A Cognitive-Behavioral Approach To Temporomandibular Dysfunction Treatment Failures: A Controlled Comparison

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The effects of cognitive-behavioral treatment for patients with temporomandibular disorders were studied by comparing active treatment to a wait-list control condition. Patients were predominantly women and had been referred to the study after having poor response to dental/physical medicine care. Patients' conditions were evaluated pretreatment and posttreatment based on self-report measures of pain, distress, and jaw function problems. They were examined by a dentist who assessed pain-free opening, muscle palpation pain, and tenderness of the temporomandibular joints. The 5-week cognitive-behavioral treatment included relaxation training, self-monitoring of stressors, and cognitive coping strategies. Treatment had its greatest impact on improving mood, especially anxiety; however, there were some effects on the patients' experiences of pain.

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Temporomandibular disorders (TMD) involve a number of clinical problems of the masticatory musculature and/or temporomandibular joint. Common symptoms are pain on palpation of the masticatory muscles, earache, headache, and/or facial pain. Patients with these disorders often complain of limited jaw movement and sometimes of joint sounds, described as clicking, popping, grating, or crepitus. The disorder is common; conservative estimates suggest that 5% of the population has relatively chronic TMD.[1,2]

The most accepted first line of treatment typically involves a dental/physical medicine approach that includes occlusal appliance therapy, physical therapy, and anti-inflammatory medications. While this approach appears to be successful with the majority of TMD patients, a sizable percentage (23%) do not respond.[3] Therefore, it appears that another form of treatment is needed for these nonresponders. There is evidence suggesting that relaxation training and biofeedback may be useful approaches for certain TMD problems.[4–9] Gale and Funch[10] reported on a comparison between electromyographic (EMG) biofeedback and relaxation training for TMD patients who had failed a variety of previous dental/physical medicine treatments. The results of their study showed that both methods are effective at reducing pain but neither is superior to the other. Dahlstrom and Carlsson[9,11] have compared EMG biofeedback to occlusal appliance therapy and have shown that both treatments produce similar outcomes.

Although relaxation and biofeedback approaches appear to be useful in the treatment of TMD, the conspicuous lack of wait-list control groups in previous research leaves open the possibility that these patients may have improved without treatment. A wait-list

control is especially important for an evaluation of TMD treatment because TMD is an intermittent problem that can remit spontaneously.[12] Furthermore, several other issues have not yet been adequately explored. Stress-management procedures (including relaxation training, time management, and cognitive therapy) without biofeedback have not been adequately investigated with TMD patients.[13] This approach has potential advantages over biofeedback because it does not require instrumentation and can be administered in a group format. The current study uses a wait-list control group to examine the effectiveness of cognitive-behavioral, stress-management group treatment on TMD patients who had recently failed a dental/physical medicine treatment approach.

Materials and Methods

Temporomandibular disorder patients were selected according to inclusion criteria that involved awareness of jaw region pain or substantial jaw dysfunction and the presence of an active TMD on clinical examination. An active TMD was defined by the presence of one or more of the following signs: temporomandibular joint (TMJ) noises, recent onset of limited jaw opening, and pain in the masticatory system replicated by palpation of the TMJ or the masticatory muscles. Exclusion criteria involved the presence of sinus problems, dental infection, or a current or recurrent ear disorder. The selected TMD patients who reported less than 50% improvement following a dental/physical medicine course of treatment (occlusal appliance therapy, physical therapy, and anti-inflammatory medications) were recommended to enroll in a 6-week cognitive-behavioral, stress-management/pain-control class. Of those treatment failures recommended to the class, 83 agreed to enroll. An exclusion criterion for data analyses was that patients could not receive additional concurrent treatment outside the study conditions. Nine patients were excluded from final analyses because they received concomitant treatment during the study. The authors believed this criterion to be a methodologic strength of the present study because the absence of concurrent treatment has typically been assumed but not directly assessed in previous research.

In addition to the 9 patients who received concomitant treatment, 18 patients who did not complete the pain class treatment (defined as attendance at fewer than 80% of the scheduled sessions) were excluded from analyses. Therefore, 56 patients completed the pain class without concomitant treatment. Twenty-four of the patients who completed treatment also served as wait-list control subjects. There was a fee for treatment: discounts were given to patients who agreed to enroll in the wait-list condition, and smaller discounts were given to those who participated in the pretreatment and posttreatment assessments.

Study patients were predominantly female (85%) and white (85%). The mean age was 35 years. Patients were relatively well educated (44% college graduates). Most were employed either full-time (57%) or part-time (11%) outside the home. Others were homemakers (15%), retired (7%), or students (7%). Most patients were married (54%) or single (35%). Some (11%) were divorced, separated, or widowed. The mean duration of TMD symptoms was 51 months.

All patients completed a comprehensive pretreatment psychosocial evaluation that included Spielberger's[14] State-Trait Anxiety Inventory (STAI), the Beck[15] Depression Inventory (BDI), and the McGill Pain Questionnaire (MPQ). The STAI contains two subtests of 20 items each assessing state or trait anxiety. The BDI is a 21-item self-rating of depression.[15] The MPQ has patients describe their pain by selecting adjective descriptors from 20 categories; three scores are obtained by adding scale values for the sensory, affective, and evaluative categories.

Visual analog scale (VAS) ratings of average pain during the last week and of pain experienced during testing were obtained by asking each patient to place a mark on a 100-mm horizontal line that had anchor points on the left for no pain and on the right for the most intense pain imaginable. Ratings of jaw function problems were obtained by asking patients to indicate their difficulties in using their jaws (chewing, talking, etc) on an 11-point scale from 0 (no problem) to 10 (extensive problems). Pretreatment and posttreatment dental exams were done by a dentist who was not aware of the experimental condition. The dentist measured pain-free mouth opening, muscle palpation pain, and tenderness of the TMJs.

Because recruiting subjects for the study took several months, all subjects were assigned to the first two pain classes. After the first nine patients (two groups) went directly into the treatment condition, the remaining 47 patients were randomly assigned to a 6-week wait-list condition. Twenty-six of the 47 patients agreed to be wait-list subjects, and they underwent identical psychosocial assessment and dental evaluation procedures without intervening treatment within or outside the

Table 1 Repeated-Measures ANOVA for Wait-List and Pain-Class Subjects

	Mean scores				*F* tests		
	Wait-list		Pain-class		Group	Repeat	
Variable	Pre	Post	Pre	Post	(A)	(B)	A×B
BDI	9.0	8.8	9.8	6.0	0.29	9.59**	6.22*
STAI state	61.8	63.0	69.7	50.3	0.11	7.82**	7.72**
STAI trait	71.6	67.5	70.0	56.5	0.63	19.25***	4.76*
Pain at test time	20.9	24.3	33.3	32.6	2.80	0.06	0.20
Pain last week	27.4	25.2	40.3	31.3	2.60	3.20	1.04
MPQ sensory	7.7	6.5	9.4	7.5	0.80	3.64	0.19
MPQ affective	1.6	1.8	2.1	2.0	0.26	0.01	0.10
MPQ evaluative	1.4	1.1	1.5	1.0	0.05	5.33*	0.47
Jaw problem	1.9	2.1	3.2	2.5	1.08	1.47	2.66
Pain-free opening	44.8	47.1	42.5	44.5	1.02	3.52	0.02

*$P < .05$
**$P < .01$
*** $P < .001$
BDI = Beck Depression Inventory.
STAI = State-Trait Anxiety Inventory.
MPQ = McGill Pain Questionnaire.
Pre = pretreatment; Post = posttreatment.

study. Twenty-four of the 26 wait-list patients subsequently completed the treatment condition with no other concurrent treatment.

The pain class consisted of five 1.5-hour weekly sessions and was conducted with groups averaging three patients. The class emphasized a broad-spectrum approach to stress management that involved self-monitoring pain/stress to increase awareness, progressive muscle relaxation training, imagery, cue-controlled rapid relaxation, cognitive therapy, self-hypnosis, and time management. All patients were given a series of three tapes on guided-relaxation and self-hypnotic procedures for home use as well as a manual that covered the content of class material.

During the sixth week of the pain-control class, patients were given a 20-minute explanation of maintenance issues targeting relapse prevention and what to do in the event of a relapse. Following this discussion, all patients completed a posttreatment evaluation that was similar to the pretreatment evaluation package.

Results

The results were first analyzed using a repeated-measures analysis of variance. Table 1 presents the pretreatment and posttreatment scores and *F* tests of patients assigned either to the wait-list or pain-class condition. Although there were no significant differences between the groups on the pretreatment measures, there was a trend for the wait-list patients to have lower scores on pain and symptom scores in the direction of less severe difficulties. The significant interactions for depression, state, and trait anxiety reflected improvement after treatment on these factors in the pain-class condition. On the MPQ evaluative score, there was a significant pretreatment-posttreatment difference across groups.

Because of the trend toward differences among patients assigned to the wait-list condition, *t* tests were done on these patients before and after their eventual participation in the pain-class treatment. These results are summarized in Table 2. Similar to the pattern found above, there was a significant drop in state and trait anxiety following treatment. The reduction in depression did not reach significance. These previously wait-listed patients showed a significant lowering of their ratings of pain over the past week even though their pretreatment levels were not very high.

Table 2 also lists the correlations between the pretreatment and posttreatment pain-class scores of the patients who had been on the wait list. The correlations for mood levels, symptoms, and average pain for the prior week were quite high while the correlations between current pain scores were low. This same pattern appeared for the pain-class only patients. It was similar for the wait-list patients during the wait-list period, except the values were generally higher. Current pain values seem to be less stable than the other factors.

Table 2 Pretreatment and Posttreatment Data for Pain-Class Patients Who Were Wait-Listed Prior to Treatment

	Pretreatment		Posttreatment		
Variable	Mean	SE	Mean	*r*	*t*
BDI	8.70	0.91	6.8	.85	2.08
STAI state	62.20	5.20	49.0	.67	2.56*
STAI trait	67.60	3.80	57.4	.84	2.70**
Pain at test time	23.70	4.80	19.2	.02	0.95
Pain last week	26.10	3.50	15.4	.70	3.08**
MPQ sensory	6.60	1.40	5.9	.14	0.48
MPQ affective	1.80	0.82	1.2	.14	0.83
MPQ evaluative	1.10	0.21	0.8	.44	1.45
Jaw problem	2.10	0.39	1.6	.65	1.21
Pain-free opening	47.30	1.40	49.4	.76	−1.55

*$P < .05$
**$P < .01$
***$P < .001$
BDI = Beck Depression Inventory.
STAI = State-Trait Anxiety Inventory.
MPQ = McGill Pain Questionnaire.

Discussion

The results of this study provide evidence for the effectiveness of a cognitive-behavioral treatment for TMD pain. These results are particularly noteworthy since the patients selected for treatment were those who reported less than 50% improvement from a dental/physical medicine treatment protocol. Therefore, the cognitive-behavioral treatment was tested with a recalcitrant population. This study is also the first to employ a wait-list comparison in evaluating a cognitive-behavioral approach to treating TMD. A wait-list control is especially important for an evaluation of TMD treatment because TMD is an intermittent problem that can remit spontaneously.[4] In the present study, random assignment was difficult to achieve. The trend toward less severe pain in the wait-list patients seems to reflect that patients who accepted random assignment to the wait-list condition were more willing to postpone seeking another active intervention.

Current results indicate that the cognitive-behavioral treatment had its greatest impact on mood, especially anxiety. Although there were some reductions in current pain levels and a trend toward improvement in symptoms, these changes did not appear to be specifically related to the treatment. The reduction of mouth opening limitations and the decrease in MPQ evaluative scores seemed to be related to the passage of time. When the pain level did seem to be reduced, it took the form of lower ratings of the prior week's pain. This could be explained as a shift in the personal importance of the pain rather than the current level of actual nociception. Overall, the results indicate that the treatment condition produced improvements in the patient's mood and perception of pain, reflecting a better quality of life. Fordyce[16] has made the distinction between suffering, defined as the negative emotional states that occur in response to or in anticipation of nociception, and pain, defined as perceived nociception. The cognitive-behavioral treatment appears to have affected suffering rather than pain. This treatment approach has advantages over biofeedback because it can be administered to groups and obviously does not require instrumentation.

Future research will explore whether the noted improvements persist over extended time periods. One- to two-year follow-up data are being collected on the pain-class patients. Follow-up should show whether other quality-of-life variables, such as impact of the problem on the person's work or social life, change over time.

Finally, the results of this study highlight an important contribution to cognitive-behavioral treatment for patients who fail to significantly improve with conventional dental/physical medicine approaches. Although patients did not report significant improvements in their pain ratings at a specific moment, they still reported significant improvements in their "suffering." Therefore, improvements were made in the quality of life in spite of the continued experience of pain. It is recommended that further research be conducted with other types of pain patients using this current methodology.

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Resumen

Comportamiento cognoscitivo para el tratamiento de casos de disfunción temporomandibular que han fracasado: Comparación controlada

Se estudiaron los efectos del tratamiento basado en el comportamiento cognoscitivo de pacientes con desórdenes temporomandibulares, comparando el tratamiento activo a otro de control en lista de espera. La mayoría de los pacientes fueron mujeres que había sido remitidas al estudio después de haber tenido una respuesta pobre al cuidado dental/médico-físico. Se evaluaron las condiciones de los pacientes antes y después del tratamiento, basados en los autoreportes de dolor, aflicción, y problemas de función mandibular. Los pacientes fueron examinados por un odontólogo quien evaluó la apertura libre de dolor, el dolor a la palpación muscular, y la sensibilidad de las articulaciones temporomandibulares. El tratamiento de comportamiento cognoscitivo duró 5 semanas e incluyó instrucción de relajación, auto-monitoreo del estrés, y el uso de estrategias de manejo cognoscitivo. El tratamiento tuvo su mayor impacto al mejorar el ánimo de los pacientes especialmente en lo relativo a la ansiedad; sin embargo, se presentaron algunos efectos sobre las experiencias de dolor de los pacientes.

Zusammenfassung

Kognitiv-behaviorale Therapie bei Myoarthropathie-Patienten nicht ansprechbar auf koventionelle Therapie: Eine Kontrollstudie

Die Auswirkungen einer kognitiv-behaviorale Therapie bei Patienten mit Myoarthropathien wurden untersucht. Als Kontrollgruppe wurden Patienten einer Warteliste genommen. Die Patienten waren vorwiegend Frauen und wurden der Studie zugewiesen, nachdem eine zahnärztlich/physiotherapeutische Behandlung einen schlechten Behandlungserfolg erbrachte. Vor und nach der Behandlung wurde der Zustand der Patienten aufgrund von Selbstreporten über Schmerz, Distress und Kieferfunktionsproblemen ermittelt. Sie wurden durch einen Zahnarzt untersucht, welcher der Grad der schmerzfreien Mundöffnung sowie die Muskel und Kiefergelenkdruckschmerzhaftigkeit untersuchte. Die fünf Wochen dauernde kognitiv-behaviorale Behandlung beinhaltete Entspannungsübungen, Selbsterkennung von Stressoren und Erlernen von Bewältigungsstrategien. Das Haupresultat lag in einer Stimmungsverbesserung, insbesondere bezüglich Angst. Einige Auswirkungen auf die Schmerzerfahrung der Patienten wurden auch festgestellt.