Cranial Electrotherapy Stimulation in Patients Suffering from Acute Anxiety Disorders

Stress-induced anxiety causes the cells of the human body to produce waveforms in different frequencies than normal. Cranial electrotherapy stimulation (CES) involves the use of bioelectric therapy to reestablish the normal electrical flow in the human body by producing waveforms similar to the body's own in a relaxed state. The authors discuss the outcome of a study which tested the usefulness of CES in regard to relief of anxiety.

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Patients diagnosed with anxiety disorders were treated with cranial electrotherapy stimulation (CES) at our clinic between January, 1989 and January, 1995. Most of these 197 patients reported that their subjective high level of anxiety had been very high for at least 2 months, and virtually all reported that it had been present for at least 6 weeks. Most of the patients also felt that there was nothing they could do to decrease the amount of anxious feelings nor control the length of time that they felt so anxious.

Since its inception in 1977, the clinic's normal protocol for assessing anxiety disorders is to ask for pre- and post-treatment subjective measures of anxiety as well as taking objective measurements. For this retrospective analysis a comparison of pre- and post-treatment measures indicates that CES does reduce both subjective feelings of anxiety as well as objective physiological measurements. As this is a retrospective analysis of outpatients in a private practice, there is no control group. However, the author has previously found CES to be useful in a controlled study on a population of drug abusers.[1]

PROCEDURE

All patients were initially seen by a doctoral-level clinical psychologist for assessment. When appropriate, the clinical psychologist did the therapy. In other cases, follow-up sessions were conducted by a psychiatric nurse skilled in working with patients with anxiety using CES, biofeedback, individual psychotherapy, hypnosis, etc. The psychologist set the protocol for the nurse to follow.

The normal procedure was to initially take a comprehensive history with a focus on the patients anxiety during the previous week, and their reactions to environmental stressors. The Alpha-Stim CES was used for about half the sessions (25 minutes) at a 0.05Hz frequency and a comfortable current setting up to 500μA. Psychophysiological and subjective measurements of anxiety were made before and after treatment. Often the patients were placed in our "Relax and Learn Room" where they watched videotapes of relaxing scenery and listened to superlearning music while their physiological anxiety levels were constantly monitored.

Over 80% of the time patients were loaned an Alpha-Stim to take home and use once or twice a day in a manner consistent with how they were using it successfully in the clinic. Patients were always made aware of their progress and their goal for the week both physiologically and subjectively. All of the patients seemed to be motivated by the goal-setting and the fact that they could use the clinic's approach to avoid medication.

TABLE 1 — Comparison of means between different types of evaluations.

Evaluative Method	EMG	EDR	TEMP	Subjective 0-100 Scale
Number of Patients	73	83	26	182
Pre-treatment	15.8	14.6	81.2	62.3
Post-treatment	4.5	7.6	92.1	14.8
Average # of treatments	8.6	7.4	12.6	8.6

DEMOGRAPHICS

As stated above, 197 patients began the treatment. Of those, 182 completed the treatment; 55 were male, and 127 were female. The average age was 35.6.

Previous treatments included 26% who had used anxiolytic medications unsuccessfully; 16% who had been placed on antidepressant medications, had used alcohol to self-medicate, had individual psychotherapy, or had behavior modification therapy; and 58% who had no previous therapy for their anxiety disorder.

All the patients were asked at the beginning of each session to rate their current level of anxiety on a 0 to 100 basis with 100 being the highest amount of anxiety they could imagine. The results of those subjective assessments are shown in the fifth column of Table 1. The post-treatment assessment scores are their subjective assessments at the beginning of the last treatment session.

Patients were also assessed objectively on physiological measures by electromylegram (EMG), electrodermal response (EDR), and peripheral temperature (TEMP). The physiological area we chose to study on a given patient was that measure that showed the greatest amount of stress or anxiety during the pretreatment evaluation. The original assessment used all three modalities at the same time and was done by the clinical psychologist. The post-treatment-objective physiological measures were done at the beginning of the last treatment session prior to the actual final treatment. The objective results are shown on Table 1 in columns two, three and four.

RESULTS

All but 6 patients were referred by local physicians in the area. In many cases anxiolytic medications were used unsuccessfully or had significant side effects that necessitated the patient getting off the medication. As mentioned above, 26% of the patients were on anxiolytic medication when the treatment began. Their goal was to get off medication and function normally without feeling any more than a normal amount of anxiety on a day to day basis.

Sixteen percent of the patients were on other medications (mostly antidepressants) at the beginning of the treatment. Four percent were on both anxiolytic and antidepressive medications. The remaining 54% were not on any medication when they began treatment. Many of the patients, however, had been in other therapy programs just prior to beginning their treatment at the clinic. These included individual therapy, group therapy, alcohol treatment, and/or behavior modification. To the best of our knowledge, not one patient was on any anxiolytic or antidepressant medication when they left treatment successfully.

A paired t-test was done on the individual results to ascertain if there were significant differences between individual patient scores as opposed to a significant difference between the average pre-treatment scores and the average post-treatment scores (both subjective and objective). As shown in Table 1, all 182 patients that completed the treatment were used in the subjective assessment (column 5 of Table 2) and 73 of those same patients were analyzed in the EMG t-test, 83 patients in the EDR t-test, and 26 patients in the temperature, or vascular physiological assessments. As can be seen, there are significant positive differences in all cases. The paired t-tests scores reveal less than a 1 in 20 probability ($P<0.05$) that the results were due to chance in these patients.

Only 15 patients who began the therapy dropped out. Our follow-up revealed that the reasons for dropping out included no money for treatment (N=8), hospitalization (N=1), would not comment (N=3), and for other, more pressing problems that they were facing (N=3). Of the patients who dropped out, 93% stated that they were still as anxious as they were when they first presented to us for treatment.

TABLE 2 — Paired sample t-test comparison pre- and post-CES.

Evaluative Method	EMG	EDR	TEMP	Subjective 0-100 Scale
Number of Patients	73	83	26	182
Mean Difference	9.102	6.894	9.909	27.459
SD Difference	2.002	1.083	2.689	16.336
DF	72	82	25	181
T Test Score	14.342	12.572	17.286	22.614
One Tailed Probability	P<.05	P<.05	P<.05	P<.05

DISCUSSION

The fact that regular objective physiological anxiety levels were constantly monitored, as well as subjective measures, offers a very interesting comparison to see if the patients' perception of anxiety varies in proportion to the physiological measures of stress and anxiety.

It is important to note that some of the treatment occurred at home between office visits and that may be an important variable. Also, patients were made aware of their goal for the week both physiologically and subjectively, and their objective progress.

The results of the paired t-tests indicate that there were significant positive physiological changes and that these changes were echoed by the patients' self-reports at the end of treatment and in some cases, months later. The t-test also showed that treatment by the psychologist and the psychiatric nurse were both beneficial for patients that used CES. No significant differences were found in the outcome measures regardless of who administered the treatment, leading one to further conclude that CES treatment made the difference, and not the therapist's level or type of training.

CONCLUSION

There was significant reductions in anxiety in both physiological objective measures and subjective measures in the patients that received CES treatment. In addition, their average perceived anxiety was reduced to a normal level. Interestingly, there was an 86% correlation between the perceived anxiety ratings and the objective measures indicating that, at least with these patients, the subjective measures were relatively accurate assessments.

The number of CES sessions appears to enhance the effectiveness and the sustained positive effect at the 0.05 level of significance, at least up to 12 sessions, which is the maximum number of treatments anyone received in this study.

No invasive procedures, and no medication was used with these patients. There was no reported side effects (either short or long term) from CES. Therefore CES seems to be an extremely safe and effective approach to use with patients suffering from anxiety disorders. Some patients resist trying this procedure just because it seems to upset them to think of electricity stimulating their bodies. However we have not noted any more resistance to CES than we see when we suggest medication, hypnosis, or biofeedback therapy as possible treatment modalities. □

REFERENCE

1. Overcash, Stephen J., and Siebenthall, A. The Effects of Cranial Electrotherapy Stimulation and Multisensory Cognitive Therapy on the Personality and Anxiety Levels of Substance Abuse Patients. *American Journal of Electromedicine*, 6(2):105-111, 1989.

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