life and culture.

The prevalence of TMD pain among immigrants varied substantially, depending on the individual's reported birth country. These results should be interpreted with caution, since some nationalities were represented by only a small group of individuals. Further, there are not enough studies on TMD pain prevalence in the general population worldwide to support the results. A recent study performed in Saudi Arabia showed a much higher frequency of TMD pain than suggested in the literature from European and American studies, indicating that the prevalence might be much higher in some parts of the world.³ The wide range of prevalence of TMD pain among immigrants is probably due to the fact that they, as immigrants, may not be representative of the prevalence of TMD pain in their birth country. Their acculturation involves navigating through unfamiliar customs, social norms, language(s), and values, which may lead to heightened pain sensitivity. The process of acculturation may also be associated with chronic stress, especially if an individual belongs to a minority that experiences discrimination and/or unfair treatment.⁴¹ Such chronic stress could then undermine a person's ability to cope with pain. When studying pain threshold and pain tolerance among

first- and second-generation Asian Americans and European Americans, evidence of heightened pain responses was found among first-generation Asian Americans.⁴² A second study replicated this pattern in finding heightened pain reactions among mainland Chinese students in Hong Kong relative to Hong Kong Chinese students.⁴² Among immigrants from Bangladesh living in London, chronic, widespread pain was more common than in either the white population or among Bangladeshi individuals born in the UK or arriving in the UK at age 14 or younger.⁴³ Vulnerable populations have been shown to have a higher risk for disparate health care access and outcomes. These populations include patients from racial or ethnic minorities and those who are socioeconomically disadvantaged. Individuals in vulnerable populations often have health conditions that are exacerbated by unnecessarily inadequate health care.⁴⁴ These results indicate the need for further study of TMD pain in immigrants.

Occlusal Factors and TMD Pain

There is disagreement about the association between tooth wear, bruxism, and the presence of TMD pain.^{15,22,23} Tooth wear is often used as a diagnostic tool for bruxism, but many studies have indicated that it is not always related to ongoing bruxism and that bruxism does not always lead to pain.⁴⁵ The present study showed that individuals with TMD pain had received more comments from a dentist or hygienist about tooth wear. In the LRA, this was a statistically significant factor related to TMD pain for both genders. A polysomnographic study found that self-reported frequent tooth grinding was strongly correlated with bruxism.⁴⁶ The same study found tooth wear in 16 out of 18 bruxers, but only 6 reported jaw discomfort. Another study has indicated that perhaps bruxism does not usually play a role in the etiology of TMD pain.⁴⁷ In the present study, the question about bruxism asked if the dentist or hygienist had given any comments about tooth wear. This means that individuals with other types of tooth wear, like erosion, were not excluded, which, consequently, could explain why the results showed a relation to TMD pain.

In the present study, individuals with TMD pain reported more missing teeth than individuals without TMD pain. In the past, those with the most missing teeth have often been elderly individuals, who also have a lower prevalence of TMD pain than average. In this case, missing teeth could be interpreted as an important factor. In the regression analysis, however, this relationship did not prove significant. Several studies have investigated the relationship between missing teeth and TMD pain, but the results have been contradictory.⁴⁸⁻⁵⁰ Today, members of the elderly population in Sweden still have most of their teeth, indicating that

the high prevalence of TMD pain among individuals with fewer teeth may represent other groups; for example, individuals from other countries or individuals with low socioeconomic status.

Other Factors

Some of the variables in the present study that showed a statistically significant relationship with TMD pain in frequency did not show that relationship in the LRA. These factors, however, have been shown to correlate to TMD pain in other studies and may still play a role in TMD pain etiology.

The three variables not included in the LRA were education, ability to chew hard food, and alcohol consumption. Education was excluded since it did not show any statistical relationship to TMD pain in frequency. Difficulties with chewing hard food was regarded as being a consequence of TMD pain rather than an etiologic factor. The relationship between alcohol consumption and TMD pain was difficult to explain as alcohol is a relaxing drug, yet individuals with TMD pain in this study drank less than individuals without TMD pain.

Studies on drugs and TMD pain have been limited to heavy drug addicts with more than one instance of drug abuse; therefore, they are not suitable for comparison with the results from the present study.^{51,52} Most population-based studies on TMD pain are from Scandinavia or North America, and reviews are based mostly on results from these parts of the world.^{4,5,32} The authors' belief is that the results from the present study are only representative of the population in Scandinavia and North America. As a continuation, the two screening questions used in the present study should be tested for validity and reliability in comparison with the TMD pain screening questions recommended in the recently published Diagnostic Criteria for TMD.¹⁸

Conclusions

The prevalence of TMD pain in the adult population in southern Sweden was 11%. Factors related to TMD pain were female gender, age under 50 years, headaches, self-reported poor general health, high scores on the OHIP-14, and tooth wear. All variables except for age showed no significant difference between genders.

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