

## **A Comparison of the Efficacy of Electromyograph and Alpha Biofeedback Therapy in Anxiety Neurosis**

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### **Reprints request**

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### ***Abstract***

Clients with anxiety neurosis selected according to Feighner et al s Research Diagnostic Criteria were assigned to experimental conditions I and II (n=8 in each group) and a Control group (n=5). All the clients were assessed on physiological (EMG, GSR and EEG - alpha) and psychological measures (Hanilton's Anxiety Rating Scale and the Behaviour Disorder Checklist) before and after a twenty day period. During this interval, clients in experimental condition I were trained to relax with EMG feedback, those in experimental condition II utilised alpha feedback and those in the control group had no contact with the clinic.

The results of the analysis of the pre-post therapy changes among the three groups are discussed.

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### **Key words -**

**Biofeedback,  
Electromyograph,  
Alpha feedback,  
Anxiety neurosis**

The use of biofeedback as an independent treatment modality in psychiatric disorders, rests on tenuous research evidence. Despite this, biofeedback therapy can be the rational choice of treatment in conditions where there is an identifiable physiological dysfunction or where there is a need to achieve general, physical or mental relaxation [1].

The authors in the present paper examine the usefulness of two biofeedback treatment modalities in alleviating symptoms of anxiety.

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## **Method**

### **Sample**

Clients with a diagnosis of anxiety neurosis [2] were selected from the NIMHANS Out-Patient Centre.

They were assigned to either Group I (electromyograph feedback) or to Group II (alpha feedback) or to Group III (Waiting list controls). There were eight subjects in each group. Due to the occurrence of drop-outs from Group III the sample size was reduced to twentyone.

## Measures

Hamilton's Anxiety Rating Scale [3]

Behaviour Disorder Checklist [4]

Feedback Myograph-Autogen 1700 [5]

Feedback Demograph- Autogen 3400 [5]

EEG analyser- Autogen 120 [5]

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## Procedure

A pre-post design was used wherein the three groups were assessed prior to and after a twenty day period.

The pre-assessment consisted of the administration of the Hamilton's Anxiety Rating Scale, the Behaviour Disorder Checklist and the recording of baseline measurements of frontalis muscle activity, skin conductance level and percent time alpha activity in individual half-hour sessions, on three consecutive days.

Following the pre-assessment the clients in Group I were trained to relax using EMG feedback, in twenty half-hour sessions. Those in Group II were trained to relax with alpha feedback for the same length of time. Those in Group III were asked to return to the clinic after twenty days.

For the post-assessment, the clients were reassessed on the Hamilton's Anxiety Rating Scale and the Behaviour Disorder Checklist. Measurement of the frontalis muscle activity, skin conductance level and alpha activity were again recorded during individual half-hour sessions on three consecutive days.

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## Analysis

The pre-post measurements of Group I and Group III were tested for significance using the paired 't' test [6]. Similarly the significance of the pre-post mean differences of Group II and III were tested. Analysis of co-variance [7] was used to compare the effects of the two interventions.

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## Results

*Table 1 - Pre -post assessment changes in the Physiological measurements in Group I and Group III*

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EMG=Electromyograph readings in microvolts

GSR=Galvanic Skin Response readings in microhms

P/T Alpha = Percent Time Alpha

*Table 2 - Pre-post assessment changes in the behavioral measures in Group I and Group III*

***Table 2 - Pre-post assessment changes in the behavioral measures in Group I and Group III***

HARS=Hamilton's Anxiety Rating Scale

BDC=Behaviour Disorder Checklist

*Table 3 - Pre -post assessment changes in the physiological measures in Group II and Group III*

***Table 3 - Pre -post assessment changes in the physiological measures in Group II and Group III***

EMG=Electromyograph readings in microvolts

GSR=Galvanic Skin Response readings in micromhs

P/T alpha = Percent Time Alpha

*Table 4 - Pre-post assessment changes in the behavioural measures in Group II and Group III*

***Table 4 - Pre-post assessment changes in the behavioural measures in Group II and Group III***

HARS=Hamilton's Anxiety Rating Scale

BDC=Behaviour Disorder Checklist

*Table 5 - Pre-post assessment changes for Groups I, II and III on the physiological measures*

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EMG=Electromyograph readings in microvolts

GSR=Galvanic Skin Response readings in micromhos

*Table 6 - Pre-post assessment changes for Groups I, II and III on the behavioral measures*

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HARS=Hamilton's Anxiety Rating Scale

BDC=Behaviour Disorder Checklist.

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## Comments

Tables 1 and 2 indicate that the clients in Group I have significantly reduced their muscle tension and their anxiety symptom scores following the EMG biofeedback training. The control group subjects manifest no significant change on any of the variables.

Tables 3 and 4 indicate that the subjects in Group II have significantly increased their percent time alpha activity and significantly decreased their anxiety symptom scores following the alpha

biofeedback training.

Tables 5 and 6 indicate the results of the analysis of co- variance. The percent time alpha scores were excluded from the analysis because of a non-significant regression co-efficient.

The changes in the symptom scores on the Behaviour Disorder Checklist significantly differentiate the three groups, with the EMG biofeedback group manifesting a greater reduction in scores than the alpha feedback group ( $t=6.25$ ,  $p=.01$ ). The later group manifests a greater decrease in symptom scores than the control group ( $t=2.38$ ,  $p .05$ ).

This indicates that the two interventions were not inert. They were effective in inducing a clinical change. This is further substantiated by the findings that both interventions had significantly altered the relevant physiological variable i.e. EMG feedback training resulted in significant reduction in muscle tension and the alpha feedback training significantly enhanced the percentage of alpha activity. A large number of variables can influence the response to EMG feedback viz. individual response patterns, demographic factors, attentional factors [10] and personality factors [11]. The response to alphafeedback can be influenced by the demand characteristics of the feedback situation [12], [13], [14], [15], [16], [17], [18] and by "constitutional, psychological and cognitive attentional factors" [19], [20], [21], [22].

In view of this the authors feel that there is a need for further research to elucidate the mechanism of change in biofeedback therapy.

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