A CRITICAL VIEW OF THE CURRENT USE OF ELECTROMYOGRAPHIC BIOFEEDBACK IN GENERAL RELAXATION TRAINING

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Abstract

General relaxation training is frequently used in the treatment of psychological and psychosomatic disorders. Recently, the application of EMG (electromyographic) feedback to general relaxation training has generated enthusiasm among clinicians. As currently used in general relaxation training, EMG feedback relaxation training is limited to the frontalis (forehead) muscle. However, there is little empirical evidence to support the assumption that the effects of such training generalize to other muscle groups. Further research on the extent of the effects of frontalis EMG feedback relaxation training is required, and an investigation of alternative ways of using EMG feedback to facilitate general relaxation appears necessary.

Résumé

Le traitement de désordres psychologiques ou psychosomatiques se fait souvent par le truchement de la relaxation générale. Récemment, l'application du biofeedback EMG (électromyographique) à l'utilisation de ce genre de relaxation suscite beaucoup d'intérêt parmi les practiciens. Tel que pratiqué présentement, l'entrainement à la relaxation en se servant du biofeedback se limite au muscle frontal. Il existe encore peu d'évidence empirique qui nous permettrait de présumer que les effets d'un tel entrainement puissent se généraliser à d'autres groupes musculaires. Deux domaines qui doivent encore être étudiés sont: l'étendue des effets obtenus en utilisant ce genre de feedback et l'investigation d'approches différentes dans l'utilisation du biofeedback EGM pour faciliter la relaxation générale.

Among the various approaches to the problem of stress-related disorders are a number of general relaxation training techniques. The therapeutic, and possible prophylactic value of general relaxation training has long been recognized, although the advent of biofeedback has renewed interest in the area. Jacobson's (1938) progressive relaxation and Schultz and Luthe's (1959) standard autogenic exercises, for example, are types of general relaxation training that have been used extensively in the treatment of anxiety and psychosomatic illness (Haugen, Dixon, & Dickel, 1958; Jacobson, 1938, 1967, 1970; Luthe, 1964, 1970a, 1970b; Schultz & Luthe, 1959; Wolpe, 1958, 1973). More recently, electromyograhic (EMG) feedback training has received widespread attention as a general relaxation training technique. In fact, Volpe (1975) has recommended that feedback facilitated relaxation training be provided as part of the regular school counselling program.

EMG feedback entails the amplification of muscle action potentials and the feeding back of this information to the subject in the form of auditory or visual signals (Autogenic Systems Incorporated, 1976). During EMG feedback training the subject is simply instructed to alter the feedback signals in the appropriate direction. EMG feedback training can be applied to any accessible muscle mass and has been used as a specific relaxation training technique on a variety of sites, including the forearm extensors (Budzynski & Stoyva, 1972; Green, Walters, Green, & Murphy, 1969), the frontalis (Budzynski, Stoyva, Adler, & Mullaney, 1973; Reeves, 1977), the masseter (Budzynski & Stoyva, 1973) and the upper trapezius (Jacobs & Felton, 1969). A number of investigators have reported both rapid muscle tension reduction at the training site, during EMG feedback relaxation training, and a transfer of learning to the no-feedback condition (Budzynski et al., 1973; Cleaves, 1970; Staples & Coursey, 1975).

When used as a *general* training technique, however, EMG feedback relaxation training is typically restricted to the frontalis (forehead) muscle, and it is assumed that the effects of the training generalize to the rest of the skeletal musculature (Alexander, 1975). The rationale for this procedure appears to have been based, initially, on the reports of EMG feedback subjects. According to Budzynski

and Stoyva (1969), "feedback subjects . . . indicated that, in most cases, deep relaxation of the frontalis muscle is followed by a generalization of the relaxation to other muscle groups" (p. 236). In an attempt to obtain some objective data regarding the generality of frontalis EMG feedback training, Stoyva and Budzynski (1974) conducted a study with college age male volunteers. In apparent support of their clinical observations, Stoyva and Budzynski (1974) found that the seven "frontalis feedback subjects decreased on *both* frontalis and forearm EMG levels" (p. 274). However, more recent studies carried out by Alexander (1975) and Freedman, Glaros and Papsdorf (1977) do not lend credence to the assumption that EMG feedback relaxation training on the frontalis is a sufficient condition for generalized skeletal muscle tension reduction throughout the body. Working with 13 male and 15 female adult volunteers, Alexander (1975) discovered no evidence of a generalization of EMG reduction from the frontalis to untrained sites on the forearm and lower leg. Freedman, Glaros and Papsdorf (1977), on the other hand, reported that frontalis training generalized to the nearby masseter but not to the forearm extensors of 12 "normal" university students. Although Freedman, Glaros and Papsdorf's (1977) findings are not as pessimistic as those of Alexander (1975), the results of both studies strongly suggest that frontalis EMG relaxation training should not yet be accepted as a viable general relaxation training technique.

Apart from the findings of Alexander (1975) and Freedman, Glaros and Papsdorf (1977), there are other reasons for suspecting that frontalis EMG feedback relaxation training is unlikely to prove an effective general relaxation training technique. Firstly, a number of investigators, including Sainsbury and Gibson (1954), have demonstrated that tense individuals tend to have idiosyncratic patterns of muscle tension. In Sainsbury and Gibson's (1954) terms, there is "a tendency for . . . muscle activity to be more evident in some muscle groups than in others" (p. 223). If individuals are able to maintain different levels of tension in different regions of the skeletal musculature, then it is difficult to understand how training on one site benefits muscles in other regions. In apparent recognition of this point, Whatmore and Kohli (1968) have taken a unique approach to the use of EMG feedback relaxation training. When diagnosing "dysponesis," or faulty effort, these clinicians measure action potential output simultaneously from eight different motor regions. On the basis of this diagnosis, EMG feedback relaxation training is conducted on the appropriate muscular sites (Whatmore & Kohli, 1968). Unfortunately, however, Whatmore and Kohli (1968) have failed to quantify the results of their training techniques.

A further reason for doubting the potential of frontalis EMG feedback relaxation training as a general relaxation training technique, is the fact that the most consistently successful applications of EMG feedback training have been those in which it has been used to train the specific muscles implicated in disorders. As Blanchard and Young (1974) indicate, EMG feedback training has marked therapeutic effects when used for such purposes as neuromuscular re-education and the elimination of subvocal speech in reading. Following this line of reasoning, it is significant that frontalis EMG feedback relaxation training has been used, with apparent success, to treat muscle contraction headaches (Budzynski et al., 1973; Haynes, Griffin, Mooney, & Parise, 1975; Reeves, 1976; Wickramasekera, 1972). On the other hand there is no clear-cut evidence of the therapeutic value of frontalis EMG feedback relaxation training as a general relaxation training technique (Blanchard & Young, 1974).

While considering data pertaining to the specificity of EMG feedback training, it is interesting to note that Slattery and Taub (1976) have commented on the specificity of effect in another area of biofeedback training. On the basis of a hand warming experiment, Slattery and Taub (1976) have indicated that "there is considerable specificity of the temperature self-regulation effect to the anatomical loci from which feedback is given" (p. 71). Although it would be presumptious, at this stage, to draw any conclusions regarding the specificity of biofeedback training, it appears likely that specificity of effects will become an issue in the area.

The purpose of the preceding discussion has not been to condemn the use of EMG feedback in general relaxation training, but rather to question the particular manner in which EMG feedback training is currently being used in the area. Clearly, there is a pressing need for further investigation of the effects of frontalis EMG feedback relaxation training. In addition, it would be useful to evaluate alternative EMG feedback training procedures, such as the multiple site training used by Whatmore and Kohli (1968).

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