SPECIAL ISSUE

Do-It-Yourself Biofeedback: Bridge Therapy for Headache Prevention

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Keywords: thermal feedback, headache, prevention, mood

A case description is used to highlight the use of biofeedback in chronic headache. A biofeedback CD-ROM was produced by Primary Care Network; it includes relaxation techniques and visualization that the client practices daily. Do-it-yourself biofeedback facilitated an increase in finger temperature, which resulted in a significant decrease in number of headaches per week and reduced medication use.

Headache: A Case Study

Ann is an 18-year-old college student with headaches that are interfering with her ability to function at school. At times she cannot get out of bed in the morning to go to class. She is nauseous and her head feels as if it were about to explode. Her first migraine occurred about the same time as menarche, around age 13. Since then, severe headaches have occurred around stressful events, like final exam time in high school. But an over-the-counter (OTC) remedy would allow her to go on.

Since she started college, her headaches have been taking over her life. Nothing seems to stop them. She takes 6-8 tablets daily of an OTC pain relief compound consisting of a combination of aspirin (250 mg), acetaminophen (250 mg), and caffeine (65 mg) to keep them at bay, but this provides little or no relief. She is at risk for developing chronic migraine.

Ann is taking too much of this OTC medication and is probably experiencing analgesic overuse or rebound headache. Under these circumstances, all other medications will probably be ineffective until the offending medication is stopped. The first course of action is to stop this OTC pain medicine and prescribe a migraine preventive medication, such as a tricyclic antidepressant or a mood-stabilizing drug. Unfortunately, these medications often take 3-8 weeks to begin to lessen headache frequency. Patients are often afraid to stop the acute medicine that has helped them function, even if it did not stop the headache. In the past, when they ran out of the acute medicine, they had the worst headache of their life or rebound headache. Without their tried-and-true acute medicine, they may quickly become discouraged, thinking that nothing is happening, and stop the new treatment before the full benefit is realized.

Temperature Biofeedback as an Adjunct to Migraine Treatment

An adjunct for the patient during this difficult period of time is temperature biofeedback. Through this process, the patient learns how to control his or her internal physiology by turning off the flight-or-fight response through relaxation. In this way, biofeedback serves as a bridge to help migraineurs cope with disabling headaches while waiting for the preventive medication to kick in.

The mechanisms by which biofeedback works are only partially understood (Schwartz & Andrasik, 2003a; Shaffer & Moss, 2006). The prevailing theory is that biofeedback brings the sympathetic nervous system under voluntary control. In addition, research by Freedman and colleagues has isolated local physiological mechanisms in hand warming (Friedman et al., 1988).

Patients use the finger temperature as a physiological marker of sympathetic arousal, correlating with the level of stress in the body. The patient learns to increase the finger temperature, indicating a deeper level of relaxation. Past research suggests that individuals with migraine typically have a finger temperature of approximately 70°F, indicating peripheral vasoconstriction, compared to the average finger temperature of 85°F in those without migraine (Baskin & Weeks, 2003; Sargent, Green, & Walters, 1972; Schwartz & Andrasik, 2003b).

Neurobiological mechanisms dispose an organism to fight or flee when confronted with the possibility of assault. Chronic pain is interpreted as assault and mobilizes the system to fight or flee. The body cannot differentiate between an internal assault and an external one but reacts to both with the release of adrenaline into the blood supply and increased heart rate and respiration. Blood vessels are constricted and muscles are tightened. Anxiety and fear accompany the physiological changes and intensify the individual's struggle to survive.
Biofeedback turns this protective agitation off and replaces the fight-or-flight response with relaxation by calling the parasympathetic system into play and quieting the sympathetic system.

Biofeedback involves visualizing a refuge, a safe harbor, where the individual can find peace and harmony. With slow diaphragmatic breathing, brain waves slow to alpha/theta frequencies. In this way, thermal biofeedback— with the goal of warming finger temperature to 96°F— also produces a whole body response that slows the entire system into relaxation.

Research Report: Applying a Do-it-Yourself Biofeedback Program

The Primary Care Network of Springfield, Missouri, produced a 10-minute biofeedback CD-ROM, "Balancing the System for Health," which included relaxation techniques and visualization to help the individual increase finger temperature to 96°F. A research study was designed to measure the effectiveness of a do-it-yourself thermal biofeedback CD-ROM in lessening the frequency of headaches during the first three weeks of treatment with a migraine preventive medication.

At the Headache Care Center in Springfield, Missouri, 30 new patients who took acute medicine for headaches more than 2 days per week were assigned randomly to a treatment group or a control group at the ratio of 2 to 1. A finger thermometer measured finger temperature initially at the first office visit and at the follow-up office visit 3 weeks later for both groups. The patients answered the Headache Impact Test-6 (HIT-6) and the Zung Depression Inventory at the first office visit and 3 weeks later. The HIT-6 consists of 6 questions about headaches over the past 4 weeks concerning severity of pain, interference with activities, bed rest, difficulty concentrating, irritability, and fatigue. A score of 60 or above indicates very severe impact.

Patients in the treatment group were given a finger thermometer, a do-it-yourself biofeedback CD-ROM, a log to record finger temperatures twice a day, and a headache diary. They were instructed to tape on the finger thermometer and listen to the CD-ROM twice a day for 10 minutes. They recorded finger temperature pre- and post-listening to the CD-ROM.

The finger temperature of the patients in the control group was taken by the nurse during the initial visit and at the follow-up visit 3 weeks later.

The results indicated that both the treatment and control groups were equivalent initially in their HIT-6 scores and Zung Depression Inventory (Figure 1). Both groups had a HIT-6 score of 65, reflecting severe impact of headaches on their lives. On the Zung Depression Inventory, the treatment group averaged a score of 55 and the control group had a score of 52, indicating mild depression. On the follow-up visit 3 weeks later, there were significant changes between the 2 groups. The treatment group’s HIT-6 score decreased to 56 whereas the control group’s HIT-6 score increased to 68. Similarly, the treatment group’s Zung score decreased to 46, no depression, compared to the control group’s Zung score that increased to 61, reflecting severe depression.

In terms of finger temperature, the treatment group’s initial temperature was 78°F and the control group’s was 80°F (Figure 2). After 3 weeks, the treatment group’s finger temperature increased to 92°F compared to the control group’s 78°F.
The number of headaches per week was also compared between the treatment and control groups (Figure 3). Initially, the treatment group had 2.5 headaches per week compared to the control group with 3 headaches per week. After 3 weeks of do-it-yourself biofeedback training, the treatment group reported 1 headache per week and the control group without biofeedback training indicated 4 headaches per week.

In summary, do-it-yourself biofeedback – guided by CD-ROM instructions – increased the functional finger temperature from 78°F to 92°F. The number of severe headaches per week was reduced from 2.5 to 1. The impact of disabling headaches was reduced to a significant degree. And the number of depressive symptoms was lessened.

Participants in the study observed that a drop in finger temperature from approximately 90°F to 80°F from one day to another was a predictor of an impending headache. On these occasions, migraineurs practiced biofeedback more than once a day to raise the finger temperature to 90°F and above.

Of the 30 subjects in the study, 2 refused to participate. Noncompliance in do-it-yourself biofeedback may be an indicator that these individuals lack motivation for self-management and probably would benefit from a referral to a psychologist for one-on-one training.

The Case Study: Ann’s Outcomes
Ann’s doctor took her off the combination OTC medication and started her on a low dose of a tricyclic antidepressant. This helped her to sleep. She also listened to the CD-ROM “Balancing the System for Health” once a day, usually right before bedtime. Initially her finger temperature was 78°F. But after 2 sessions, she increased the finger temperature to 89°F. She felt relaxed. She hadn’t realized before how she clenched her jaws when worrying about class assignments. She was able to soothe the muscles of her face, jaws, and neck, which eliminated much of the soreness that she had associated with migraine.

Even though she did not like the thought of taking medicine everyday to lessen the number of headaches, she was relieved when her doctor assured her that the preventive medicine would be necessary only 3-6 months. She kept a diary of headache days, what medicines she took, and how long the headache lasted after taking the medicine. She noticed that the headaches were occurring only once a week and the acute medicine stopped them in 1-2 hours.

While practicing biofeedback by listening to the CD-ROM, she was able to identify anxiety that she carried in her gut. Through very slow breathing, she was able to calm the anxiety. She realized that her body produced feelings other than head pain. She found love, joy, envy, anger, impatience. She was gaining control over disabling headaches. Often a strong negative emotion would precede the start of a headache. She learned to reverse the emotion by breathing slowly, deeply, and visualizing herself in a peaceful refuge.

After 6 months, Ann no longer needed the preventive medication. She was able to control the headaches through a combination of acute medication and biofeedback. College life became fun. No longer having to cope with frequent headaches, the course became challenging rather than drudgery. Ann had her life back.

Conclusion: Do-It-Yourself Biofeedback Integrated with Pharmacotherapy
The intent of the study was to measure the effectiveness of do-it-yourself biofeedback while migraineurs waited for their preventive medication to kick in. These results could have been influenced by the medication stabilizing the nervous system sooner than 3 weeks. Because medication may affect individuals differently, especially migraineurs who traditionally are very sensitive to medication, the positive effect of the preventive medication may have influenced the results of this study. This study does not suggest that biofeedback alone could reverse medication-overuse headache. However, when working in conjunction with a pharmacological intervention, biofeedback can act synergistically, enhancing the effectiveness of the drug while at the same time teaching the individual how to self-manage disabling headaches and be more receptive to the idea of using both medication and biofeedback to lessen the frequency of headaches.
Notes

References


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