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THE USE OF CRANIAL ELECTROTHERAPY STIMULATION TO BLOCK FEAR PERCEPTION IN PHOBIC PATIENTS

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ABSTRACT

Cranial electrotherapy stimulation (CES) involves small pulses of electrical current (1.5 mA or less) across the head. It is a known treatment for depression, anxiety, and insomnia. Chance clinical observations suggested that CES might be effective in reducing fear perception in phobic patients. This study was designed to investigate this possible effect. Thirty-one persons responded to public media announcements requesting subjects for a phobia treatment project. They were asked to imagine themselves in their worst phobic situation, then rate their fear on a scale from no fear to extreme fear. They were then given 30 minutes of CES, after which they were asked to frighten themselves again and to rate the fear as before. The patients were successful in generating a fear response, which, in turn, appeared to be mitigated by CES.

INTRODUCTION

Among the approaches for the treatment of fear in phobic patients, varied success has been claimed for biofeedback,[1,2] desensitization,[3,4] aversion relief,[5] and combinations of behavior and/or cognitive therapies,[6] including relaxation therapy.[7] All of these are time consuming and require great attention to detail by the patient and therapist alike.

The treatment of phobic patients can be a long and taxing process for the physician or other therapist. Among pharmaceutical approaches, antidepressant drugs are said to be of particular benefit,[8] as is at least one cardiovascular medication.[9] However, even the newer tricyclic antidepressants are not without their risk to the patient, requiring the physician to be conscientious in the regulation of dosage and alert to the numerous possible negative side effects.[10] They may also take days or weeks to begin to be effective.

Recently, the authors serendipitously observed that cranial electro-

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therapy stimulation (CES) appeared to control anger and rage states in some adolescent psychiatric inpatients, and dental fear in others. Only two reports of the effects of CES in behavioral states, other than generalized anxiety and depression, have been reported in the literature,[11] and these involved its successful use in an attention-to-task disorder in hyperactive patients.[12,13]

Dymond and coworkers had earlier studied the intracerebral flow of CES current in man and found that, while the current spread throughout the brain, it canalized along the limbic system.[14] This makes it likely that CES current could impact specific emotions or their perception by the patient. We decided to test its effects on the perception of fear in phobic patients.

PATIENTS AND METHODS

The study was held at an outpatient treatment facility. A physician provided medical orders for the use of CES and an investigational review board supervised the implementation of the protocol. All patients provided written informed consent to participation in the study.

Thirty-one people responded to public media advertising for volunteers who had been medically diagnosed as having one or more phobias. Women comprised 81% of the sample (n = 25). The average age was 48.69 years (range, 26 to 66 years), and the average length of time since their phobia had been diagnosed was 16.33 years (range, one to 44 years). Only 25 subjects were willing to list their primary phobia. Of these, 32% listed social and/or agoraphobia (n = 8), while the next largest group listed driving (20%, n = 5). Flying (n = 3) was next in frequency with one person each listing water, nocturnal, signing name, snakes, death, doctors, hospitals, and being abandoned.

Sixty-five percent (n = 20) of the subjects were on medication, and of these, 60% were taking alprazolam (n = 12), either alone or in combination with other medications.

Subjects were seated side by side on a single row of church pews, facing a well-lighted, open gym area. We took advantage of May's finding that internally elicited phobic thoughts produced as much and, at times, greater subjective anxiety, fear, and physiological activity than similar thoughts triggered externally by pictures or verbal statements about phobic objects.[15] To have them generate their phobic response, we therefore asked the subjects to close their eyes and place themselves in their most fearful phobic situation. They were requested to generate as much fear as they could, then rate their fear on a seven-point scale (1 = no fear to 7 = extreme fear).

The subjects then received CES for 30 minutes with a CES device,

which produces 0.5 bi-phasic, square wave pulses per second (pps). Current intensity was limited to 600 μA via electrodes clipped to the ear lobe of each ear. The duty cycle was 100%. The subjects set their own stimulation amplitude, most of them to the maximum available. At the end of the 30 minutes, and with the CES current still on, the subjects were asked to again close their eyes and generate as much fear as possible. They then rated their fear level achieved, as before.

RESULTS

One subject left before the program began, citing increased situational anxiety as the reason. Four subjects, appearing to be elated, rated their end-of-study fear as zero, which was not on the seven-point scale. This left us with 26 patient responses that could be analyzed. The results are shown in the table, where it may be seen that the pre-CES fear level obtained by the total group was a mean of 3.33 ± 1.22. (The scoring range achieved was from 1 to 6 on the seven-point scale.) Their mean post-CES fear level was 1.96 ± 0.76 (with a range of from 1 to 4). A one-way analysis of variance yielded a probability that was off our computer's range at 0.0000 (STATEX program). A Fisher's *t* test of the means fared no better.

Also shown in the table are the group comparisons according to medication status. While there had been no significant differences in the fear levels of the groups when compared against each other, either pre- or post-CES, the group on non-alprazolam medication did not fare as well when compared against itself. One of these patients, who claimed to be taking clonazepam, had high-moderate fear (a score of 4) pre-CES and the same score post-CES. This was the only instance of apparent blocking of CES effects seen in any subject in the study.

Table. Differences between pre- and post-cranial electrotherapy stimulation (CES) fear levels reported by subjects

Group	No. of Subjects	Mean ± SD	F	df	*P*-Value
Total					
Pre-CES	26	3.33 ± 1.22			
Post-CES	26	1.96 ± 0.76	23.38	1,50	0.0001*
Nonmedicated					
Pre-CES	11	3.18 ± 1.40			
Post-CES	11	1.82 ± 0.75	8.09	1,20	0.01
XANAX medicated					
Pre-CES	9	3.50 ± 1.32			
Post-CES	9	1.75 ± 0.66	12.60	1,16	0.003
Other medication					
Pre-CES	6	3.33 ± 0.81			
Post-CES	6	2.53 ± 0.75	3.14	1,10	0.11

* The computer program yielded four zeros. It was rounded off to 0.0001.

Overall, while 77% of the subjects (n = 20) rated their fear as moderate to extreme going into the study, 85% rated their fear from very low to none following 30 minutes of CES (n = 22).

DISCUSSION

It is not possible to determine the adequacy of our selection among all possible phobic patients, nor did we attempt to. It is unlikely that persons responding to public advertisements mirror the range of the pathology. Also, Lader has shown physiological evidence that patients with specific phobias are different in terms of arousal from other phobic patients,[16] so we may or may not have been dealing with more than one subtype. What we found, however, is that the group of subjects who responded to our advertisements represented a wide range of phobic types, and that with the one exception mentioned above, they responded to CES in a highly significant manner, as measured by the task they performed.

This study was not designed to discover the length of time of the phobic blocking effect, whether it habituates over time, or, indeed, whether the blocking is a placebo effect alone.

This study was also not designed to elicit the mode of action of CES in changing phobic states or perceptions. There is growing clinical evidence that it interdicts many emotions, from extreme sorrow to dental phobia, from anger to elation. If true, that may be due to its interruption of signals along the rhinencephalic pathways in the brain.

It appears unlikely that CES can stand alone in the treatment of something as complicated as phobias. It is more likely that it may be used best as a means of ongoing desensitization therapy, where CES is used to block the fear response while the patient gains more experience with the phobic stimulus. That would allow improvement of function to begin at the start of desensitization therapy instead of near the end of a sometimes long, drawn-out process, as it is currently practiced.

From our data, it would appear that CES may be successfully instituted while patients are still on some form of supportive medication. By the same measure, CES appears to be as effective without supportive medications and might be a useful tool with which to withdraw patients from such medications, should the physician desire.

Since modern CES devices are portable and inexpensive, being about the same size and cost as a transcutaneous electrical nerve stimulation unit, its use by the patient in most phobic stimulus situations would appear feasible. CES devices are prescription devices, however, and the physician should be prepared to supervise their use in the recovery process.

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References:

1. Klein DF. Medication in the treatment of panic attacks and phobic states. *Psychopharmacol Bull* 1982; 18(4):85–90.
2. Pirrelli AM, Nazzaro P. Well-being during indapamide treatment: A benefit of blood pressure control. *Curr Ther Res* 1989; 45(4):611–620.
3. Peters MD, Davis SK, Austin LS. Clomipramine: An anti-obsessional tricyclic antidepressant. *Clin Pharm* 1990; 9(3):165–178.
4. Reeves JL, Maeliea WL. Biofeedback-assisted cue-controlled relaxation for the treatment of flight phobias. *J Behav Ther Exp Psychiatry* 1975; 6(2):105–109.
5. Harrison JA, Carlsson SG, Berggren U. Research in clinical process and outcome methodology: Psychophysiology, systematic desensitization and dental fear. *J Behav Ther Exp Psychiatry* 1985; 16(3):201–209.
6. Leitenberg H, Callahan EJ. Reinforced practice and reduction of different kinds of fears in adults and children. *Behav Res Ther* 1973; 11(1):19–30.
7. Ender TZ, Brand E. Coping response training versus in vivo desensitization in fear reduction. *Cognitive Ther Res* 1980; 4(4):397–407.
8. Solyom L, Miller SB. Reciprocal inhibition by aversion relief in the treatment of phobias. *Behav Res Ther* 1967; 5(4):313–324.
9. Carney RM. Behavior therapy and the anxiety disorders: Some conceptual and methodological issues. *Psychiatr Dev* 1985; 3(1):65–81.
10. Surwit RS, Keefe FJ. Frontalis EMG feedback training: An electronic panacea? *Behav Ther* 1978; 9(5):779–792.
11. Smith RB. Cranial electrotherapy stimulation. In: Myklebust JB, Cusick JF, Sances A Jr, Larson SJ, eds. *Neural stimulation*. Vol. 2. Boca Raton: CRC Press, 1985:129–150.
12. Wilson LF, Childs A. Cranial electrotherapy stimulation for attention-to-task deficit: A case study. *Am J Electromed* 1988; 93–99.
13. Childs A. New treatments offer hope for agitated brain syndrome. *The Psychiatric Times* 1988 September.
14. Dymond AM, Coger RW, Serafetinides EA. Intracerebral current levels in man during electrosleep therapy. *Biol Psychiatry* 1975; 10:101–107.
15. May JR. A psychophysiological study of self and externally regulated phobic thoughts. *Behav Ther* 1977; 8(5):849–861.
16. Lader MH. Palmar skin conductance measures in anxiety and phobic states. *J Psychosomatic Res* 1967; 11(3):271–281.