EMG Biofeedback and Tension Headache: A Controlled Outcome Study

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A significant reduction in muscle contraction headache activity was observed in patients trained in the relaxation of the forehead musculature through EMG biofeedback. Training consisted of 16 semiweekly 20 min. EMG feedback sessions augmented by daily home practice. A pseudofeedback control group and a no-treatment control group failed to show significant reductions. A three-month follow-up questionnaire revealed a greatly decreased medication usage in the experimental group.

In the late fifties, two British researchers (1) employed a then unique electromyographic (EMG) integration circuit to show that the resting level of frontalis EMG activity was higher in tension headache patients than normals. Since the immediate cause of pain associated with this common type of headache (more properly called muscle contraction headache) is usually due to a sustained contraction of the scalp and neck muscles (2,3,4), we hypothesized that if patients could be taught to relax these muscles, the pain would be alleviated.

A previous study in our laboratory has indicated that individuals can be trained to lower frontalis tension levels through EMG biofeedback. (5) Subjects in this study reported that there was a generalization of the relaxation to other muscle groups especially in the head and neck area. In view of these observations and the results of the British study, we decided to apply EMG feedback from the frontalis to tension headache.

The results of a pilot study with five patients (6) revealed that the EMG feedback training appeared to be effective in reducing the frequency and severity of tension headaches. However, to rule out the possibility that these results were mainly attributable to either placebo or suggestion effects, we initiated the present study which employed two control groups in addition to the experimental group.

METHOD

Patients

Advertisements placed in a local paper asked for individuals afflicted with frequent tension headaches to participate in a study at the University of Colorado Medical Center. The applicants were offered no pay. A 22-item telephone questionnaire was used to screen out applicants who appeared to have other than muscle contraction headaches. Those who passed the telephone interview next underwent a thorough medical and psychiatric examination in order to

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rule out the possibility of neurological and other organic disorders and to confirm the diagnosis of tension headache. Typically, this type of headache is characterized by a dull "band-like" pain located bilaterally in the occipital region, although it is often felt in the forehead region as well. It is gradual in onset and may last for hours, weeks, even months.

Following the examination patients were asked to begin daily charting of their headache activity. The purpose of this charting was to provide us with quantitative data on headache levels for the entire course of the study. As shown in Fig. 1 (a hypothetical patient), the charts were 3 by 5 in. cards with the vertical scale representing headache intensity from 0 to 5, with "5" indicating an intense, incapacitating headache. A "4" represented a very severe headache which made concentration difficult, but the patient could perform tasks of an undemanding nature. A "3" headache was painful, but the patient would be able to continue at his job. The "2" level represented a headache pain level that could be ignored at times. A level "1" headache was a very low level type which entered awareness only at times when attention was devoted to it.

The patient plotted one point for each waking hour, and the headache data were averaged to obtain a weekly score. For example, in Fig. 1, the hourly average for this day would be computed in this fashion:

$$H_D = [(1 \times 3) + (2 \times 4) + (3 \times 3) + (4 \times 4) + (5 \times 2)] \div 24 = 1.92$$

The weekly score would be the simple average of the seven H_D scores for that patient. An average of 1.92 for a week would indicate an extremely high level of headache activity.

In order to establish a baseline level of headache activity, all patients charted headaches for two weeks prior to any training. Data from the pilot study indicated that an average of 0.3 was a moderate level of headache activity. Those patients who scored below this average (approximately 25%) for the two week baseline were not included in the main study but were assigned to a "case study" group. These "case study" pa-

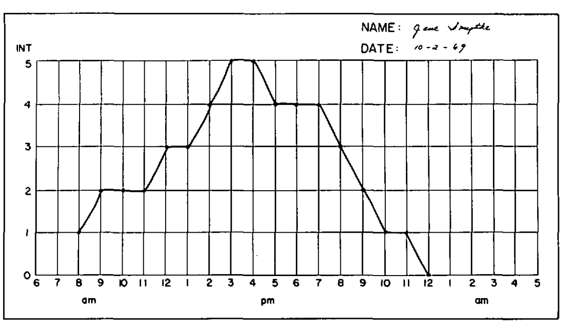

Fig. 1. Headache rating chart.

tients were not used in the main study, but they were given EMG feedback training. Almost all of these individuals reported a sudden disappearance or decline of headaches soon after their acceptance into the study. However, their headaches usually returned after five to twelve days. This placebo or suggestion response produced genuine wonderment in most of these patients.

All patients who passed the physical and psychiatric interview screen were given the Minnesota Multiphasic Personality Inventory (MMPI). This test was again administered at the end of the training period. Those patients who showed evidence of severe psychological problems as detected by the MMPI were eliminated from the main study although they were allowed to continue training. Dropouts were replaced with patients who answered the second advertisement placed in the paper. Of the 18 patients selected for the study, 2 were male and 16 were female. The mean age was 36 years, with a range of 22–44 years. The mean duration of severe headache activity for groups A, B, and C was 9.6, 6.8, and 6.7 years, respectively. Occupations included secretaries, teachers, housewives, graduate students, nurses, and a writer.

Experimental Design

After the two-week baseline period during which two no-feedback sessions were used to assess pretraining EMG levels, 18 patients were randomly assigned to one of three groups for a total of six in each group. Group A patients received the EMG biofeedback training (the experimental condition). Group B patients also received the "feedback" except that it was tape recorded from Group A (the "pseudofeedback" condition), i.e., the feedback signal produced and heard by the experimental patients was tape recorded and then played back to the Group B patients. Thus, they received noncontingent feedback. Group C received no training but the patients were asked to keep track of their headaches on the daily charts (no-treatment condition).

After the two-week baseline, Groups A and B received 16 sessions of training (ideally, two sessions per week) followed by a three-month follow-up period. During this time the patients charted their daily headache activity. At the end of the three-month follow-up, patients from Groups A and B were brought back for three no-feedback sessions to assess their ability to produce low EMG levels. A questionnaire was also administered to Groups A and B at the end of the three-month follow-up. The questionnaire was particularly designed to assess evidence of symptom substitution and levels of medication usage.

Upon completion of 16 sessions by Groups A and B, Group C patients were allowed to begin feedback training. Similarly, after the three-month follow-up, Group B patients were told that they could, if they so desired, receive additional training of a slightly different sort (real feedback).

Instructions to the Patients

The instructions to Group A patients were as follows:

"Tension headaches are primarily due to sustained contraction or tightness in the muscles of the scalp and neck.

The goal of this study is to learn to relax your muscles so that the tension level never gets too high, and you no longer get headaches. This will involve a great deal of work on your part, both here in the lab, and also at home.

In order to help you learn, we are going to provide you with information as to the level of muscle tension in your forehead region. You will hear a series of clicks in the headphones. The click rate will be proportional to your forehead tension; that is, the higher the tension, the faster the click rate. Your job will be to find out what makes the click rate slow down, because this means lower muscle tension. Try to eliminate those things that make the click rate go faster. Do not try *too* hard, or this will defeat your goal of deep relaxation. Remember to keep your attention focused on the clicks—do not let your mind wander.

This session will last about 30 minutes.

Remember—do not go to sleep.

Any questions?"

The instructions to Group B patients were as follows:

"Tension headaches are primarily due to sustained contraction or tightness in the muscles of the scalp and neck.

The goal of this study is to learn to relax your muscles so that the tension level never gets too high, and you no longer get headaches. This will involve a great deal of work on your part, both here in the lab, and also at home.

As you relax, it is important to keep out intruding thoughts. The varying click rate you will hear in the headphones will help you to keep out these thoughts. It is very important to keep your attention focused on the varying rate of clicks. Do not let your mind wander.

This session will last about 30 minutes.

Remember—do not go to sleep.

Any questions?"

Patients in this control group were *not* told that the feedback reflected tension levels in their forehead musculature because they could easily have determined that this was not true.

Group C patients were told that they were to chart their headache activity each day and that training would begin after a two-month base-line period. These patients were brought to the laboratory several times during this period for full instrumentation no-feedback sessions in order to encourage them to remain in the study.

Home Practice

Since our pilot study results had indicated the critical importance of daily practice outside the laboratory setting, patients in Groups A and B were told to practice relaxation outside of the laboratory for two 15–20 minute periods every day. No specific relaxation instructions were given for the home practice except that the patients were told to relax in the same way they had in the laboratory—but, of course, without the aid of any instruments.

Instrumentation and Laboratory Procedure

The "BIFS" EMG feedback system (Bio-Feedback Systems, Inc., Boulder, Colorado) was designed to assist individuals in reaching a condition of thorough muscle relaxation by means of information feedback. The unit was able to provide several types of auditory feedback as well as visual feedback. However, for this study, only auditory feedback in the form of a series of click sounds was employed. The frequency of the clicks was proportional to the integrated EMG level. A high EMG level produced a high click rate. As the EMG level declined, the click frequency decreased. The patient, who had EMG electrodes applied to the skin surface over the frontalis muscle, attempted to lower the click rate by progressively relaxing the muscle.

The electrodes (one-half in. diam.; silver, silver-chloride) were placed 1 in. above each eyebrow and spaced 4 in. apart on the patient's forehead. One reference electrode was located in the center of the forehead. Electrode resistances were less than 10,000 ohms. The patient reclined on a couch, in a dimly-lighted, electrically shielded room, and kept the eyes closed.

The EMG feedback unit functions as diagrammed in Fig. 2. An a.c. differential preamplifier with a bandwidth of 120–1000 Hz is used to amplify (gain = 1000) the bioelectric signal generated by the muscle. The amplified EMG signal is then both quantified and converted into a feedback signal by the BIFS. The fluctuating EMG level is changed into a varying click rate. Thus, the patient can "hear" his own muscle activity. The quantification of the EMG is such that a digital readout, available each minute, represents the average level of EMG activity in microvolts (μV) peak-to-peak (p-p) for that minute.

A cassette tape recorder was used to present the feedback clicks, as recorded from experimental patients, to the pseudofeedback control patients.

RESULTS

EMG Levels

In this carefully selected group of tension headache patients, the level of frontalis EMG during the two baseline weeks averaged slightly over 10 V (p-p) for each group. These values are at least double those shown by young normal subjects in our laboratory. These readings are also a considerable increase over the 6 μV p-p baseline level for the five patients in the pilot study (6) and probably reflect the more stringent selection criteria used in the present study. It is evident from

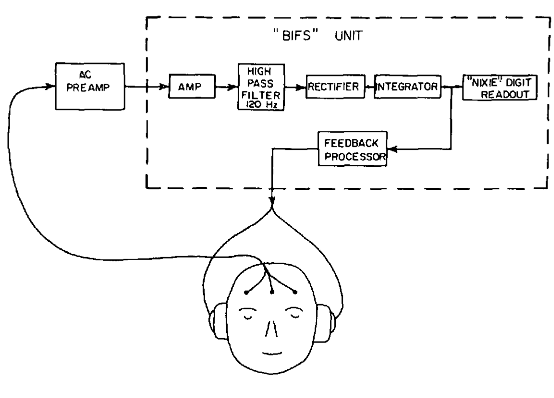

Fig. 2. Functional diagram of the EMG feedback system.

Fig. 3 that the mean EMG level for Group A showed a considerable decrease from the baseline level in the first feedback sessions. The mean EMG level of the Group B patients also dropped somewhat after the baseline sessions; however, the mean value of Group B remained at a higher level than the mean of Group A. The Group B curve also showed a great deal more variation than did that of the feedback group, perhaps not a surprising

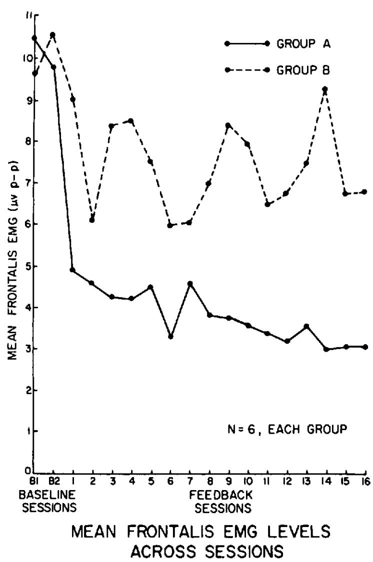

Fig. 3. Mean frontalis EMG levels across sessions. Group A—true feedback. Group B—pseudofeedback.

result since it is characteristic of feedback to decrease the variance of the response.

It was expected that the pseudofeedback Group B patients would show some decrease in EMG level as a result of the focusing of attention on a meaningless and comparatively monotonous stimulus (the "feedback" clicks). Furthermore, the shifting of attention from troublesome, anxiety-evoking thoughts to a relatively neutral stimulus probably also contributed to the lowered EMG level. Interestingly, it may be noted that the focusing of attention on a neutral, meaningless thought or word, to the exclusion of other thoughts, is an essential characteristic of many meditative disciplines.

Although all three groups showed no differences in baseline EMG levels, there was a significant difference ($p < 0.05$ one-tailed) between Groups A and B during the last two weeks of training (Group C did not receive any training).

After the three-month follow-up period, the patients from Groups A and B were tested for three sessions with no feedback. The mean frontalis EMG levels were 3.92 and 8.43 μV p-p for A and B respectively, and again represented a significant difference ($p < 0.01$ one-tailed) between the groups. Apparently the trained group had retained the learning over the three-month period.

Headache Activity

As expected, the averaged headache rating scores for both the A and B groups declined over time (see Fig. 4). However, as Fig. 4 indicates, *baseline* levels of headache activity had been somewhat lower in Group A than in Group B or C. Therefore, a Kruskal-Wallis analysis of variance by ranks was first applied to the baseline headache data. This test showed that the starting levels of the three groups were not significantly different from each other.

Additionally, in order to eliminate the possibility that different baseline levels

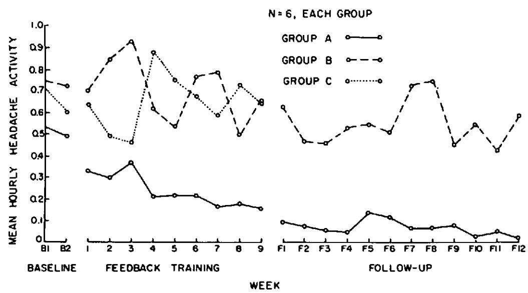

Fig. 4. Headache activity during feedback training (all 3 groups) and during the three-month follow-up (A and B only). Group A—true feedback. Group B—pseudofeedback. Group C—no treatment.

were contributing to a significant difference between groups, we performed a slope analysis for each group. (7) Only Group A produced a statistically significant decline ($p < 0.001$ when the regression coefficient was tested against the null hypothesis of zero slope).

The headache data for *individual* patients in each group were also analyzed in this fashion. The analysis revealed that four out of six patients in the A group showed significant declines ($p < 0.05$) in headache activity, while in the pseudofeedback control group, only one of six showed a significant decline. None of the C group patients showed a significant decline below baseline levels.

Finally, the Kruskal-Wallis analysis of variance by ranks which had been applied to the baseline headache activity was also used to test differences among the three groups at the end of the training period (weeks eight and nine). At this time there were significant differences in headache activity among the groups ($p < 0.001$).

Correlation Betwen EMG Levels and Headache Activity

When weekly headache activity during the baseline and training weeks was correlated with weekly frontalis EMG levels, the A group data showed a + 0.90 correlation while the B group showed only − 0.05, or essentially no correlation. This result may be due to the fact that the patients receiving the real feedback were indeed learning to relax in the laboratory and were able to apply this learning outside the laboratory, whereas the pseudofeedback patients generally were unable to do so.

The three-month follow-up data (see Fig. 4) indicated that the B group patients appeared to have stabilized at a mean headache level of about 0.53, whereas the A group was producing very little in the way of headache activity during the last month.

Dropouts

It should be noted that there were four

dropouts from the original group B. These were patients who felt that the training was having no effect on their headaches. All of them were experiencing high levels of headache activity when they retired from the study. However, the Group B patients who remained felt that the training was helpful. There were also two dropouts in the C group, but none in the A group. All dropouts were replaced with new patients.

Subjective Reports

While being instrumented prior to the sessions as well as just after the sessions, the patients would often volunteer comments as to their success or lack of it with the training. These comments were later entered into a log book by the technicians. On the basis of these comments, it soon became apparent that in this study, as well as the prior pilot study, the patients passed through several discrete stages in terms of their ability to use a "cultivated" relaxation response to reduce headache activity.

Stage 1. Patient is unable to prevent or abort headaches.

Stage 2. Patient becomes more aware of the tension preceding the headaches and can relax to some degree with a conscious effort. However, he cannot abort headaches.

Stage 3. Patient shows an increasing awareness of the tension, plus he is better able to relax consciously and abort light-to-moderate headaches. The frequency and intensity of headaches is now diminishing.

Stage 4. Patient now seems to relax automatically in the face of stress and does not have to make a conscious effort to do so. The headache activity is now appreciably reduced or even eliminated.

The last stage would seem to indicate that the ability to relax in the face of stress eventually becomes an overlearned habit resulting in a change in life style.

MMPI Results

All the patients were given the Minnesota Multiphasic Personality Inventory (MMPI) before and after the training period. In general, the "before" profile of scores showed that the Hs (hysteria), D (depression), and Hy (hypochondriasis) scales were somewhat elevated (the means for all three groups were in the low 60's). The "after" profiles of all three groups showed reductions in these three scales; however, the only statistically significant mean before-after change occurred in the Hy score of Group A ($p < 0.05$ two-tailed).

Table 1 lists the number of patients in each group who showed declines of 10 points or more on these three scales. The A group produced a total of 10 change-scores equal to or greater than 10 points while Group B showed four, and group C a total of three. A chi-square test performed with the data from this table

TABLE 1. Number of Patients in Each Group Showing Declines of Ten or More Points on Three MMPI Scales

	Hs	D	Hy
Group A	3	3	4
Group B	2	1	1
Group C	1	1	1

showed that the three groups were significantly different ($p < 0.01$) in the number of negative change-scores greater than ten.

The "before" profile showing the elevated triad of hysteria, depression and hypochondriasis is in general agreement with Martin (4) who found the same elevations in a large group of tension headache patients.

Follow-up Data

A four-page post-training questionnaire was used to assess drug usage, evidence of symptom substitution, mood and behavior changes, and interpersonal relationships. All the patients in Groups A and B received this questionnaire after the three-month follow-up period. The patients were asked to rate the severity or frequency of symptoms on a scale of 0 to 3. Ratings were made for four periods: before training, first half of training, second half of training, and after training.

In the A group decreasing severity or frequency was seen in 27 of 28 items. Group B patients rated themselves as decreasing on 23 of 28 items. In both groups the items showing the greatest decreases were depression, tension, anxiety, insomnia, fast heart beat, irritability, persistent thoughts, sexual disinterest, and fear of driving. Lesser decreases in both groups included chest pain, use of alcohol, sweating, and sexual anxieties. The Group A patients in addition registered large decreases in tiredness, apathy, fear of crowds, and compulsive behavior. Patients in both groups saw themselves as improved in relationships with spouses and/or friends.

Although, generally, there was no evidence of symptom substitution, one patient in Group A did report a certain amount of stomach distress as she proceeded through training in deep relaxation. This phenomenon appears to be related to the sudden shift from a predominantly sympathetic autonomic state towards a parasympathetically dominant pattern. This transition does seem to produce an increase in stomach acidity in some individuals. As the patient continues the daily relaxation practice this reaction tends to disappear.

Drug usage decreased dramatically in Group A patients. As seen in Table 2, 4 of 6 went from a rate of 3 to 4 capsules of prescription tranquilizers and pain killers (typically valium, librium, fiorinal, and darvon) per day to only occasional use of

TABLE 2. Drug Usage in Group A (Experimental)

Patient	Before Study	First Half of Training	Second Half of Training	After Training
1	Fiorinal, Valium 3–4 daily	Fiorinal, Valium 3–4 daily	Librium 3–4 daily	Librium 3 per week
2	Darvon, Equagesic (all day)	Darvon, Equagesic (all day)	Darvon, Equagesic seldom	Darvon seldom
3	Valium 4 per day	Valium 1 × day	none	none
4	Anacin—10 per day	Anacin—4 per day	Anacin—2 per week	Anacin—2 per week
5	Darvon—4 per day	Darvon—4 per day	Darvon—2 per day	none
6	none	none	none	none

the tranquilizer. Another patient in Group A decreased his intake of aspirin from up to 10 per day to 2 per week. The final patient in this group took no medication for his headaches (and did not show a significant decrease in headache activity).

Two of the Group B patients (see Table 3) reported decreases in medication, while three did not change in their usage. One patient switched from a fiorinal-by-day, librium-by-night schedule to librium day and night. Interestingly, one patient from this group who showed *no* decrease in drug usage had reported a decrease in headache activity.

The questionnaire also required patients to rate their level of headache activity before, during, and after the training. In Group A, five of six rated their headaches as decreasing. One patient indicated no change. Three of the Group B patients rated themselves as decreasing in headache activity, while three others saw no change. One of those who rated her headaches as decreasing did not show a decrease in her daily charting of the headache activity.

Eighteen-month Follow-up. Approximately 1½ years after the completion of feedback training, four of the six Group A patients (two had left Colorado) were contacted. Three of the four previously had shown significant declines in headache activity during training. The three reported that their headaches remained at a very low level (roughly one or two mild headaches a month). Because they now felt more relaxed generally, they no longer engaged in a daily period of deep relaxation, using this approach only when feeling particularly tense. The fourth patient (who had *not* shown a significant reduction during training) reported that his headaches continued, though at a reduced rate.

"Real" Training for Group B and C

TABLE 3. Drug Usage in Group B (Pseudofeedback Control)

Patient	Before Study	First Half of Training	Second Half of Training	After Training
1	Fiorinal—2 per day Librium—2 at night	Fiorinal—2 per day Librium—2 at night	Fiorinal—2 per day Librium—1 at night	Librium—4 day and night
2	Librium—2 per day Aspirin—4–5 day	Librium—1 per day Aspirin—2 per day	Aspirin—1 per day	Aspirin—1 per day
3	Anacin—4–6 per day	same	same	same
4	Meprobamate—3 per day Elavil—2 per day	same	same	same
5	Wigraine Valium	same	same	same
6	Equagesic—3 per day Meprobamate—2 per day	Equagesic—2 per day Meprobamate—1 per day	none	none

Patients. After the three-month follow-up, three patients from the pseudofeedback group (B) decided to try "another type" of training. Two of these people showed significant decreases in their headache scores through the training period. The third individual did not improve significantly.

Five of the Group C patients also received training consisting of 16 sessions of EMG feedback. Their training was initiated after their nine-week "baseline" period was completed. Four of the five showed significant declines in headache activity.

The biofeedback training of the eight former control group patients along with a number of "pilot" headache patients was augmented with cassette tape recordings for home practice. In several instances portable EMG feedback units were used at home as well.

DISCUSSION

The results of an earlier pilot study with five patients (6) had suggested that training in relaxation of the forehead muscles with EMG feedback might be effective in eliminating muscle contraction or tension headaches. That conclusion was further strengthened by the analysis of the data from this second experiment which employed two control groups in addition to the experimental group. It now seems apparent that chronic tension headache patients can learn to decrease their resting forehead EMG levels by 50 to 70% in three to six 20-minute feedback sessions. When they subsequently engage in regular, daily relaxation, the headache activity diminishes considerably. Recently, other laboratories (8,9) have also reported that EMG feedback training is useful in the alleviation of tension headache.

These results are in keeping with a suggestion made independently by Malmo (10) of McGill University Medical School, who has worked extensively with electromyographic recording since the early 1950's. Malmo proposed that systematic muscle relaxation training might well be useful for treating tension headache.

Stages of Progress

As the patients progressed through training, their verbal reports suggested that they first developed a heightened awareness of maladaptive tension levels. This was followed by an increasing ability to remove the tension (and slight-to-moderate headaches) through relaxation. If the patients then applied this new learning to every day stress situations, a change in life style frequently seemed to occur. At this stage, patients typically reported that they no longer overreacted to stress. This "automatic" moderation of arousal level in the face of stress has also been reported by anxiety patients who have received EMG feedback-assisted relaxation training in our laboratory.

Transfer to Real Life

The no-feedback sessions at the end of the three-month follow-up revealed that those patients who had received feedback training still retained the ability to produce low forehead EMG levels. The eighteen-month follow-up interview indicated that most experimental group patients had also managed to keep themselves relatively free of headaches even though they had been chronic headache sufferers for years prior to the training. In this group also, the use of powerful prescription drugs decreased dramatically.

Only one of the pseudofeedback controls produced a significant decline in headache activity over time. This patient was the youngest member of that group. She regularly performed the daily home relaxation practice. Although she was not given specific relaxation instructions, this patient learned to discriminate the internal cues of thorough relaxation such as heaviness and warmth in the arms.

Importance of Daily Practice

This study, as did the pilot study, pointed up the importance of daily home practice. The two experimental group patients who did not show significant declines had found it difficult to carry out the home relaxation assignments. Typically they reported that the hectic state of affairs at home did not permit quiet periods of relaxation. Other patients stated that they would have preferred more explicit relaxation instructions for home use. A few found the daily home practice to be somewhat boring.

Addition to the Basic Technique

In the present study, only a minimal sort of training was employed—EMG feedback from the frontalis muscle. Probably this training could be strengthened considerably. For example, we have recently begun experimenting with two home practice techniques which should add both structure and novelty to the home training. One technique makes use of a 30-minute cassette tape containing relaxation instructions on either side. The other technique utilizes a battery-powered portable EMG feedback unit (Bio-Feedback Systems, Inc.). The tape and portable unit can be employed singly, sequentially, or simultaneously.

Preliminary results indicate that each of these two supplementary methods will be a valuable addition to the minimum procedure used for Groups A, B and C. By now, tapes and portable equipment have been used in the training of some of the approximately 30 tension headache patients (including those from the B and C groups who later received the "real" feedback) who have been trained in muscle relaxation with EMG biofeedback since the completion of this second study. The overall results indicate that roughly 75% showed significant declines in headache activity.

It is possible that some of those who did not show decreases may have been unwilling to give up their headaches. The headaches may have allowed those patients to avoid certain anxiety-arousing situations, or to manipulate others in their family or at work. In these instances, psychotherapy or behavior therapy is required. (11)

Even though EMG feedback training alone is not effective in all cases, the technique would seem to be of considerable value for a substantial proportion of tension headache cases. The training does not involve drugs or other kinds of therapy and can be accomplished with relatively inexpensive portable equipment. Training can be carried out by a technician (or perhaps by the patient himself) under professional supervision. In most instances, beneficial results can be achieved in four to eight weeks. Since many tension headache patients experience pain in the back of the neck and shoulders, it is possible that faster results could be obtained with some of these patients through feedback from these muscle sites. These locations were not used in this study because it is more difficult to obtain precise electrode location here than on the forehead.

A variety of evidence suggests that biofeedback techniques may have applications to stress-related disorders other than tension headache. For example, researchers at the Menninger Foundation (12) have explored the use of skin temperature feedback with migraine patients. In our own laboratory, we have for several years regularly employed EMG feedback techniques in the systematic desensitization of phobias. (13) Insomnia may be another potential application. Drowsiness is a frequent accompaniment of profound muscle relaxation; perhaps EMG (and related) feedback techniques would be useful in some instances of sleep-onset insomnia. Observations in support of such a surmise may be found in Jacobson's writings (14) on progressive relaxation and in the autogenic training literature. (15) It may be noted that both these older approaches systematically train patients in the ability to shift readily into a relaxed, low arousal condition.

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