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ORIGINAL ARTICLE

Temporomandibular disorders, headaches, and cervical pain among females in a Sami population

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Abstract

Objective. The aim of this study was to examine the prevalence and co-morbidity of long-standing, intense, and frequent symptoms of pain and dysfunction in the jaw-face, head, and cervical region among adult females drawn from the Sami population in northern Sweden. ***Methods***. A total of 487 females, taken from the register of the Swedish Sami Parliament or registered as reindeer owners or reindeer herders in the Swedish Board of Agriculture and living in the Arctic region of northern Sweden, participated in a questionnaire study. ***Results***. The prevalence of pain and/or dysfunction in the jaw-face region was 32%, of headaches 61%, and of pain in the cervical region 56%. When the criterion of frequent symptoms (once a week or more often) was used, prevalence dropped to 17%, 19%, and 30%, respectively, and when that of intense symptoms, defined as 5 or more on an 11-point numerical rating scale, was added, prevalence dropped further to 8%, 11%, and 20%, respectively. The majority reported long-standing symptoms (67–98% depending on symptom). A high statistically significant relationship was found between frequent symptoms of pain and/or dysfunction in the jaw-face, frequent headaches, and frequent cervical pain ($p < 0.0001$). ***Conclusions***. Symptoms in the jaw-face, headaches, and cervical pain were frequently reported among a sample of Sami females living in the Swedish Arctic region. The prevalence of symptoms was strongly dependent on criteria of frequency and intensity.

Key Words: *Cross-sectional, epidemiology, gender, masticatory, native*

Introduction

Pain and/or dysfunction in the jaw-face region related to musculoskeletal disorders is commonly termed temporomandibular disorder (TMD). In 1972, the first epidemiological study of dysfunction of the masticatory system was published [1] based on Skolt and Inari Lapps living in northern Finland. The presence of signs and symptoms of mandibular dysfunction was common (88% had one or more signs and 57% had one or more symptoms). Despite a large number of subsequent studies [2–6], no one has since reached such a high prevalence of pain and dysfunction in the jaw-face region as among this population of Samis. A recent study based on an indigenous South American population reported a prevalence of TMD similar to Scandinavian samples [7].

Contrary to patient-based studies [8], early cross-sectional population-based studies did not find any large differences in prevalence of pain and dysfunction in the jaws of men and women [6]. Longitudinal studies have shown a fluctuating pattern of both signs and symptoms with time [9–11]. Different courses for symptoms of TMDs have been reported between men and women and may indicate that women are less likely to recover from TMD [12] than men. Factors such as frequency, perceived intensity, duration, and impact on daily living may influence demand for treatment of TMD [13,14]. In a review article [15] of gender variations in pain experience, Unruh summarized that women were more likely than men to experience a variety of recurrent pains and to report more severe, more frequent pain of longer duration than men were. Besides gender, sociological and psychological factors, culture and ethnicity may also influence pain perception and behavior and are of importance in the understanding of pain and disability in a population. Since pain and dysfunction in the jaw-face, head-neck region may be related to gender, it has been proposed that men and women should be studied separately in research of etiology [12] and

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that such investigations should be directed at the biological and psychosocial factors that are more common in women than in men [16].

The Samis, the original population in Sweden, Norway, Finland, and the Kola Peninsula in Russia, have a culture and language of their own. They were basically a limited group of individuals, and marriage to someone not belonging to the Sami population was rare. The homogeneous genetic composition of the Samis, combined with a shared cultural heritage, makes them suitable for studies related to development of diseases with a multi-factorial background [17]. A high prevalence of musculoskeletal disorders has been reported among reindeer herders [18,19] and attributed to changes in the working conditions [19]. The health situation of the Sami population in Sweden, the female Sami population in particular, is largely unknown.

The aim of this study was to examine prevalence, frequency, intensity, duration, and co-morbidity of TMDs, headaches, and cervical pain, among females in a Sami population.

Material and methods

Study population

Included in the study were all females 21–70 years of age living in the communities of Kiruna and Gällivare, in the county of Norrbotten, Sweden, and registered in the 1997 year electoral register of the Swedish Sami Parliament or in the register of the Swedish Board of Agriculture (those registered as reindeer owners or reindeer herders). A total of 751 subjects fulfilled the inclusion criteria. The ethics committee of the Faculty of Medicine and Odontology, Umeå University approved the study.

Method

A questionnaire concerning symptoms of TMDs, headaches, neck pain, and shoulder pain was sent to the subject's home address together with information and a post-free return envelope. The questionnaire focused on questions regarding frequency, duration, intensity, and impact on daily life. Seven weeks after the first letter had been sent, a reminder, along with a questionnaire, was sent to those who had not responded, and after another 4 weeks a second reminder was sent out.

Each question on symptoms had six possible responses describing frequency: Never; No, not now but had it previously; Yes, at most once or twice a month; Yes, once a week; Yes, several times a week; Yes, daily. "Frequent symptom" was defined as a reported frequency of once a week or more often. Each symptom had four alternatives for describing duration: less than 1 month; 1 month to 1 year; 1 year to 5 years; more than 5 years. In this study, "long-standing symptom" was defined as a reported duration of 1 year or longer. Intensity of symptoms was measured on 11-point numerical rating scales (NS). Impact of activities on daily living (ADL) related to symptoms was also measured on NS and addressed to headaches and cervical pains (neck and/or shoulder pains), respectively, and to symptoms of TMD as a group. Symptoms of pain and dysfunction in the jaw-face region were grouped in accordance with the anamnestic dysfunction index (Ai) devised by Helkimo [20]. The index was calculated on the basis of affirmative answers to having symptoms occasionally and also frequently.

Response rate

Altogether 487 females (65%) answered and returned the questionnaire. Their mean age was 40.2 years (SD 12.9; 21–70 years of age). Nine questionnaires were returned due to unknown addressee, 1 because the respondent had deceased, and 12 questionnaires were returned blank.

Drop-outs

Out of the 242 individuals who did not participate, every third in each 10-year age group was selected for drop-out analysis. The subjects were telephoned and interviewed. It was not possible to indentify 14 of the 78 individuals in the drop-out sample (no telephone number could be found) and, despite several attempts, another 11 could not be contacted. A total of 53 subjects were reached. The most common reasons given for not participating were "out of principle" (38%) and "no particular reason" (25%). Other answers were that they "had no time to fill out the questionnaire" (11%), they did not consider themselves as being Sami (9%), they had been away from home (8%), they felt that the study was discriminating (4%), they had no symptoms (4%), or they were severely ill (2%). Of the drop-out sample, 30 answered a few selected questions from the questionnaire. The prevalence of symptoms of TMD among these was 33% (Ai I 17%, Ai II 17%) and two-thirds reported pain from the neck/shoulder region. No significant differences were found between the drop-outs and the participants.

Statistical methods

The data were transferred to a database (EpiInfo) and then converted into SPSS vs. 12.0 for Windows. Mantel-Haenszel estimates of odds ratio and 95% confidence interval were used and the level of statistical significance was set to a p-value <0.05.

Results

Eighty-six percent of the females reported that their general state of health was good; the remainder that their health was not so good (13%) or bad (0.6%). Altogether 24% reported that they presently had a disease which was under medical care and 29% took medications ordered by physicians on a regular basis. Impaired general state of health was significantly related to ongoing symptoms (OR 2.1, 95% CI 1.2–3.5), ongoing frequent symptoms (OR 2.7, 95% CI 1.5–4.8), and to long-standing, frequent, and intense symptoms of TMD (OR 2.8, 95% CI 1.3–6.0).

A total of 56% of these women reported that they had never ever experienced any symptoms of TMD. One or more ongoing symptoms of TMD was reported by 32% of the sample (Figure 1). Mild ongoing symptoms according to the anamnestic dysfunction index (Ai I) had 21% and 11% reported severe symptoms (Ai II). The most common symptoms of TMD were fatigue in the jaws and TMJ sounds, each reported by approximately 20% of the sample. Seven percent reported pain in the jaw-face region (Table I). Between 74% and 96% reported that their symptoms had been present for more than a year. The mean intensity on NS varied between 3.3 and 4.7 among the reported symptoms. The lowest mean intensity was given for TMJ sounds and the highest for TMJ locking.

When only the criterion "frequent symptoms" was included, the prevalence of symptoms was significantly reduced (Table II). The prevalence of frequent symptoms of TMD was 17%. The most prevalent symptom was TMJ sounds (12%), while the lowest was TMJ locking (0.6%). Frequent pain in the jaws was reported by 3% of the sample. The prevalence of long-standing symptoms ranged from 67% to 98%. The lowest mean intensity was given to TMJ sounds (3.9) and the highest to pain in the jaws (5.8).

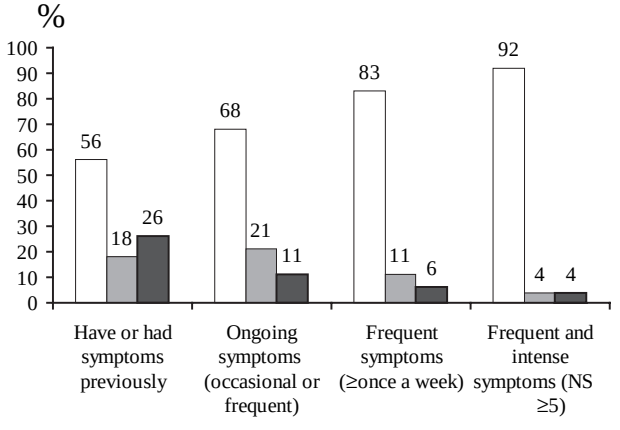

Figure 1. Percentage distribution of symptoms of pain and dysfunction in the jaw among 487 females in a Sami population (in accordance with the anamnestic dysfunction index Ai) [20]. Open bars denote no symptoms (Ai 0), stippled bars the presence of mild symptoms (Ai I), and closed bars severe symptoms (Ai II) at different frequency and intensity levels.

A total of 28% of the sample reported that they had never had any headaches and 30% that they never ever had any cervical pain. Frequently occurring headaches was reported by 19% and frequent cervical pain by 30% (Table II). Almost 90% reported long-standing symptoms. The mean intensity of frequent pain was approximately 6 on NS.

The prevalence of frequent, long-standing symptoms of at least level 5 on NS was significantly lower than for frequent symptoms. A total of 8% had symptoms of TMD at this level of severity (Table III). TMJ sounds (5%) and fatigue in the jaws (3%) reached the highest figures of symptoms of TMD. The prevalence of cervical pain at this level of severity was 20% and for headaches 11%.

There was a highly statistically significant association between frequent symptoms of TMD and frequent headaches ($p < 0.0001$, OR 4.1, 95% CI 2.4–6.9), between frequent symptoms of TMD and frequent cervical pain ($p < 0.0001$, OR 3.2, 95% CI 1.9–5.3), and between frequent headaches and frequent cervical pain ($p < 0.0001$, OR 4.4, 95% CI 2.7–7.2). The association is presented in a Venn diagram (Figure 2). Approximately 60% with frequent symptoms of TMD as well as those with frequent headaches also had frequent symptoms in the cervical area. Approximately one-third with frequent symptoms of TMD had frequent headaches and, also, one-third with frequent cervical pain had frequent symptoms of TMD. The relationships were similar when the factors long-standing and intensity equal to or higher than 5 on NS were added.

Discussion

The results of the present study show that prevalence of TMD among a female sample drawn from a Sami population strongly depends on the criteria of frequency and intensity. While almost half of the sample reported that they had symptoms of TMD, 8% reported these symptoms to be long-standing, frequent, and intense. The study also indicates a strong co-morbidity between symptoms of TMD, headaches, and cervical pain.

The decision to study females was based on the indications that long-standing pain and dysfunctional symptoms are more commonly found among women than among men [12,13]. There may be unknown factors involved in the maintenance of symptoms that relate to the female gender. Hypotheses in this issue have been psychosocial factors [16,21] and hormones [22], but no conclusive knowledge has yet come to light. A well-defined and fairly homogeneous group of women might therefore help to evaluate differences between those who never experience symptoms of TMD and those who have long-standing disability due to TMD.

Table I. Prevalence of symptoms of temporomandibular disorders, headaches, neck and shoulder pain. Percentage of a reported duration of at least 1 year, mean value of reported intensity of symptoms on a numerical rating scale (NS) and standard deviation (SD) among 487 Sami females, 21–70 years old

Symptoms		Prevalence (%)	Duration ≥1 year (%)	Intensity	
				NS	SD
1	Pain in the jaws	7.1	74.2	4.6	2.3
2	Fatigue/stiff in jaws	20.1	80	4.1	2.1
3	TMJ sounds	19.8	90.3	3.3	2.8
4	TMJ locking	3.5	82.3	4.7	3.1
5	Difficulties in opening wide	4.9	95.8	4.3	3.1
6	One or more symptoms (1–5)	31.8			
7	Headaches	61.1	82.5	4.7	2.6
8	Neck pain	46.8	86.7	5.1	2.3
9	Shoulder pain	51.2	83.2	5.2	2.2
10	Cervical pain (8 and/or 9)	56			

The overall prevalence of symptoms of TMD was lower among these women than among the Skolts and Inari-Lapps surveyed by Helkimo in the early 1970s. One reason for the difference could be living standards in general. At the beginning of 1970s the Skolt Lapps were virtually uninfluenced by other cultures due to isolation and a high degree of intermarriage. They were economically poor and their living accommodation was bad. Their dental state was also bad, but their general health was otherwise good [23]. Another reason could be related to differences in the methods used to harness the case histories. Helkimo used an oral interview, and with this "face-to-face" technique may have received a higher positive response rate. Prevalence among the Sami females in this study was close to a median value of symptoms based on several epidemiological studies [2], on an overall rate based on a meta-analysis [5], and more recent studies of adult samples [4,24].

The influence of frequency and intensity on prevalence shows the importance of the wording in a question, and can probably explain much of the variance in prevalence figures found in previous studies. The difference between the overall prevalence and the prevalence of frequent symptoms with an intensity limit of at least 5 on an 11-point numerical rating scale may imply that for most subjects in the general population symptoms of TMD are of low or inconsistent frequency and of low or negligible intensity. Most cope with these symptoms and do not demand treatment. The 8% who reported frequent, intense, and long-standing symptoms of TMD reflect the estimated level of treatment needs in the adult population [6,13]. The results therefore add understanding to why previous fairly high prevalence figures reported in epidemiological studies have never been directly transformed to treatment needs. The demand for treatment is not just based on the bare presence of signs and symptoms of TMD. Frequency, intensity, duration, and disability also have a significant influence [14]. These factors not only increase reliability in studies of TMD, they also increase clinical relevance. Prospective studies on non-patient samples have not shown that subjects with mild inconsistent symptoms of TMD will develop more severe symptoms; instead, a fluctuating pattern has been found [25].

The most commonly reported symptoms of TMD were feelings of fatigue in the jaws and TMJ sounds,

Table II. Prevalence of symptoms of temporomandibular disorders, headaches, neck and shoulder pain reported at a frequency of once a week or more often (Frequent). Percentage of a reported duration of at least 1 year, mean value of reported intensity of symptoms on a numerical rating scale (NS) and standard deviation (SD) among 487 Sami females 21–70 years old

Symptoms		Frequent (%)	Duration >1 year (%)	Intensity	
				NS	SD
1	Pain in the jaws	3.1	86.7	5.8	2.5
2	Fatigue/stiff in jaws	9.2	81.4	4.6	2.3
3	TMJ sounds	11.9	98.2	3.9	3.1
4	TMJ locking	0.6	66.7	4.7	3.5
5	Difficulties in opening wide	3.7	94.4	4.3	3.2
6	One or more symptoms (1–5)	17.3			
7	Headaches	18.8	87.4	6.0	2.4
8	Neck pain	25.3	89.9	6.1	2.1
9	Shoulder pain	26.9	87.2	6.2	2.0
10	Cervical pain (8 and/or 9)	30.4			

Table III. Percentage distribution of symptoms with a frequency of once a week or more often and with a duration of 1 year or more and an intensity of ≥5 on a numerical rating scale (0–10) among 487 Sami females 21–70 years

	Symptoms	Frequently + ≥1 year duration + intensity ≥5 on NS (%)	Interference with daily life activities (%)
1	Pain in the jaws	1.9	
2	Fatigue/stiff in jaws	3.3	
3	TMJ sounds	5.2	
4	TMJ locking	0.4	
5	Difficulties in opening wide	1.9	
6	TM pain (1or 2)	3.8	
7	TM dysfunction (3 or 4 or 5)	6.1	
8	One or more symptoms of TMD	8.4	6.3
9	Headaches	10.9	10.9
10	Cervical pain	20.7	20.1

which concurs with many previous studies [1,2,4,9,12,25]. As far as we know, this was the first time perceived intensity level of the separate symptoms of TMD was measured with NS. Interestingly, fairly small differences between the different symptoms were found. Fatigue in the jaws was judged approximately as intense/troublesome as pain in the jaws. The lowest intensity level was reported for TMJ sound. Another interesting result was that almost twice as many (6.1%) reported frequent, intense, and long-standing dysfunctional symptoms as did those reporting frequent, intense and long-standing pain (3.8%). This may need further analysis as well as analysis of any age-related differences.

Headaches and pain in the cervical area are common symptoms reported in population-based studies [15,24,26–28]. Generally, females report pain more frequently in these areas than men do [15,24,27–29]; they also report a higher degree of related disability [15,30]. As for symptoms of TMD, it is difficult to compare figures of prevalence of these pain conditions between studies because of differences in methodology and inclusion criteria. In a Danish sample of 25 to 64-year-olds the lifetime prevalence of headache was 99% for women and 93% for men, while point prevalence was 22% in women and 11% in men [31]. Similar figures were found in an English sample [32]. The lifetime prevalence of headache was higher in those samples than in the present one and may be related to the fact that occasional episodes of headache in the past may not have been taken into account among the Sami females. The prevalence of frequent (weekly) headaches was close to figures previously presented in females [3,24,32].

The 95% confidence interval for lifetime prevalence of neck pain among both men and women was 64–70% in a Canadian sample [33], figures only slightly higher than among these females. The prevalence of frequent (weekly) neck pain in this study population was lower than was reported among females, 30 to 55-year-olds, in a Finnish study [24], higher than reported among a sample drawn from the general population in England [30], and close to the results from a Norwegian survey [34]. Using the same questions, the 1-year period prevalence of troublesome neck pain among females reached 40% in a Norwegian sample [28] and the same in an Italian sample [35]. When the criteria frequent (weekly) neck pain and intense (moderate or worse) neck pain of at least 5 years' duration, and with a significant effect on daily life, were added in an analysis, the 95% confidence interval for

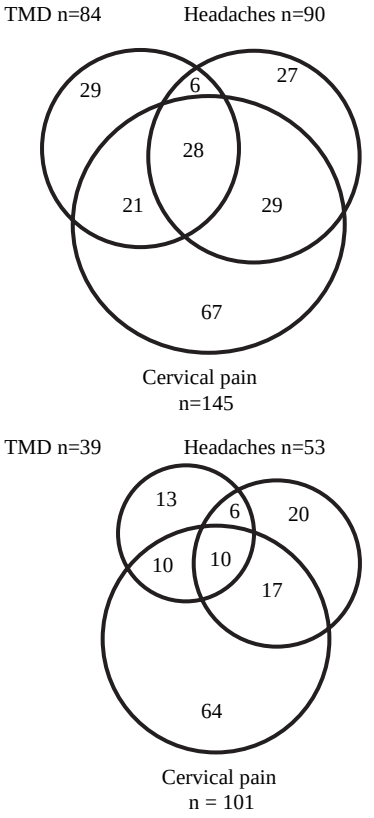

Figure 2. Relationships between frequent symptoms of temporomandibular disorders, headaches, and cervical pains (top). Relationships between frequent, long-standing, and intense symptoms (bottom) among 487 females drawn from a Sami population in northern Sweden.

prevalence of neck pain among females was 2.2–5.4% [30], a figure significantly lower than in this sample.

The significant relationships found between signs and symptoms of TMD, headache, and cervical pain confirm results from several previous studies [24,35–37] and indicate that these symptoms are influenced by the same contributing factors and/or by each other. The exact causality of the co-morbidity is not known. Central and peripheral sensitization mechanisms are involved in pain perception [38] and may induce spread of pain to the jaw-face area [39]. Chronic pain in the head and cervical region has also been associated with mood disturbances and perceived impaired general state of health [24,40,41].

In conclusion, symptoms of TMD, headaches, and cervical pains were frequently reported among a sample of female Samis living in the northern part of Sweden. The prevalence of symptoms was strongly dependent on the criteria of frequency and intensity. The study forms a basis for a subsequent qualitative study design aiming at a further understanding of factors associated with long-standing symptoms of TMD among women living within the Arctic Circle.

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