Assessment of Pain (Distribution and Onset), Symptoms, SCL-90-R Inventory Responses, and the Association With Infectious Events in Patients With Chronic Orofacial Pain

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A visual analog pain scale and scalar responses to 13 pain/symptom indicator Symptom Checklist-90-Revised (SCL-90-R) questions were used to assess symptom prevalence and pain severity in 43 chronic orofacial muscle pain patients and 40 control subjects. The orofacial muscle pain group reported pain in an axial skeletal distribution; neurocognitive, gastrogenitourinary, and musculoskeletal symptoms; infectious events at or preceding onset; similar symptoms in sexual partners; and low prevalence of trauma. Sudden onset was reported by 30.2% of pain patients. Strong associations were found between chronic orofacial muscle pain and (1) *onset-related infectiouslike events (67.4%);* (2) *a higher prevalence of history of respiratory and gastrogenitourinary infectious events; and* (3) *high prevalences of similar pain symptoms in long-term sexual partners. The SCL-90-R somatization scores (> 62) had a higher prevalence in the chronic pain group. No prevalence differences or associations with pain/symptom indicators were found for depression or anxiety dimension scores. These data suggest that patients with recurrent systemic infectious events have a higher prevalence of reporting of chronic orofacial muscle pain compared with control subjects, and these infectious events are associated with the onset of chronic orofacial muscle pain in 67% of patients.*

J OROFACIAL PAIN 1996;10:339–350.

key words: pain etiology, chronic disease, myofascial pain, fibromyalgia, cervical pain, temporomandibular pain

Chronic muscle pain conditions form a group of syndromes that have many similar characteristics. These heterogeneous yet overlapping groups of conditions may intermittently affect up to 70% of the population, with severe forms such as fibromyalgia occurring in between 5% to 10%.[1] They represent a very common clinical and therapeutic problem[1,2] with unknown etiology. Many etiologic hypotheses have been proposed for these conditions, including psychologic phenomena, neurotransmitter-related anomalies, reflex muscle hyperactivity, denervation and deafferentation-related occurrences, immunologic- or cytokine-mediated events, and viral infections.[3]

In a pilot study[4] of 35 patients with chronic orofacial muscle pain, an association was found between multiorgan symptoms and a history of urinary tract infection. There was no increase in the prevalence of reporting of viral infections such as measles, mumps, or glandular fever. Initial assessment of the urinary tract microbiology revealed that although there was an increased prevalence of history of urinary tract infection, the patients with orofacial muscle pain did not have pyuria or hematuria and therefore did not have current urinary tract infections. However, there was an increased prevalence of elevated midstream urinary staphylococcal counts ($P < .02$) in the patients with orofacial muscle pain (n = 9) compared to those in age-matched and sex-matched control subjects. Thus, the present study assesses chronic orofacial muscle pain patients with age- and sex-matched control subjects for pain characteristics, Hopkins Symptom Checklist-90-Revised (SCL-90-R) responses, microbiology, symptom prevalence, and onset events. This study presents the data on *(1)* pain distribution, *(2)* symptom presentation, *(3)* SCL-90-R psychologic inventory responses, and *(4)* onset-related events and infectious histories in patients with chronic orofacial muscle pain. The assessment of the microbiology in this study cohort will be presented in subsequent articles.

Materials and Methods

Selection of Patients and Control Subjects

Forty-six sequentially presenting patients, unrelated to the pilot study cohort, were referred for assessment of chronic orofacial pain and were interviewed and clinically examined during a 7-month period (January to July 1993). These patients were designated to be the chronic orofacial muscle pain (MP) group. Patients were selected as having muscle pain on the basis of a positive response on a visual analog pain scale (VAS) of average pain intensity in the 2 weeks prior to consultation, as well as the presence of palpable muscle pain in the reported pain areas.

The pain was present on greater than 50% of days during the 3 months immediately preceding consultation. Pain was not associated with the teeth; temporomandibular joint (TMJ) clicking, arthritis, or crepitation; sinusitis; salivary glands; or nerve or vessel pathology.

Forty-one age- and sex-matched control subjects were recruited. Nine were relatives of the pain patients and 32 were unrelated subjects to ensure similar socioeconomic and ethnic backgrounds. Control subjects were eligible for inclusion in the study if they had no response to the VAS of average pain intensity in the 2 weeks prior to consultation, did not give a history of chronic pain, and had not required professional advice or treatment for chronic muscle pain in the previous 12 months. Acute pain associated with trauma during the preceding 12 months was not an exclusionary criterion. Each patient and control subject provided informed consent and was assessed by one clinician (NRM).

Collaborative Pain Research Unit Questionnaire

To facilitate standardized data collection, a comprehensive questionnaire (Collaborative Pain Research Unit Questionnaire [CPRU], 1995) was completed by all study participants at initial presentation. The questionnaire was compiled from an existing University of Sydney Orofacial Pain Questionnaire, together with items about features of other muscle pain conditions (generalized, regional, and localized pain syndromes) reported in multiple articles from the literature (MEDLINE, 1966 to 1991). The questionnaire contained four body diagrams (left and right head and neck, front and back of whole body for pain distribution) and 154 questions on medical and family history, onset, exacerbation, signs and symptoms, duration, pain severity, previous treatment, and potential etiologic conditions. The patients were asked to delineate on the body diagrams the usual areas of pain, irrespective of their perception of the pain's origin, and to qualify by notes what they perceived to be the origin if they thought it was unrelated to their orofacial pain.

Symptom Checklist-90-Revised

The study participants completed an SCL-90-R[5]; the prevalence and degree of responses to individual questions, the index scores, and the dimension scores were compared between the MP and control groups. The SCL-90-R raw dimension scores were expressed as a T score, which is a dimension index score standardized for changes in age and sex. The SCL-90-R dimension T scores greater than 62 were used to indicate psychologic morbidity per the SCL-90-R handbook.[5] Psychologic syndrome T score profiles were allocated according to the SCL-90-R handbook. The SCL-90-R dimension profile patterns were created using the K means cluster analysis method. This allowed assessment of the

various psychologic dimension profiles and the distribution of these profile patterns between MP and control groups.

Pain/Symptom Assessment

Pain was defined to be of muscle origin if there was positive palpation of head, neck, and shoulder muscles[6,7] in the sites reported to be painful. Patients reporting pain without associated muscle tenderness were excluded. Patients were chosen to comply with a myofascial pain diagnosis (a Group I muscle disorder) of the temporomandibular disorders (TMD) research diagnostic criteria.[8] After patient selection, pain and somatic symptom severity were retrospectively assessed using the scalar responses to the VAS and 13 questions (Q) from the SCL-90-R (Q1, headaches; Q4, faintness and dizziness; Q12, chest pain; Q14, low in energy or run down; Q27, lower-back pain; Q39, heart palpitations; Q40, nausea; Q42, muscle soreness; Q52, numbness or tingling; Q55, trouble concentrating; Q56, weakness; Q58, heavy feelings in limbs; Q66, restless or disturbed sleep).[5] An index of symptom prevalence was calculated as the total number of symptoms reported from the 54 symptom questions in the pain questionnaire. The SCL-90-R global indexes were also used to assess intergroup differences. The SCL-90-R global symptom index (GSI) is a measure of psychologic distress combining symptom number and severity.[5] The SCL-90-R positive symptom distress index (PSDI) is a measure of psychologic severity corrected for symptom number. The positive symptom total (PST) is a measure of psychologic symptom prevalence.[5] Subjects were instructed to report any body symptoms, irrespective of the subjects' impression of their origin, and not to restrict reporting to the orofacial region. This was done to avoid restricted reporting of whole body symptoms and to exclude the bias toward subjects reporting only orofacial symptoms that may be perceived to be of importance in assessment of their orofacial condition.

Statistical Analysis

The clinical data were analyzed using *t* tests, the chi square test, the Mann-Whitney *U* test, and multiple regression analysis (significance $P \leq .05$). Cluster analysis by the K mean method was used to differentiate the SCL-90-R dimension profile patterns. Correction for multiplicity occurred where necessary. *Sensitivity*, defined as the prevalence of true positives in the MP group, and *specificity*, defined as the percentage of true negatives in the control group, were determined. These data were processed using Access (version 1.1, Microsoft, Redmond, WA), Excel (version 4.0, Microsoft), and Statatisca (version 4.5, Statsoft, Tulsa, OK).

Results

Patient Characteristics

Of the 46 interviewed MP patients who met the criteria, three were excluded because of incomplete questionnaires. One of the 41 control subjects was excluded because of a positive response to the VAS and a history of chronic pain within the previous 12 months. The age and sex characteristics were similar for the MP and the control (C) groups (MP mean age and standard deviation [SD] 39.5 ± 11.6 years, range 16 to 62 years, 79.1% female; C mean age and SD 35.5 ± 15.2 years, range 11 to 72 years, 70% female). No statistically significant difference was found in the number of MP or control subjects in long-term marital or de facto relationships (29 MP and 25 C subjects). No difference was found in the ethnic backgrounds of the participants. All were born in Australia except two (both of Chinese origin). The majority of participants were of Western European ethnic origin (Anglo-Celtic-Germanic, 74 of 83, 89.2%), seven (7 of 83, 8.4%) were of Eastern European origin (Croatian/Slavic), and two were of Asian origin (Chinese, 2 of 83, 2.4%).

Pain Distribution

Although all MP patients reported a history of orofacial muscle pain, on the day of the clinical examination, they also reported pain to be present in other regions: *(1)* 38 (88.4%) had neck, shoulder, and thoracic spine pain; *(2)* 35 (81.4%) had face and head pain; *(3)* 30 (69.8%) had lower-limb pain; *(4)* 29 (67.4%) had lower-back pain; *(5)* 24 (55.8%) had upper-limb pain; *(6)* 17 (39.5%) had abdominal pain; and *(7)* 14 (32.6%) had anterior chest wall and sternum pain. At initial examination, three patients (7.0%) presented with pain restricted to the head, 12 (27.9%) had regional pain distributed predominantly in a facioscapulohumeral distribution, and 28 (65.1%) had pain in all four quadrants. Thus, at initial examination, 7.0% were classified as having orofacial pain alone, and 27.9% were classified as having myofascial pain syndrome; although the fibromyalgia points were not palpated, 65.1% had a pain distri-

bution consistent with symptoms of fibromyalgia. Limb and anterior chest wall and/or sternal pain were reported only by patients with pain in all four quadrants. These patients characterized the fibromyalgiclike patients.

At onset of the pain condition, head pain was the first site of pain reported by 20 of the 43 MP patients (46.5%), with 30 (69.8%) reporting a facioscapulohumeral distribution. However, eight (18.6%) also reported pain to be first noticed in the lower back. Most patients reported localized or regional pain at onset, which progressed to more generalized pain involving all four quadrants of 28 (65.1%) patients in this cohort.

Pain Assessment

As previously described, there was a difference in the VAS (mean ± standard error of the mean [SEM] MP = 2.72 ± 0.76; C = 0) between the MP and control groups. Forty-two of 43 (97.7%) MP patients had a VAS score of greater than 2. Forward stepwise discriminant function analysis using all pain symptom indicators and the SCL-90-R global indexes, excluding the VAS, was used to assess intergroup differences. Table 1 shows that symptom prevalence and SCL-90-R Q42 (muscle soreness), Q14 (low energy or run down—lethargy/fatigue), and Q40 (nausea) were important factors in differentiating between the MP and control groups. The SCL-90-R global indexes were not important intergroup determinants. Therefore, MP patients in this cohort, selected on the basis of muscle pain, also had increased symptom prevalence, fatigue, and nausea compared with control subjects.

When the patients with four-quadrant pain (fibromyalgiclike group, n = 28) were compared with the remainder of the MP patients (Other MP group, n = 15), forward stepwise discriminant function analysis revealed that Q40 (nausea, $P < .003$), Q14 (low energy or run down—lethargy/fatigue, $P < .002$), Q42 (muscle soreness), and symptom prevalence were also important factors in differentiating between the fibromyalgiclike patients and the remainder of the MP patients (model: Wilks' lambda = .387, $F[4,38] = 15.03$, $P < .00001$). Thus, nausea and fatigue were important in determining the difference between the fibromyalgiclike patients and the other MP patients.

Table 1 Pain Assessment Questions Found Important in Determining the Difference Between MP Patients and Control Subjects

Pain/symptom indicators	Wilks' lambda	$F(1,75)$	P*
Symptom prevalence	.443	7.09	< .009
Q42 Muscle soreness	.462	10.59	< .002
Q14 Low in energy or run down	.429	4.46	< .04
Q40 Nausea	.438	6.18	< .02
Q27 Lower-back pain	.423	3.46	= .066
Q39 Palpitations	.422	3.23	= .076
Q58 Heaviness in limbs	.417	2.31	= .132

*Forward stepwise discriminant function analysis.
$P < .00001$, Wilks' lambda = .40492.

Signs and Symptoms

Of the 54 symptoms reported in the CPRU questionnaire, 35 symptoms and the sensitivity (Sen) and the specificity (Spec) of each are presented in Table 2. An increased prevalence of the symptoms in the MP patients was found (multiplicity correction $P \leq .005$). The symptoms could be grouped into musculoskeletal-, gastrointestinal-, genitourinary-, neurologic-, and infection-related and other groups. There were highly significant prevalence differences in the musculoskeletal-, gastrogenitourinary-, and infection-related symptoms between the MP and control groups. The fibromyalgiclike group also reported increased symptom prevalence (fibromyalgiclike = 21.2 ± 10.6 and Other MP = 13.1 ± 8.5; $P < .01$), in particular nausea (Sen = 88%, Spec = 78%; $P < .001$) and dizziness (Sen = 72%, Spec = 83%; $P < .001$) when compared with the other MP patients (multiplicity correction $P \leq .005$).

Onset-Related Events

Thirty-one of the 43 (72.1%) MP patients associated onset of their symptoms with one or more causally-related events including upper respiratory tract/influenzalike infection, low-grade diarrhea, genitourinary tract infection, glandular fever, or trauma (Table 3). Pain and symptom onset was reported to be either sudden (13 of 43, 30.2%) or gradual (30 of 43, 69.8%). Patients with sudden pain/symptom onset were more likely to report an infectious event associated with onset (upper respiratory tract/influenzalike infections [sudden = 11 of 13, gradual = 5 of 30; $P < .001$) or genitourinary tract infections [sudden = 3 of 13, gradual = 1 of 30; $P < .05$]). Interestingly, pain onset following a new sexual contact was reported by 3 of 43 (7%) MP patients, each of whom reported a genitourinary tract infection at onset, and one of whom also reported glandular fever at onset. Patients with

Table 2 Sensitivity and Specificity of Questionnaire-Reported Symptoms in MP Patients (n = 43) and Control Subjects (n = 40)

Symptom	Sensitivity (%)	Specificity (%)	P^*
Musculoskeletal symptoms			
Headaches	88.4	55.0	< .001
Tension headaches	69.8	70.0	< .001
TMJ clicking	67.4	82.5	< .001
Muscle weakness	65.1	100.0	< .001
Morning joint stiffness	62.8	85.0	< .001
Muscle fatigue	60.5	92.5	< .001
Muscle twitches	46.5	92.5	< .001
Muscle cramps	41.9	95.0	< .001
Bruxism	39.5	90.0	< .005
Sciatica	32.6	100.0	< .001
Gastrointestinal symptoms			
Nausea	65.1	92.5	< .001
Abdominal bloating	51.2	87.5	< .001
Abdominal pain	48.8	97.5	< .001
Irritable bowel syndrome	44.2	95.0	< .001
Low-grade diarrhea	41.9	92.5	< .001
Gastric reflux	39.5	95.0	< .001
Constipation	32.6	100.0	< .001
Genitourinary symptoms			
Urinary frequency	55.8	90.0	< .001
Groin lymphodynia	39.5	97.5	< .001
Recurrent genital infections	25.5	100.0	< .001
Dysuria	23.2	97.5	< .005
Menstrual pain (females)	64.7	72.0	< .005
Infection-related symptoms			
Fatigue or lethargy	65.1	95.0	< .001
Low-grade fever	48.8	95.0	< .001
Cervical lymphodynia	55.8	92.5	< .001
Axial lymphodynia	44.2	92.5	< .001
Recurrent sore throats	44.2	90.0	< .001
Neurologic symptoms			
Hyperesthesia	51.2	90.0	< .001
Paresthesia	41.9	97.5	< .001
Other symptoms			
Cardiac dysrythmias	46.5	95.0	< .001
Chest pain	32.6	95.0	< .005
Allergies	53.5	87.5	< .001
Dizziness or fainting spells	48.8	95.0	< .001
Tinnitus	44.2	90.0	< .001
Earaches	32.6	92.5	< .001

*Chi square test. Multiplicity-corrected P value. $P \leq .005$.

Table 3 Prevalence of Major Onset-Related Events in MP Patients

Onset event	Sudden onset	Gradual onset	Total prevalence
Upper respiratory tract/influenzalike infection	11/13 (84.6%)	5/30 (16.7%)	16/43 (37.2%)
Diarrhea	4/13 (30.8%)	6/30 (20.0%)	10/43 (23.3%)
Trauma	2/13 (15.4%)	3/30 (10.0%)	5/43 (11.6%)
Genitourinary infection	3/13 (23.1%)	1/30 (3.3%)	4/43 (9.3%)
Glandular fever	1/13 (7.7%)	3/30 (10.0%)	4/43 (9.3%)
No associated event	0/13 (0.0%)	12/30 (40.0%)	12/43 (27.9%)

gradual pain/symptom onset were more likely to be unable to identify an onset-associated event (sudden = 0 of 13, gradual = 12 of 30; $P < .007$).

History of Infectious Events

Patients with MP had more occurrences of history of chronic recurrent upper respiratory tract infection (Sen = 39.5%, Spec = 95.0%; $P < .001$), history of genitourinary infection (Sen = 37.2%, Spec = 82.4%; $P < .05$), and history of appendectomies (Sen = 23.2%, Spec = 92.5%; $P < .05$). No statistically significant differences were noted for reporting of glandular fever.

Pain in Long-Term Partners

In the MP group, a total of 29 patients were in long-term relationships, and 17 of these (Sen = 39.5%, Spec = 90.0%; $P < .02$) reported that their partner had chronic muscle pain of varying severity and distribution. When the participants in long-term relationships were compared between the MP and C groups, the difference was even more pronounced (Sen = 58.6%, Spec = 84.0%; $P < .002$). Both of the control subjects who reported that their partners had muscle pain also responded positively to at least one of the SCL-90-R pain/symptom indicator questions.

Group Differences for the SCL-90-R

Table 4 shows the analysis of the responses to the various SCL-90-R global indexes and dimension scores. The major difference between the groups was the higher global indexes and the somatization dimension scores in the MP group, with higher scores also noted in the obsessive-compulsive and depression dimensions. The somatization dimension was the only group dimension in the SCL-90-R–defined psychologic morbity indexes range (greater than 62), and there was a higher prevalence of somatization T scores of greater than 62 in the MP patients (25 of 43 MP, 6 of 40 C; $P < .0001$). No other dimension T score of greater than 62 was found to have an increased prevalence when MP and C groups were compared.

The fibromyalgiclike patients had higher SCL-90-R global indexes for the global symptom index (GSI) ($P < .005$) and the positive symptom total (PST) ($P < .02$), but not for the positive symptom distress index (PSDI) ($P < .054$) when compared with the other MP patients (Mann-Whitney U test). Similarly, the fibromyalgiclike group had higher scores in the somatization dimension ($P < .0003$), the depression dimension ($P < .004$), the obsessive-compulsive dimension ($P < .008$), and the anxiety dimension ($P < .02$) when compared with the other MP patients. Discriminant function analysis of the difference between the fibromyalgiclike patients and the other MP patients revealed that the somatization dimension ($P < .03$) was the prime assessment difference between the two groups (model: Wilks' lambda = .53, $F[5,37] = 6.56$, $P < .0002$), with the hostility ($P < .05$) and the PST ($P < .005$) being the second and third variables, respectively. Depression and anxiety were not important discriminant dimensions in this model.

Table 4 Mean ± SEM SCL-90-R Global and Dimension T Scores in MP Patients and Control Subjects

	Muscle pain patients	Control subjects	Statistical significance*
Global indexes			
Global severity	58.0 ± 1.32	48.8 ± 1.78	< .02
Positive symptom total	58.1 ± 1.17	50.7 ± 1.77	< .05
Positive symptom distress	60.5 ± 0.97	52.3 ± 1.15	< .0008
Dimension scores			
Somatization	64.2 ± 1.15	50.2 ± 1.73	< .000001
Obsessive-compulsive	58.1 ± 1.42	49.8 ± 1.69	< .02
Interpersonal sensitivity	51.9 ± 1.59	52.9 ± 1.60	NS
Depression	58.0 ± 1.35	49.9 ± 1.77	< .03
Anxiety	52.3 ± 1.56	48.8 ± 1.53	NS
Hostility	50.5 ± 1.27	49.8 ± 1.43	NS
Phobic anxiety	49.6 ± 1.22	47.8 ± 1.07	NS
Paranoid ideation	48.2 ± 1.37	49.1 ± 1.47	NS
Psychoticism	54.8 ± 1.32	50.8 ± 1.36	NS

*Mann Whitney U test ($P \leq .05$).

Global Index Associations With Dimension Changes and Pain/Symptom Indicators

Logistic regression analysis of the GSI against the dimension T scores revealed important associations, in order of discriminant ability, with the depression dimension ($P < .000000001$), the obsessive-compulsive dimension ($P < .0000004$), the somatization dimension ($P < .00000006$), and the interpersonal sensitivity dimension ($P < .00008$); a negative association was found for the phobic anxiety dimension ($P < .03$) (model: $R^2 = .960$, $F[7,75] = 255.87$, $P < .00001$). The GSI was also associated with SCL-90-R Q66 (restless or disturbed sleep, $P < .15$), Q52 (numbness or tingling, $P < .008$), and Q12 (chest pain, $P < .007$) (model: $R^2 = .413$, $F[4,78] = 13.71$, $P < .000001$). The GSI was not associated with the index of symptom prevalence or the VAS, and it was not an important factor in determining the difference between the MP and control groups.

Logistic regression analysis of the PSDI against the dimension T scores revealed a significant association only with the somatization dimension ($P < .0000002$; model: $R^2 = .529$, $F[9,73] = 9.10$, $P < .00001$). The PSDI was also associated with SCL-90-R Q1 (headaches, $P < .002$), Q42 (muscle soreness, $P < .002$), and Q52 (numbness or tingling, $P < .002$) (model: $R^2 = .542$, $F[15,67] = 5.29$, $P < .000001$). The PSDI was not associated with the index of symptom prevalence or the VAS, and it was not important in determining differences between the MP and control groups.

Logistic regression analysis of the PST against the dimension T scores revealed strong associations, in order of discriminant ability, with the depression dimension ($P < .000002$), interpersonal sensitivity dimension ($P < .007$), and the obsessive-compulsive dimension ($P < .004$) (model: $R^2 = .887$, $F[6,76] = 99.92$, $P < .00001$). The PST was also associated with SCL-90-R Q66 (restless or disturbed sleep, $P < .06$), Q52 (numbness or tingling, $P < .07$), and Q12 (chest pain, $P < .21$) (model: $R^2 = .325$, $F[4,78] = 9.39$, $P < .000001$). The PST was not associated with the index of symptom prevalence or the VAS.

Pain/Symptom Indicators and SCL-90-R Dimension Differences

Five pain/symptom indicators, the VAS, the index of symptom prevalence, Q14 (low energy/lethargy/fatigue), Q40 (nausea), and Q42 (muscle soreness), were associated with differences between the MP and C groups. Analysis of the dimension score changes with these pain/symptom indicators was undertaken to assess the association between each dimension and pain expression.

Logistic regression analysis of the VAS against the dimension T scores revealed that important changes in dimension scores occurred with increasing VAS scores (model: $R^2 = .337$, $F[9,73] = 4.12$, $P < .0003$). A positive relationship was found between the VAS and somatization scores ($P < .0002$), and a negative relationship was found with interpersonal sensitivity ($P < .02$). The index of symptom prevalence was associated with strong dimensional changes (model: $R^2 = .614$, $F[9,73] = 4.91$, $P < .00004$). A positive relationship was found between the index of symptom prevalence and somatization ($P < .008$), obsessive-compulsive ($P < .05$), and psychoticism ($P < .05$), and a negative relationship was found with interpersonal sensitivity ($P < .04$). The SCL-90-R Q42 (muscle soreness) was associated with pronounced dimensional changes (model: $R^2 = .439$, $F[9,73] = 6.36$, $P < .00001$) and had a positive relationship with the somatization dimension ($P < .000002$). The SCL-90-R Q14 (low energy/run down) was also associated with significant dimensional changes (model: $R^2 = .372$, $F[9,73] = 4.81$, $P < .00005$) and had a negative relationship with interpersonal sensitivity ($P < .005$). No relationship was found between Q14 and the depression dimension, even though Q14 forms part of that dimension. The SCL-90-R Q40 (nausea) was also associated with strong dimensional changes (model: $R^2 = .392$, $F[9,73] = 5.23$, $P < .00002$) and had a positive relationship with somatization ($P < .02$) and a negative relationship with interpersonal sensitivity ($P < .04$). No association was found between any of the pain/symptom indicators and the depression and anxiety dimension scores.

Three dimensions had increased responses in the MP patients: somatization; obsessive-compulsive; and depression. Logistic regression analysis of the somatization dimension against the pain/symptom indicators found positive associations with SCL-90-R Q52 (numbness or tingling; $P < .009$) and Q42 (muscle soreness; $P < .04$) (model: $R^2 = .592$, $F[15,67] = 6.49$, $P < .000001$). The obsessive-compulsive dimension was positively associated with SCL-90-R Q55 (trouble concentrating, $P < .008$), Q52 (numbness or tingling; $P < .009$), and Q12 (chest pain, $P < .04$). The depression dimension was not associated with any of the pain/symptom indicators. The anxiety dimension was positively associated with SCL-90-R Q39 (heart palpitations, $P < .05$) and negatively associated with the VAS ($P < .05$) (model: $R^2 = .452$, $F[15,67] = 3.68$, $P < .0002$).

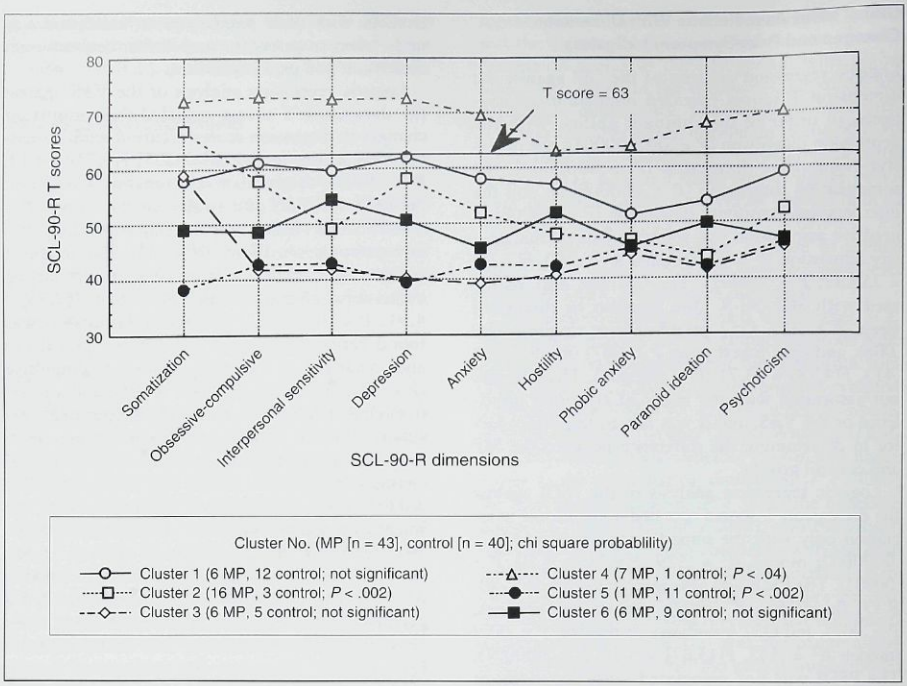

Fig 1 Mean SCL-90-R dimension T scores for each cluster.

K Means Cluster Analysis of the SCL-90-R Dimension Profiles

Clustering divisions were restricted to subject numbers of five or greater. Using this basis, all participants were clustered into six subgroups, and their dimension profiles are shown in Fig 1. Cluster 2 ($P < .002$) and cluster 4 ($P < .04$) had a higher prevalence in the MP group; cluster 5 ($P < .002$) had a higher prevalence in the control group. Only cluster 4 (n = 8, MP = 7, and C = 1) had responses that were greater than 63 in all dimensions. Cluster 4 could be interpreted from the SCL-90-R handbook criteria[5] to indicate significant psychologic morbidity; however, this cluster may also be interpreted as being a possible augmenting response subgroup. Similarly, cluster 5, which was higher for the control subjects ($P < .002$), may be interpreted as a possible repressive response subgroup.

Interpretations of SCL-90-R Question Responses

The SCL-90-R is a symptom checklist and includes questions that are subject to different clinical interpretations. There were no associations between the VAS, symptom prevalence, or muscle soreness, and the SCL-90-R symptom scores were higher in the fibromyalgiclike patients compared with the other MP patients. As a result, the SCL-90-R responses were assessed from two points of view. The responses were interpreted as either a psychologic illness with associated physical symptoms, or as a physical illness with psychologic consequences. The prevalence of positive responses and increased scalar responses to each of the 90 questions within the SCL-90-R were determined for the MP and control groups. Table 5 shows the two different interpretations for the 29 questions that had responses from the MP patients that were different

Table 5 Clinical Characteristics of the 29 Elevated Muscle Pain-Related SCL-90-R Questions

	SCL-90-R interpretation
Physical symptoms	
Q1 Headaches	Somatization
Q4 Faintness or dizziness	Somatization
Q12 Pains in heart or chest	Somatization
Q27 Pains in lower back	Somatization
Q40 Nausea or upset stomach	Somatization
Q42 Muscle soreness	Somatization
Q48 Trouble getting your breath	Somatization
Q49 Hot or cold spells	Somatization
Q52 Numbness or tingling in parts of your body	Somatization
Q53 A lump in your throat	Somatization
Q56 Weak feelings in body	Somatization
Q58 Heavy feelings in the arms or legs	Somatization
Q17 Trembling	Anxiety
Q39 Heart pounding or racing	Anxiety
Sleep disturbance	
Q44 Trouble falling asleep	Additional items
Q64 Awakening in the early morning	Additional items
Q66 Sleep that is restless or disturbed	Additional items
Neurocognitive events	
Q9 Trouble remembering things	Obsessive-compulsive
Q38 Having to do things very slowly to ensure correctness	Obsessive-compulsive
Q46 Difficulty making decisions	Obsessive-compulsive
Q51 Mind going blank	Obsessive-compulsive
Q55 Trouble concentrating	Obsessive-compulsive
Possible disease consequences	
Q5 Loss of sexual interest or pleasure	Depression
Q14 Feeling low in energy or slowed down	Depression
Q71 Feeling everything is an effort	Depression
Q87 The idea that something serious is wrong with your body	Psychoticism
Possible psychologic responses	
Q30 Feeling blue	Depression
Q32 Feeling no interest in things	Depression
Q50 Having to avoid certain things, places, or activities because they frighten you	Phobic anxiety

from those of the control subjects. The SCL-90-R interpretation shows increases in questions from the somatization, obsessive-compulsive, and depression dimensions. The somatization dimension could be interpreted to indicate simple physical symptom reporting, and the obsessive-compulsive dimension responses could be interpreted to indicate neurocognitive changes. The sleep disturbance grouping was classified as an additional item by the SCL-90-R. The questions from the depression dimension could be interpreted as reactive psychologic responses or symptoms, or consequences of the disease condition.

Discussion

The patients with chronic orofacial pain in this study were compared with a control group of subjects who did not respond to a VAS of average pain intensity in the previous 2 weeks and did not report a history of or treatment for chronic pain in the last 12 months. Pain and symptom presentation was assessed against the scalar responses to 13 SCL-90-R questions that were predominantly from the somatization dimension and that represented a range of symptoms likely to be higher in pain patients than in control subjects. A symptom preva-

lence score derived from the questionnaire was also used. In studies of this type, the reporting of pain and treatment sought for pain are influenced by many factors that have been shown to be poor indicators of the presence of physical symptoms.[9,10] The SCL-90-R questions were used in the present study, even though they were not specific for orofacial pain symptom expression, because they *(1)* gave a scalar response; *(2)* indicated pain/symptom expression in the previous 7 days only, representing current symptom expression; *(3)* were components of a larger questionnaire and were unlikely to register to the study participant as pain or symptom response indicators; and *(4)* may more accurately reflect overall symptom expression. In an attempt to more completely understand the etiology of these conditions and not simply each patient's major complaint of pain, a broader assessment of the study participants was made. In support of this approach, symptom prevalence was found to be a much stronger indicator of increasing condition severity and intergroup differences than was the assessment of muscle soreness. In support of these observations, other studies using palpable muscle tenderness found no correlation between palpable tenderness and pain.[9] Fatigue or lethargy (SCL-90-R Q14) and nausea (SCL-90-R Q40) were also found to be important intergroup determinants that were also more prevalent in patients with fibromyalgialike pain than in those with myofascial or localized pain. The assessment of these symptoms may allow better quantification of the pain condition than would pain scores alone.

In the present study, patients with orofacial muscle pain reported a wide pain distribution that was prominent in the axial skeleton, but also extended to the limbs and anterior chest wall in patients with more severe symptoms. The distribution of patients in this study cohort with fibromyalgiclike, myofascial pain, and localized pain presentation appeared skewed toward the fibromyalgiclike patients. This may reflect the method of patient selection, the difference in approach in obtaining patient reporting of whole body symptoms, or simply a random event. However, every effort was made to request that patients report symptoms distant from the face, symptoms that they may not normally report in a dental setting. Irrespective of these considerations, this cohort of patients with chronic orofacial muscle pain had a higher prevalence of musculoskeletal, gastrointestinal, genitourinary, and neurologic symptoms consistent with a systemic condition; symptoms and histories suggestive of nasopharyngeal, gastrointestinal, and genitourinary infectious events, particularly in patients reporting a sudden onset; low-grade fever and lymphodynia; reporting of pain in their sexual partners; and infectious events occurring at the time of onset. The TMD research diagnostic criteria[8] were devised for a dental setting and do not differentiate between patients on the basis of most of these associated symptoms. The present study showed that patients with orofacial muscle pain (Group I, myofascial pain[8]) reported multiple symptoms distant to the orofacial area, suggesting that the condition has a systemic basis and that the orofacial muscle pain is unlikely to represent a localized functional phenomenon. Interpretations of these data include *(1)* patients presenting with orofacial muscle pain have a heterogeneous group of etiologic medical conditions, *(2)* orofacial muscle pain patients have increased prevalence of infectious events as a result of their related medical condition(s), or *(3)* a medical condition with orofacial muscle pain as a presenting symptom is the result of a transmissible agent(s). In support of these possibilities, chronic muscle pain conditions have been associated with enterovirus[11] and Epstein-Barr virus[12] infections; chronic bacterial infections, such as Lyme disease[13]; and parasitic infections, such as toxoplasmosis.[14] In addition, injection of inflammatory mediating cytokines such as interleukin-2[15] and interferon[16] induces myalgia and many signs and symptoms reported by patients with chronic pain, supporting the possibility of an immune-mediated condition. This model might explain the development of muscle pain symptoms via multiple etiologic pathways.

A psychophysiologic model has been proposed for chronic pain, and several studies have shown an association with increased psychologic dimension changes, particularly depression scores, in muscle pain patients.[7,10,17–21] In the present study, patients had increased T scores in the somatization, obsessive-compulsive, and depression dimensions. The MP group had a higher prevalence of somatization dimension T scores greater than 62 but did not have a higher prevalence of obsessive-compulsive or depression dimensions scores greater than 62. The SCL-90-R GSI, PSDI, and PST were not found to be important intergroup determinants, and none was associated with the factors found by logistic regression to be important intergroup determinants, eg, VAS, symptom prevalence index, or SCL-90-R Q14 (fatigue/lethargy), Q40 (nausea), and Q42 (muscle soreness). The GSI (the SCI-90-R psychologic distress index) and the PST (the SCL-90-R symptom prevalence index) were predominantly associated with increasing depression scores; the PSDI (the SCL-90-R symptom severity measure) was strongly

associated with the somatization dimension. The patients with higher GSI and PST scores had strong associations with the depression dimension and were found to have symptom associations different from those most commonly expressed by the MP patients. Cluster analysis revealed a subgroup of patients with increased multiple SCL-90-R dimension T scores greater than 62 and with a higher prevalence in the MP group. Possible interpretations include *(1)* patients in this subgroup have a psychologic morbidity, *(2)* patients in this subgroup represent an augmenting group,[5] or *(3)* a combination of the other two. The distinction between these three possibilities can only be determined by the appropriate clinical investigations. However, these data do not provide strong evidence for a direct association between increasing affective disturbance and muscle pain or physical symptom prevalence in the study cohort, but a subgroup that may have a psychologic morbidity was found.

The validity of the SCL-90-R interpretation for pain patients has been previously questioned[17] and was examined in the present study from two aspects: the affective psychologic assessment of the SCL-90-R and as a physical disease with possible psychologic consequences. Table 5 presents these two possible interpretations of the SCL-90-R responses and shows that the SCL-90-R can be interpreted in two ways. It was not within the scope of this article to attempt to differentiate between these two possibilities, but these data suggest that the MP group could be divided into patients with a predominantly physical illness, and another smaller subgroup (about 15%) with potential psychologic morbidity similar to that described in the TMD research diagnostic criteria.[8] The SCL-90-R responses do suggest that patients with chronic orofacial muscle pain have a higher prevalence of altered neurocognitive responses particularly associated with memory and concentration. These data are interesting because alterations of N-methyl-D-aspartate (NMDA) receptors in the brain and the spinal cord are associated with not only modulation of pain responses[22] but also memory functions.[23] The possibility of changes in brain metabolism and function are also supported by the observation of alteration of the hypothalamic-pituitary-adrenal axis in patients with fibromyalgia syndrome,[24] depression, and chronic fatigue syndrome.[25]

Conclusions

The present study indicates that for patients with chronic orofacial muscle pain, *(1)* muscle pain symptoms are not restricted to the orofacial areas; *(2)* multiorgan involvement and diverse symptom expression suggest that a systemic condition may be occurring in at least a subgroup of patients; *(3)* gastrogenitourinary symptoms are prominent; *(4)* onset is associated with infectious events in a subgroup of patients; *(5)* there is an increased prevalence of history of infectious events and recurrent infections; *(6)* partners of muscle pain patients have an increased prevalence of muscle pain; *(7)* there are increased SCL-90-R inventory scores in the somatization, obsessive-compulsive, and depression dimensions; *(8)* the SCL-90-R responses suggest that neurocognitive changes are occurring in the pain patients; *(9)* the SCL-90-R inventory responses can have multiple interpretation; and *(10)* multiple etiologies are likely. Future research should focus on assessment of the many possible etiologic agents or events associated with onset of chronic orofacial muscle pain.

Acknowledgments

The authors wish to acknowledge the support of the Gideon Lang Foundation for this research.

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Resumen

Evaluación del Dolor (Distribución y Ataque), Síntomas, Respuestas al Inventario SCL-90-R, y la Asociación con Eventos Infecciosos en Pacientes con Dolor Orofacial Crónico

Se utilizó una escala de dolor análoga y las respuestas escalonadas a 13 respuestas indicadoras de dolor y síntomas correspondientes a la Lista de Verificación de Síntomas Revisada-90 (SCL-90-R), para evaluar la prevalencia de los síntomas y la severidad del dolor en 43 pacientes con dolor muscular orofacial crónico y 40 pacientes de control. El grupo con dolor muscular orofacial presentó dolor caracterizado por una distribución esquelética axial; lo mismo que síntomas neurocognoscitivos, gastrogenitourinarios, y musculoesqueléticos; eventos infecciosos antes o en el momento del ataque; compañeros sexuales con síntomas similares; y una baja prevalencia de trauma durante el ataque. El ataque repentino fue reportado por el 30.2% de los pacientes con dolor. Se encontraron asociaciones fuertes entre el dolor muscular orofacial crónico y *(1)* los eventos de carácter infeccioso relacionados al ataque (67,4%); *(2)* una prevalencia alta de antecedentes respiratorios y eventos infecciosos gastrogenitourinarios; y *(3)* prevalencias altas de síntomas dolorosos similares en los compañeros sexuales con quienes se había mantenido una relación a largo plazo. Los valores de somatización (> 62) de la SCL-90-R presentaron una prevalencia alta en el grupo con dolor crónico; no se encontró ninguna diferencia en cuanto a la prevalencia de los valores de la depresión o la ansiedad. No se encontró ninguna asociación entre los valores de la depresión y los indicadores de dolor y síntomas. Estos datos indican que los pacientes con infecciones sistémicas recurrentes tienen una mayor prevalencia en cuanto al hecho de reportar dolor muscular orofacial crónico en comparación con los sujetos de control, y estos eventos infecciosos están asociados con los ataques de dolor muscular orofacial crónico en 67% de los pacientes.

Zusammenfassung

Einschätzung von Schmerzen (Verteilung und Anfang), Symptome, SCL-90-R und der Zusammenhang mit infektiven Ereignissen in Patienten mit chronischen orofazialen Schmerzen

Um die Prävalenz von Symptomen und die Intensität der Schmerzen einzuschätzen, wurden bei 43 chronischen orofazialen Muskelschmerzpatienten und bei 40 Kontrollpersonen eine Visual Analog Scale und der SCL-90-R Fragebogen benutzt. Die orofaziale Muskelschmerzgruppe berichtet über: Schmerzen in einer axial skelettalen Verteilung; neurokognitive, gastrourogenitale und muskuloskelettale Symptome; infektive Ereignisse zu oder vor Beginn der Schmerzen; ähnliche Symptome beim Partner; und eine kleine Prävalenz von Traumata bei Beginn. Ein plötzlicher Beginn der Schmerzen fand man in 30.2% der Patienten. Außerdem wurde ein starker Zusammenhang zwischen chronischen orofazialen Muskelschmerzen und *(1)* infektionsähnlichen auslösenden Ereignissen (67.4%), *(2)* eine erhöhte Prävalenz von Atemwegs-und gastrourogenitalen Infektionen gefunden, und *(3)* eine höhere Prävalenz der Schmerzen bei den Partnern der Patienten. Der SCL-90-R zeigte eine höhere Somatisierung bei den chronischen orofazialen Muskelschmerzpatienten. Es wurde kein Unterschied bezüglich Depression und Angstgefühl gefunden (> 62). Es wurde kein Zusammenhang zwischen Depression und Schmerzen gefunden. Diese Studie zeigt, dass Patienten mit wiederholten systemischen Infektionserkrankungen häufiger unter chronischen orofazialen Muskelschmerzen leiden. Außerdem sind diese infektiven Erkrankungen in 67% der Fälle der auslösende Faktor für chronische orofaziale Muskelschmerzen.