

Massage Therapy and Frequency of Chronic Tension Headaches

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Research in massage therapy has found promising results for reducing pain associated with chronic conditions including migraine headache,¹ lower back pain,^{2,3} fibromyalgia,⁴ and juvenile rheumatoid arthritis.⁵ The benefits of massage therapy may therefore extend to other chronic pain conditions such as tension headache.

In the few studies of nonpharmacological interventions addressing chronic tension headache found in a literature search, the treatment described included physical therapy,⁶ transcutaneous electrical nerve stimulation,⁷ acupuncture,⁸ and homeopathy.⁹ These techniques resulted in varying levels of success in reducing pain associated with chronic headache, although the literature is scant. Only 1 scientific research study has been conducted on the effects of massage therapy on chronic tension headache.¹⁰ In that study, the authors noted a decrease in neck pain after subjects received 10 one-hour upper body massages over a 2-week period. Although the treatment was effective, the massage regimen employed may not be realistic for most patients; furthermore, the therapeutic massage procedures were not clearly described. Interestingly, the effects of massage may persist, as neck pain was still reduced at a 6-month follow-up.

The etiology of tension-type headache is unclear,¹¹ but there is evidence to suggest that some forms may originate from sustained isometric contraction of muscles associated with the head and neck.¹²⁻¹⁴ This type of extended muscle contraction may result in local nutrient deficiencies due to ischemia,¹⁵ which can generate trigger points within muscles. The tightly contracted region of a muscle trigger point can remain contracted for an extended period of time even without sympathetic activation.¹⁶ Collectively, these effects may result in a tension headache.

Objectives. The effect of massage therapy on chronic nonmigraine headache was investigated.

Methods. Chronic tension headache sufferers received structured massage therapy treatment directed toward neck and shoulder muscles. Headache frequency, duration, and intensity were recorded and compared with baseline measures.

Results. Compared with baseline values, headache frequency was significantly reduced within the first week of the massage protocol. The reduction of headache frequency continued for the remainder of the study ($P = .009$). The duration of headaches tended to decrease during the massage treatment period ($P = .058$). Headache intensity was unaffected by massage ($P = .19$).

Conclusions. The muscle-specific massage therapy technique used in this study has the potential to be a functional, nonpharmacological intervention for reducing the incidence of chronic tension headache. (*Am J Public Health.* 2002;92:1657-1661)

The activation of myofascial trigger points has also been implicated as a cause of headache.¹⁷ Trigger-point treatment via electrical stimulation has been effectively used to increase pain threshold in patients with tension headache.¹⁸ Manual treatment of trigger points has also been suggested for reducing trigger-point pain.¹⁹ Massage therapy techniques, which act in part to increase blood flow to tissue, may also reduce the activity of a trigger point. Thus, it is possible that headaches originating from this etiology may be reduced with massage therapy.

The objective of this study was to determine whether a regimented massage therapy program could have beneficial effects on the frequency, intensity, and duration of pain associated with chronic tension headache. A 4-week measurement period prior to treatment was used to establish individual subjects' baseline measures. Following the baseline period, a 4-week treatment program was initiated that included therapeutic massage and trigger-point treatment of the following 6 muscles: upper trapezius, sternocleidomastoid, suboccipital, splenius capitis, levator scapulae, and temporalis. In addition to massage, each session included stretching and muscle energy techniques as outlined in the "Methods" section.

METHODS

Subjects

Subjects were recruited for this study through physician invitation, fliers placed in the waiting room of health clinics, or local newspaper advertisements. To participate in the study, candidates had to be nonsmokers aged 18 to 55 years who had experienced 2 to 3 headaches per week for at least the past 6 months. Fulfillment of these initial criteria was confirmed when the prospective subject called to express interest. The subjects were then scheduled for a diagnostic interview with the first author. Headache diagnosis was made according to International Headache Society (IHS) guidelines.¹¹ The enrolled subjects were limited to persons suffering from chronic tension headache (IHS classification 2.2) or episodic tension headache (IHS classification 2.1). Subjects suffering exclusively from either migraine with aura (IHS classification 1.1) or migraine without aura (IHS classification 1.2) were excluded from participation. However, subjects with distinct and occasional episodes of migraine with aura or migraine without aura *in addition to* chronic tension headache as a primary diagnosis were included.

A total of 25 subjects were interviewed, with 10 subjects meeting the criteria for inclu-

sion in this phase of the study. Enrollment into the study occurred during November 2000. Subjects were instructed to continue pharmacological treatment if currently on medication but not to begin new pharmacological intervention during the course of the study. Similar instructions were given for non-pharmacological interventions. Six subjects were removed from the study owing to repeated missed treatments, lapses in diary recordings, or lack of availability for scheduling. Four subjects completed all therapy sessions and diary entries. The data from these 4 subjects are included in this study. All massage therapy procedures were performed with the subject in a supine position. Subjects were permitted to stop treatment at any time, for any reason.

Study Design

The 8-week study consisted of baseline headache measures recorded for the first 4 weeks, when each subject served as his or her own control, followed by twice-weekly, 30-minute massage therapy sessions for the remaining 4 weeks of the study. A logbook was completed daily by each subject every evening before retiring. The headache diary form was used to record number of headaches, intensity of most severe headache, and duration of longest headache for each day. Headache intensity was determined by having the subject draw a mark along a visual analog scale (0–100 mm, where 0 = no pain and 100 = most pain), with the distance from the 0 point determined in millimeters. Headache duration was recorded to the nearest quarter hour. Because headache parameters varied considerably from day to day, weekly averages are presented.

Massage Treatment

Each subject received a total of eight 30-minute massage therapy sessions during the 4-week treatment period. Two massage therapy sessions were administered each week and were separated by at least 48 hours. Massage therapy treatments were conducted by certified massage therapists, each with a minimum of 1000 hours of training and with 3 to 21 years of professional practice. A standardized, precise 30-minute massage treatment protocol was developed, refined, and practiced by each therapist for 4 weeks be-

fore the study began. The treatment protocol consisted of 6 distinct phases within the 30-minute time frame; brief descriptions of each phase follow.

Phase 1—preparatory tissue warm-up (3 minutes) included bilateral pressure moving from the lower cervical region to the occiput. This procedure was repeated, with completion of 3 passes bilaterally.

Phase 2—myofascial release (5 minutes) included 3 palmar glide passes each over the deltopectoral, deltoid, and posterior deltoid regions bilaterally. Additionally, 3 passes with a soft fist contact were made from the occiput to the lateral shoulder along the upper trapezius bilaterally.

Phase 3—axial cervical traction (2 minutes) included application of manual axial traction with 1 hand under the head and neck and the other hand on the forehead. Gentle traction was applied with the head first slightly flexed, then with slight right lateral flexion, and finally with the head in slight left lateral flexion. Traction was held for 15 seconds in each position.

Phase 4—trigger point therapy procedure (15 minutes) consisted of scanning palpation of the upper trapezius, sternocleidomastoid, suboccipital, splenius capitis, levator scapulae, and temporalis muscles to locate and manually treat trigger points.¹⁶ When located, active trigger points were treated by pincer or flat palpation with just enough pressure to elicit referred pain or autonomic referral phenomena. That pressure was maintained on the trigger point until the client reported that the referral pain had dissipated or for a maximum of 2 minutes. Pressure on the active trigger point was then slowly eased to elicit a vascular flushing. This procedure was repeated 3 to 5 times on each trigger point. Typically, 6 active trigger points were treated in the time allotted.

Phase 5—facilitated stretching techniques (5 minutes) consisted of muscle energy techniques, which included therapist-assisted lengthening and stretching of the cervical paravertebral musculature.²⁰ The stretching procedure invoked relaxation through reciprocal innervation mechanisms. The antagonist musculature was isometrically contracted; this was followed by passive stretching of the agonist musculature.

Phase 6—session closure (3–5 minutes) included relaxing effleurage and petrissage strokes and application of passive motion to the cervical region to end the session.

Each session was observed by a student assistant who served as timer for each phase and recorder of pain referral responses for each client. Each therapist was told to use only the practiced specific protocol and not to improvise during the treatment. The therapists were instructed that their role was to perform the protocol, not to specifically treat the subjects' headaches.

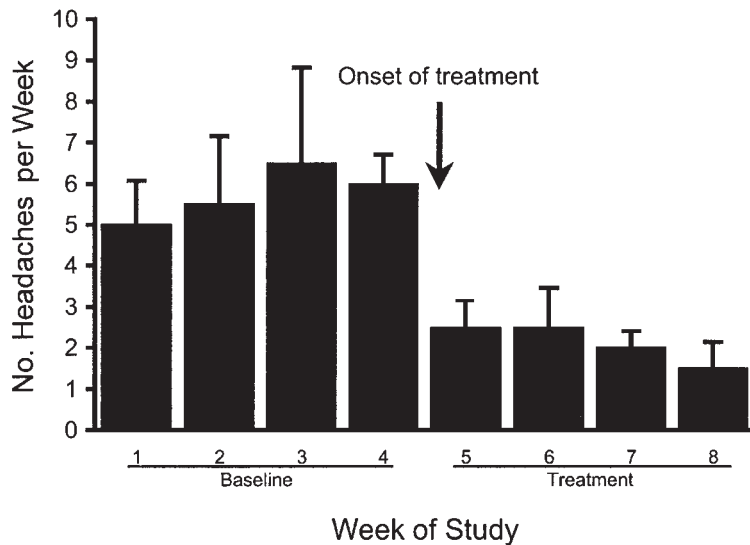
Data Analysis

Number of headaches is presented as mean \pm standard error of measurement. A repeated-measures analysis of variance was used to assess changes in number of headaches over the 8-week study. A Fisher post hoc test was employed to identify differences among weeks of the study. Change in headache duration or intensity between baseline and treatment was determined by paired *t* test. Statistical significance was fixed at $P < .05$. Statistical analysis was performed with the StatView computer program (SAS Institute Inc, Cary, NC).

RESULTS

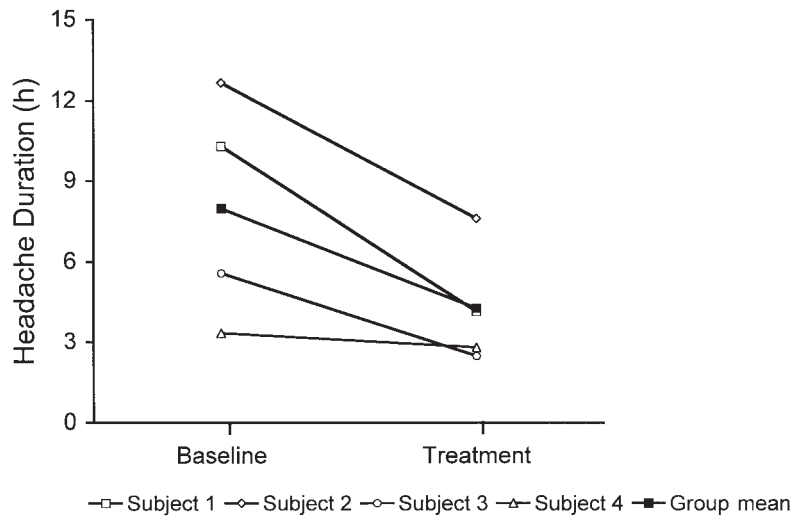
The mean number of headaches per week is presented in Figure 1. A repeated-measures analysis of variance indicated a reliable change over time for number of headaches per week ($F_{7,21} = 3.69$, $P = .009$). Post hoc analysis confirmed that headache frequency was significantly lower during the weeks of massage treatment (weeks 5–8) than during the baseline weeks (weeks 1–4). A reduction in number of headaches per week was noted for all subjects within the first week of massage treatment. Additionally, the mean number of headaches per week was reduced from 6.8 during baseline to 2.0 during the treatment period.

The mean duration of headaches during the baseline period was compared with the mean duration during the treatment period (Figure 2). For the group as a whole, mean headache duration decreased from 8.0 ± 4.3 hours during the baseline period to 4.3 ± 2.3 hours during the treatment phase, and the



Note. Data are presented as mean ± standard error of measure for 4 subjects ($P = .009$).

FIGURE 1—Mean number of headaches per week experienced during baseline and during massage treatment.



Note. Subjects recorded the duration of the longest headache for each day. Days in which no headache was observed were not included in determining the mean.

FIGURE 2—Mean duration of headaches experienced during 4-week baseline and 4-week massage treatment period.

duration of each headache also decreased for each subject. Because there were only 4 subjects in the study, however, the P value of this measure did not achieve statistical significance ($P = .058$).

The intensity of the most severe headache that occurred each day was marked on a vi-

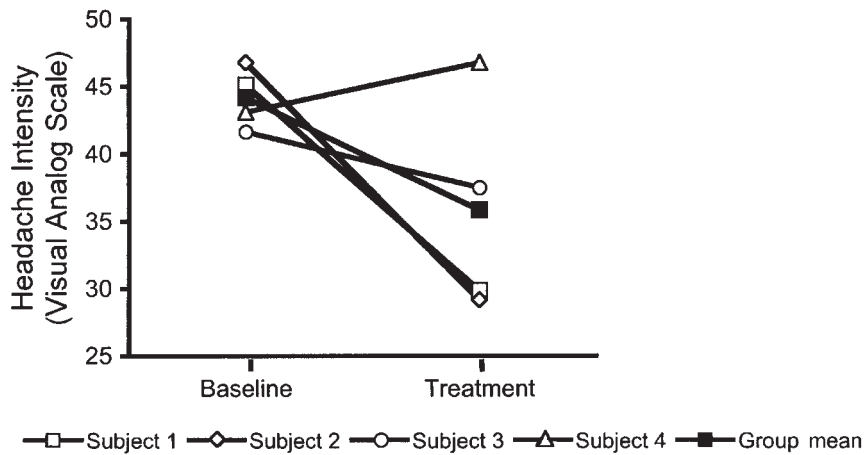
sual analog scale ranging from 0 to 100 mm (with 100 mm indicating the most severe headache). The mean headache intensities during the baseline period and the treatment period are compared in Figure 3. The effect of massage therapy on headache intensity was subject dependent. Two subjects showed

marked improvement, 1 subject showed mild improvement, and 1 subject showed an increase in headache intensity. For the group as a whole, changes between the baseline period (44.2 ± 2.2 mm) and the treatment period (35.8 ± 8.2 mm) were not significant for headache intensity as measured by a visual analog scale ($P = .19$).

DISCUSSION

The results of this study suggest that massage therapy is effective in reducing the number of headaches per week in chronic tension headache sufferers. Compared with baseline levels, headache frequency was reduced within 1 week of massage treatment. This reduction was maintained during the 4 weeks of the treatment period. A trend toward a reduction in the average duration of each headache event between the baseline period and the treatment period was also noted. On the basis of these results, we conclude that pain associated with chronic tension headache can be alleviated through specific massage therapy treatments directed at cranial and cervical muscles.

Active muscle trigger points may be the underlying etiology of many tension headaches. Muscle trigger points have been identified by electromyogram measurements as hyperactive contractile regions of a muscle compared with the surrounding tissue.²¹ These hyperalgesic regions in skeletal muscle and fascia have been implicated as a cause of regional and referred pain associated with chronic headache.^{22,23} Furthermore, a connection between tension headache induction and muscle trigger-point activity has been suggested.²⁴ Tension headache, for example, has been experimentally induced by 30 minutes of teeth clenching, which resulted in increased facial tenderness, a characteristic of active trigger points.²⁵ However, literature reports regarding specific treatment of active trigger points for reduction of headache pain have been limited. In a 1996 case study, Duntzman et al. injected anesthetic into active trigger points of the sternocleidomastoid muscle and found a reduction in headache pain that persisted for at least 14 months.²⁶ In the present study, active trigger points were frequently noted, by palpation techniques, in



Note. A visual analog scale ranging from 0 to 100 mm was used.

FIGURE 3—Mean intensity of headache experienced during 4-week baseline and 4-week massage treatment period.

the muscles of subjects. Approximately 6 active trigger points could be massaged during the therapy session within the given time parameters. Because our therapeutic massage protocol specifically addressed trigger-point activity, we believe that the reduction in activity of these regions by massage was a major contributor to the observed beneficial effects on tension headache.

Results of a pharmacological intervention suggest that amitriptyline, a drug commonly used to treat chronic headache, can reduce myofascial tenderness in chronic tension headache sufferers; however, this effect was achieved by reducing nociceptive stimuli rather than reducing trigger-point sensitivity.²⁷ It is interesting to note that in most of our sessions, patients reported a reproduction of their headache pain with deep palpation of identified trigger points, despite not experiencing a headache immediately prior to this palpation. This finding suggests an association between the trigger point and formation of a headache. Further investigation into the relationship between headache and trigger points would prove valuable.

Our massage therapy treatment protocol was successful in reducing pain associated with chronic tension headache. However, we cannot unequivocally state that the massage portion directed at trigger-point therapy rather than the stretching or relaxation tech-

niques was the causative agent. Evidence from the literature shows slight reductions in headache activity after stretching and relaxation.²⁸ Given that these techniques constituted only a small portion of our treatment protocol and that the effects found by other researchers with stretching or relaxation were small, we believe that our massage procedure focusing on trigger-point therapy is effective.

This study was unique in that we used a highly standardized massage treatment protocol, which was practiced and performed by certified massage therapists. Although this design complicates the question of which component of the treatment was most effective, we feel that standardization of treatment is critical for consistency in therapies. Once an effective procedure has been developed, additional aspects of massage can be included and assessed for their therapeutic contribution.

Unfortunately, this study is limited by its extremely small sample size—only 4 subjects completed all massage sessions and all of the daily logbook entries. The low completion rate may have been influenced by the enrollment period of the study, which occurred just before Thanksgiving, and by difficulty in scheduling appointments during the Christmas and New Year's holidays. The lack of a larger sample of subjects contributed to low statistical power, hindering our ability to show a significant reduction in headache du-

ration and intensity between baseline and treatment phases. However, because headache duration improved in all 4 subjects and headache intensity in 3 subjects, the reduction was probably real.

Our specific massage technique may also benefit headache sufferers during an acute headache episode. On 4 occasions when a subject entered the massage session with a headache, the headache was alleviated by the end of the 30-minute treatment; on no occasion did a subject enter treatment without a headache and leave with one. This suggests that massage administered during a headache episode might result in immediate beneficial effects and that patients should be instructed in appropriate self-massage.

Massage therapy appears to be an effective nonpharmacological treatment for alleviating chronic tension headache. A significant and meaningful reduction in headache frequency and duration was observed in this study even though the number of subjects was small. The findings suggest that a larger, more complete study that includes a proper control group is warranted. ■

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Contributors

All authors contributed to the experimental design of the study. C. Quinn and C. Chandler developed the massage therapy protocol for headache treatment. C. Quinn and A. Moraska analyzed and interpreted the data and wrote the article.

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Human Participant Protection

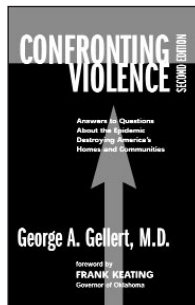
The procedures used in this study were approved by the Institutional Review Committee at the Boulder College of Massage Therapy.

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