Effectiveness of a Meditation-Based Stress Reduction Program in the Treatment of Anxiety Disorders

Jon Kabat-Zinn, Ph.D., Ann O. Massion, M.D., Jean Kristeller, Ph.D., Linda Gay Peterson, M.D., Kenneth E. Fletcher, Ph.D., Lori Pbert, Ph.D., William R. Lenderking, Ph.D., and Saki F. Santorelli, Ed.D.

Objective: *This study was designed to determine the effectiveness of a group stress reduction program based on mindfulness meditation for patients with anxiety disorders.* *Method:* *The 22 study participants were screened with a structured clinical interview and found to meet the* DSM-III-R *criteria for generalized anxiety disorder or panic disorder with or without agoraphobia. Assessments, including self-ratings and therapists' ratings, were obtained weekly before and during the meditation-based stress reduction and relaxation program and monthly during the 3-month follow-up period.* *Results:* *Repeated measures analyses of variance documented significant reductions in anxiety and depression scores after treatment for 20 of the subjects—changes that were maintained at follow-up. The number of subjects experiencing panic symptoms was also substantially reduced. A comparison of the study subjects with a group of nonstudy participants in the program who met the initial screening criteria for entry into the study showed that both groups achieved similiar reductions in anxiety scores on the SCL-90-R and on the Medical Symptom Checklist, suggesting generalizability of the study findings.* *Conclusions:* *A group mindfulness meditation training program can effectively reduce symptoms of anxiety and panic and can help maintain these reductions in patients with generalized anxiety disorder, panic disorder, or panic disorder with agoraphobia.*

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Self-regulatory behavioral strategies, used alone or as adjuncts to other behavioral or medication regimens, may offer a unique approach to treating anxiety disorders. Three major self-regulatory strategies—meditation, relaxation, and biofeedback—are currently used in clinical practice for the treatment of anxiety. Research suggests that all three play a role in reducing both physiological and psychological components of anxiety in normal populations and that the latter two techniques are effective in anxious populations, although with variable efficacy (1–6).

The research on meditation techniques has been largely limited to nonpsychiatric populations (7). To our knowledge, there are no studies of the effectiveness of meditation for patients with anxiety disorders as delineated by *DSM-III* or *DSM-III-R* criteria (8). Two controlled studies (9, 10) used meditation for patients with anxiety neurosis as defined by *DSM-II* criteria, but both lacked standardized diagnostic procedures. There was one uncontrolled study of patients diagnosed as having anxiety neurosis (11). None of these studies used a structured clinical interview for diagnosis. All of them investigated variants of one particular type of meditation, namely, transcendental meditation, in which the practitioner focuses on a mantra—a word or phrase repeated silently to achieve a meditative state.

In general, these studies suggested that transcendental meditation may be as effective as other behavioral techniques, such as biofeedback or relaxation, in the treatment of anxiety. Another uncontrolled study (12) investigated mindfulness meditation as an adjunct to psychotherapy for patients with a wide range of psychi-

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choses. In that study, Kutz et al. found that according to both the patients' self-assessments and the therapists' assessments, there was moderate to marked improvement in a variety of psychological symptoms, including anxiety, from before to after treatment.

The lack of diagnostic assessment according to standardized diagnostic criteria in previous studies and the widespread practice of studying nonclinical populations (e.g., college students) limit the applicability of research findings regarding the clinical effectiveness of meditation. Moreover, the majority of the studies of the effects of meditation on anxiety have relied solely on measures of state-trait anxiety to determine outcome. Such measures do not adequately assess the presence of panic attacks or avoidance behavior and may fail to capture the complexity of clinically significant anxiety symptoms.

The present pilot study was devised to address some of the shortcomings of previous research that investigated the relation between meditation training and anxiety reduction. The study was conducted in conjunction with a well-established outpatient program for stress reduction and relaxation that involves intensive training in mindfulness meditation (13, 14), with emphasis on its practical applications in coping with stress and in enhancing adaptive health behaviors. Like other forms of meditation such as transcendental meditation, mindfulness meditation helps practitioners to cultivate greater concentration and relaxation (15). It differs specifically from transcendental meditation by training practitioners to attend to a wide range of changing objects of attention while maintaining moment-to-moment awareness (mindfulness), rather than restricting one's focus to a single object such as a mantra (16) (see the Method section for an operational definition). The choice of mindfulness as the primary meditative approach was due to its immediate applicability to a great variety of present-moment experiences. This orientation lends a quality of "ordinariness" to the intervention that makes it more acceptable and accessible to a wide range of people with different life stressors and different medical disorders (17).

The stress reduction and relaxation program serves a broad spectrum of patients with both physical and psychological disturbances (18). Previous studies have shown that participation in the program results in reductions in both physical and psychological symptoms of patients in many diagnostic categories. Chronic pain patients participating in the program reported markedly reduced levels of state anxiety (as measured with the Symptom Checklist-90-Revised) during the intervention period—levels that were maintained over a 4-year follow-up period (17, 19, 20). Similar changes were reported over a 2-year follow-up period by patients with stress-related medical disorders (Kabat-Zinn, unpublished manuscript).

The specific objectives of the present investigation were 1) to conduct a prospective, open trial of the *DSM-III-R* criteria in a well-established, meditation-based outpatient stress reduction program and 2) to examine whether variables at intake were predictive of outcome at follow-up.

METHOD

Potential subjects were selected from among all patients referred to the stress reduction and relaxation program in two consecutive cycles (spring and fall of 1988). The Symptom Checklist-90-Revised (SCL-90-R) (21) and the Medical Symptom Checklist (17) were administered to all patients referred to the program, as part of the intake evaluation. Those who scored above the 70th percentile on the anxiety subscale of the SCL-90-R and reported more than 10 anxiety-related symptoms (out of 37 possible symptoms) on the Medical Symptom Checklist were invited to take part in a formal screening interview to assess their appropriateness for inclusion in the study. A referral diagnosis of panic attacks or anxiety also qualified an individual to be invited to participate in the screening procedure for the study. Patients who met the study criteria and who agreed to participate were then interviewed by either a psychologist or a psychiatrist trained in administering the Structured Clinical Interview for DSM-III-R (SCID) (22). Diagnoses were determined after review of the SCID data by the two psychologists (J.K. and L.P.) and two psychiatrists (A.O.M. and L.G.P.) who conducted the individual screening evaluations. Only the patients who met the formal diagnostic criteria for generalized anxiety disorder or panic disorder with or without agoraphobia were included in the study. Individuals were excluded if they had other primary psychiatric diagnoses, any disorder with psychotic symptoms, any endocrine disorder, or significant current alcohol or substance abuse. Because of the small sample size and the pilot nature of the study, patients taking anxiolytic or other medications (N=12) were not excluded. Medication type and usage were assessed for all patients during the study.

In the two cycles of the program from which patients were recruited for this study, 192 (60%) of 321 patients satisfied the initial screening criteria of the SCL-90-R and the Medical Symptom Checklist. However, for logistical reasons and because this was a pilot study, only 44 patients were invited to undergo further screening, of whom 32 completed the evaluation. Of these, 24 met the *DSM-III-R* criteria for generalized anxiety disorder or panic disorder with or without agoraphobia according to the SCID. Of the eight excluded patients, four had other primary psychiatric diagnoses and four had no psychiatric disorder. Two of the 24 subjects did not complere the program and were not included in the analysis of outcome. Both of these individuals had psychiatric diagnoses of generalized anxiety disorder.

treatment measures. In addition, study participants were compared on the SCL-90-R and Medical Symptom Checklist with other patients who met the initial screening criteria and were enrolled in the stress reduction and relaxation program during the same time period but who were not invited to take part in the study. This second group of patients (termed "nonstudy participants") received the same meditation intervention but did not undergo screening or the weekly assessments that the study subjects underwent.

Subjects who met the diagnostic criteria and agreed to participate in the study were evaluated with both self-rating scales and ratings of trained interviewers. Data on the following measures were gathered by telephone interview at weekly intervals from the time of recruitment through the end of treatment and at monthly intervals for 3 months after treatment: the Beck Anxiety Inventory (used by special permission of Jeffrey Sugerman, Ph.D., Psychological Corp., personal communication), the Beck Depression Inventory (23), and ratings of the frequency and severity of panic attacks. The length of time between recruitment and the start of treatment in which data were collected varied according to when subjects were recruited into the study relative to the beginning of the program (range=1–8 weeks).

In addition to these assessments, a more extensive assessment battery was administered four times: at recruitment into the study, at the start of the program (pretreatment), at completion of the program (posttreatment), and at 3-month follow-up. This battery consisted of the Hamilton Rating Scale for Anxiety (24) (as modified by DiNardo and Barlow [25] to include a separate rating scale for symptoms present during panic attacks, yielding the Hamilton panic score), the Hamilton Rating Scale for Depression (26), the Fear Survey Schedule (27), and the Mobility Inventory for Agoraphobia (28). At recruitment patients were also asked to rate on a 5-point scale their expectancy of improvement due to the treatment. A compliance questionnaire was administered at the end of treatment and at follow-up. Eight subjects entered the study so close to the beginning of the treatment intervention that only pretreatment, posttreatment, and follow-up measures were obtained.

The Hamilton anxiety and depression rating scales were administered at recruitment by the same clinicians who administered the SCID. Subsequent Hamilton assessments were administered to all subjects by one trained interviewer. To minimize bias in data collection related to expectancy of change, scoring was done after all data were collected.

The stress reduction and relaxation program is a highly structured training program in mindfulness meditation and its applications, described in detail elsewhere (14, 17–20). It takes the form of an 8-week-long course in which participants attend weekly 2-hour classes and, in addition, a 7.5-hour intensive and mostly silent "meditation retreat" session in the sixth week. During each 8-week cycle, five separate but parallel classes are offered. Each is led by one instructor who stays with that group for the duration of the course. Each class has approximately 30 participants with a wide range of medical and psychological disorders. During classes and for homework, participants practice a range of different formal and informal meditation techniques (14, 17). These experiences are discussed weekly in the classes. The 22 subjects in this study were distributed among five of the 10 classes held during that period. The exposure of these subjects differed from that of the remainder of the program participants only in their involvement in the additional assessment protocol required for the study. Four program instructors conducted classes in this study. The instructors did not know which patients were in the study, nor did they know the patients' *DSM-III-R* diagnoses.

We used repeated measures analysis of variance (ANOVA) to compare the recruitment, pretreatment, posttreatment, and 3-month follow-up scores of the subjects for whom all data points were available, with computation of appropriate contrasts. Matched t tests were used to calculate intervention effects between the pretreatment and posttreatment assessments for the entire sample. Intergroup comparisons of compliance and expectancy measures were done with standard t tests. Variables expected to predict outcome were studied with ANOVA. We plotted the weekly scores of all subjects to examine the course of change, but formal single-subject analyses are not included in this report because of the consistency and strength of the group effects. In addition, after accounting for pretreatment scores with the regression technique described by Cohen and Cohen (29), we compared posttreatment scores of the subjects receiving medication with those of the subjects taking no medication. Finally, we used t tests to compare the study participants and nonstudy participants in the program on pretreatment and posttreatment SCL-90-R scores, Medical Symptom Checklist scores, and change scores.

RESULTS

Of the 22 study participants who completed the program, 10 had panic disorder with agoraphobia, four had panic disorder without agoraphobia, and eight had generalized anxiety disorder as the primary psychiatric diagnosis. Seventeen subjects had more than one psychiatric diagnosis; 14 had other anxiety disorders and eight had diagnoses of major depressive episode (six concurrent). The average duration of their anxiety disorders was 6.5 years (range=3 months to 28 years). Eleven patients were taking medication for their anxiety disorders at intake, and 11 were taking no medication for anxiety.

The subjects' ages ranged from 26 to 64 years, with an average of 38 years. There were five men and 17 women. Eighteen of the subjects were married, two were single, and one was separated (data on one subject were missing).

The recruitment and pretreatment scores on the Ham-

TABLE 1. Scores on Outcome Measures Over Time of Patients With Anxiety Disorders in a Study of a Meditation-Based Stress Reduction Program

Measure	N	Initial Recruitment Mean	Initial Recruitment SD	Pretreatment Mean	Pretreatment SD	Posttreatment Mean	Posttreatment SD	3-Month Follow-Up Mean	3-Month Follow-Up SD	Repeated Measures ANOVA F	df	p
Hamilton Rating Scale for Anxiety	14	30.36	8.53	26.93	11.13	17.86	9.18	15.86	8.65	21.1	3, 39	<0.001[a]
Hamilton Rating Scale for Depression	14	33.07	7.98	31.07	8.43	23.71	5.59	25.14	7.01	8.87	3, 39	<0.001[a]
Beck Anxiety Inventory	15	24.13	13.49	20.53	13.24	9.00	9.14	7.93	7.29	15.36	3, 42	<0.001[a]
Beck Depression Inventory	15	18.87	10.37	16.47	10.97	10.00	9.58	7.53	8.77	9.96	3, 42	<0.001[a,b]
Fear Survey Schedule	11	118.73	41.31	93.55	34.09	78.46	44.28	66.82	38.68	9.79	3, 30	<0.001[c,d]
Mobility Inventory for Agoraphobia												
Accompanied	10	45.80	16.22	41.30	16.81	36.40	12.02	36.70	13.52	4.05	3, 27	<0.05[e]
Unaccompanied	10	61.80	24.40	53.50	24.09	45.50	17.19	46.20	18.87	6.62	3, 27	<0.01[c,e]

[a]Significant change from pretreatment to posttreatment ($p<0.01$).
[b]Trend for significant change from posttreatment to follow-up ($p<0.10$).
[c]Significant change from recruitment to pretreatment ($p<0.05$).
[d]Significant change from posttreatment to follow-up ($p<0.05$).
[e]Trend for significant change from pretreatment to posttreatment ($p<0.10$).

ilton Rating Scale for Anxiety, the Hamilton Rating Scale for Depression, the Beck Anxiety Inventory, the Beck Depression Inventory, the Fear Survey Schedule, and the Mobility Inventory for Agoraphobia of the subjects with complete data at the four primary assessment points are shown in table 1. They were in the moderate to severe range on both the Beck and the Hamilton anxiety scales and in the mild to moderate range on the Beck and Hamilton depression scales.

At recruitment, nine individuals reported one or more panic attacks in the previous week (range=1–3), with a mean Hamilton panic score of 26.11 (SD=11.25, range=6–40). At pretreatment assessment, 13 individuals reported at least one panic attack in the previous week (range=1–2), with a mean Hamilton panic score of 24.46 (SD=8.71, range=11–34). At pretreatment the mean SCL-90-R general severity index score of the 22 subjects was 1.10 (SD=0.70, range=0–3) and the mean SCL-90-R anxiety score was 1.61 (SD=1.05, range=0–3).

Repeated measures ANOVA indicated that among subjects for whom scores at all four primary assessment points were available, the Hamilton and Beck anxiety and depression scale scores showed small, statistically nonsignificant reductions from baseline to pretreatment, highly significant decreases over the course of the intervention (pretreatment to posttreatment), and maintenance of these changes from posttreatment to follow-up (table 1). Comparisons with matched t tests at pretreatment and posttreatment time points for all subjects, not just those with complete data at all time points, showed comparable results, with mean pretreatment and posttreatment scores, respectively, of 25.86 (SD=10.56) and 17.10 (SD=9.31) on the Hamilton anxiety scale ($t=5.18$, $df=20$, $p<0.001$) and 30.85 (SD=8.81) and 23.85 (SD=6.65) on the Hamilton depression scale ($t=4.88$, $df=19$, $p<0.001$). Mean pretreatment and posttreatment scores, respectively, were 20.32 (SD=12.05) and 7.09 (SD=8.20) on the Beck Anxiety Inventory ($t=6.14$, $df=21$, $p<0.001$) and 16.18 (SD=10.33) and 8.18 (SD=8.53) on the Beck Depression Inventory ($t=4.65$, $df=21$, $p<0.001$). These represented mean reon the four scales. Twenty of the 22 subjects showed marked improvement in scores on the Beck and Hamilton anxiety and depression scales.

The means of the subjects' weekly ratings of anxiety and depression on the respective Beck scales are presented in figures 1 and 2. These show elevated levels before treatment, a significant decline during treatment to a relatively low level by the end of treatment, and maintenance of the lower posttreatment level over 3 months of follow-up. Scores for "accompanied" on the Mobility Inventory for Agoraphobia showed a similar pattern of improvement. However, scores for "unaccompanied" on that inventory and scores on the Fear Survey Schedule improved as much from recruitment to pretreatment assessment as from pretreatment to posttreatment assessment (table 1).

Of the 13 patients who reported at least one panic attack in the preceding week at pretreatment assessment, five reported one panic attack in the previous week at posttreatment assessment (mean Hamilton panic score=22.0, SD=8.40, range=13–34). At 3-month follow-up, three of the original 13 patients reported one attack in the previous week (mean Hamilton panic score=18.0, SD=6.24, range=11–23). This was a statistically significant decrease in the number of individuals reporting panic attacks from pretreatment to posttreatment to follow-up assessment (Cochran's $Q=14.60$, $df=2$, $p<0.001$, $N=20$). Within this group, the individuals whose primary psychiatric diagnosis was panic disorder with or without agoraphobia also showed a statistically significant linear decrease from pretreatment to posttreatment to follow-up (Cochran's $Q=12.67$, $df=2$, $p<0.005$, $N=13$).

In both groups there was a significant decline in Hamilton panic scores between pretreatment and posttreatment assessments. For the subjects who reported at least one panic attack at pretreatment assessment ($N=13$), the mean pretreatment Hamilton panic score was 24.46 (SD=8.71) and the mean posttreatment Hamilton panic score was 8.46 (SD=12.15) ($t=4.75$, $df=12$, $p<0.001$). For the panic disorder subset ($N=11$),