
Medical hypnosis for temporomandibular disorders: Treatment efficacy and medical utilization outcome

Eric P. Simon, PhD, ABPP,^a and David M. Lewis, DDS,^b Honolulu, Hawaii
TRIPLER REGIONAL MEDICAL CENTER AND THE UNIVERSITY OF HAWAII

Aim. The aim of this study was to examine the effectiveness of a particular behavioral medicine treatment modality, medical hypnosis, on reducing the pain symptoms of temporomandibular disorders (TMD).

Methods. Twenty-eight patients who were recalcitrant to conservative treatment for TMD participated in a medical hypnosis treatment program and completed measures of their pain symptoms on 4 separate occasions: during wait list, before treatment, after treatment, and at a 6-month follow-up. In addition, pretreatment and posttreatment medical use were examined.

Results. Statistical analysis of this open trial suggests that medical hypnosis is a potentially valuable treatment modality for TMD. Patients reported a significant decrease in pain frequency ($F [3, 87] = 14.79, P < .001$), pain duration ($F [3, 87] = 9.56, P < .001$), and pain intensity ($F [3, 87] = 15.08, P < .001$), and an increase in daily functioning. Analysis suggests that their symptoms did not simply spontaneously improve, and that their treatment gains were maintained for 6 months after hypnosis treatment. Further, after hypnosis treatment, patients exhibited a significant reduction in medical use.

Conclusion. Medical hypnosis appears to be an effective treatment modality for TMD, in terms of reducing both symptoms and medical use.

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Patients with temporomandibular disorder (TMD) have dysfunction of the masticatory musculature, the temporomandibular joint, or both. These patients typically complain of pain in the masticatory muscles, often accompanied by earaches, headaches, and facial pain that radiates to the neck and shoulders. In the past, TMD was commonly differentiated from other forms of facial pain by the absence of radiographic evidence or by clinical evidence of organic changes to the temporomandibular joint and by a lack of tenderness in the condyles.^{1,2} More recent classifications of TMD now include the various intracapsular disorders, including organic changes to the temporomandibular joint.³⁻⁵ Conservative epidemiologic surveys estimate that TMDs are prevalent in 5% of the general population.^{6,7}

For years, it was commonly agreed that malocclusion was responsible for most TMDs⁸; however, more recent reviews strongly suggest that the role of malocclusion is small at best.^{9,10} It was also once believed that TMD could be a function of a specific personality type (clenching-prone and grinding-prone), but this hypothesis simply has not been supported by research.¹¹⁻¹³ Some researchers have found a link between poor work-

environment ergonomics or parafunctional oral activity, such as excessive chewing of gum, erasers, or pen caps, and the increase and maintenance of TMD pain.¹⁴ Still others have found evidence to suggest that trigger points may be an important link between TMD and psychological stress; it is possible that sympathetically mediated trigger points in the muscle spindles might arise, resulting in stress.¹⁵⁻¹⁷

Some evidence suggests that a significant proportion of patients with TMD have, at some point in their lives, experienced some form of physical, emotional, or sexual abuse.^{18,19} However, TMD is best thought of as a biopsychosocial dysfunction.²⁰ Even when psychological factors are present, as they usually are, it is typically considered best to intervene at the level of physiologic self-control strategies. Patients with TMD are not usually able to confront the more "deep-seated" issues and would approach psychoanalytic (or insight-oriented) treatments with resistance.^{21,22}

Perhaps the most agreed-on cause for TMD in the current literature is parafunctional clenching and grinding (often occurring without awareness), typically resulting from psychological stress. Patients with TMD tend to respond to stressors with more intense facial muscle activity.²³⁻²⁵ Other research points to the hypothesis that patients with TMD have poor muscle discrimination²⁶ or unconsciously brace their muscles.^{13,27}

Conservative treatments of TMD typically involve a dental and physical medicine approach, including occlusal appliance therapy, physical therapy, and anti-inflammatory agents. Although this is helpful for most patients, it is estimated that approximately 23% of patients do not respond to these treatments at all.²⁸ Thus,

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^aDepartment of Psychology, Multi-Disciplinary Pain Clinic.

^bDepartment of Dentistry.

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alternative treatments are often considered, and much of the research on treatment efficacy is mixed. Such treatments include habit reversal,²⁹ massed negative practice,³⁰ sleep interruption devices,³¹ cognitive-behavioral strategies,³² stress management and relaxation,³³ and biofeedback.³⁴ Another alternative treatment option is hypnosis.

One might expect that hypnosis would be a common treatment for TMD, given its overall established effectiveness for most types of chronic pain.³⁵ In addition, hypnosis has logistical advantages over biofeedback and sleep interruption devices because it can be administered to groups and does not require instrumentation. Hypnosis is also preferred over habit reversal because such techniques involve extensive office monitoring, coaching, and practice, and still are not appropriate for the exceedingly common patient with TMD who clenches or grinds during sleep.

Despite these advantages there is a relative dearth of clinical research on medical hypnosis as a treatment for TMD. Perhaps this is because of the low number of providers trained to offer or inclined to offer such treatment, or because of the relative lack of exposure to this treatment approach. However, many authors have discussed the possibility of using hypnosis to treat TMD and have offered a variety of hypnotic suggestions to use.³⁶⁻⁴⁴ In addition, a number of published case studies anecdotally document the use of this unique treatment for TMD.⁴⁵⁻⁴⁹ However, only one broader-scale study is found in the research literature. Patients with TMD who have been treated with hypnosis showed an average 27% decrease in pain scores (average decrease from pain score of 61.6 to 44.8).⁵⁰ This study, although well-constructed, consisted of only 12 subjects in the hypnosis treatment group.

The purpose of this study is to add to the extant literature and to examine the effectiveness of medical hypnosis for the reduction of TMD pain symptoms. It is hypothesized that patients treated with medical hypnosis will exhibit a significant reduction in pain symptoms and medical use.

METHODS

Subjects

Twenty-eight patients with TMD participated in the hypnotherapeutic treatment for this study. All were initially evaluated by a dentist or oral surgeon and were determined to have TMD on the basis of the symptoms outlined in the beginning of this article. For the purpose of ensuring homogenous patient selection, we included only those patients who had no radiographic or clinical evidence of organic changes to the temporomandibular joint. Patients who were recalcitrant to

conservative treatment (ie, they did not respond to medication and wore through several occlusional splints) were referred for hypnosis treatment. With this in mind, any positive treatment effects should be considered especially compelling. Patients ranged in age from 20 to 52 (mean, 33 years). Twenty-three patients were included in the final analyses, all of whom completed at least 3 of the 6 treatment sessions. The remaining 5 were classified as dropouts. The few patients lost to attrition did not differ in any appreciable manner from the patients who completed this study. Gender differences were not examined because of an insufficient sample size of men ($n = 3$, or 13%).

Procedure

Occasionally, TMD symptoms spontaneously remit, even in the absence of treatment⁹; thus, a wait list was used as a nontreatment multiple baseline control procedure. Given the lack of a separate control group, however, this study should be more conservatively viewed as an open trial, and conclusions should be drawn accordingly. All patients completed pretreatment questionnaires of their pain symptoms, and the duration between initial screening and beginning of treatment was approximately 1 month.

Treatment groups ranged in size from 3 to 8 patients. Patients continued with previously recommended treatment modalities over the hypnotic trial period. Patients were seen for 6 sessions that met once a week. Treatment groups were conducted throughout the year, so history effects, such as holidays and changes in climate, should not have systematically influenced the data. During the first session of this 6-session group treatment, patients again completed pretreatment questionnaires. The mechanics of TMD were then explained to them, and they were given a basic understanding of hypnosis and trance to dispel the many myths and distortions of hypnosis, often created or exacerbated by the media. Patients were also given examples of the power of the mind in gaining control over what is typically thought to be unconscious physiologic processes. A formal hypnotic induction was not used during the first session.

Sessions 2 through 5 entailed hypnotic treatment, typically with eye closure inductions, imagery to evoke relaxation, catalepsy of a limb, hypnotic-deepening techniques, metaphors to induce automatic or unconscious bodily responses, hypnotic analgesia and anesthesia, and suggestions that use muscle tension, pain, or both as a cue for automatic muscle relaxation. An example of this follows:

"I will now give you a very powerful post-hypnotic suggestion...that should you ever feel any tension in your jaw...head...neck...or shoulders...that is related to your

medical, dental condition...it will be an immediate signal and cue to you for your muscles to relax...you will immediately take 2 deep relaxing breaths...and envision the healing ball causing the muscles to immediately relax...let go...release the tension...numbing the entire area...and then absorbing...any remaining pain or discomfort in those areas...as those muscles relax some more...and that's just fine...you may be consciously aware of carrying out this healing process...or maybe just simply aware of carrying this process out at an unconscious level...as those muscles let go of the tension immediately...and your healing continues...and you will be surprised to find that this process occurs even during your sleep...instructing you that your unconscious is protecting you whether you had realized it or not..."

Session 6 was similar to sessions 2 through 5, with the addition of posthypnotic suggestions for relapse prevention. At the end of each session, patients were instructed to practice daily self-hypnosis with audiotaped recordings of the hypnotic inductions, because it has been shown that medical problems successfully treated with hypnosis often need to be reinforced by self-hypnosis.⁵¹

Outcome measures

All patients completed TMD pain questionnaires on 4 separate occasions: at the time of their wait list intake, before treatment (during the first session), after treatment (during the sixth session), and again at a 6-month follow-up. These questionnaires were simple numerical pain-rating scales, allowing for self-report measurement of pain frequency (range of scores, 1 - 7 days per week), pain duration (range of scores, 1 - 600 minutes per episode), and pain intensity (range of scores, 0 - 10, where 0 represents "not noticeable" and 10 represents "unbearable"). Additionally, to assess for improvement in quality of life in the posttreatment and follow-up evaluations, patients were also asked to rate the extent to which they noticed an improvement in daily functioning since beginning hypnosis treatment. Patients were not tested for depth of trance for reasons outlined in the discussion.

To examine medical use outcome, patients were analyzed pretreatment versus posttreatment on the following variables: hospitalizations, emergency room visits, number of clinic visits, and total dollar cost of prescriptions filled.

RESULTS

Hypnosis treatment outcome

Three separate analysis of variance tests (ANOVAs) showed significant results for the medical hypnosis treatment effect for reduction in pain frequency ($F [3, 87], 14.79, P < .001$; Fig 1), pain duration ($F [3, 87], 9.56, P < .001$; Fig 2), and pain intensity ($F [3, 87],$

$15.08, P < .001$; Fig 3). In addition, patients were asked, "Since you began hypnosis treatment, to what degree have you seen improvement in daily functioning?" They responded by reporting an average of 71% (SD = 21.49; range, 30 - 100) improvement after treatment and 80.45% (SD = 20.93; range, 30 - 100) improvement at 6-month follow-up evaluation. Finally, although it was not quantified statistically, it is interesting to note that many patients exhibited much less wear on their splints. Thus all patients continued with their previous treatment modalities while undergoing hypnotic treatment.

There is some evidence that patients' symptoms did not spontaneously improve because comparisons of mean pain scores for wait list patients versus pretreatment patients showed no statistically significant differences for pain frequency ($F [1, 44] = .87, P > .05$) (wait list, mean, 4.26, SD = 2.16 versus pretreatment; mean, 4.87, SD = 2.26), pain duration ($F [1, 44] = .23, P > .05$) (wait list, mean, 277.26, SD = 341.47 versus pretreatment; mean, 327.91, SD = 371.13), nor pain intensity ($F [1, 44] = .13, P > .05$) (wait list, mean, 6.22, SD = 1.99 versus pretreatment; mean, 6.43, SD = 2.04).

To examine whether patients sustained treatment gains over time, posttreatment and 6-month follow-up mean pain scores were compared (an insignificant difference of means would indicate that treatment gains were sustained). The results indicated that not only did patients sustain treatment gains for pain duration ($F [1, 43] = 1.29, P > .05$) (posttreatment mean, 23.96; SD = 35.09, versus 6-month follow-up mean, 14.36; SD = 18.78) and pain intensity ($F [1, 43] = .81, P > .05$) (posttreatment mean, 3.52, SD = 2.15, versus 6-month follow-up mean, 2.86, SD = 2.73), the gains had significantly improved at 6 months posttreatment for pain frequency ($F [1, 43] = 4.53, P < .05$) (posttreatment mean, 2.43, SD = 2.08, versus 6-month follow-up mean, 1.23, SD = 1.69).

Medical use outcome

Only 3 patients were hospitalized for medical reasons during the period studied. This sample was too small to allow conclusions to be generated regarding inpatient stays. Additionally, although emergency room visits dropped from a total of 6 pretreatment visits to a total of 4 posttreatment visits, this also was too small a sample to allow conclusions to be drawn. None of the patients' hospitalizations or emergency room visits were related to their TMD.

Of the 23 patients studied, 17 had fewer outpatient medical visits (either directly or indirectly associated with TMD) after hypnosis treatment, whereas 6 had more visits. A difference of this magnitude is statistically significant ($\chi^2 = 5.26$, degrees of freedom (df) = 1, $P < .05$).

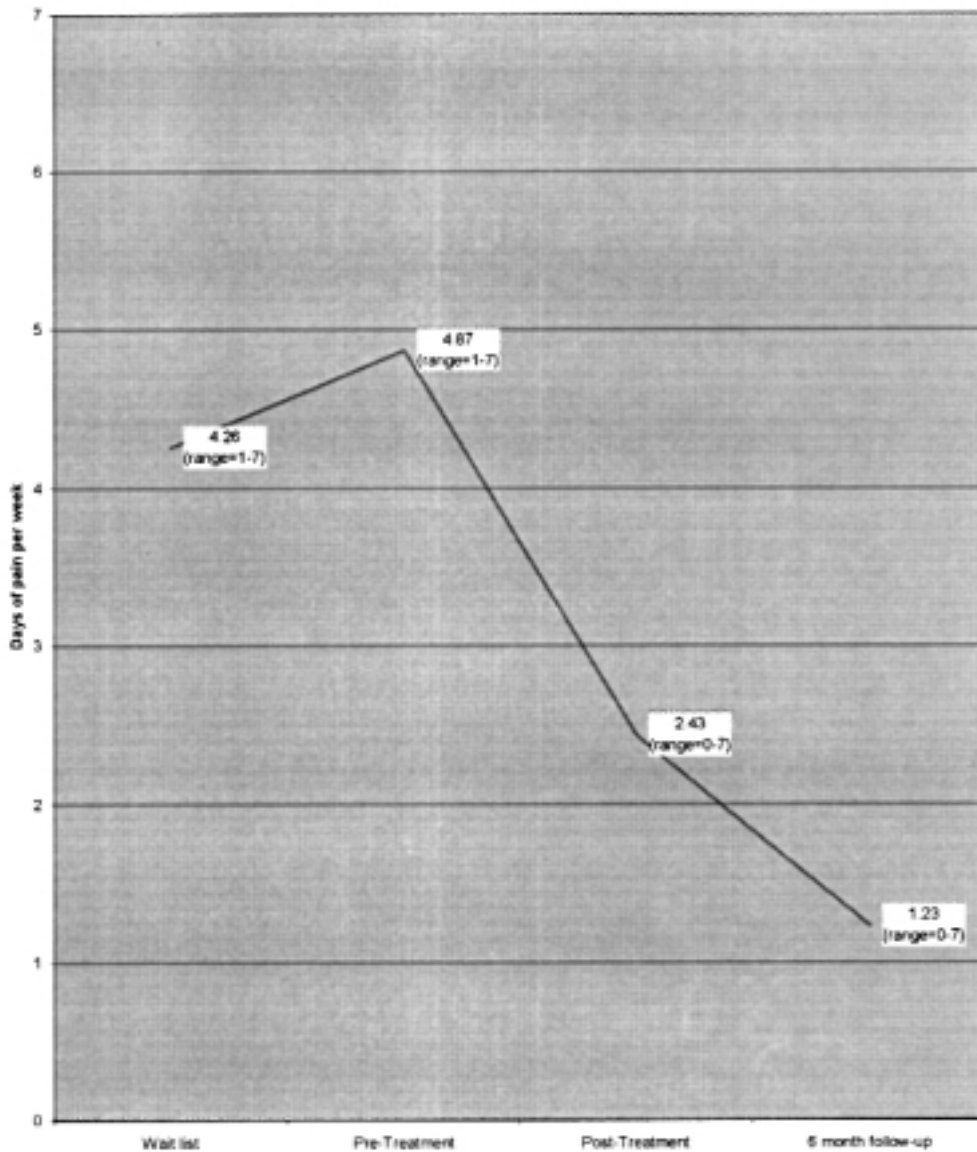


Fig 1. Frequency of TMJ pain.

Shifting from numbers of patients to numbers of visits as our measure, the mean number of medical visits by all 23 patients in the 6 months before hypnosis treatment was 15.48 (SD = 14.63), and dropped to 10.56 (SD = 11.53) during the 6 months after hypnosis treatment (Fig 4). This difference was highly significant statistically ($t = 2.70$, $df = 22$, $P = .006$), yielding a probability of .006 that such a decrease is simply caused by chance. Economically, this is very significant as well. By using the standard metric (for our multidisciplinary pain clinic) of \$140 per outpatient visit, this amounts to a savings of approximately \$700 per patient, or \$16,000 for the entire cohort of 23 patients.

To examine use of prescription medications, each patient's filled prescriptions were tallied (to include all pharmaceuticals, not just analgesics for TMD) and then multiplied by cost per pill to get a common denominator for comparisons. As a group, the total cost of filled prescriptions during the 6 months before hypnosis treatment was \$1741.41, which dropped to \$1437.39 during the 6 months after hypnosis treatment. The mean cost of filled prescriptions in the 6 months before hypnosis treatment was \$75.71 (SD = 93.93) per patient versus \$62.49 (SD = 75.94) per patient. Although this difference was in the expected direction, it was not of statistical significance ($t = .70$, $df = 22$, $P > .05$).

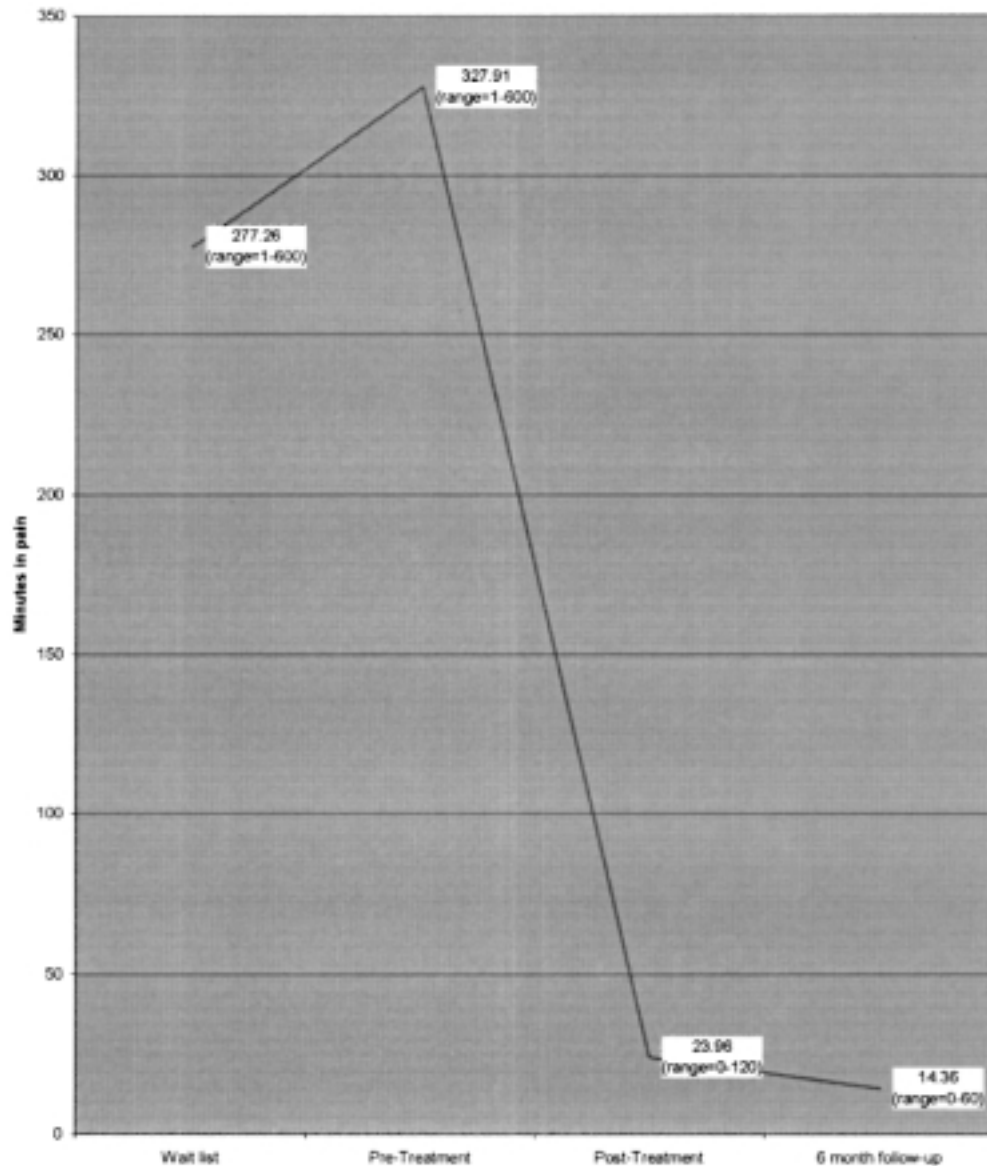


Fig 2. Duration of TMJ pain.

DISCUSSION

After hypnosis treatment, the patients in this study exhibited a significant decrease in symptoms in terms of reduced frequency, duration, and intensity of their TMD pain. Additionally, they reported a significant improvement in their overall daily functioning. Although absolute conclusions about treatment efficacy cannot be made from this study (as with a randomized control trial), treatment gains are not likely to be considered spontaneous improvement, as wait-list data did not differ from pretreatment data. Further, treatment gains were maintained over time (at 6 months posttreatment), and patients reported even less

frequent TMD pain symptoms 6 months after treatment. Finally, in terms of use, patients exhibited a significant reduction in the frequency of their outpatient medical visits after hypnosis treatment.

These results can be considered especially impressive considering that all these patients were recalcitrant to conservative treatment modalities; that is, all the patients were previous treatment failures. However, patients (subjects) continued with their previously recommended treatment modalities during application of hypnotic treatment. Additionally, patient data were analyzed in this study even if the patient had attended only 3 of the 6 treatment sessions. The results may

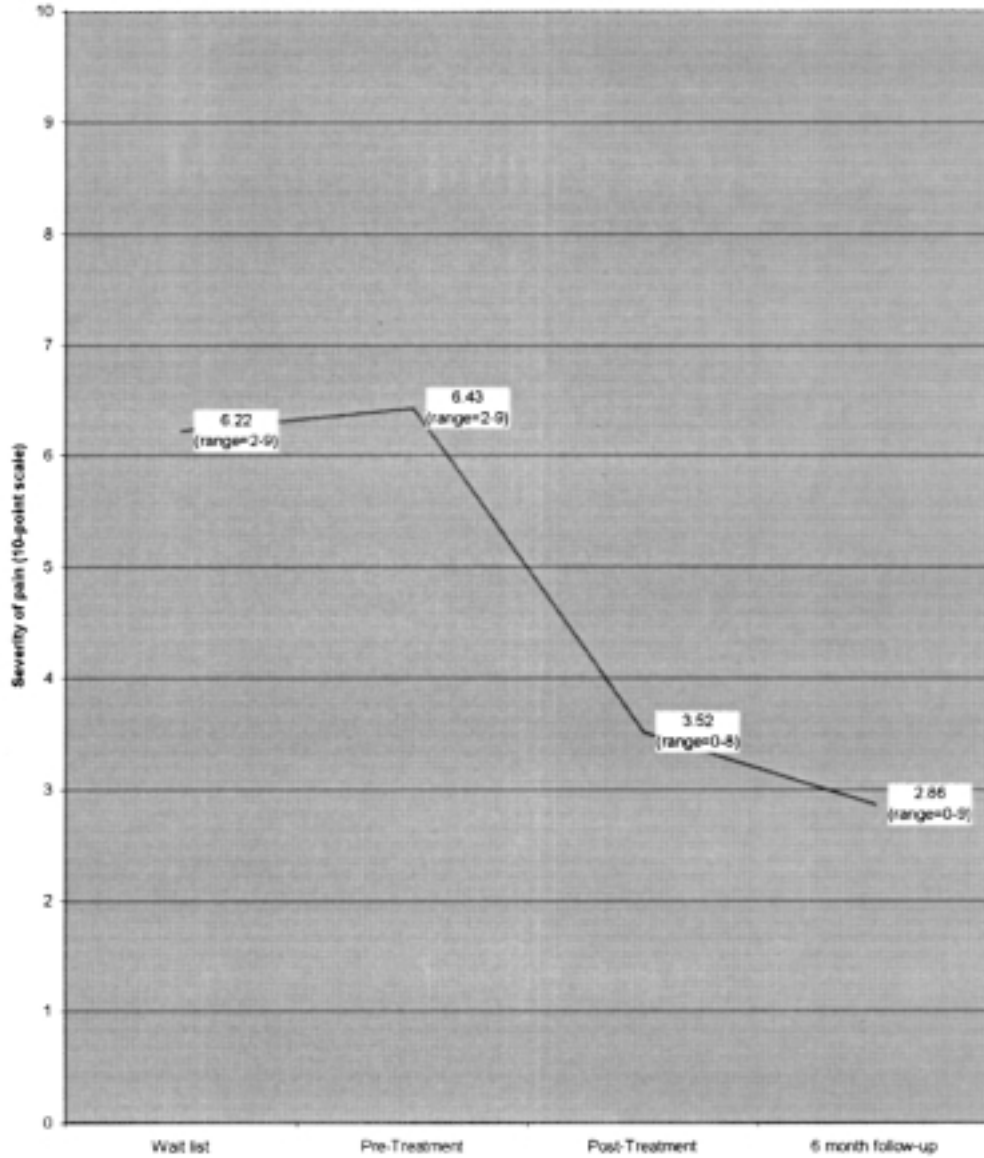


Fig 3. Intensity of TMJ pain.

have been even more compelling if there were a large enough sample size to examine only patients that had been fully compliant with the treatment by attending all 6 sessions.

The results of this study and our clinical experience would suggest that patients with TMD who are recalcitrant to other conservative treatment modalities and who are treated with hypnosis tend to achieve statistically and clinically significant decreases in pain ratings. It is quite possible that this is because of a well-tailored induction with specific suggestions for relaxation of the muscles surrounding the temporomandibular region. Generalized relaxation may provide a critical role in the treatment of

TMD by way of increasing parasympathetic activity and decreasing concordant sympathetic arousal (related to the “fight or flight” response), and hence, increasing the pain threshold.^{52,53} As a result, relaxation can reduce the pain-spasm-pain cycle, which is so common to patients with chronic pain.⁵⁴ However, like many others in this area, we conceptualize hypnosis as a type of dissociative state—a mental separation of components of experience that would ordinarily be processed together—^{55,56} when the unconscious mind is more open to suggestions for positive change and to the evocation of involuntary unconscious experience, such as hypnotic analgesia and hypnotic anesthesia. In fact, research indicates that

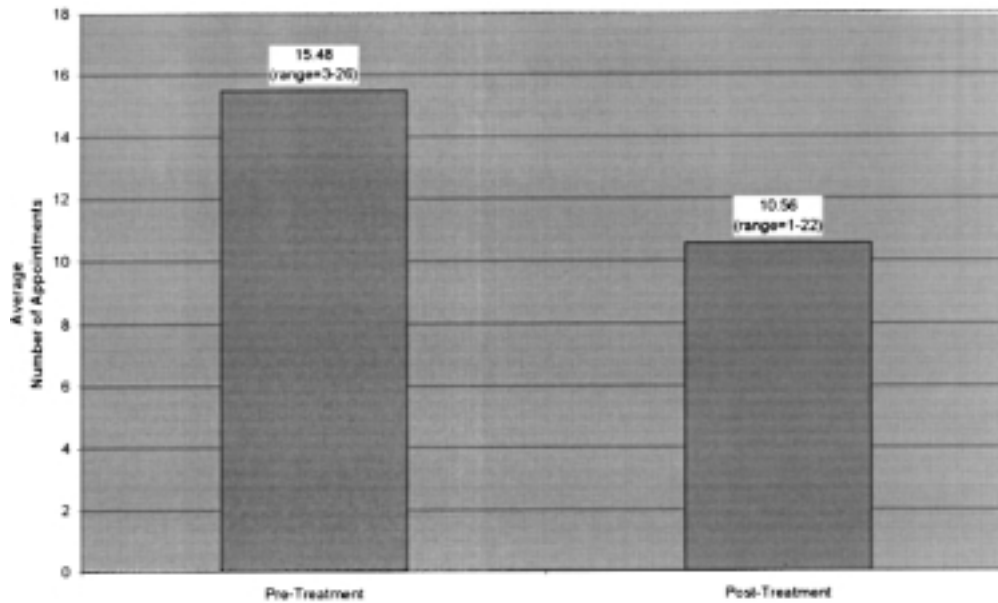


Fig 4. Outpatient medical visits.

subjects in hypnosis experience very unique phenomena, such as time distortion (typically temporal constriction), which relaxation subjects do not.^{57,58} Further, critical studies have elucidated the fact that hypnosis is not necessarily a state of relaxation or low physiologic arousal, but rather can be accomplished during states of hyper physiologic arousal.⁵⁹⁻⁶³ Finally, many fine studies have shown that hypnosis is a neurophysiologically different state than relaxation.^{64,65}

Therefore, although general relaxation has been shown to help decrease chronic pain symptoms, a well-tailored hypnotic induction with posthypnotic suggestions for symptom control would be significantly more effective for controlling TMD symptoms. In fact, it is our belief that treatment of patients with TMD often fails because the behaviors responsible for the maintenance of the pain symptoms (clenching or grinding) mainly occur at an unconscious level, often during sleep,⁶⁶ and most treatments are designed to target (or be received at) the conscious level of awareness. Thus, hypnosis may be uniquely effective by providing patients with posthypnotic suggestions that muscle tension, pain, and discomfort can be cues and signals for the muscles to automatically relax, whether during sleep or when awake. In many ways, this can be thought of as a classical conditioning model in which the body learns to respond to muscle tension in a new manner and hence can begin to stop grinding and clenching even during sleep. A hypnotic induction with classic pain-removing techniques designed to enable the patient to block out noxious sensory stimuli would likely be less than fully effective because most TMD

pain is largely generated by a spasm process. As such, the hypnotic suggestions need to be addressed at the level of cues for unconscious muscle relaxation, not simply at the level of pain removal. An “automatic” physiologic response needs to be evoked from within the patients, just as their unconscious minds already inform them “automatically” to awaken when the bladder is full, for example, so that they do not urinate in bed.

Medical hypnosis, or hypnotherapy, is the clinical application of hypnosis to medical disorders or procedures. During a hypnotic session, patients are encouraged to focus on the hypnotherapist’s voice and pleasant images and to fix their gaze in some particular manner. During this induction phase, the patient begins to enter a hypnotic trance. A trance is associated with many physiologic changes to include flattening of facial muscles, decrease in orienting movements, immobility, changes in blinking and swallowing, catalepsy in a limb, autonomous motor behavior, altered breathing and pulse, fixed gaze, faraway look, changed voice quality, time lag in response, literalism, perseveration in response, dissociation, relaxed muscles, amnesia, and time distortion.⁶⁷

As a patient enters trance, the conscious mind becomes less and less vigilant to the immediate surroundings. When this conscious/unconscious mind dichotomy becomes more salient to the patient, the unconscious mind becomes more amenable to suggestions (congruent with the patient’s belief system) for new possibilities from the hypnotherapist. The hypnotherapist serves as a guide, helping transport a

patient from the normal awake state of consciousness to a state of hypnotic trance. Patients often describe trance as a pleasant, relaxed, altered state of consciousness or a type of reverie. Ideally, with practice, this ability is taught to patients so that they can enter trance on their own and control painful psychophysiological symptoms.⁶⁸ (For more in-depth exploration of the various theories of hypnosis, see the recent work of Kirsch and Lynn.⁶⁹)

Health care providers who specialize in treating orofacial pain may want to consider medical hypnosis as a viable treatment modality for their patients who are recalcitrant to conservative treatment. Hypnosis has advantages over biofeedback because it can be administered to groups and does not require expensive or unwieldy equipment. Hypnosis also has advantages over habit reversal because such techniques involve extensive office monitoring, coaching, and practice, and they are still not appropriate for the exceedingly common patient with TMD who clenches or grinds during sleep. Finally, hypnosis can address the symptoms at the level of unconscious; that is, patients are given posthypnotic suggestions that are designed to inhibit their habitual clenching and grinding, even when asleep. Patients seem to exhibit a reduction in terms of both pain symptoms and medical system use.

LIMITATIONS

A major limitation of this study was that there was no control group for comparison. However, in a clinical setting it can be logistically difficult to establish an appropriate control group. In this study, patients served as their own controls, allowing for multiple baselines of symptom measurement across 4 discrete periods of chronic TMD pain. Given these multiple baseline measurements and given that these patients were recalcitrant to conservative treatments, spontaneous improvement is considered relatively unlikely, and it seems probable that observed gains are treatment-related. Nevertheless, this study is best thought of as an open trial, and conclusions about efficacy should be further documented by future research.

A second major limitation of this study was the dropout rate (17.8%). It is possible that results may have been different if the analyses included patients who attended less than 3 sessions. However, it was our opinion that it would not be appropriate to evaluate those patients who did not undergo hypnosis treatment and did not learn the material and pain management techniques contained in our program.

Patients were not tested for depth of trance mainly because of the limitations of resources in a clinical setting, but also because of secondary conceptual issues. Although some research has shown stability

across the lifespan of hypnotic susceptibility,⁷⁰ our clinical experience has shown that patients vary on ability to enter trance from session to session. In addition, ability to enter trance can be a learned skill for many patients, often improving with practice.^{71,72} Further, even patients who dispositionally can enter only a light trance tend to benefit from treatment. In fact, although some studies show a clear relationship between hypnotizability and pain reduction outcomes,⁷³ other research in this area has indicated that there is sometimes little or no correlation with depth of trance and treatment efficacy of psychophysiological disorders.⁷⁴

DIRECTIONS FOR FUTURE RESEARCH

To improve the specificity of treatment factors, researchers in this area should examine different types of hypnosis or hypnotic inductions and potentially differential effectiveness that may be based on individual difference variables. For example, it may be found that certain types of individuals are more responsive to indirect suggestions for TMD, whereas others are more responsive to direct suggestions.

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Reprint requests:

Eric P. Simon, PhD, ABPP
Department of Psychology
Multi-Disciplinary Pain Clinic
Tripler Regional Medical Center
Honolulu, HI 96859
EricSimon@yahoo.com

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