Electromyographic Feedback Training and Tension Headache: Preliminary Observations

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Five female Ss diagnosed by neurologists as chronic headache cases and who had failed to respond to a variety of other treatment procedures (e.g., psychotherapy, medication, etc.) were trained to relax their frontalis area with EMG feedback. Ss receiving contingent EMG feedback reduced the frequency and intensity of headache activity but Ss who received non-contingent, but non-frustrative EMG feedback did not reduce headache activity.

Sustained contraction of the scalp and neck muscles appear to be associated with tension headache (Oetfeld, 1962; Wolff, 1963). Electromyographic (EMG) feedback seems useful in the induction of muscular relaxation (Budzynski & Stoyva, 1969, Green, Walters, Green & Murphy, 1969). Budzynski, Stoyva and Adler (1970) described an EMG instrument and feedback training procedure which appeared to reduce both the intensity and frequency of tension headache. Their report was a collection of case studies and lacked several experimental controls. The purpose of the present study was to attempt to replicate their observations with more control, while retaining the merits of the case study method.

METHOD

Instrumentation: EMG Feedback System

The purpose of this instrument is to enable the S to monitor his muscle tension by means of an analog information feedback system. The S hears a tone with a frequency proportional to the EMG activity in the relevant muscle group. The feedback tone tracks the changing EMG level of the muscle. Three surface electrodes are applied either to the forearm extensor one inch below the elbow, or to the frontalis in such a way that the center electrode is centered on the forehead about one inch above the eyebrows. The instrument is constructed so that there is a maximum of 20K unbalanced electrode resistance and a maximum of 30K resistance to ground for each active electrode. The instrument is constructed to eliminate the EKG, EEG and “noise” artifacts.

The S is instructed to keep the tone low by relaxing the relevant muscle group. As the S improves this control, the loop gain of the feedback system is increased, thus requiring him to maintain a lower EMG level in order to hear a low tone. The response of muscle relaxation is shaped by increasing the difficulty of the task in three steps (three sensitivity settings, i.e., low, medium, high). Brief visual feedback was provided only in the first session of training with the

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use of a meter unit calibrated in microamps. The microvolt level, sensitivity setting and meter readout were inter-related. For example, for an S to hold a meter reading of 26 while the sensitivity control is increased from low to medium to high, the S must drop microvolt level from 5.8 to 4.1 to 3.7.

Procedure

Five female Ss diagnosed by neurologists as chronic (6-20 years) tension headache cases, were accepted for the following medical and psychological procedures: (a) Psychological testing (M.M.P.I., SHSS Forms A (pretested prior to EMG feedback training) and B (post-tested after EMG feedback training). (b) Complete physical examination by consulting internist, EEG and examination by consulting neurologist. (c) Next, the patients were given charts on which they were required to keep an accurate record of the intensity and frequency of all headache activity. They were also instructed to cease taking any medication prescribed for their headaches till the conclusion of the study. (d) There was an initial three week observation period to determine base rates of headache activity. (e) At the end of the three week baseline period, Ss were orientated and instructed (for ten minutes) in the use of the EMG feedback training procedure. The instruction was conducted with "true" or contingent EMG auditory feedback. (f) Next the patients received six sessions of "false" or non-contingent EMG auditory feedback training over a three week period. Each session lasted 30 minutes. Patients did not know they were receiving "false" feedback, hence the study was single blind. The "false" auditory EMG feedback was not randomly generated and hence possibly frustrating in nature. After the orientation period the EMG console was placed on a table behind the S's chair. The earphones which delivered the auditory feedback were disconnected without the Ss knowledge from the EMG console and connected to a recorder that delivered taped auditory EMG feedback from the actual first six sessions.
of an S successfully trained to relax with "true" or contingent feedback. Hence during the control period Ss received a pattern of feedback which had the appearance of reality and progress, because the feedback tone declined over time. But the decline was unrelated to anything that the S did or did not do during the control period. Informal post-experimental inquiry revealed that the Ss believed that they were receiving "true" feedback from their own frontalis and that they had improved in their relaxation skills. Ss continued to keep the record of their headache activity during the "false" feedback period. (g) At the end of the "false" feedback period all patients received six sessions of EMG auditory feedback training with "true" or contingent feedback for another three weeks. Each contingent feedback training session was identical in length (30 minutes) to the previous non-contingent training sessions.

RESULTS

Inspection of the records of all patients appear to indicate no significant difference in the frequency and intensity of headache activity between the baseline period and the non-contingent ("false") EMG feedback period. But there appears to be for all patients significant differences in both intensity and frequency of headache activity between the baseline period and the contingent feedback period. The significant differences in headache activity between the non-contingent and contingent feedback period appears to suggest that the observed differences were probably not a function of placebo efforts (e.g., attention, impressive instrumentation, etc.) These preliminary data seem to suggest that contingent EMG auditory feedback training may be a promising method of reducing the frequency and intensity of tension headache.

REFERENCES


