Self-Hypnosis Training for Headaches in Children and Adolescents

Daniel P. Kohen, MD, and Robert Zajac, MD

Objective To describe the effect of treatment with self-hypnosis for youth with recurrent headaches.

Study design A retrospective review was conducted of outpatient clinical records of 178 consecutive youths referred to the Behavioral Pediatrics Program (University of Minnesota) from 1988 to 2001 for recurrent headaches. All patients were taught self-hypnosis for self-regulation. Intensity, frequency, and duration of headaches before, during, and after treatment were measured. Outcomes included number and frequency of visits, types of medication, and nature of self-hypnosis practice.

Results Data were available for 144 patients in this patient self-selected and uncontrolled observation. Compared with self-reports before learning self-hypnosis, children and youths who learned self-hypnosis for recurrent headaches reported reduction in frequency of headache from an average of 4.5 per week to 1.4 per week ($P < .01$), reduction in intensity (on a self-rating scale of 0 to 12) from an average of 10.3 to 4.7, $P < .01$, and reduction in average duration from 23.6 hours to 3.0 hours, ($P < .01$). There were no adverse side effects of self-hypnosis.

Conclusions Training in self-hypnosis is associated with significant improvement of chronic recurrent headaches in children and adolescents. *(J Pediatr 2007;150:635-9)*

Recurrent and chronic headache (HA) are common conditions in children and adolescents and may result in substantial discomfort, distress, and functional disability. In children between 5 and 15 years old, recurrent HA may occur in as many as 10.6%.[1] Additionally, in adolescents from 15 to 19 years of age, the prevalence may be as high as 28%.[2] Compared with 13% of adults, nearly 20% of children have migraine headaces.[3]

Chronic HAs are among the most common chronic conditions of childhood. Although pharmacologic interventions are often used first in the treatment of recurrent HA, they may not be successful and can be accompanied by unpleasant side effects. Also, although prescription analgesics may help relieve episodic HA, they often do not. Analgesics or medications to abort HA can contribute to rebound HA if used excessively.[4]

Although triptan medications and β-blocking agents often are prescribed for adults and are not uncommonly given to young people, they are much less effective in children and may cause more side effects than benefits.[5] In at least one study, Olness et al[6] found that self-regulation strategies were superior to propranolol, which was no more effective than placebo.

The psychosocial toll of recurrent HA can be substantial. In addition to the impact on the ability to concentrate in school, recurrent HA can result in an increased focus on other somatic concerns, difficulties in peer and family interactions, and increased days missed from school.[7,8]

Training in self-hypnosis (SH) has been shown to be an effective therapeutic approach for the [self-] management of HAs in children and adolescents.[6,9-14] The hypnotic state in children is understood and described as most consistently characterized by engagement in imagery and relaxation.[10] In a Cochrane Library systematic review, Eccleston et al[9] concluded that psychological approaches such as relaxation and cognitive behavioral therapies effectively reduce the severity and frequency of chronic HA in children and adolescents.

Self-hypnosis has many advantages over pharmacotherapy as a therapeutic strategy for HA. Beyond the cost savings of not having to purchase prescription or over-the-counter medications, appropriate training and use of SH has the advantage of having virtually no adverse effects[10] compared with medications. As a form of active coping and self-regulation, SH also reflects an internally derived and self-reinforcing treatment compared with treatments (eg, medications) that come from outside of the individual.

HA	Headache	SH	Self-hypnosis

From the Department of Pediatrics, University of Minnesota, Minneapolis, Minnesota (D.P.K.); and the Department of Pediatrics, Glencoe Regional Health Services, Glencoe, Minnesota (R.Z.).

Submitted for publication Jun 13, 2006; last revision received Jan 9, 2007; accepted Feb 2, 2007.

Reprint requests: Dr Daniel P. Kohen, Behavioral Pediatrics Program, KDWB University Pediatrics Family Center, Suite #160–McNamara Alumni Center, 200 Oak Street, SE, Minneapolis, MN 55455. E-mail: dpkohen@umn.edu.

0022-3476/$ - see front matter

10.1016/j.jpeds.2007.02.014

The review by Holden et al[15] found good evidence for the efficacy of both SH and relaxation in reducing pain. However, few reports have investigated outcomes in large groups of children and adolescents who have had training in and used SH for HA problems. We examined the clinical effects of SH in a large group of children and adolescents with migraine and other chronic HA and its therapeutic effects over time. We hypothesized that most patients would have substantial improvement in HA, either in frequency, duration, or intensity, or some combination thereof.

METHODS

A retrospective review was conducted of the outpatient clinical records of 178 consecutive children and adolescents referred to our Behavioral Pediatrics Program (University of Minnesota) between 1988 and 2001 for help with the management of chronic recurrent headaches.

The reviewer was not the clinician for any of those whose charts were reviewed. These patients were self-selected, referred either because medication or other treatments were not providing adequate relief, because their parents did not wish to continue medication, or both. Patients were included if their records included the following pre-training and post-training in SH information: age, sex, intensity, duration, and frequency of HA, medications used, and previous approaches to management of headaches. This study was approved by the University of Minnesota's Institutional Review Board for Human Subjects Research.

Intervention

The treatment for all patients was training in self-regulation techniques in the form of SH. Training was consistently accomplished within 3 to 4 visits, that is, all patients learned and demonstrated competency in doing and applying SH within 4 visits. (Overall number of visits ranged from as few as one visit to as many as 20 visits.) The first clinical visit was reserved for obtaining the patient's history in the context of developing a positive rapport, emphasizing the value of self-monitoring, and clarifying understanding of hypnosis as an alternative state of awareness in which an individual develops heightened concentration on some image or idea for the purpose of realizing some goal, resolving some problem, or both.[10] At the second visit, training in hypnosis and SH was begun.

Induction

Induction (initiation) of hypnosis was typically easily begun with simple focus on eye closure and imagination of any one of the patient's several favorite activities (so-called "favorite place imagery").[10]

Intensification

Intensification or deepening of the hypnotic experience was accomplished with suggestions for multisensory imagery (eg, encouraging the patient to imagine being in their favorite place, enjoying what they see, hear, feel, taste, and smell there), progressive relaxation (eg, head to toe or toe to head), or both.

Therapeutic Hypnotic Suggestions

Therapeutic hypnotic suggestions for control of HA were offered as a "menu" from which the patient could choose, for example, "When you have a HA, let yourself imagine you are somewhere where you never have a HA, and go there," "When you have a HA, picture in your mind that ruler from 0 to 12 on which you measure your HA . . . Notice what number it is on, perhaps 8 or 6 or 3 or 9 or 7 . . . and then watch the number go lower. Maybe you will do that as though you were on an elevator . . . if your HA is a 7, push the button to ride down to 6, and then and . . . . . then . . . . . 4 . . . . . and . . . then . . . . all the way to 0," "OR maybe you will imagine your HA is a certain shape and color and in another part of your mind is the color and shape of happy and comfortable . . . and you can watch the HA shape and color in your mind get smaller and smaller and smaller while the happy and comfort shape get bigger and bigger until it fills the screen in your imagination," "OR perhaps you will have another way in your mind. Whichever works best for you is the best for you."

Before Conclusion

Before conclusion of the first hypnotic session, all patients were taught precisely how to do SH at home and were encouraged to practice this two to three times daily.

At the third and subsequent visits, patients were asked about their experience of doing and practicing SH at home in the interim, questions were answered, and additional practice and reinforcement was accomplished. Patients were taught how to apply their SH techniques quickly and easily either at the privacy of their desk in school, or, as needed, in a brief period (15 or 20 minutes) of quiet in the nurse's office or comparable "quiet space" at school.

Self-Monitoring

At the first visit, patients were introduced to a self-monitoring approach by using a scale from 0 to 12 (as illustrated with a 12-inch wooden ruler) on which to rate HA intensity, with 0 = no HA and 12 = "the worst HA you can imagine."

Pretreatment HA History

Pretreatment HA history was obtained by using the 0 to 12 scale. Patients were asked to keep a diary monitoring frequency, intensity, and duration of HA by using the scale twice daily.

After children demonstrated comfort with and effectiveness applying SH at home (eg, after the third or later visit), they were offered the opportunity to have an office practice session audiotaped and to have a cassette to use at

Table I. Patient characteristics at first visit

	Average age 1st visit in months (SD)	Average duration of headaches in months (SD)	Average frequency of headaches per week (SD)	Average number of referring diagnoses (SD)
Total (144)	140.1 (36.0)	36.3 (31.5)	4.5 (4.7)	2.3 (1.5)
Male (63)	132.5* (31.0)	38.2 (29.5)	3.4* (3.3)	2.3 (1.3)
Female (81)	146.0* (38.6)	34.9 (33.1)	5.3* (5.4)	2.4 (1.6)

*$P < .05$.

Table II. Evaluations and treatments related to headaches before first visit

Previous professionals (n)	Previous imaging (n)	Medication class used (n)	Previous therapies (n)
Average per patient = 2.1	Average per patient = 0.7	Average per patient = 2.2	Average per patient = 0.4
Neurology (102)	CT (56)	NSAID (52)	Relaxation (14)
Pediatrician (80)	MRI (23)	β-Blocker (32)	Biofeedback (13)
Family physician (32)	EEG (27)	Tricyclic antidepressant (26)	Mental imagery (11)
Allergist (15)	Any abnormal (14)	Anticonvulsant (15)	Audiotape (5)
Psychologist (12)	Total studies (106)	Migraine class (14)	Ice pack (2)
Chiropractic (11)	Patients with at least 1 study (76)	Barbiturate (12)	Rest (4)
Ophthalmologist (10)	Percent of studies abnormal = 13%	Ergotamines (8)	Acupressure (2)
ENT practitioner (7)		Corticosteroid (5)	Healing touch (1)
Endocrinologist (5)		Stimulant (4)	Homeopathic (2)
Gastroenterologist (5)		Benzodiazepine (4)	Diary (1)
Psychiatrist (3)		α-Agonist (3)	Diet changes (1)
Neurosurgeon (2)		SSRI (2)	Psychotherapy (3)
Dentist (2)		Muscle relaxant (1)	Other not specified (33)
Other* (9)			

*Practitioners in orthopedic surgery, occupational or physical medicine, infectious disease, rheumatology, behavioral pediatrics, pulmonology, and herbal medicine.

home to facilitate daily SH practice. Whether a tape was prepared and given was at the discretion of the patient (and specifically not at the discretion of the clinician or parent).

Outcome Measures

Outcomes included intensity, frequency, and duration of HA and number of visits, medication use, and frequency of SH practice during the respective period of clinical follow-up visits. Data were analyzed with the use of SPSS Base module, both for descriptive statistics and ANOVA for comparison of means when applicable.

RESULTS

Data were available for 144 patients. Demographic and primary description of the patient population are outlined in Table I. The mean age of the patients at the first visit was 11.5 years. Girls tended to be older than boys and to have more frequent headaches. Table II summarizes the evaluations and treatments related to HAs before the first visit. The patients provided numerous descriptive characteristics of the HAs during their initial visit, including 40 who described an aura preceding onset of their HAs, as shown in Table III. Before the first visit, most patients had been evaluated by a pediatrician (n = 80) or a family physician (n = 32) and a neurologist (n = 102). Half of the patients had at least one MRI, CT scan, or EEG performed.

Children and adolescents who learned SH reported having less frequent HA than before learning self-hypnosis. Nearly 88% reported a decrease in frequency and 5% reported no change.

The remaining 7% reported an increase in HA frequency and said that SH "did not work" for them. The average frequency of HA decreased from 4.5 per week to 1.4 per week ($P < .01$). Those who learned SH reported having less intense HA than before learning SH. that is, 87% said that their HAs were less intense, and 6% had no change. Overall, the average self-rating of intensity decreased from a self-rating of 10.3 to 4.7 ($P < .01$); duration decreased from an average of 23.6 hours to 3.0 hours. ($P < .01$), with 89% of patients reporting decreased duration.

Of 126 children for whom there was follow-up information, 123 (97.6%) demonstrated at least some improvement, that is, either decreased frequency, duration, or intensity of HA (or combinations thereof) as a result of learning and applying SH techniques. Of the three patients who had no improvement, two reported no change, and one was worse. Those who received an SH tape reported infrequent use while simultaneously indicating "It's nice to have in case I need it." Of the total sample, 26% reported becoming and remaining completely HA-free after learning self-hypnosis.

Overall there was an average of three SH rehearsal sessions per patient. Patients who received an audiotape to

Table III. Headache characteristics*

Aura (N)	Associated symptoms (n)	Triggers (n)	Location (n)
Visual change (10)	Decreased energy (113)	Sound (123)	Frontal (102)
Dizzy (8)	Nausea (96)	Light (116)	Parietal (90)
Tired (6)	Dizzy (86)	Stress (36)	"All over" (53)
"Heavy head" (4)	Light-headed (72)	Movements (28)	Occipital (30)
Tingling (3)	Visual change (65)	Weather (17)	Eyes (28)
Nausea (3)	Vomiting (52)	Food (14)	
Hot (2)	Abdominal pain (37)	Fatigue (9)	
Flushed (1)	Hot (18)	Allergy (7)	
Numb (1)	Cold (7)	Sports (7)	
Taste (1)	Bloating (5)	Smell (6)	
Smell (1)	Weakness (3)	School (3)	
Sounds (0)	Paralysis (3)	Computer (3)	
	Itching (3)	Reading (2)	
	Increased energy (2)	Car rides (2)	
	Flushed cheeks (1)	Television (2)	

*Patients could provide more than one answer per category.

facilitate rehearsal of SH at home had a significantly larger decrease in HA intensity than those who did not request or receive a tape.

DISCUSSION

This is a retrospective, observational study of children referred specifically for help with self-regulation training for management of headaches. It was neither a controlled nor a prospective study. Outcomes may be attributable to factors other than self-hypnosis, such as positive expectancy effects (of patients, parents, or clinician), the time and attention of a clinician, positive effects of keeping a diary, or unknown effect(s) of self-help. Other potentially confounding factors include medication changes during SH training, timing of sessions (eg, summer compared with school year), or frequency of SH daily practice. Data on medication use or days missed from school before and after SH training were not collected. These considerations will help create hypotheses and methodologic considerations studies for future prospective studies.

Although HA did not disappear in all patients (25% became HA-free), those who still had HA reported they were able to manage them readily with self-hypnosis. This is reflected in the overall decrease in duration of headaches. Analysis revealed that those who requested an audiotape had a significantly larger decrease in HA intensity than those who did not. We did not examine possible differences between those who requested tapes and those who did not. Given the reported infrequent use of the tapes, it is possible that tapes functioned as an available "security blanket." It is not clear if similar results could be expected from a more general population of youth with HA seeking care from primary physicians.

Regardless of the cause of a child's HA, a child's perception of discomfort is influenced by the HA and its cause; by the memory of prior HA; by associated symptoms, success, or failure of interventions; and by anticipation of success or failure of next step interventions. Many families today are increasingly interested in complementary or alternative therapies not only for adults but also for their children.[16-18] With appropriate scientific inquiry we are beginning to add validity to the mind-body connection in mainstream pediatric health care.[19-24] In view of psychoneuroimmunology research,[23-26] we wonder if children might be able to be conditioned to the positive effect of one of the known abortive HA medications, by simultaneously receiving SH training thus remembering the effect of abortive medication in the future without in fact having to take it. This effect has been demonstrated in animal models.[25,26]

Prospective study and long-term follow-up of patients learning SH for HA or other ailments clearly is needed. Physicians may benefit their patients by acquiring skills in self-hypnosis training available through the Society for Developmental and Behavioral Pediatrics at www.sdbp.org.

REFERENCES

1. Abu-Arafeh I, Russell G. Prevalence of headache and migraine in schoolchildren. BMJ 1994:309:765-9.
2. Split W, Neuman W. Epidemiology of migraine among students from randomly selected secondary schools in Lodz. Headache 1999:39:494-501.
3. International Classification of Headache Disorders, 2nd ed. Cephalalgia 2004; 24(Suppl 1):24-49.
4. Fisher P. Help for headaches: a strategy for your busy practice. Contemp Pediatr 2005;22:34-41.
5. Lewis D, Ashwal S, Hershey A, Hirtz D, Yonker M, Silberstein S. Practice parameter: pharmacological treatment of migraine headache in children and adolescents. Neurology 2004;63:2215-24.
6. Olness K, MacDonald JT, Uden DL. Comparison of self-hypnosis and propranolol in the treatment of juvenile classic migraine. Pediatrics 1987;79:593-7.
7. Carlsson J, Larsson B, Mark A. Psychosocial functioning in schoolchildren with recurrent headaches. Headache 1996;36:77-82.
8. Karwautz A, Wober C, Lang T, Bock A, Wagner-Ennsgraber C, Vesely C, et al. Psychosocial factors in children and adolescents with migraine and tension-type headache: a controlled study and review of the literature. Cephalalgia 1999;19: 32-43.
9. Eccleston C, Yorke L, Morley S, William AC de C, Mastroyannopoulou K. Psychological therapies for the management of chronic and recurrent pain in children and adolescents. Cochrane Database Syst Rev 2003;1:1-46.

10. Olness KN, Kohen DP. Hypnosis and Hypnotherapy with Children. 3rd ed. New York, NY: Guilford Publications; 1996.
11. McGrath PJ. Commentary: recurrent headaches: making what works available to those who need it. J Pediatr Psychol 1999;24:111-2.
12. Masek BJ. Commentary: the pediatric migraine connection. J Pediatr Psychol 1999;24:110.
13. Larsson B, Carlsson J. A school-based, nurse-administered relaxation training for children with chronic tension-type headache. J Pediatr Psychol 1996;21:603-14.
14. Kroner-Herwig B, Mohn U, Pothmann R. Comparison of biofeedback and relaxation in the treatment of pediatric headache and the influence of parent involvement on outcome. Appl Psychophysiol Biofeedback 1998;23:143-57.
15. Holden EW, Deichmann MM, Levy JD. Empirically supported treatments in pediatric psychology: recurrent pediatric headache. J Pediatr Psychol 1999;24:91-109.
16. Chan E, Rappaport LA, Kemper KJ. Complementary and alternative therapies in childhood attention and hyperactivity problems. J Dev Behav Pediatr 2003;24:4-8.
17. Spiegelblatt L, Laine-Ammara G, Pless IB, Guyver A. The use of alternative medicine by children. Pediatrics 1994;94:811-4.
18. Kemper KJ. Holistic pediatrics = good medicine. Pediatrics 2000;105:214-8.
19. Ng DK, Chow P, Ming S, Hong S, Lau S, et al. A double-blind, randomized, placebo-controlled trial of acupuncture for the treatment of childhood persistent allergic rhinitis. Pediatrics 2004;114:1242-7.
20. Ferber S, Laudon M, Kuint J, Weller A, Zisapel N. massage therapy by mothers enhances the adjustment of circadian rhythms to the nocturnal period in full-term infants. J Dev Behav Pediatr 2002;23:410-5.
21. Kemper K, Wornham W. Consultations for holistic pediatrics for inpatients and outpatient oncology patients at a children's hospital. Arch Pediatr Adolesc Med 2001; 155:449-54.
22. Hewson-Bower B, Drummond PD. Secretory immunoglobulin A increases during relaxation in children with and without recurrent upper respiratory tract infections. J Dev Behav Pediatr 1996;17:311-6.
23. Lee LH, Olness KN. Effects of self-induced mental imagery on autonomic reactivity in children. J Dev Behav Pediatr 1996;17:323-7.
24. Olness KN, Culbert TC, Uden D. Self-regulation of salivary immunoglobulin A by children. Pediatrics 1989;83:66-71.
25. Ader R (ed). Psychoneuroimmunology. 2nd ed. New York, NY: Academic Press; 1991.
26. Ader R. Conditioned immune responses and pharmacotherapy. Arthritis Care Res 1989;2:S58-S64.

50 Years Ago in *The Journal of Pediatrics*

The chloride concentration of salivia and sweat in infancy

Dancis J, Grobow E, Boyer A. J Pediatr 1957;50:459-62

These authors wondered whether the high concentration of salt in the saliva and sweat of patients with cystic fibrosis might be a factor leading to colonization with *Staphylococcus aureus*. They noted that newborn infants also frequently harbored *S. aureus* in the nasopharynx and hypothesized that they might also have high concentrations of salt in their saliva and sweat. They collected saliva and sweat from healthy premature and full-term infants. The weights of the premature infants were 1425 to 2390 grams—very large by today's standards! The results of the study confirmed an earlier finding of progressive fall in salivary chloride concentration from 1 week to 2 years of age.

Most notable in this paper was the methodology to collect sweat. Infants were placed in plastic sacks, with gauze pledgets placed on the abdomen and back. Sometimes they were also placed in incubators with temperatures of 90°F. Collections <150 mg were discarded. The rate of "quantity not sufficient" (QNS) samples was 72%. The current standards require collections of either 75 mg or 15 μL sweat after pilocarpine iontophoresis in a 2- by 2-inch area of skin or with a special collector to be sure the sweat glands are maximally stimulated. Sites on the abdomen and back are no longer used, and techniques must be used to prevent evaporation to prevent the concentration of electrolytes that might cause false-positive test results. Infants can be tested at any time after 48 hours of age, although the rate of QNS samples are higher in very young infants.

At the time this article was published, few patients with cystic fibrosis lived long enough to become colonized with *Pseudomonas aeruginosa*. *S. aureus* led to lung abscesses and was a feared pathogen. In the 1950s, doctors found that *S. aureus* was becoming resistant to the wonder drug, penicillin. Physician investigators struggled to find reasons why some patients became colonized and infected with *S. aureus*. It is telling that we continue to struggle with emergence of antibiotic resistance of *S. aureus* today and are trying desperately to find non-antibiotic methods to prevent patients from becoming colonized with this organism.

Drucy Borowitz, MD
Chief
Women's and Children's Hospital of Buffalo
Pulmonary Division
Buffalo, New York
10.1016/j.jpeds.2006.11.019