Behavioral Self-management in an Inpatient Headache Treatment Unit: Increasing Adherence and Relationship to Changes in Affective Distress

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Objective.–To evaluate prospectively the contribution of a psychological self-management program to the amelioration of headache-related distress of patients with intractable migraine treated in a comprehensive, multidisciplinary, inpatient program.

Background.–Previous research has shown the effectiveness of this overall inpatient program but did not examine the relationships between the use of relaxation and other headache-related behavioral factors.

Methods.–Data from 221 admissions to a Commission on Accreditation of Rehabilitation Facilities-accredited, nationally recognized, inpatient treatment unit were analyzed for the current study. On admission and on discharge (average length of stay, 12.9 days), subjects completed a 7-day retrospective, self-report questionnaire assessing health behavior compliance and emotional factors. The intervention consisted of intensive medical therapy in addition to cognitive-behavioral treatment delivered in a group setting.

Results.–Adherence increased significantly for relaxation practice and life-style modifications of diet, exercise, and sleep regulation for headache prevention ($P<.00001$). Beck Depression Inventory scores decreased significantly ($P<.00001$), and a greater decrease in depression by the end of the program was reported by subjects who practiced relaxation most compared with those who practiced relaxation least.

Conclusions.–Low baseline adherence rates for health behavior increased significantly during the final week of inpatient treatment. Behavioral self-management variables, not headache reduction, were significantly associated with patients' reduction in affective distress.

Key words: migraine, chronic daily headache, relaxation, inpatient, depression

Abbreviations: BDI Beck Depression Inventory

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The objective of the current study was to evaluate prospectively the contribution of a psychological self-management program to the amelioration of headache-related distress of patients with intractable migraine who were being treated in a comprehensive, multidisciplinary, inpatient program. The inpatient treatment program combines state-of-the-art intensive medical management and psychological intervention, with the promotion of the patient's self-responsibility for optimal health behavior. Previous research has shown the effectiveness of this overall inpatient[1] and outpatient program[2] but did not examine the relationships between the use of relaxation and other headache-related behavioral factors.

In outpatient settings, previous research has clearly demonstrated the contribution of relaxation and other cognitive-behavioral variables to the control of headache.[3] A smaller body of literature has also provided evidence that treatment in groups is no

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less effective than individual therapy.[4] Depression has been associated with migraine in both prospective[5,6] and retrospective[7] epidemiological studies, and psychological distress has been shown to be responsive to cognitive-behavioral headache interventions.[8] However, these relationships have not been explored in inpatient settings in conjunction with intensive medical interventions to treat intractable, chronic headache refractory to outpatient treatment.

Furthermore, the literature indicates that patient compliance with treatment recommendations declines with increasing duration, complexity, and life-style disruption of the recommended regimen.[9] Consistent with the literature, by the time patients are eligible for a tertiary center such as this one, they are at high risk of nonadherence, even though the majority have had relaxation or biofeedback training in the past in addition to education regarding life-style modifications likely to enhance headache prevention.

We attempted to answer the following questions: What are the baseline adherence rates of self-management behavior (relaxation and life-style modifications of diet, exercise, and sleep regulation)? Could a coping-skill acquisition program emphasizing group intervention along with individual psychological attention and access to relaxation tapes significantly increase the frequency of self-management behavior in the short run, during the brief inpatient hospital stay? To what extent would these self-management behaviors be associated with changes in headache-related affective distress?

METHODS

Subjects.–Data from 376 continuous admissions to a CARF-accredited, nationally recognized, inpatient treatment unit were analyzed. The data from 221 patients were usable, as they contained information from both the time of admission and at discharge (59% of admissions). The mean age of subjects (±SD) was 39.12±12.40 years; 77% were women; the mean Beck Depression Inventory (BDI) score on admission was 16.15±11.39, and at discharge was 8.06±7.79 (t=14.08, P=.00001). No statistical difference was evident between the usable and nonusable data in age, sex, and BDI scores. The headache diagnosis for 86% of the sample was a migraine variant (chronic daily headache), with the remaining 14% composed of a combination of chronic posttraumatic headache (11.2%), cluster headache (1.8%), migraine variant and cluster headache (0.5%), and facial pain (0.5%).

Measures.–On admission and at discharge (average length of stay, 12.9 days), subjects completed the BDI[10] and a 7-day retrospective self-report questionnaire assessing the frequency of severe headaches and health behavior compliance in two general categories: relaxation and life-style modifications.

Affective distress was indicated by the BDI score. The severity of headache was indicated by the number of days in the past 7 during which a severe headache was experienced.

Relaxation used as a preventive measure and during headache and stress was indicated in terms of the number of days practiced in the past 7 (range, 0 to 7). A relaxation total score was derived as the sum of the number of days each subject reported that relaxation was practiced as a preventive measure and during headache and stress (range, 0 to 21).

All life-style modifications were indicated in terms of number of days in the past 7 during which the recommendations were followed: these involved not skipping meals and avoiding food triggers, exercising at a moderate aerobic level, waking up at the same time each day, and avoiding daytime naps.

Medical Intervention.–Each patient received intensive medical therapy including intravenous DHE-45 or other intravenous medication, or both; detoxification; prophylactic therapy; and appropriate tests and procedural interventions.

Behavioral Intervention.– Cognitive-behavioral treatment was delivered in a group setting (five groups per week that included training in different methods of relaxation, and self-monitoring of associated changes in finger temperature and self-rated subjective tension). In addition, a set of relaxation tapes was provided to each patient individually with expectations made explicit at the time of admission that they were to listen to a minimum of two relaxation tapes daily. Other topics addressed in the group intervention included self-pacing of functional activity, sleep regulation, avoidance of medication overuse, building an exercise program, and behavioral pain-management skills. Components in all classes in-

cluded goal-setting, stepwise phasing in of behavioral changes, and relapse prevention[11] techniques. The psychology team also monitored and reinforced adherence during individual therapy sessions and frequent bedside rounds. In addition, patients participated in individual and family-related psychological intervention and other group programs on themes related to head pain (eg, family dynamics, medications, care of the neck).

Data Analysis.–Four quartiles for each of the relaxation measures were developed by grouping together subjects according to the reported number of days in the past 7 in which the specific relaxation behavior occurred. Thus, the lowest quartile was a frequency of 0 to 2 days, the highest quartile a frequency of 7 days, and the second and third quartiles comprised frequencies of 3 to 4 days and 5 to 6 days, respectively. (See Table 1 for quartiles of relaxation during stress, during headache, and as a preventive measure. See Table 2 for quartiles of total relaxation.) Repeated-measures analyses of variance were performed with the BDI score as the dependent variable, and with independent variables composed of each of the relaxation measures.

RESULTS

Statistical Significance Testing.–Data analysis was performed with Systat 7.0 for Windows,[12] using paired *t* tests of pretreatment versus posttreatment comparisons for the 10 measures composed of days involving relaxation (4 measures), adherence to life-style modifications (5 measures), and affective distress (1 measure). Applying the Bonferroni correction ([$P<.05$]/[10 planned comparisons]), a probability level of $P<.005$ served as the level of significance for measures. Statistical tests were carried to five decimal places, so that $P<.00001$ was the highest attainable level of significance.

Table 1.–Number of Subjects in Each Quartile for Relaxation During Stress, During Headache, and as a Preventive Measure at Discharge

		Number of Subjects		
Quartile	Range of Scores*	During Stress	During Headache	Preventive Measure
1 (lowest)	0-2	63	37	40
2	3-4	58	62	51
3	5-6	44	47	45
4 (highest)	7	56	75	85

*Score in terms of number of days in the past 7 that target behavior was used.

Table 2.–Number of Subjects in Each Quartile for Relaxation Total at Discharge

		Number of Subjects
Quartile	Range of Scores*	Relaxation Total†
1 (lowest)	0-8	54
2	9-13	50
3	14-18	59
4 (highest)	19-21	57

*Range of scores is 0 to 21.
†Total relaxation was computed as the sum of days in the past 7 that relaxation was reported in each of three following categories: during stress, during headache, and as a preventive measure.

Adherence.–As shown in Table 3, baseline rates of adherence were low for relaxation, ranging from 1.79 days per week for relaxation during stress to 2.84 days per week for relaxation during headache. The lowest baseline rate for the other life-style behaviors was 1.55 days per week for exercising. However, by the time of discharge from the hospital, the use of relaxation had not only increased significantly but it had approximately doubled during headache and during stress, as well as daily as a preventive measure not cued by headache or stress. Life-style modifications of diet, exercise, and sleep regulation for headache prevention also exhibited significant increases but were less than optimal.

Depression.–Beck Depression Inventory scores decreased significantly from a mean within the mild-moderate range of depression at admission to a mean within normal limits of mood variation at discharge. A 4 (quartiles for frequency of relaxation practice)×2 (admission-discharge) analysis of variance was then applied

Table 3.–Self-reported Frequency of Relaxation, Affective Distress, and Life-style Modifications: Means at Admission and Discharge

Source	Admission	Discharge	*t*	*P*
Relaxation*				
During headache	2.84 ± 2.53	4.67 ± 2.22	−9.55	.00001
During stress	1.79 ± 2.32	3.93 ± 2.52	−10.94	.00001
Preventive	2.32 ± 2.71	4.70 ± 2.37	−13.02	.00001
Total	6.90 ± 6.58	13.29 ± 6.12	−13.56	.00001
Life-style†				
Eat frequently	3.74 ± 2.67	6.21 ± 1.59	−13.36	.00001
Avoid food triggers	4.25 ± 2.90	6.23 ± 1.72	−9.55	.00001
Exercise	1.55 ± 2.04	4.26 ± 2.26	−14.38	.00001
Wake up at same time	4.15 ± 2.47	5.98 ± 1.95	−10.71	.00001
Avoid naps	4.32 ± 2.44	4.99 ± 1.50	−3.57	.00045
Affective distress‡				
Depression	16.15 ± 11.39	8.06 ± 7.79	14.08	.00001

*Relaxation as a preventive measure and during headache and stress is expressed in terms of mean number of days practiced in the past 7. The relaxation total is expressed as the sum of the mean number of days relaxation was practiced as a preventive measure and during headache and stress (range, 0 to 21).
†All life-style modifications are expressed in terms of number of days in the past 7 during which the recommendations were followed.
‡Affective distress: depression is expressed as the Beck Depression Inventory score.

to each type of relaxation: relaxation during headache, relaxation as a preventive measure, relaxation during stress, and total relaxation. Applying the Bonferroni correction ([$P<.05$]/[4 planned comparisons]), a probability level of $P<.0125$ served as the level of significance for these analyses. A significant admission-discharge reduction in BDI scores, regardless of the differences in frequency of relaxation practice, was revealed for relaxation during headache ($F_{3,211}=4.614$, $P=.004$) and relaxation as a preventive measure ($F_{3,211}=3.930$, $P=.009$). Similar trends were evident for relaxation during stress ($F_{3,211}=2.672$, $P=.048$) and total relaxation ($F_{3,211}=2.618$, $P=.052$). Direct post hoc comparisons of quartiles showed that the top and bottom quartiles for frequency of relaxation differed significantly for relaxation during headache ($F_{1,106}=9.155$, $P=.003$) (Figure 1) and relaxation as a preventive measure ($F_{1,117}=8.118$, $P=.005$) (Figure 2). In addition, a significant interaction effect between the frequency of relaxation practice and BDI scores occurred (Figures 1 and 2). Subjects who practiced relaxation more frequently (ie, the top quartile) during headache and as a preventive measure had higher BDI scores on admission and showed the greatest decrease in depression at discharge.

Correlations Between Changes in Headache, BDI Scores, and Frequency of Relaxation.–No statistically significant associations between change in the frequency of severe headache during the last 7 days of hospital treatment and life-style modifications were revealed by a Pearson product moment correlation coefficient matrix. The change in number of days per week with severe headache was not correlated with the change in BDI score (Pearson $r=0.102$, $P=.137$). In contrast, as shown in Table 4, relaxation as a preventive measure, during headache, and total use of relaxation were significantly correlated with the change in BDI score. However, only relaxation during headache was significantly and negatively correlated with change in the frequency of severe headache. This is a logical finding, as a higher frequency of severe headaches provides more opportunities for the practice of relaxation during headache.

COMMENTS

For patients whose headache severity and intractability had been sufficient to warrant inpatient treatment, the program as a whole or aspects of it proved

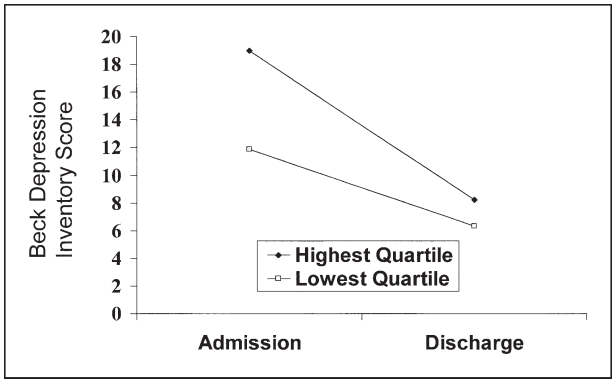

Fig 1.–Interaction effect. Mean Beck Depression Inventory score as affected by relaxation during headache: lowest and highest quartiles of frequency of use during the past 7 days.

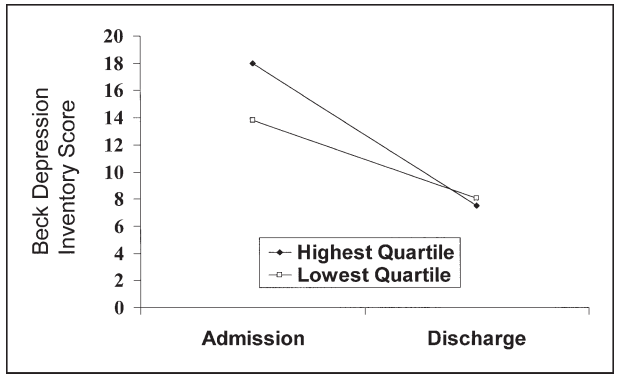

Fig 2.–Interaction effect. Mean Beck Depression Inventory score as affected by relaxation as a preventive measure: lowest and highest quartiles of frequency of use during the past 7 days.

to be effective in increasing adherence to the use of relaxation and life-style modifications for headache prevention. Whereas the change in the frequency of severe headache for the cohort of patients during their brief hospital stay was not correlated with change in depression, the higher frequency of relaxation practice was significantly correlated with decreased depression. This finding suggests that the change in self-management behavior was clinically meaningful in terms of the reduction in psychological distress. The correlational nature of this study does not, however, permit the parsing out of the specific contributions of the coping-skill training program or other treatment components of the inpatient program as a whole.

The subjects in this study were tertiary patients, many of whom had exposure to relaxation techniques prior to their admission to hospital but clearly were not using them consistently or frequently prior to our program. Although the rationale for the hospitalization is intensive medical intervention, part of the mission is to facilitate the patients' assuming an optimal role in their own health. This study suggests that our program has met this goal, certainly in the short run during these patients' stay.

Our analyses revealed that those who did the most relaxation by the end of the program, both during headache and as a preventive measure, actually started out on admission to the program with the

Table 4.–Pearson Product Moment Correlation Coefficient Matrix of Frequency of Relaxation Practice at Discharge With Change in Score and Change in Number of Days With Severe Headache

		Relaxation at Time of Discharge		
	Total	Preventive Measure	During Headache	During Stress
Severity change*	−0.064	−0.059	−0.193‡	0.070
Beck change†	0.182‡	0.183‡	0.187‡	0.107

*Severity change reflects number of days with severe headache the previous week reported at discharge subtracted from number in the previous week reported on admission.
†Depression change reflects score on Beck Depression Inventory at discharge subtracted from score on admission.
‡$P < .05$, Bonferroni-corrected probabilities.

highest BDI scores and experienced the greatest decrease in these scores by the time of discharge. That the patients who adhered most closely to the relaxation regimen by the end of the program were also those who had been the most depressed at the beginning of the program is somewhat surprising as one would expect more of an amotivational syndrome due to depression. However, mediating variables such as internal health locus of control may have played a role. For example, among individuals with treatment-resistant conditions, holding a strong belief about personal control over health outcome has been shown to be associated with a markedly greater degree of depression as compared with those with a low internal health locus of control.[13] It might be the case that the stratum of patients in this study who were most depressed at the outset responded to prompting and training in self-management precisely because they had higher internal health locus of control that had been, until that point, disconfirmed by lack of treatment gains. Thus, being given an avenue to exercise some modicum of behavioral control may have contributed to reduced affective distress.

In summary, our program was effective in increasing reported rates of adherence to behavioral self-management of headache, regarding both life-style modifications and relaxation practice. Furthermore, our finding that the practice of relaxation was associated with reducing depression gives credence to the importance of relaxation to the overall well-being of patients.

These findings should be viewed with some caution due to the possible demand characteristics (expectations of the structured inpatient milieu and the self-report nature of the data) of the situation, the below-optimal adherence rates reported at time of discharge, and the possible contribution of medical intervention to the behavioral outcomes. Demand characteristics might have inflated the gains patients reported by the end of the program. However, despite the significant increases in self-reported adherence to recommendations for relaxation and life-style by the time of discharge, subjects were still reporting frequencies below the optimal level recommended. At the time of discharge, the percentage of patients using relaxation on at least 5 days in the past 7 was only 45% for relaxation during stress, 55% for relaxation during headache, and 59% for relaxation as a preventive measure. The below-optimal rates reflect the difficulties in increasing adherence in this population. It is true that the intensive medical intervention could have played a major role in the reduction in affective distress reported by all. Nevertheless, variations in BDI scores were clearly associated with the level of reported relaxation practice and, thus, could also be attributed in part to the behavioral intervention.

Research currently under way is investigating the robustness of our findings over time. Future research could also explore how to further increase adherence. Nevertheless, the results of the current study are consistent with the hypothesis that behavioral variables have a significant impact on coping with chronic headache, not only as has been shown in experimental studies with the outpatient population but also with intractable headache in inpatient settings.

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