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Brief Report

Effects of Transcerebral Electrotherapy (Electrosleep) on State Anxiety According to Suggestibility Levels

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INTRODUCTION

The management of patient anxiety is a significant problem for medical and psychiatric practitioners. Chemotherapy, although highly effective in many cases, cannot be considered the final regime. Total reliance upon prescription medications predisposes the patient to possible untoward side effects, physiologic dependence, and overdose. The development of a safe, effective, and economical treatment for anxiety is worthy of serious investigation.

Recent research suggests that transcerebral electrotherapy (TCET), often called electrosleep, may be such an efficacious treatment. TCET involves the transmission of low amplitude electric current through the brain via electrodes attached to the anterior and posterior regions of the head. Modal treatment time for TCET is 30 min and post-treatment evaluations by patients reflect feelings of tranquility, alertness, and pleasure (Rosenthal and Calvert, 1972). TCET differs from electroanesthesia and electroshock treatments in that very low current levels are employed. Stupor, convulsion, analgesia, and unconsciousness do not occur (Rosenthal, 1972).

A review of relevant literature suggests that TCET produces significant decreases in anxiety for a variety of psychiatric populations (Feighner *et al.*, 1973; Gomez and Mikhail, 1974; Rosenthal, 1972; Rosenthal and Wulfson, 1970a, 1970b, 1970c).

On the other hand, some investigators profer the view that positive findings from TCET are due mainly to suggestibility (Achte *et al.*, 1968; Boblitt, 1969; Marshall and Izard, 1974). Thus, additional research is needed which in-

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corporates the organismic factor of suggestibility as an independent variable. This would argue for the use of a factorial design whereby two independent variables, treatment and level of suggestibility, are simultaneously evaluated. The present study used such a design (2 X 2) and measured the effect of TCET on the reduction of state anxiety in a heterogeneous psychiatric population.

METHODS

Original subject pool consisted of 42 (41 males and 1 female) psychiatric inpatients at a Veterans Administration hospital. They displayed predominantly neurotic symptomatology and met the following selection criteria: (i) recent admission designated by ward psychiatrist/physician as nonpsychotic and without neurological impairment; (ii) considered medically appropriate for TCET; (iii) manifested signs of significant anxiety as indicated by psychiatrist/physician's subjective assessments; and (iv) not on medication or not responding satisfactorily to current medication.

Subjects were given a simply explanation of TCET and signed permission slips prior to their involvement in the study. All subjects were told that there was a "good" possibility of beneficial results from the treatment, but that no promises could be made concerning remission of their anxiety. Following this, they completed the *State Anxiety Inventory* (Spielberger *et al.*, 1970) and were administered the *Harvard Group Scale of Hypnotic Susceptibility* (Shor and Orne, 1962). The Harvard Scale was used to operationally define the construct of suggestibility.

On the basis of the Harvard Scale scores, 24 subjects (23 males and 1 female) were identified as either High or Low (n = 12 per group) on the measure of suggestibility. These subjects were then randomly assigned to either an active TCET or placebo condition. This yielded six subjects per cell for the 2 X 2 factorial design. The remaining subjects (n = 18) in the medium suggestibility range, although treated, were not included in the present study. Experimental subjects ranged in age from 21 to 59 years with a mean of 38 years.

The apparatus was a Neurotone 101 manufactured by Neuro-Systems, Inc. of Garland, Texas. It is a portable, battery-operated, solid-state unit which generates a gated sine wave burst of current with no d-c bias. Burst rate was 100 Hz per sec with a width of 2 msec. In addition a 25 watt, yellow light bulb was used. The light was controlled by a variable potentiometer, but not attached to the Neurotone machine. This permitted independent manipulation of the Neurotone mechanine and the light bulb.

Immediately prior to treatment, electrodes were attached according to instructions in the *Neurotone Instruction Manual* (1972). The subject was then instructed to observe the yellow light and informed that the bulb would indicate the amount of electricity being delivered.

For all subjects, the Neurotone and yellow light were turned on simultaneously. For subjects in the active condition, amplitude and light intensity were increased gradually until the subject reported an uncomfortable sensation. Current and light brightness were then slowly decreased until a comfortable level of stimulation was achieved. Amplitude and light brightness were readjusted after 15-min duration. Each treatment lasted 30 min for a total of five sessions administered on consecutive days.

For the placebo condition, the same procedure was followed with one exception. Once the subject reported an uncomfortable sensation, the Neurotone amplitude switch and light were slowly adjusted downward to a comfortable level. With the yellow light remaining on, the experimenter then proceeded to turn the amplitude to "O" without clicking off the machine. Subjects in the placebo condition received no electrical stimulation other than that delivered during the initial adjustment and 15-min readjustment periods, but were told that they were receiving continuous current at a level just below reported threshold. To support this suggestion, individual subjects were again instructed to notice the yellow light.

Six to nine days following his last treatment each subject again completed the *State Anxiety Inventory*.

RESULTS

Table I presents the pre- and post-treatment mean State Anxiety scores and the mean change scores for the active and placebo groups.

Analysis of variance on the pretreatment mean anxiety scores revealed that the groups were statistically identical prior to treatment ($p > 0.25$, $F < 1$). To assess the effects of TCET, the differences between pre- and post-treatment anxiety scores were subjected to a 2 X 2 analysis of variance and the results shown in

Table I. Pre-Post Mean State Anxiety Scores

Suggestibility level	Active[a]			Placebo[a]		
	Pre	Post	Change	Pre	Post	Change
Low	58.33 (n = 6)	43.50 (n = 6)	14.83	57.33 (n = 6)	57.16 (n = 6)	0.17
High	57.66 (n = 6)	50.66 (n = 6)	7.0	56.33 (n = 6)	55.00 (n = 6)	1.33
		Total change	21.83		Total change	1.50

[a]The higher the score the higher the State Anxiety.

Table II. Summary of Analysis of Variance

Source	SS	df	MS	F
Treatment (active *vs.* placebo)	570.375	1	570.375	8.261[a]
Suggestibility (low *vs.* high)	63.375	1	63.375	< 1
Treatment × suggestibility	145.042	1	145.042	2.101
Within group (error)	1380.833	20	69.042	
Total	2159.625	23		

[a] $p < 0.01$.

Table II. Subjects in the active TCET condition showed significantly greater anxiety reduction than did subjects in the placebo condition ($p < 0.01$, $F = 8.26$).

There was no overall effect of suggestibility, nor was there a significant interaction between suggestibility and type of treatment. Although subjects in the active-Low suggestibility condition showed greater improvement than subjects in the active-High suggestibility condition, additional group comparisons indicated that the magnitude of change for these two groups were not significantly different ($p > 0.10$, $F = 2.89$). Likewise, there was no differential responding between Low- and High-suggestible subjects in the placebo treatment.

DISCUSSION

The present study demonstrated that active TCET produced significantly greater reductions in State Anxiety than did a simulated treatment. These findings held true regardless of suggestibility level. Thus, the earlier reports by Rosenthal (1972; Rosenthal and Wulfsohn, 1970a, 1970b, 1970c) that TCET is an effective treatment for anxiety are supported. Although suggestibility was unimportant for this group of State Anxiety patients, our results do not clarify the role of suggestibility in other disorders treated by TCET. For example, the study by Achte *et al.* (1968) with insomniacs and the Marshall and Izard (1974) study of depressives may very well have reflected strong suggestibility effects. Obviously additional research is warranted with these patient populations. Currently, we are in the process of collecting such data and will report on this matter at a later date.

With regard to anxiety, our results contradict those presented by Moore *et al.* (1975). They found that TCET was ineffective for reducing anxiety as measured by the *Taylor Manifest Anxiety Scale* (TAS). These inconsistent findings may have resulted from the differential sensitivity of the two instruments. The TAS is composed of 50 true-false items. The *State Anxiety Inventory,* on the other hand, permits the patient to rate the intensity of his anxiety symptoms. Thus, it is likely that the *State Anxiety Inventory* is a more sensitive barometer of anxiety.

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Results of the present study reinforce the need for additional research to clarify the role of suggestibility in response to TCET. It is recommended that studies using a wide variety of outcome criteria, a variety of suggestibility measures, and sophisticated experimental designs be conducted. Studies with well-defined homogenous patient populations would also be informative.

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