

ELECTROMYOGRAPH FEEDBACK: TREATMENT OUTCOME IN ANXIETY NEUROSIS

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Twenty two clients were assessed before and after ten sessions of Electromyograph [EMG] feedback assisted relaxation on both psychological and physiological measures. Results demonstrated significant decreases in the symptom scores and anxiety, as seen on the self-report measures. The clients were found to be significantly less anxious on the Hamilton's Anxiety Rating Scale. Though there was a significant reduction in resting EMG levels, there was no significant decrease in the GSR of the clients. Clients could acquire feedback control as well as self-control.

Key words: electromyograph feedback, feedback control, outcome, anxiety neurosis

INTRODUCTION

Relaxation training, one of the therapeutic strategies in behavior therapy, targets the physiological manifestation of anxiety. It has been proved to be a useful treatment technique in anxiety neurosis. Systematic work done in evaluating relaxation training has focussed on enhancing its effectiveness through the use of biofeedback procedures especially electromyograph biofeedback with the use of the frontalis as the target muscle.

Researchers like Lavellee et al, (1977) and Sargunraj and Kumaraiah (1990) report that about ten sessions of EMG feedback assisted relaxation are sufficient for a significant reduction on psychological and physiological measures. Clients with anxiety have been found to report a feeling of relaxation within these ten sessions. To substantiate this, the authors conducted a ten session EMG biofeedback therapy program in a sample of anxious clients.

MATERIAL AND METHODS

SAMPLE

Twenty two clients was studied. They were selected from among those who were referred to the Behavior Therapy and Biofeedback Unit, National Institute of Mental Health and Neuro Sciences (NIMHANS), from the out-patient center.

The criteria for inclusion were as follows:

1. A diagnosis of anxiety state ICD-9 code: 300.0 (WHO, 1978).
2. Literacy in either English, Kannada or Tamil.
3. Age between 20 to 45 years

The criteria for exclusion were as follows:

1. Presence of an additional psychiatric diagnosis.
2. Presence of any medical illness.

3. Presence of anxiety symptoms during marked physical exertion or life threatening situations.

4. Duration of anxiety neurosis of more than ten years.

TOOLS

Psychological measures and self report measures:

1. Symptom Rating Scale

The Symptom Rating Scale [SRS] (Sargunraj, 1988) was used to obtain quantitative ratings of anxiety symptoms. This was derived from the Patient Record Form (Lader & Wing, 1966). The client is asked to rate each of his symptoms on a 100 millimeter line [labelled as 'absent' at the extreme left, 'moderate' at the middle and 'severe' at the extreme right] to indicate how much each symptom has troubled him over the preceding ten days. The distance is measured to the nearest millimeter and the score for each symptom totalled to give an overall rating of the severity of the listed symptoms.

2. Cognitive Somatic Anxiety Questionnaire

The 14 items in this questionnaire [CSAQ] (Schwartz et al, 1978) are randomly ordered into Cognitive and Somatic subscales. The client is asked to rate each item on a 5 point scale from 'not at all' to 'very much so' as to the degree to which he generally or typically experiences the symptoms when he feels anxious, giving emphasis to the preceding ten days. The sum of the ratings on each subscale provides a measure of cognitive and somatic anxiety. The CSAQ provides a useful measure of these two anxiety components (Steptoe & Kearsley, 1990).

3. State Trait Anxiety Inventory

The State Trait Anxiety Inventory [STAI - Forms Y₁ and Y₂ (Spielberger et al, 1983) were used. The

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measure of state anxiety consists of twenty statements that evaluate how respondents feel 'right now' or 'at the moment'. Clients circle a number to the right of each statement that best describes the intensity of their feelings: either (1) not at all, (2) somewhat, (3) moderately so, or (4) very much so.

The trait anxiety scale consists of twenty statements that assess how clients generally feel. Clients rate the frequency of their feelings of anxiety on the following 4 point scale: (1) almost never, (2) sometimes, (3) often, (4) almost always, emphasis being given to the preceding ten days.

The Kannada and Tamil versions of STAI forms Y₁ and Y₂ (Sargunraj, 1988) were also used. Sargunraj et al (1991) report that the vernacular translations are reliable measures of anxiety.

Therapists report measures:

1. Hamilton's Anxiety Rating Scale

This scale [HARS] (Hamilton, 1959) consists of thirteen variables. The therapist's ratings are based on the clients' report of the presence / absence, and the severity of the symptoms defining a particular variable, emphasis being given to the preceding ten days. The rating is done on a 5 point scale (0-4): none, mild, moderate, severe and very severe/grossly disabling. A sum of the ratings on all thirteen variables provides the anxiety score.

2. Physiological measures

(a). Feedback dermatograph - Autogen 3400 (ASI, 1975a).

(b). Feedback myograph - Autogen 1700 (ASI, 1975b).

PROCEDURE

Each client was taught to relax using frontalis EMG feedback assisted relaxation (ASI, 1975b; Sargunraj, 1988). Ten sessions of therapy were spaced over ten days. Five minutes for adaptation and two five minute periods before and after the actual feedback sessions for obtaining pre and post-session EMG baselines were given. The duration of each session was for about one hour. The emphasis in the therapeutic program was on the self-regulation of muscle tension using the feedback myograph as a passive learning device.

Prior to commencing therapy (Pre-therapy), each client was assessed on the SRS, CSAQ forms Y₁ and Y₂ and the HARS. The resting levels of skin conductance (GSR) and frontalis muscle tension were

recorded using the Autogen 3400 and Autogen 1700 respectively. After completing ten sessions of EMG feedback assisted relaxation (Post-therapy), the clients were re-assessed on the same measure.

ANALYSIS

Student's t statistic was computed to find out if there was a significant difference between the two means obtained from correlated groups on the psychological and physiological measures, i.e., before and after biofeedback therapy. A repeated measures analysis of variance (ANOVA-R) across the first, fifth and tenth therapy sessions was also computed to find out if there was a significant difference between the means of the EMG levels across these occasions for the group when feedback was given to the clients. In addition, pre and post-session mean EMG baselines across the first, fifth and tenth therapy sessions were compared using ANOVA - R to find out if there was a significant difference between the means of the EMG levels across these occasions for the group when feedback was not given to the clients.

RESULTS

Table 1 depicts the means and standard deviations of the group on the psychological and physiological measures at the pre and post-therapy assessments.

Table 1
Means and standard deviations of the group on the psychological and physiological measures at the pre and post-therapy assessments.

Pre-therapy Variables	Post-therapy n = 22	t value n = 22	df = 20	statistical significance
SRS	M 224.64 SD 122.55	185.82 102.90	2.59	p
CSAQ	M 25.18 SD 7.80	20.82 6.28	3.93	p
Cognitive anxiety	M 17.36 SD 4.66	14.36 3.66	3.90	p
Somatic anxiety	M 47.82 SD 13.15	41.95 12.86	3.96	p
STAI	M 58.64 SD 9.69	52.14 8.12	4.81	p
State anxiety	M 27.77 SD 4.42	19.14 5.27	1.84	p
Trait anxiety	M 16.55 SD 9.77	19.94 11.81	1.31	NS
HARS	M 3.00 SD 2.14	1.64 2.19	6.85	p
GSR				
EMG				

n = Sample size; M = Mean; df = degrees of freedom; SD = Standard deviation; NS = Not significant.

Figure 1 illustrates the mean EMG values obtained by the group on session 1 ($3.14 \pm 3.38 \mu\text{v}$), session 5 ($1.31 \pm 0.51 \mu\text{v}$) and session ten ($1.16 \pm 0.50 \mu\text{v}$) of therapy. The F ratios from the ANOVA-R [$F(2, 42) = 8.50, p < 0.001$] was significant and [$F(21, 42) = 1.81, \text{NS}$] was not significant indicating that there was a significant reduction in frontalis EMG level across these occasions of therapy when feedback was given to the clients. There was, however, no evidence to say that some clients were consistently better than others regardless of occasion.

Figure 1
Mean EMG values across therapy sessions

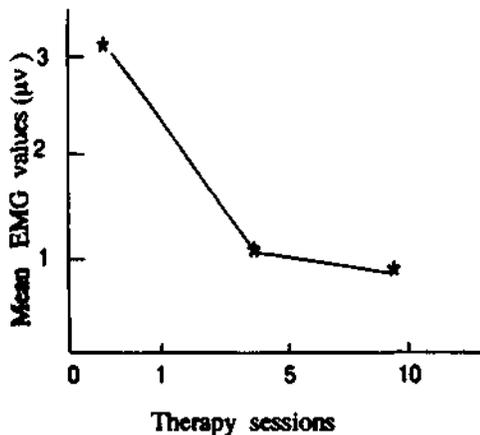
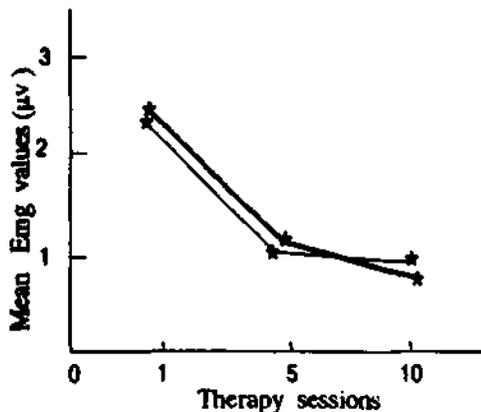


Figure 2
Pre - post-session mean EMG baseline values across therapy sessions



— Pre-session
— Post-session

Figure 2 illustrates the pre-and post-session mean EMG baselines of the group obtained on session 1 ($2.42 \pm 1.34 \mu\text{v}$ and $2.54 \pm 1.59 \mu\text{v}$), on session 5 ($1.37 \pm 0.53 \mu\text{v}$ and $1.50 \pm 1.08 \mu\text{v}$) and on session 10 ($1.24 \pm 0.59 \mu\text{v}$ and $1.13 \pm 0.38 \mu\text{v}$). The F ratios from the Anova - R ($F(2, 42) = 18.18, p < 0.001$), ($F(21, 42) = 2.75, p < 0.01$) and ($F(2, 42) = 10.41, p < 0.001$), ($F(21, 42) = 1.40, \text{NS}$)

indicate that the clients experienced a significant reduction in frontalis muscle tension across these occasions when feedback was not given to them both before and after the sessions and that some clients were consistently better than others without regard to occasion before feedback was given.

DISCUSSION

EMG feedback assisted relaxation could bring about significant decreases on all the psychological measures, i.e., in the symptom scores and anxiety, as seen on the self-report measures. The therapist rated the clients as being significantly less anxious on the HARS. As regards the physiological measures, though there was a significant decrease in the resting EMG levels, there was no significant decrease in the GSR of the clients (Table 1). Clients could acquire feedback control, i.e., the ability to manifest the response in the desired direction during feedback sessions, and extra-feedback control or self control, i.e., the ability to manifest the response in the desired direction when feedback is not given (Figures 1 and 2).

The findings demonstrate an association between muscular relaxation and subjective relaxation and that the effect of EMG feedback assisted relaxation is specific with no cross-modality generalization effects. These findings concur with those of other researchers who have worked in this area.

The study conducted supports the fact that ten sessions of EMG feedback assisted relaxation are sufficient to bring about significant psychological and physiological changes in clinically anxious clients and that the skill of relaxation can be mastered within ten sessions. However, it must be noted that further sessions may be needed in order that clients can attempt to generalize the ability to relax in situations other than the clinic setting (Sargunraj et al, 1990).

REFERENCES

Autogenic Systems Incorporated (1975a) *Instruction manual for Autogen 3400*. USA.

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- Autogenic Systems Incorporated (1975b)** *Instruction manual for Autogen 1700*. USA.
- Hamilton, M.** (1959) The assessment of anxiety states by rating. *British Journal of Medical Psychology*, 32, 50-55.
- Lader, M.H. & Wing, L.** (1966) Physiological measures, sedative drugs and morbid anxiety. London: University of Oxford press. (Cited by D. Sargunraj, 1988).
- Lavellee, Y.J., Lamontagne, Y., Pinard, G., Annable, L. & Tetreault, L.** (1977) Effects of EMG feedback, diazepam and their combination on Chronic anxiety. *Journal of Psychosomatic Research*, 21, 65-71.
- Sargunraj, D.** (1988) *Electromyograph feedback in anxiety neurosis: A therapeutic study*. Doctoral thesis, Bangalore University, Bangalore.
- Sargunraj, D. & Kumarajah, V.** (1990) EMG biofeedback I: Treatment outcome in anxiety neurosis. *Indian Journal of Psychiatry*, 32, 345-350.
- Sargunraj, D. & Kumarajah, V.** (1991) The reliability of translations of STAI, CSAQ, EPI and I-E Scale. *Journal of Personality and Clinical studies*, 31, 109-112.
- Schwartz, G.K., Davidson, R.J. & Goleman, D.J.** (1978) Patterning of cognitive and somatic processes in the self-regulation of anxiety: Effects of meditation versus exercise. *Psychosomatic Medicine*, 40, 321-328.
- Spielberger, C.D., Gorsuch, R.L., Lushene, R., Vagg, P.R. & Jacobs, G.A.** (1983) *Manual for the State Trait Anxiety Inventory (Form Y)*. Palo Alto, CA: Consulting Psychologists press. (Cited by D. Sargunraj, 1988).
- Stephens, A. & Kearsley, N.** (1990) Cognitive and Somatic Anxiety. *Behavior Research and Therapy*, 28, 75-81.
- World Health Organization (1978)** *International Classification of Diseases (9th edn)*. Geneva: WHO.

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