EFFECTS OF THERMAL FEEDBACK TRAINING AND PREHEADACHE CUE IDENTIFICATION ON MIGRAINE MANAGEMENT

BY

John S. Baldwin

A Dissertation Presented to the Faculty of Graduate Studies

University of Manitoba

In Partial Fulfillment of the Requirements for the

Degree of Doctor of Philosophy

Department of Psychology

July, 1978

EFFECTS OF THERMAL FEEDBACK TRAINING AND PREHEADACHE CUE IDENTIFICATION ON MIGRAINE MANAGEMENT

BY

JOHN STILES BALDWIN

A dissertation submitted to the Faculty of Graduate Studies of the University of Manitoba in partial fulfillment of the requirements of the degree of

DOCTOR OF PHILOSOPHY

Abstract

Thermal feedback training is beginning to be adopted clinically for management of migraine headaches though mechanisms of resulting migraine improvement are unclear. The relative importance of specific and placebo effects of feedback training were investigated in this study. Three groups of migraineurs solicited through undergraduate courses were taught to either increase or stabilize skin temperature using analogue visual feedback. Twenty females and nine males participated, ranging in age from 17 to 57. A two-level procedure factor was crossed with the training factor to compare the relative effectiveness of each on control of temperature without feedback. In addition to feedback training migraineurs in one of the two increase groups were trained to identify preheadache cues. Experimenter contact time was equated for remaining migraineurs by individual "headache history" sessions. All migraineurs were instructed in the recording of headache information, and self-reported data on migraine frequency, duration, intensity and medication were compared between groups. Results showed significant differences between groups on mean skin temperature increase without feedback, with no difference between procedures. Multivariate analysis of headache data, though confounded by the failure of one increase group to demonstrate significant increases, suggested that all migraineurs improved. There were no differences between increase and stabilize groups on

the multivariate package of migraine measures. However regression analyses of each measure indicated that skin temperature was negatively correlated with two of the four measures. The effect of preheadache cue identification was not significant. This effect was inadequately evaluated due to overlap between the training period and collection of "posttraining" measures. The importance of both specific and placebo effects of feedback training for migraine are discussed.

Acknowledgements

At times during those 17 months, contingent reinforcement seemed too infrequent to maintain my efforts. Retrospectively, the process of conducting this research from conception to final defense has allowed me to integrate on my own terms our mythical scientist- practitioner ideal. Some stages of the process are memorable: the interminable obsessing and preparatory reading, the painstaking writing and rewriting of the proposal, the relief of a small crowd at the proposal oral, the headaches of finding enough migraineurs to fill all cells of the design, the desperation of instrument failure, the expressed gratitude of migraineurs from both experimental and placebo conditions, the frustration of reliance on the computer, more writing and nail biting, editing, committee work, and a last-minute run to the downtown post office to airmail a copy to my external who was vacationing in Norway.

I am grateful for the guidance of my committee, particularly David Martin and John Schallow who offered their time and encouragement before the process formally began. Dave later proved an effective committee chairman, while John was a willing resource and critic. Roger Wilson gave freely of his time and advice in spite of the clinical nature of the research. Derek Jehu, who

joined the committee at the eleventh hour, contributed willingly and tactfully. I am grateful to my external examiner, Johann Stoyva, who made the supreme sacrifice of vacation time in Europe to read and react to this research.

I also would like to thank four people who were not on my committee but who contributed to the process at some of my more troubled moments. J. G. Eales of Zoology provided me with a chart recorder after two other instruments proved inadequate (and coincidentally, chaired my final oral helpfully by limiting discussion to the prescribed 90 minutes). Lorne Sexton made several valuable suggestions, the most helpful of which allowed me to limit the design to three groups instead of four. Les Bell provided technical assistance with instrumentation, and repaired the feedback unit, thus preventing lengthy delay. My final thanks are extended to Deborah Baldwin, who helped in data collection and edited all versions of the proposal, results and discussion with adroitness. Her constant unconditional support and encouragement were crucial to my completing this research.

Thank you.

December, 1978

TABLE OF CONTENTS

List of Tables

List of Tables (cont.)

Skin temperature biofeedback training is receiving widespread attention as a nonmedical treatment for migraine headaches. Previous treatment for migraine relief has not been consistently successful. Sargent, Green and Walters (1972, 1973) claim that thermal feedback training gives migraineurs control over vascular changes which lead to migraine head pain, without the undesirable side effects of pharmacological treatment. However, treatment successes claimed for thermal feedback may be due to placebo effects. Insofar as thermal feedback training is effective, it is important to identify migraineurs most likely to benefit from it, and ways to improve effectiveness of the procedure.

Migraine refers to a group of related symptom complexes of which headache is the most common complaint. Migraine headache is a pulsating head pain accompanied by other disturbances mediated by the autonomic nervous system. Estimates of migraine incidence in adults range from 5 to 10 per cent, making migraine "one of the most common psychosomatic disorders" (Sacks, 1970). Frequency and duration of headache vary widely across migraineurs, but extreme intensity of pain is uniformly reported. According to Wolff (1963), characteristic features of migraine usually include unilateral onset of head pain, scalp tenderness, nausea and irritability. Often other members of the family of the migraine sufferer

have similar headaches.

Physiological concomitants of migraine were investigated by Graham and Wolff (1938) who implicated abnormal vascular changes in extracranial arteries as the mechanism of head pain. Schumacher and Wolff (1941) described the biphasic vascular changes accompanying migraine. They demonstrated that preheadache disturbances occur with occlusive vasoconstriction of intracranial arteries, and that headache resulted from dilation of extracranial arteries. The possible cause for vascular lability was considered by these investigators to be neurogenic.

At present, sympathetic control of vasomotor responses is considered to mediate migraine symptoms (Dalessio, 1972). Exacerbations of cranial vascular lability may be initiated by any stimulus which has a vascular effect. The identification of migraine precipitants and knowledge of the mechanism do not account for the cause of the migraine syndrome. Reports of familial incidence have led many physicians to consider migraine an inherited disorder. Waters (1971 a) cites strong evidence that although familial incidence is high, migraine may not be genetically transmitted. Thus, although the mechanisms of migraine have been investigated, the etiology of migraine is still unknown.

Medical treatment for migraine headache has been with vasoconstrictors, analgesics and tranquilizers. Vasoconstrictors tend to be more effective than placebo, with analgesics and tranquilizers having about the same success rate as

placebo (Friedman and Merritt, 1957). Alternatives to medical treatment have included traditional psychotherapy, autogenic training, hypnosis and a wide range of behavioral procedures.

Since Miller's (1969) demonstrations of operant control of autonomic functioning with animals, growing consideration has been given to applications of biofeedback in training humans to control disordered autonomic functioning. Sargent, Green and Walters (1972) combined autogenic training (Schultz and Luthe, 1969) with feedback of skin temperature to explore their combined effect on migraine headache. Skin temperature was used as a measure of blood flow which could be obtained nonintrusively. The authors reported improvement of migraine for about 70% of their patients and concluded that the procedure merited further investigation. They cautioned that "the placebo factor was not evaluated", though they acknowledged that they were indeed working in the area of conscious suggestion to bring about physiological change.

Andreychuk and Skriver (1975) compared the effects of three different training procedures on migraineurs' report of their headaches: skin temperature feedback, alpha feedback, and autohypnosis. All groups showed significant reductions on a composite index of headache measures, with degree of success reported in the aforementioned order. Differences between groups were not significant. The

authors assessed hypnotic suggestibility for each subject and found that the skin temperature feedback group had the highest average suggestibility, while the autohypnosis group had the lowest. The authors concluded that the particular biofeedback treatments were not necessarily the relevant variables in producing these effects.

Friar and Beatty (1976) used a different feedback mode, plethysmography, to explore the contentious issue of specificity of the effects of biofeedback training for migraine relief. They found significantly greater improvement in the group trained to constrict extracranial vessels than in their placebo group, which was trained to constrict finger vessels. However the group considered to be receiving a placebo treatment may have actually learned a procedure with headache-exacerbating effects.

Purpose

The present study investigated two possible treatment components in the skin temperature feedback training procedure first described by the Sargent studies (1972, 1973). Past failure to assess the possible placebo effect of that procedure has left its presumed mechanisms in doubt while retarding its acceptance as a method of treatment. In this study the placebo control group was trained to stabilize skin temperature. Procedure and apparatus were identical to the active treatment group, but stabilizing skin temperature was considered to be without specific effect for