Mind-Body Therapies for Headache

VICTOR SIERPINA, MD, *University of Texas Medical Center, Galveston, Texas*
JOHN ASTIN, PhD, *California Pacific Medical Center, San Francisco, California*
JAMES GIORDANO, PhD, *Georgetown University Medical Center, Washington, D.C.*

Headache is one of the most common and enigmatic problems encountered by family physicians. Headache is not a singular entity, and different pathologic mechanisms are involved in distinct types of headache. Most types of headache involve dysfunction of peripheral or central nociceptive mechanisms. Mind-body therapies such as biofeedback, cognitive behavior therapy, hypnosis, meditation, and relaxation training can affect neural substrates and have been shown to be effective treatments for various types of headache. Meta-analyses of randomized controlled trials show that the use of mind-body therapies, alone or in combination, significantly reduces symptoms of migraine, tension, and mixed-type headaches. Side effects generally are minimal and transient. (Am Fam Physician 2007;76:1518-22, 1523-4. Copyright © 2007 American Academy of Family Physicians.)

▶ **Patient information:** A handout on mind-body therapies for headache, written by the authors of this article, is provided on page 1523.

Headache is among the most common conditions encountered by family physicians. Although pharmacotherapy is commonly used for prophylaxis and abortive therapy of headache, it carries the risks of side effects, rebound headache, and addiction. Routine pharmacotherapy also is limited in pregnant women and in children.

Several mind-body therapies have been proven effective for the treatment of headache.[1] Mind-body medicine focuses on the interactions among the brain, mind, body, and behaviors, and on the ways in which emotional, mental, social, spiritual, and behavioral factors can affect health. It emphasizes an approach that respects and enhances each person's capacity for self-knowledge and self-care.[2]

Psychosocial and other mind-body approaches offer useful options for reducing stress-related aspects of headache and for managing pain. Tension and migraine headaches may result from work or familial stress, anxiety, depression, and musculoskeletal conditions.[3] Such headaches are often complex and multifactorial. Work-up may require investigation of menstrual changes, sinus and allergy problems, mood states, personality disorders, and lifestyle factors such as food and beverage intake and sleep patterns. Attention to these issues can guide therapy. The most common mind-body therapies and their applications in the treatment of tension and migraine headaches are listed in *Table 1*.[4]

Pathophysiology

Headache is not a singular entity, and different types of headache have distinct pathophysiologic mechanisms and etiologies. The most common types of headache, tension and migraine headaches, generally involve hyperactivity of central or peripheral neural nociceptive substrates, dysfunction of central pain modulatory systems, and feed-forward activation of peripheral inflammatory or muscular contractile mechanisms. Mind-body therapies can affect these neurologic pathways at multiple levels.[5-11]

Mind-Body Therapies for Headache

MIGRAINE HEADACHE

A meta-analysis of the behavioral literature on migraine was supported by the Agency for Healthcare Research and Quality.[12] Using stringent research design and data extraction requirements, 39 trials studying behavioral approaches to migraine were selected. Treatments included relaxation training, thermal and electromyographic (EMG) biofeedback, stress management training, and cognitive behavior therapy, alone or in combination. The meta-analysis showed that these treatments reduced migraine symptoms by 32 to 49 percent compared with no treatment. These effect sizes were similar to those

reported in other meta-analyses of behavioral approaches for treatment of migraine.[13,14]

A meta-analysis of trials comparing relaxation training and biofeedback (34 trials) with drug therapy (25 trials) in patients with recurrent migraine found benefits and effect sizes to be similar between treatment groups.[15] Meta-analyses of randomized trials of beta blockers (32 trials), calcium channel blockers (31 trials), and combined relaxation training and biofeedback (35 trials) showed similar levels of improvement.[15-17] A meta-analysis of five trials showed that thermal biofeedback improved migraine symptoms by 37 percent.[18] A review of 79 biofeedback studies among children with migraine found that thermal biofeedback and combined biofeedback with progressive relaxation training were superior to other behavioral treatments, to commonly used prophylactic pharmacologic therapy, and to placebo.[19]

The American Academy of Neurology recommends that cognitive and behavioral treatments be considered Grade A or B level evidence.[20]

TENSION HEADACHE

A meta-analysis of 35 trials on behavioral treatments for tension-type headache showed a 37 to 50 percent reduction of symptoms in treated patients compared with a 2 to 9 percent reduction in control patients.[21] Therapies included relaxation training, EMG biofeedback, EMG biofeedback plus

Table 1. Commonly Used Mind-Body Therapies

Therapy	*Description*	*Effectiveness for headache*
Biofeedback	A system of externally generated signals that measure some aspect of physiology (e.g., thermal biofeedback, muscle tension biofeedback, galvanic skin response to sweating)	Progressive muscle relaxation and thermal and combined biofeedback effective for migraine Muscular biofeedback effective for tension headache
Cognitive behavior therapy	A method of replacing inner thoughts and dialogue that may be irrational or that contribute to distress (e.g., depression, anxiety, pain) with a revised, salutogenic script and frame of reference	Effective for migraine and tension headaches
Guided imagery	The use of inner images and symbols (self-guided or interactive) with therapies to induce a specific psychobiologic state (e.g., immune enhancement, relaxation, conflict resolution)	—
Hypnosis	The use of aroused, attentive, focused concentration and relative suspension of peripheral awareness to create opportunities for suggestion	—
Meditation	Intentional self-regulation of attention to inner and outer experiences (e.g., mindfulness meditation, transcendental meditation)	—
Psychoeducational approaches	Combined with other biobehavioral strategies, these methods help patients become more informed about their disease and how to manage it with improved self-efficacy	Stress management training effective for tension headache
Relaxation training	Methods used to reduce sympathetic arousal and muscle tone (e.g., progressive muscle relaxation, Benson's relaxation response)	Progressive muscle relaxation effective for tension headache Combination of progressive muscle relaxation and biofeedback effective for migraine in children, adolescents, and adults

Adapted with permission from Astin JA, Shapiro SL, Eisenberg DM, Forys KL. Mind-body medicine: state of the science, implications for practice. J Am Board Fam Pract 2003;16:132.

relaxation training, cognitive behavior therapy, and stress management training. The effect size was larger than those in earlier meta-analyses, with a 35 to 55 percent reduction in headache frequency and pain; however, patient variables may have significantly affected the treatment effects.[14,22,23] The inclusion of patients who were younger, female, and who were solicited for a study rather than referred correlated with better results.[23]

Biofeedback has been found in a controlled study to relieve tension headache in adolescents.[24]

MIXED-TYPE AND CHRONIC HEADACHES

Compared with clinic-based behavioral therapies, minimal-contact home-based treatments using materials such as manuals or audiotapes have resulted in equal or superior clinical improvements in patients with migraine, tension, and mixed-type headaches.[25] Furthermore, providing home-study materials is up to five times as cost-effective as clinic and therapist-based treatments.

A meta-analysis of seven trials found that cognitive behavior therapy improves headache activity by 49 percent.[18] This treatment can be combined with relaxation training and group therapy.[22]

A Cochrane review concluded that there is good evidence that psychological treatments, especially relaxation training and cognitive behavior therapy, reduce the severity and frequency of chronic headache in children and adolescents.[26]

Another, more recent, meta-analysis examined biofeedback, relaxation training, and cognitive behavior therapy in children and adolescents with chronic headache.[27] High effect sizes (more than 50 percent headache reduction) were found in patients with migraine and tension headaches compared with control patients.

Table 2. Recommended Mind-Body Therapies for Headache

Therapy	*Evidence rating*	*References*
Migraine headache		
Behavioral therapy with prophylactic drug therapy	B	18
Cognitive behavior therapy	A	15, 18, 27
Combination of progressive muscle relaxation and biofeedback	A	15, 27
Electromyographic biofeedback	A	15, 27
Relaxation training	A	14, 15, 18, 27
Thermal biofeedback (alone or in combination with relaxation training)	A	14, 15, 18, 19
Tension headache		
Cognitive behavior therapy	B	14, 21, 22
Cognitive behavior therapy in children and adolescents with chronic headache	A	26, 27
Home-based behavioral therapies	B	25
Muscular biofeedback	B	14, 21, 22, 24
Progressive muscle relaxation	B	14, 21, 22
Relaxation training in children and adolescents with chronic headache	A	26, 27
Stress management training	B	14, 21, 22

A = consistent, good-quality patient-oriented evidence; B = inconsistent or limited-quality patient-oriented evidence; C = consensus, disease-oriented evidence, usual practice, expert opinion, or case series. For information about the SORT evidence rating system, see page 1435 or http://www.aafp.org/afpsort.xml.

Contraindications and Adverse Effects

Behavioral and mind-body therapies generally are safe. Some patients have had anxiety symptoms, particularly with relaxation exercises and meditation. These symptoms may be related to feelings of loss of control, discomfort with inactivity, fear of letting go, or underlying psychopathology. Physical symptoms may include dizziness, dyspnea, chest pain, myoclonic jerks, intrusive thoughts, or other disturbing sensory experiences.[4] Although these symptoms are transient, they can be sufficiently distracting to cause patients to discontinue mind-body therapies. Thus, a good clinical relationship and follow-up is important to initiating and maintaining these therapies.

Final Comments

Physicians have a wide range of well-evidenced behavioral and mind-body therapies available for the treatment of headache in children and adults *(Table 2)*.[14,15,18,19,21,22,24-27] Similar outcomes have been found for pharmacologic and behavioral treatments.[13]

Despite evidence from many studies, mind-body therapies are an underused treatment modality in medical practice, possibly because of lack of training, insufficient time, or lack of awareness of the evidence base supporting these therapies.[28,29]

Many therapies, such as the relaxation response, progressive muscle relaxation, and simple diaphragmatic breathing, can be taught quickly in the physician's office and can be practiced by the patient at home. Simple biofeedback devices are available for office or home use, such as color-changing body temperature sensors (one brand: Biodot, 800-272-2340), skin thermistors, galvanic monitors, and various computer-based or Internet-based software programs that measure heart rate variability. Muscle relaxation methods are simple and effective, and they can mitigate centrally mediated pain patterns. Books, audiotapes, compact discs, and other instructional aids can assist patients and physicians in using mind-body therapy *(Table 3)*.

The physician's personal experience with such therapies is helpful in making recommendations to patients. Furthermore, the use of such therapies for self-care may improve professional satisfaction and decrease the effects of stress.

Professional training, continuing medical education, and experiential training in hypnosis, biofeedback, meditation, and other relaxation therapies are available. Alternatively, referral to a qualified psychologist, social work therapist, hypnotist, or biofeedback specialist may be considered, because the specialized training and equipment for some of these therapies, as well as the time limits in a primary care practice, may limit their use. Cognitive behavior therapy often requires consultation with behavioral medicine or clinical psychology professionals, but these collaborations are often useful in providing new perspectives on pain, stress, and coping mechanisms for other psychophysiologic headache triggers, and they may be valuable in the management of these conditions.

The authors thank Julie Trumble and Wanetta Prelow for their assistance in preparation of the manuscript.

Table 3. Resources for Mind-Body Therapies

Books

Benson H, Stuart EM. *The Wellness Book: The Comprehensive Guide to Maintaining Health and Treating Stress-Related Illness.* 1st ed. New York, N.Y.: Simon and Schuster, 1992

Davis M, Eshelman ER, McKay M. *The Relaxation and Stress Reduction Workbook*. 5th ed. Oakland, Calif.: New Harbinger Publications, 2000

Kabat-Zinn J. *Coming to Our Senses: Healing Ourselves and the World Through Mindfulness.* 1st ed. New York, N.Y.: Hyperion, 2005

Rakel D. *Integrative Medicine.* 2nd ed. Philadelphia, Pa.: Saunders Elsevier, 2007

Watkins AD. *Mind-Body Medicine: A Clinician's Guide to Psychoneuroimmunology.* New York, N.Y.: Churchill Livingstone, 1997

Journals (peer-reviewed)

Alternative Therapies in Health and Medicine (http://www.alternative-therapies.com/at)

Annals of Behavioral Medicine (http://www.sbm.org/annals)

Explore: The Journal of Science and Healing (http://www.explorejournal.com)

Journal of Alternative and Complementary Therapy (http://www.liebertonline.com/acm)

Journal of Behavioral Medicine

Training (continuing medical education)

American Holistic Medical Association (http://www.holisticmedicine.org)

American Society of Clinical Hypnosis (http://www.asch.net)

The Center for Mind-Body Medicine (http://www.cmbm.org)

University of Massachusetts Medical School Center for Mindfulness in Medicine, Health Care, and Society (http://www.umassmed.edu/cfm/mbsr)

NOTE: *All Web sites accessed July 19, 2007.*

Members of various family medicine departments develop articles for "Alternative and Complementary Medicine." This is one in a series coordinated by Sumi Sexton, MD.

The Authors

VICTOR SIERPINA, MD, is the W.D. and Laura Nell Nicholson Family Professor of Integrative Medicine and a professor of family medicine at the University of Texas Medical Center, Galveston. He received his medical degree from the University of Illinois Abraham Lincoln School of Medicine, Chicago, and completed a family practice residency at MacNeal Hospital, Berwyn, Ill.

JOHN ASTIN, PhD, is a researcher at the California Pacific Medical Center, San Francisco.

JAMES GIORDANO, PhD, is a resident scholar at the Center for Clinical Bioethics at Georgetown University Medical Center, Washington, D.C., and the Samueli-Rockefeller Professor in the Division of Pallative Care at Georgetown University Medical Center. Dr. Giordano also is director of the Brain, Mind, and Healing Program at the Samueli Institute, Alexandria, Va.

Address correspondence to Victor Sierpina, MD, University of Texas Medical Branch, 301 University Blvd., Galveston, TX 77555-1123 (e-mail: vssierpi@utmb.edu). Reprints are not available from the authors.

Author disclosure: Dr. Sierpina's work is funded by two National Institutes of Health (NIH) grants, a National Institute on Aging Mind-Body Exploratory and Development Grant (R21 AG023951-01), and a National Center for Complementary and Alternative Medicine Education Enhancement award (R25 AT00586-01). Dr. Astin's work is funded by an NIH/National Center for Complementary and Alternative Medicine Grant (R01 AT00869-04). Dr. Giordano's work is funded by Georgetown University Medical Center, the Manchikanti Distinguished Lectureship of the American Society of Interventional Pain Physicians, the Laurence S. Rockefeller Trust, and the Samueli Institute.

REFERENCES

1. Symvoulakis EK, Clark LV, Dowson AJ, Jones R, Ridsdale L. Headache: a 'suitable case' for behavioural treatment in primary care? Br J Gen Pract 2007;57:231-7.
2. National Institutes of Health, National Center for Complementary and Alternative Medicine. Mind-body medicine: an overview. Accessed May 18, 2007, at: http://nccam.nih.gov/health/backgrounds/mindbody.htm.
3. Van Hook E. Non-pharmacological treatment of headaches—why? Clin Neurosci 1998;5:43-9.
4. Astin JA, Shapiro SL, Eisenberg DM, Forys KL. Mind-body medicine: state of the science, implications for practice. J Am Board Fam Pract 2003;16:131-47.
5. Bendtsen L. Central sensitization in tension-type headache—possible pathophysiological mechanisms. Cephalalgia 2000;20:486-508.
6. Blanchard EB, Nicholson NL, Taylor AE, Steffek BD, Radnitz CL, Appelbaum KA. The role of regular home practice in the relaxation treatment of tension headache. J Consult Clin Psychol 1991;59:467-70.
7. Giordano J. The neurobiology of nociceptive and anti-nociceptive systems. Pain Physician 2005;8:277-90.
8. Jensen R, Olesen J. Initiating mechanisms of experimentally induced tension-type headache. Cephalalgia 1996;16:175-82.
9. Rakel D. Prescribing relaxation techniques. In: Rakel D. Integrative Medicine. 2nd ed. Philadelphia, Pa.: Saunders Elsevier, 2007:1017-22.
10. Silberstein SD, Lipton RB. Overview of diagnosis and treatment of migraine. Neurology 1994;44 (10 suppl 7):S6-16.
11. Weiller C, May A, Limmroth V, Juptner M, Kaube H, Schayck RV, et al. Brain stem activation in spontaneous human migraine attacks. Nat Med 1995;1:658-60.
12. Agency for Health Care Policy and Research, Duke University, Center for Clinical Health Policy Research. Behavioral and physical treatments for migraine headache, technical review 2.2. Rockville, Md.: U.S. Dept. of Health and Human Services, Public Health Service, Agency for Health Care Policy and Research, 1999.
13. Andrasik F. What does the evidence show? Efficacy of behavioural treatments for recurrent headaches in adults. Neurol Sci 2007;28(suppl 2):S70-7.
14. Blanchard EB, Andrasik F, Ahles TA, Teders SJ, O'Keefe D. Migraine and tension-type headache: a meta-analytic review. Behav Ther 1980;11:613-31.
15. Holroyd KA, Penzien DB. Pharmacological versus non-pharmacological prophylaxis of recurrent migraine headache: a meta-analytic review of clinical trials. Pain 1990;42:1-13.
16. Davis MK, Holroyd KA, Penzien DB. Flunarizine and propranolol: comparative effectiveness in the treatment of migraine headaches [Abstract]. Headache 1999;39:349.
17. Holroyd KA, Penzien DB, Cordingley GE. Propranolol in the management of recurrent migraine: a meta-analytic review. Headache 1991;31:333-40.
18. Campbell JK, Penzien DB, Wall EM, for the U.S. Headache Consortium. Evidence-based guidelines for migraine headache: behavioral and physical treatments. Accessed May 18, 2007, at: http://www.aan.com/professionals/practice/pdfs/gl0089.pdf.
19. Hermann C, Blanchard EB. Biofeedback in the treatment of headache and other childhood pain. Appl Psychophysiol Biofeedback 2002;27:143-62.
20. Silberstein SD. Practice parameter: evidence-based guidelines for migraine headache (an evidence-based review): report of the Quality Standards Subcommittee of the American Academy of Neurology [Published correction appears in Neurology 2000;56:142]. Neurology 2000;55:754-62.
21. McCrory DC, Penzien DB, Hasselblad V, Gray RN, for the Duke University Evidence-based Practice Center, Center for Clinical Health Policy Research, Foundation for Chiropractic Education and Research. Evidence report: behavioral and physical treatments for tension-type and cervicogenic headache. Des Moines, Iowa: Foundation for Chiropractic Education and Research, 2001.
22. Bogaards MC, ter Kuile MM. Treatment of recurrent tension headache: a meta-analytic review. Clin J Pain 1994;10:174-90.
23. Holroyd KA, Penzien DB. Client variables and the behavioral treatment of recurrent tension headache: a meta-analytic review. J Behav Med 1986;9:515-36.
24. Bussone G, Grazzi L, D'Amico D, Leone M, Andrasik F. Biofeedback-assisted relaxation training for young adolescents with tension-type headache: a controlled study. Cephalalgia 1998;18:463-7.
25. Haddock CK, Rowan AB, Andrasik F, Wilson PG, Talcott GW, Stein RJ. Home-based behavioral treatments for chronic benign headache: a meta-analysis of controlled trials. Cephalalgia 1997;17:113-8.
26. Eccleston C, Yorke L, Morley S, Williams AC, Mastroyannopoulou K. Psychological therapies for the management of chronic and recurrent pain in children and adolescents. Cochrane Database Syst Rev 2003;(1):CD003968.
27. Trautmann E, Lackschewitz H, Kröner-Herwig B. Psychological treatment of recurrent headache in children and adolescents—a meta-analysis. Cephalalgia 2006;26:1411-26.
28. Astin JA, Soeken K, Sierpina VS, Clarridge BR. Barriers to the integration of psychosocial factors in medicine: results of a national survey of physicians. J Am Board Fam Med 2006;19:557-65.
29. Sierpina V, Levine R, Astin J, Tan A. Use of mind-body therapies in psychiatry and family medicine faculty and residents: attitudes, barriers, and gender differences. Explore (N.Y.) 2007;3:129-35.