Treating Fibromyalgia With a Brief Interdisciplinary Program: Initial Outcomes and Predictors of Response

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Fibromyalgia is a chronic disorder characterized by diffuse pain, stiffness, and fatigue.1 The 1990 American College of Rheumatology criteria for diagnosing fibromyalgia are widespread pain and tenderness at 11 of 18 specific tender points. These criteria have a sensitivity of 88% and a specificity of 81%.2 In the general population, the prevalence of fibromyalgia is 2%: 3.4% among women and 0.5% among men. In women, the prevalence increases with age and is greater than 7% in those older than 60 years.3 Fibromyalgia is also perceived by many people as a disabling condition. Almost 20% of fibromyalgia patients have applied for disability benefits, and more than 7% have received such benefits.3

Fibromyalgia is a frustrating condition without a known cause or a widely accepted treatment, and current therapeutic practices are often inadequate. Research shows that symptoms remain unchanged over time, even when patients are being seen in rheumatology centers specializing in fibromyalgia.4 Medication therapies, in particular the tricyclic antidepressant amitryptiline, are effective at relieving symptoms in only 30% to 50% of patients.5 Individual nonpharmacological interventions show symptomatic relief, but meaningful improvement occurs in only a few patients.6

The difficulty encountered in treating fibromyalgia is partially due to the condition’s heterogeneity. Patients present with a diversity of symptoms, ranging from sleep disturbances and depression to numbness and forgetfulness. Thus, it is not surprising that improved outcomes occur in patients cared for by physicians who consider psychological issues, a broad range of treatments, and specific patient concerns to be highly important.7 A multidisciplinary approach to treatment that incorporates such variety is currently considered essential to the treatment of fibromyalgia.8

Research on interdisciplinary fibromyalgia treatment programs that combine physical and psychological components has demonstrated the efficacy of this approach.9-13 However, the efficacy of these programs appears to be based on improvement in less than 50% of patients treated.6,14 This is one of the factors substantiating the proposal that tailoring treatment plans to specific patient subgroups with fibromyalgia would lead to better clinical outcomes.15,16 Identifying which patient characteristics predict response to a particular intervention would allow de-
sign of programs that target specific subgroups of fibromyalgia patients and would allow patients to receive the type of treatment that would be most beneficial.

Unfortunately, few studies have attempted to identify patient characteristics that predict response to interdisciplinary interventions and that are useful to a clinician trying to refer patients appropriately to a particular treatment program. The available limited evidence shows no association between patient factors and clinical response, is contradictory, or is impractical for a referring clinician to use. Bennett et al demonstrated that patients with a pain profile on the Minnesota Multiphasic Personality Inventory or major depression did not have a poorer response to a multidisciplinary program consisting of weekly meetings for 6 months. Patients with a psychological disturbance profile on the Minnesota Multiphasic Personality Inventory did not respond as well to this type of treatment. In a program consisting of 15 weekly, 2-hour, multidisciplinary treatment sessions, Keel et al associated successful outcomes with a shorter duration of illness and less pretreatment impairment from fibromyalgia. Turk et al found that pretreatment levels of pain did not predict pain improvement in a 4-week interdisciplinary program consisting of 6 half-day sessions. Patient characteristics that did predict posttreatment pain reduction were low pretreatment levels of depression and perceived disability, high pretreatment levels of sense of control and solicitous responses from their significant others, and an idiopathic onset to the condition.

The present study was designed to identify patient characteristics associated with a significant response to an interdisciplinary treatment intervention. When choosing the characteristics to evaluate to determine an association with treatment success, our goal was to select factors that physicians could easily identify and use to refer patients appropriately for treatment. Thus, we selected age, duration of illness, whether onset of fibromyalgia was precipitated by trauma (physical, emotional, or medical trauma), history of depression, and global effect of the condition on the patient. We hypothesized that patients with the following characteristics would be more likely to respond to the treatment program: younger age, shorter duration of symptoms, nontraumatic onset, no history of depression, and less affected by their condition.

The study also aimed to examine the overall effectiveness of a brief, interdisciplinary treatment intervention, the Fibromyalgia Treatment Program (FTP). This program contains the traditional medical, educational, self-management, and occupational-physical therapy components. However, unlike most interdisciplinary treatment programs that are carried out over many weeks with 1 meeting or more per week, this entire program is consolidated into 1½ days.

**PATIENTS AND METHODS**

**Procedures**

The FTP at the Mayo Clinic in Rochester, Minn, is a 3-part, 1½-day interdisciplinary program. During the first half day, evaluation of patients by a nurse and a physician consists of medical, physical, psychological, educational, and pharmacological assessments. Patients who were evaluated between February 14, 2000, and May 9, 2000, and met the American College of Rheumatology criteria for fibromyalgia were eligible to participate in the study. Eligible patients who were recommended by their physician to proceed through the FTP and who consented to participate were enrolled in the study. They completed the pretreatment measurements at this point in the program.

The second half-day segment of the program is a nurse-led course with an emphasis on self-management. It includes written materials, lectures, and group discussions about the following topics: what fibromyalgia is and is not, the cycle of pain, stress management, relaxation, difficult-day planning, sleep hygiene, anger management, communication skills, coping skills, perfectionism, and personal responsibility.

The third half-day segment includes both occupational and physical therapy components led by physical and occupational therapists. Written materials, lectures, group discussions, and interactive demonstrations are used to teach patients how to manage their condition. Exercise, stretching, and moderation are specifically emphasized in the physical therapy component. Proper body mechanics and energy conservation are emphasized in the occupational therapy component.

Posttreatment outcome measures and a follow-up demographic information form were mailed to the patients 1 month after participating in the treatment program. To identify any relevant differences between groups of patients, eligible patients who chose to participate in the program were compared to those who did not choose to participate. In addition, participants who completed the 1-month follow-up questionnaires were compared to those who did not complete this part of the study. This study was approved by the Institutional Review Board of the Mayo Foundation.

**Measurements**

**Fibromyalgia Impact Questionnaire.**—The Fibromyalgia Impact Questionnaire (FIQ) is a 20-item questionnaire used to assess the current health status of fibromyalgia patients. Specifically, it evaluates physical functioning, work status, depression, anxiety, sleep, pain, stiffness, fatigue, and well-being. Individual item scores excluding the 2 scores dealing with work status are combined into a total fibromyalgia impact score ranging from 0
to 80. Higher scores indicate a patient is more affected by fibromyalgia. The total score and all individual scores that comprise this total were used to evaluate the FTP. All symptom and functional areas evaluated by these scores were addressed in the program. The FIQ has proven construct validity, test-retest reliability, and content relevance and is a widely recommended tool to use in fibromyalgia research.18,19

Multidimensional Pain Inventory.—The Multidimensional Pain Inventory (MPI) is a 61-item questionnaire developed to evaluate patients with chronic pain. It consists of 13 empirically derived scales that measure different pain-related aspects. Five of these scales were chosen as useful outcome measures for this study: pain severity, interference (patients’ perceptions about how pain interferes with their daily lives), life control (patients’ perceptions about control over pain and life events), affective distress (mood, irritability, tension), and general activity level (composite activity score based on 4 other MPI scales: household chores, outdoor work, activities away from home, and social activities). The 5 scales used represent areas that the FTP addresses. The 4 scales involving support from a spouse or significant other are not used because the program does not address these issues and not all participants have significant others. The MPI has proven reliability and validity for both chronic pain and fibromyalgia.20-22

Data Analysis

Characteristics of the initial 100 study participants and 39 nonparticipants as well as the 74 responders to follow-up and the 26 nonresponders were compared by using 2-sample t tests and \( \chi^2 \) tests, as appropriate. Posttreatment improvement for the 74 patients who responded to the follow-up surveys was analyzed with paired t tests. Univariate and multivariate regression models were used to examine patient characteristics associated with treatment response. The outcome measure used was the raw difference in total FIQ scores (post-FIQ – pre-FIQ) because this method is simple to understand and discuss.

Because of a possible “ceiling” effect in the scores, additional analyses were performed to confirm the results. First, the percent difference in outcome scores ([post-FIQ – pre-FIQ]/pre-FIQ) was calculated and used as the outcome variable. Second, the 74 patients were divided into quartiles based on pretreatment FIQ scores, and the raw scores of these 4 groups were examined. The results of these 2 additional analyses were similar to the findings calculated from the raw difference in outcome scores. Thus, only the results based on the raw difference were reported.

The patient characteristics that we examined were age, sex, duration of symptoms, traumatic onset, pretreatment total FIQ score (measure of the global effect of fibromyalgia on the patient), history of depression, and whether the patient had taken more or fewer relevant medications during the follow-up period. For some patients, the duration of symptoms could not be determined exactly. Thus, this category was divided into 2 groups, less than 5 years or at least 5 years. Although more information was available on the type of trauma that precipitated the onset of fibromyalgia, all types of trauma (physical, emotional, and medical) were grouped for more statistical power.

RESULTS

Of the 180 patients referred to and evaluated in the fibromyalgia clinic between February 14, 2000, and May 9, 2000, 139 met the American College of Rheumatology criteria for fibromyalgia. Of these patients with physician-diagnosed fibromyalgia, 100 consented to participate in the study by filling out the pretreatment measurements, choosing to complete the 1 1/2-day FTP, and agreeing to complete the posttreatment surveys mailed 1 month after the FTP. The other 39 patients gave no specific reason for not participating or stated that they were not interested in completing the necessary paperwork. Of these 100 patients, 95 completed the entire 3-part FTP, while 5 each missed a single part. Of the 100 study participants, 74 returned the posttreatment questionnaires between 1 and 2 months after completing the program (74% response rate). Letters were sent to participants to encourage them to return posttreatment questionnaires.

The 100 participants had an average age of 44.7 years (range, 18-73 years). They were primarily female (93%), white (98%), married (83%), and educated at least through high school (97%). Additionally, 44% had a history of depression, 53% had a nontraumatic onset of disease (idiopathic onset), 48% worked more than 20 hours per week, 78% had a family income greater than $30,000, and 55% had symptoms for less than 5 years. Medication use varied widely. The main psychotropic medications used were selective serotonin reuptake inhibitors (33%), tricyclic antidepressants (26%), narcotics (17%), benzodiazepines (15%), and trazodone (13%). Daily use of nonsteroidal anti-inflammatory drugs was widespread (39%) as a major form of pain control even though these medications have been proved to be ineffective at treating symptoms of fibromyalgia.5

In regard to age and sex, the 100 study patients were not significantly different from the 39 nonparticipants. In 10 of 11 variables examined, the 74 study subjects whose follow-up data were returned were not significantly different from the 26 who did not return follow-up data. The 10 variables evaluated that demonstrated no significant difference be-
between the groups were age, sex, pretreatment FIQ score, marital status, educational level, distance from home, family income, whether onset was idiopathic, duration of symptoms, and history of depression. The 2 groups were statistically different in employment status (P=.02). More than 80% (55/65) of patients who were retired, disabled, or worked at least 20 hours per week responded to the follow-up questionnaire, while 53% (9/17) of unemployed patients and 61% (11/18) who worked less than 20 hours per week responded.

Effectiveness of the FTP

The mean scores and SDs for the outcome measurements are shown in Table 1. At posttreatment evaluation, patients were less affected by fibromyalgia, as demonstrated by a significant change in the total FIQ score (P<.001). At follow-up, 52 patients (70%) showed improvement in this score, and 31 (42%) improved by at least 10 points (total FIQ score range, 0-80). Individual FIQ questions that are components of the total score showed significant improvement in bad days per week (P<.001), pain severity (P<.001), fatigue (P<.001), awake refreshed (P=.001), stiffness (P<.001), and nervousness and anxiety (P=.009). Improvement in physical impairment (P=.11) and depression (P=.06) were not statistically significant.

At posttreatment evaluation, the MPI scores also demonstrated significant improvement in the areas of pain severity (P<.001), interference (P=.01), and general activity level (P=.03). Improvement in life control was not statistically significant (P=.12), and no improvement occurred in the affective distress category (P=.38).

Patient Characteristics Associated With Treatment Response

Results of patient characteristics associated with treatment response are shown in Table 2. Only the pretreatment total FIQ score (P=.001) was significantly associated with change in the total FIQ score (post-FIQ – pre-FIQ), although a history of depression had a value of P=.13. The correlation coefficient using the pre-FIQ score as a predictor of treatment success was negative (-0.366) (Figure 1). If the pretreatment total FIQ score is accounted for in a multivariate model, then the predictive ability of a history of depression is greatly reduced (P=.80). This indicates a possible association between a history of depression and the pretreatment total FIQ score. The 44 patients with a history of depression had an average pre-FIQ score of 56.0 (more affected by fibromyalgia), while the 56 patients with no history of depression had an average pretreatment FIQ score of 47.5 (less affected by fibromyalgia) (P<.001).

Table 2. Patient Characteristics Associated With a Better Treatment Response*

<table>
<thead>
<tr>
<th>Patient characteristic</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-FIQ score</td>
<td>.001</td>
</tr>
<tr>
<td>Age</td>
<td>.77</td>
</tr>
<tr>
<td>Sex</td>
<td>.92</td>
</tr>
<tr>
<td>Duration of symptoms</td>
<td>.73</td>
</tr>
<tr>
<td>History of depression</td>
<td>.13</td>
</tr>
<tr>
<td>Traumatic onset</td>
<td>.59</td>
</tr>
<tr>
<td>Medication change</td>
<td>.28</td>
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*FIQ = Fibromyalgia Impact Questionnaire.
DISCUSSION

Initial data indicate that the 1½-day interdisciplinary FTP is effective at reducing symptoms associated with fibromyalgia. Pain, number of bad days per week, morning and daytime fatigue, stiffness, nervousness and anxiety, and overall effect of this condition on patients' lives were all shown to improve at 1-month follow-up analysis. Improvement was determined by posttreatment outcomes that showed a statistically significant difference from pretreatment measurements. The manner in which statistical improvement correlates with more subjective clinical improvement is not exactly known. In this study, 9 of the 13 FIQ and MPI outcome scores (69%) reached statistical significance for posttreatment improvement. In addition, preliminary evidence indicates that fibromyalgia patients were very satisfied with the FTP at 1-month follow-up (C.D.S., unpublished data, 2000) even though such patients have traditionally been unsatisfied with treatment.7 This evidence suggests that clinical and statistical improvement occurred.

Compared to the interdisciplinary program evaluated by Turk et al8 (which consisted of approximately twice the number of treatment hours as the FTP in a more than 4-week period), the brief FTP evaluated in the current study showed similar outcome trends. The results from the study by Turk et al were evaluated immediately after completion of the program, whereas the results from the FTP program were evaluated between 1 and 2 months after program completion. While no control group was used in our FTP study, 21 patients who received no treatment in a study by Gowans et al10 showed no improvement after 6 weeks. The results of the 3 studies are compared in Table 3. Clearly, these comparisons are limited by the different time frames after program completion at which outcomes were assessed. However, the results suggest that brief programs like the FTP are initially effective and are comparable to programs of longer duration.

Knowing that brief interdisciplinary treatment programs for fibromyalgia are effective is especially important for tertiary care centers whose patients often do not live nearby. Brief, intense programs provide an approach for treating patients who stay in the area for only a few days. The importance of this issue in treating patients was demonstrated by a study that was conducted at a large tertiary care medical center. Of 100 participants, 46 lived more than 200 miles away. This knowledge may also be useful to community-based programs because convenience and decreased time away from work may increase program attendance and compliance.

Besides demonstrating that the brief FTP was effective at relieving symptoms of fibromyalgia, another goal of our study was to identify clinically useful patient characteris-
Table 3. Comparison of the Results From 3 Studies*

<table>
<thead>
<tr>
<th>Measurements</th>
<th>FTP patients</th>
<th>P value</th>
<th>Fibromyalgia patients</th>
<th>P value</th>
<th>Wait-listed controls</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of patients</td>
<td>74</td>
<td>67</td>
<td>21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duration of treatment program</td>
<td>1½ days</td>
<td></td>
<td>4 wk</td>
<td>NA</td>
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</tr>
<tr>
<td>Length of follow-up</td>
<td>1 mo</td>
<td>Immediately</td>
<td>6 wk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fibromyalgia Impact Questionnaire mean change (post-FIQ – pre-FIQ)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>−7.2</td>
<td>&lt;.001</td>
<td>NR</td>
<td>...</td>
<td>NR</td>
</tr>
<tr>
<td>Physical impairment</td>
<td>−0.1</td>
<td>.11</td>
<td>−1.5</td>
<td>&lt;.001</td>
<td>0.0</td>
</tr>
<tr>
<td>Bad days</td>
<td>−1.3</td>
<td>&lt;.001</td>
<td>NR</td>
<td>...</td>
<td>0.0</td>
</tr>
<tr>
<td>Pain</td>
<td>−1.3</td>
<td>&lt;.001</td>
<td>−1.1</td>
<td>&lt;.001</td>
<td>0.0</td>
</tr>
<tr>
<td>Fatigue</td>
<td>−0.9</td>
<td>&lt;.001</td>
<td>−1.7</td>
<td>&lt;.001</td>
<td>0.0</td>
</tr>
<tr>
<td>Awaken refreshed</td>
<td>−0.8</td>
<td>.001</td>
<td>−1.2</td>
<td>.01</td>
<td>+0.2</td>
</tr>
<tr>
<td>Stiffness</td>
<td>−0.9</td>
<td>&lt;.001</td>
<td>−1.2</td>
<td>.02</td>
<td>0.0</td>
</tr>
<tr>
<td>Nervousness and anxiety</td>
<td>−0.8</td>
<td>.009</td>
<td>−1.5</td>
<td>&lt;.001</td>
<td>+0.3</td>
</tr>
<tr>
<td>Depression</td>
<td>−0.5</td>
<td>.06</td>
<td>−1.6</td>
<td>&lt;.001</td>
<td>+0.9</td>
</tr>
</tbody>
</table>

*Derived from Turk et al and Gowans et al. FIQ = Fibromyalgia Impact Questionnaire; FTP = Fibromyalgia Treatment Program; NA = not available; NR = not reported.

**tics associated with treatment success. High pretreatment FIQ scores were significantly associated with treatment response measured by the FIQ itself. These results suggest that the more a patient is affected by fibromyalgia, the more likely improvement occurs after treatment in a multidisciplinary program. This makes intuitive sense because the more disrupted a patient’s life is because of a medical condition, the more opportunity there is for improvement. However, this finding could also be an artifact reflecting a “ceiling” effect (eg, it may be difficult for fibromyalgia patients to achieve FIQ scores <20 regardless of the effectiveness of the intervention). Additional analyses described earlier in this article were performed to test whether this finding was simply an artifact, and the results suggested that the group most affected by fibromyalgia benefited most from the treatment intervention.

As noted previously, available information on patient characteristics that predict treatment success is limited and conflicting. Our study demonstrated that patient characteristics like age, sex, duration of symptoms, traumatic onset, and medication changes did not predict treatment success. Conflicting information in the literature combined with the results from this study suggest that predicting which fibromyalgia patients will benefit from an interdisciplinary treatment program is difficult. Simply put, all patients have the potential to benefit from these programs.

Another interesting finding that arose during analysis was that, even though a history of depression did not significantly predict treatment success, an association exists between a history of depression and a high level of impairment from fibromyalgia. Patients with a history of depression were shown to be more affected by fibromyalgia than those without a history of depression. Although no data exist to indicate whether these patients were depressed at the time of treatment, these findings suggest that properly identifying and treating depression is important in treating fibromyalgia. A recent study showed that depression may be independent of the more objective pain measurements in fibromyalgia; however, depression is likely related to how patients interpret the effects of their symptoms on daily life. Further studies in this area are needed, including research on how effectively fibromyalgia patients are evaluated and treated for their depression and what effect this has on their condition.

Our study has 2 main shortcomings. First, no control group was used, which makes it more difficult to say that posttreatment changes were due to the actual treatment intervention or the result of test-retest or placebo phenomena. The availability of a true control group for fibromyalgia interventions in which no “gold standard” treatment or reasonable placebo design exists is a problem. However, this study was designed to evaluate the effectiveness of an actual clinical treatment program that was in operation for 1 year before the start of the study, and practicalities did not allow the use of wait-listed controls. However, Table 3 demonstrates that fibromyalgia patients who are initially assessed and then placed on a waiting list for a treatment intervention do not improve symptomatically. In addition, because the FIQ and MPI have demonstrated high test-retest reliability, the improvement demonstrated in patients after participation in the FTP is likely real.

The second shortcoming in our study is the short 1-month follow-up. Clearly, more research is needed to assess long-term maintenance of symptomatic improvement in patients completing the FTP. However, other studies on fibromyalgia interventions have used follow-up time
frames as short as 4 to 6 weeks. In addition, findings from our study showed treatment gains compared to patients receiving no treatment and are comparable to results from the study by Turk et al. (Table 3). Interestingly, the study by Turk et al also demonstrated 6-month maintenance in most of the initial treatment gains, a finding that optimistically suggests that interdisciplinary fibromyalgia treatment programs like the FTP benefit patients over a prolonged period.

Fibromyalgia is a frustrating condition for patients to have and for physicians to treat because of its diverse symptoms and uncertain etiology. The knowledge that the brief FTP is effective provides an incentive to develop and study similar treatment programs. Research involving these programs could focus on issues not addressed in our study. Adherence to program principles during the follow-up period, convenience for different patient populations, cost efficiency in various medical environments, and patient satisfaction with treatment are all areas that could provide information to validate and improve further the efficacy of brief, intense interdisciplinary programs such as the FTP.

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REFERENCES