

# Menstrual Migraine Headache: Results of a Controlled, Experimental, Outcome Study of Non-drug Treatments

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## SYNOPSIS

Female migraineurs frequently report a severe migraine headache a few days prior to, during, or immediately following a menstrual period. Menstrual migraines were identified in a study of 193 migraineurs who *participated* in a controlled, experimental, outcome study of non-drug treatments for the control of migraine headaches. Participants were required to monitor their daily headache activity and drug usage for 36 weeks and were assigned to one of four groups: (1) No Treatment; (2) Autogenic Phrases; (3) Electromyographic Feedback, and (4) Thermal Feedback. Data were reduced and analyzed using multivariate analysis of variance and covariance. There was a tendency for all groups to improve over the 36 weeks. No significant difference was found among the four groups in headache improvement.

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## INTRODUCTION

Migraine headache afflicts three to four times as many females as males. According to Diamond and Dalessio, about 70% of the women seen by physicians for migraine report that some of their attacks occur prior to, during, or at the end of their menstruation.<sup>1</sup> Female migraineurs frequently report an absence or decrease in migraine activity during pregnancy and after menopause.

Physicians have tended to label all migraines, including menstrual migraine, as a psychosomatic illness. Various theories of the causation of the menstrual migraine, however, indicate its causation may be more on a physiological basis than a psychological one. One theory states that menstrual migraine is specifically related to a decline in the plasma level of estrogen, which occurs during the premenstrual phase.<sup>2</sup> Budoff postulates that cyclic variations in estrogen, progesterone and prolactin hormones result in changing hormone levels; their interaction leads to increased levels of prostaglandins, which fall around menstruation.<sup>3</sup> Epstein et al in a study of menstrual migraine and the reproductive hormones conclude that variation in hormonal activity may be a potentially relevant factor in all women with migraine, more striking in those with a clear history of menstrual relationship.<sup>4</sup>

Nattero found, in a study of 720 migraineous women, significant differences between those with menstrual migraine and those with only non-menstrual migraine.<sup>5</sup> Differences between the 2 populations were found in regard to frequency, location, accompanying symptoms, duration and pattern. He believes such differences indicate that menstrual headache should be treated as a distinct clinical entity.

Treatment has been traditionally limited to the use of drugs. Progesterone has been used for menstrual migraine.<sup>6</sup> According to Dalton, those headaches which are most likely to benefit from this treatment are those showing a definite relationship to menstruation, and beginning either at puberty, after a pregnancy or while on the pill.<sup>7</sup> Presently, there is no single, universally effective treatment for menstrual migraine.

Thermal biofeedback, a technique by which one can increase blood flow in the hands at will and produce a change of feeling, such as increased warmth or fullness in the hands, has been demonstrated to be effective in the control of migraine headaches when used with medications.<sup>8</sup> One reason for thermal training's effectiveness could be due to a decrease in sympathetic outflow.

Dalessio, et al, demonstrated that thermal training was not associated with the conditioning of a single response but was related to a general decrease of sympathetic outflow with improvement of migraine activity.<sup>9</sup> Kentsmith and colleagues showed a reduction in the level of dopamine-B-hydroxylase activity and migraine headache using a combination of meditation, biofeedback and relaxation training.<sup>10</sup> The plasma-B-hydroxylase activity varies directly with the activity of the sympathetic nervous system.

The purpose of this study was to determine if thermal biofeedback was effective in the treatment of menstrual migraine. In addition to the Thermal Biofeedback Group, an Autogenic Phrases Group, which did not receive biofeedback, was included to investigate whether the addition of biofeedback was required to achieve therapeutic response. Autogenic Phrases are phrases repeated to oneself to encourage relaxation and increased blood flow to the hands. A third group, receiving electromyographic feedback with the aim of achieving muscle relaxation, was added to ascertain whether generalized relaxation might not be the most effective treatment. A No Treatment Group, which only kept daily records, was included to control for placebo-attention effects.

## METHODS

Only subjects with predominantly classical or common migraine headaches were accepted into the study. Prior to entering the study, each subject had a detailed headache and medical history, and a complete physical and neurological exam. In addition, a brain scan or a CT-Scan of the head, EEG, X-rays of the chest and skull, complete blood count, sedimentation rate, urinalysis, and serological test for syphilis were included in the evaluation. Subjects with serious physical or psychological problems were not accepted into the study.

Subjects were randomly assigned to one of four independent groups: (1) No Treatment, (2) Autogenic Phrases, (3) Electromyographic Biofeedback, and (4) Thermal Biofeedback. The No Treatment Group kept daily records, while the Autogenic Phrases Group kept daily records and used autogenic phrases to help encourage relaxation and to increase blood flow into the hands. The EMG Biofeedback Group kept daily records, used the autogenic phrases and received electromyographic feedback from the frontalis area. The Thermal Biofeedback Group kept daily records, used autogenic phrases, and received temperature feedback from the right hand regardless of hand dominance. All subjects except those in the No Treatment Group were instructed to practice daily at home for 15 minutes.

Subjects were required to participate for 36 weeks and keep daily records of their headache activity which included frequency, duration, intensity, disability, location and symptoms. They also recorded their daily medication usage for headache and their menstrual period. Subjects participated during the 36 week period in 22 laboratory sessions during which electromyographic and temperature measurements were recorded during a 5 minute stabilization period and a 15 minute practice period. Subjects were blind to the hypothesis of the study. Upon their termination in the study, subjects underwent a debriefing interview and were asked what they perceived to be the hypothesis of the study and their feelings about their participation.

A total of 193 migraineurs entered the study over a 5-year period; 136 subjects completed the study and included 114 females and 22 males. Eighty-three, or 73% of the 114 females who completed the study, were identified with migraines which occurred around their menstrual period. Menstrual migraine is defined in this study as any migraine headache which occurs 3 days prior to the menstrual flow, during the time of the flow, or three days following.

Twenty-one subjects with menstrual migraine were in the No Treatment Group. The Autogenic Phrases Group had 22 subjects with menstrual migraine; 24 subjects were in the EMG Group and the Thermal Group had the smallest number with 16 subjects.

The average of the sample was 31 years. The majority, 48, or 58%, had been referred by their physicians; the rest, 35, or 42%, were self-referred. Most, 75, or 90%, were from Topeka or within a 30 mile radius. The majority, 58, or 79%, were married, with 63, or 76%, doing part-time or full-time work outside the home. Three, or 4%, were members of a minority.

Forty-eight, or 58%, reported headache which began during the day; 13 or 16%, had headache onset during the night which woke them or was present upon awakening. The remainder, 22, or 26%, had a combination of day and night headache onset. Sixteen, or 19%, were diagnosed with classical migraine; 67, or 81%, had common migraine. Forty-nine, or 59%, reported a warning prior to the headache onset. The average length of the headache problem prior to entry into the study was 13 years.

Sixty-three, or 76%, reported a history of headache in the family, with the majority, 48, or 58%, having at least two family members with headache. The most frequently identified family member was mother, 35, or 42%, followed by father, 16, or 19%, sister, 15 or 18%, and maternal grandmother, 11, or 13%. Subjects' headache onset began at the average age of 19 years.

Physical examinations identified 9 subjects, or 11%, with irritable colon; 19, or 23%, with allergies; 4, or 5%, with sinus problems; 3, or 4%, with hypertension and 20, or 24%, with obesity.

## RESULTS

Scores for frequency, intensity, disability and symptoms were calculated and analyzed. The frequency score was a total of those days a headache was reported. Intensity and disability were reported by subjects using 100 point example-anchored scales. The symptom score was the total number of symptoms checked on a list comprising both preceding and accompanying headache symptoms. Four-week averages were calculated for the headache activity variables; these were the sums of the individual headache scores over four weeks divided by 28 days.

To test the hypotheses of overall change across all groups ("time" effect), differences among the groups in level averaged across time (group effect), and the

interaction (parallelism), multivariate profile analysis of variance and covariance were used with the baseline 4-week average as the covariate.

The "time" effect for the multivariate profile analyses of variance was significant with the total of all four groups demonstrating a reduction in headache frequency ( $F=3.679;df=75;p < .001$ ); intensity ( $F = 3.363;df=75;p < .002$ ); disability ( $F = 3.73; df=75;p<.001$ ) and symptoms ( $F=3.964;df=75; p < .001$ ) for menstrual migraine over the 36 week period.

Multivariate profile analyses of covariance followed by two sets of orthogonal comparisons among groups showed that there was no significant interaction ("groups X time" or test of parallelism) on menstrual migraine frequency, intensity, disability and symptoms.

In contrast, when the data on both menstrual and non-menstrual migraines are combined and analyzed for the total sample, that is the 136 subjects who completed the study and from which the sub-sample of 83 subjects is drawn, significant differences among the groups are found.

The No Treatment Group showed significantly less reduction in migraine frequency ( $F = 5.975; df = 1,131; r < .043$ ) and intensity ( $F.5.975; df=1,131; r < .007$ ) than the other three treatment groups combined. The Thermal Biofeedback Group achieved significantly more reduction in migraine frequency ( $F=6.117; df=1,131; r < .051$ ), and intensity ( $F=6.117, df=1,131; r < .020$ ), than the other three groups combined.

In analyses of the physiological data of the total sample of 136 subjects, most of the learning was found to occur in the 5 minute stabilization period in the 22 laboratory sessions, A similar finding appeared for the menstrual migraine subjects.

Subjects in the three treatment groups more often reported in the stabilization period a relaxation in the muscles of the head and neck ( $X^2=18.09; df=3; r < .001$ ) and a general body relaxation ( $X^2 = 19.51; df=3; r < .001$ ) than the No Treatment Group, with subjects in the Thermal Biofeedback Group reporting the relaxation slightly more often. Subjects in the Thermal Biofeedback Group were able more often to accurately report a change of feeling in the hands with an accompanying 1.5 temperature increase in the stabilization period than the other three groups ( $X^2 = 55.43; df=3; r < .001$ ).

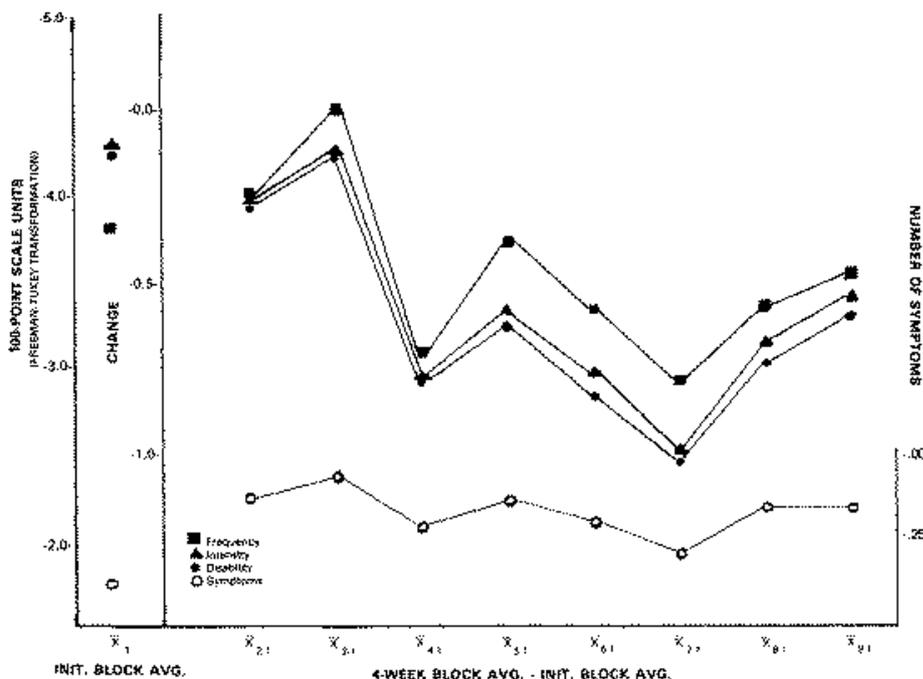


Fig 1. -- Comparison of the 4-week Blocks 1 through 9 on Headache Activity Variables for Menstrual Migraine for the Total Group (N = 83).

## DISCUSSION

It has been estimated that approximately 10 million Americans suffer with migraine headache. The majority of these sufferers are women, many of whom experience intense, disabling headaches around their menstrual period. We have been impressed in our clinical work over the last 10 years by the small impact that non-drug treatments seem to have on the menstrual migraines of these sufferers.

Results of this controlled, experimental study confirm our clinical impressions. Thermal biofeedback, which has been demonstrated to have a significant impact on non-menstrual migraine, showed no evidence in this study of being associated with any greater reduction in headache activity compared to a no treatment regimen and two other well-known and employed non-drug treatments for headache even though subjects in the Thermal Biofeedback Group showed a learning effect in the physiological data.

It should be noted that because of unequal N's in the 4 groups, estimation of effects and parameters are

**Table 1**  
**Comparison of Four Groups on Reports of Change**  
**During 22 Laboratory Sessions/Stabilization Period**

Relaxation in Head and Neck Muscles					
		No	Yes		
		freq	%	freq	%
NT	154	37		266	63
AP	121	27		319	72
EMG	142	30		337	70
TT	73	23		247	77
( $\chi^2 = 18.09$ , 3df; $p < .001$ )					
General Body Relaxation					
		No	Yes		
		freq	%	freq	%
NT	90	21		330	79
AP	57	13		383	87
EMG	72	15		407	85
TT	34	11		286	89
( $\chi^2 = 19.51$ ; 3 df; $p < .001$ )					
Reported Change in Hand/Temperature 1.5 in 1 min.					
		No	Yes		
		freq	%	freq	%
NT	183	48		195	52
AP	210	54		179	46
EMG	216	50		212	49
TT	80	27		213	73
( $\chi^2 = 55.43$ ; 3df; $p < .001$ )					

not equally good among the treatment groups. With a minimum of 16 and a maximum of 24 in the groups, the power to detect an effect was not as great as if more subjects had been included in each group. It would have been too difficult and unrealistic to recruit more menstrual migraine subjects into the study in the length of time available.

Our study did show that the total group of 83 subjects demonstrated a reduction in menstrual migraine frequency, intensity, disability and symptoms over the 36 week period. This is due, we feel, to non-specific effects such as increased attention on the subject's part to the manifestations of the headache through daily record keeping, the subject's expectancy to improve, and the helping and caring interest in the headache problem at the Center. All of these factors are at work in any therapeutic situation.

More research is needed in identifying the causes and effective treatments for menstrual migraine. We believe the first step is to make physicians who treat headache aware of the menstrual migraine phenomenon. Often it is not identified in a female sufferer's headache workup, but is lumped under the category "migraine."

The results of this study add to the growing evidence that menstrual migraine should be considered and treated as a special clinical entity in headache. Until those of us who treat headache do so, the morbidity associated with menstrual migraine will go unrecognized and under treated.

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