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Fibromyalgia

RESEARCH ARTICLE

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Functionally Oriented Rehabilitation Program for Patients with Fibromyalgia

Preliminary Results

ABSTRACT

Wennemer HK, Borg-Stein J, Gomba L, Delaney B, Rothmund A, Barlow D, Breeze G, Thompson A: Functionally oriented rehabilitation program for patients with fibromyalgia: Preliminary results. *Am J Phys Med Rehabil* 2006;85:659–666.

Objective: To evaluate function and disability in patients with fibromyalgia before and after participation in a functionally oriented, multidisciplinary, 8-wk treatment program.

Design: A total of 23 patients who met American College of Rheumatology criteria for the diagnosis of fibromyalgia were enrolled in the study. Outcome measures included: range of motion, 6-min walk test, a modified Fibromyalgia Impact Questionnaire, a modified SF-36 Physical Functioning Scale, and the Fibromyalgia Health Assessment Questionnaire. Pretreatment and posttreatment scores were analyzed using paired *t* tests.

Results: All subjects completed the program, and there were no reported injuries. Three subjects failed to complete the survey instruments at the conclusion of the study. Intention to treat analysis including these subjects was carried out but did not significantly change results. For the remaining subjects ($n = 20$), a significant improvement was found on the Physical Functioning Scale ($P = 0.01$). Trends toward improvement on the Fibromyalgia Impact Questionnaire ($P = 0.40$) and Fibromyalgia Health Assessment Questionnaire ($P = 0.14$) were seen but did not achieve statistical significance. Range of motion testing revealed significant improvements in lumbar spine extension ($P < 0.001$), straight-leg raise ($P < 0.001$), cervical spine flexion ($P < 0.01$), cervical spine rotation ($P < 0.05$), and cervical spine side bending ($P < 0.05$). Distance traveled during the 6-min walk test increased significantly ($P < 0.01$), whereas perceived exertion as measured by the Borg scale did not change. There were no injuries or other adverse consequences of the program.

Conclusions: This study utilized multiple functional outcome measures to demonstrate improved function and decreased disability in patients with fibromyalgia. Our patients reported significantly improved physical function after participation in the 8-wk intensive multidisciplinary treatment program. This progressive, functionally based exercise training program was well tolerated by all participants and outlines an effective exercise prescription for patients with fibromyalgia. Fibromyalgia patients in this study responded favorably to a treatment program that focused on function instead of pain.

Key Words: Fibromyalgia, Exercise, Pain, Rehabilitation, Treatment

Fibromyalgia is a distinct chronic pain syndrome that is estimated to affect 2% of the population.¹ Of those affected with fibromyalgia, 80–90% are women.² Fibromyalgia and chronic muscle pain are extremely prevalent in outpatient musculoskeletal practice and consume a significant portion of our healthcare resources. In one study, fibromyalgia patients averaged ten outpatient physician visits per year, and the healthcare utilization cost was more than \$2000.00 per patient in 1996.³ Fibromyalgia patients are hospitalized approximately once every 3 yrs, and almost half of these hospitalizations are due to fibromyalgia-related symptoms.³

The American College of Rheumatology criteria for the diagnosis of fibromyalgia include widespread pain for ≥ 3 mos in duration and the presence of ≥ 11 of 18 specific tender points.⁴ Pain is considered widespread if located above and below the waist on both sides of the body. Tender points are identified on physical examination when approximately 4 kg of digital pressure applied to these specific muscle-tendon junctions elicits pain.⁴ In addition to chronic pain, fibromyalgia patients often report associated symptoms of fatigue, sleep disturbance, neurologic symptoms, and exercise intolerance.^{5,6}

The pathogenesis of fibromyalgia is unclear. Although studies have demonstrated normal muscle cell morphology and mitochondrial processes in patients with fibromyalgia, alterations in neurotransmitters such as serotonin and substance P have been found, suggesting dysfunctional central pain processing.⁵ This central sensitization theory proposes that normally painless stimuli are amplified in the brain and spinal cord, resulting in the perception of pain.⁵

Exercise is known to be an essential component of treatment for fibromyalgia patients, and several studies have shown that low-impact aerobic conditioning is beneficial to fibromyalgia patients.^{7–12} Unfortunately, patients with fibromyalgia experience exercise intolerance and have a predisposition to postexercise muscle soreness and overuse injuries.¹³ For example, high-intensity exercise has been found to cause increased pain in fibromyalgia patients, who generally have lower fitness levels than age-matched controls.^{10,12} Therefore, individualizing the exercise prescription for fibromyalgia patients is essential and has been shown to increase compliance with fitness programs.^{7,8} Patients with fibromyalgia report less pain after participation in carefully designed exercise programs such as low-intensity walking programs, flexibility training, and relaxation training, and further improvement in function has been

found with a combination of both exercise and education.¹⁴

The present study utilized multiple measures of functional outcome to examine the effects of an intensive 8-wk treatment program on impairment and disability in fibromyalgia patients.

METHODS

The study was approved by the Spaulding Rehabilitation Hospital institutional review board. Patients were recruited from the outpatient practices of two academic physiatrists specializing in the treatment of fibromyalgia. All participants met the diagnostic criteria for fibromyalgia established by the American College of Rheumatology.⁴ Exclusion criteria for the study included inflammatory joint disorders and cardiovascular, pulmonary, renal, or severe psychiatric comorbid illness. Before participation in the study, each patient was evaluated by a physiatrist, and any regional contributors to pain, such as bursitis or tendonitis, were treated. Oral medications were optimized before study entry, and no treatment changes were allowed during the 8-wk training session. The focus of the program was function, not pain. All subjects received a standardized 60-min lecture by the physiatrist on exercise and fibromyalgia. Patients were educated that they may have a transient increase in pain or stiffness, to use ice as needed, and to work through the pain as much as possible.

Subjects participated in a progressive multidisciplinary treatment program designed to incorporate education, exercise, and stress reduction. Each subject participated in three 120-min training sessions per week for 8 wks. Physical therapists educated participants in flexibility training, low-impact aerobics, dynamic strengthening, stabilization exercises, and Feldenkrais. Simulated functional tasks, ergonomic techniques, relaxation training, and Tai Chi were supervised by occupational therapists. The exercise was individualized, began at a low-intensity level, and gradually increased during the 8-wk period. Each session began and ended with warm-up/cool-down exercises, included two brief rest periods, and ended with 10–20 mins of Tai Chi or Feldenkrais exercises. A more detailed outline of the exercise program is provided in Appendix 1.

Outcome measures included range of motion in all planes of the cervical and lumbar spine, straight-leg raise, 6-min walk test, modified Fibromyalgia Impact Questionnaire (FIQ), Fibromyalgia Health Assessment Questionnaire (FHAQ), and a modified ten-item SF-36 Physical Functioning Scale (PFS).^{10,15,16} The FIQ and PFS questionnaires were simplified to a ten-question format (Appendices 2 and 3). Pretreatment and posttreat-

ment data were compared using a paired *t* test, with a *P* value of ≤ 0.05 considered significant.

Each patient completed the questionnaires before and after participation in the program. These questionnaires (FIQ, FHAQ, PFS) are self-administered instruments designed to assess the effect of fibromyalgia on patients' daily lives (Appendices 2–4 provide sample questionnaires). The FIQ and the FHAQ each measure a patient's ability to perform daily activities such as shopping, housework, and rising from a seated position. Scores for the FIQ and FHAQ range from 0 to 30 and 0 to 24, respectively, with higher scores representing greater disability. The PFS assesses the patient's degree of physical impairment. However, a high score (30) indicates no limitation of ability to perform tasks such as climbing stairs or running, and a low score (10) represents severe limitation of daily activity by fibromyalgia symptoms.

RESULTS

A total of 23 subjects with fibromyalgia were enrolled in the study. All subjects completed the treatment program; however, three subjects did not complete the posttreatment questionnaires. Intention to treat analysis with the data from these three patients did not significantly alter results, and these data were not included in the final statistical analysis.

After participation in the 8-wk rehabilitation program, participants demonstrated a statistically significant improvement in physical functioning as measured by the PFS ($P = 0.01$). A trend toward improvement on the FIQ ($P = 0.40$) and FHAQ ($P = 0.14$) was shown but did not achieve statistical significance (Fig. 1). The average FIQ, FHAQ, and PFS scores before and after participation in the program are provided in Table 1.

Range of motion data showed significant im-

provements in the straight-leg raise ($P < 0.001$ bilaterally) (Fig. 2). There was also significant improvement in lumbar extension (<0.001), cervical flexion ($P < 0.01$), cervical rotation ($P < 0.05$), and cervical side bending ($P < 0.05$). There was no significant improvement in cervical spine extension, lumbar flexion, or lumbar side bending (Table 2).

There was significant improvement in distance traveled during the 6-min walk test ($P < 0.01$) (Figure 3), whereas the perceived exertion as measured by the Borg scale did not change significantly (Table 3).

DISCUSSION

Fibromyalgia patients are known to benefit from exercise but also report exercise intolerance and symptom exacerbation. Fibromyalgia patients often report increased pain after participation in exercise programs.¹³ As one may expect, motivation for participation in exercise programs is often a challenge for this patient population.^{17–19} Given the high drop-out rates and exercise intolerance generally seen with this patient population, the successful completion of our 8-wk intensive program by all subjects who were enrolled in the study is a significant observation.

These findings support previous studies demonstrating that patients with fibromyalgia benefit from exercise.^{9–12,14} In addition to exercise, the 8-wk comprehensive treatment program included education, group participation, task-oriented functional training, flexibility training, and strengthening. This program seems to provide clinically significant short-term benefits for fibromyalgia patients. Our results suggest that a carefully designed, graded, progressive exercise program in conjunction with education not only is well tolerated and effective in patients with fibromyalgia but

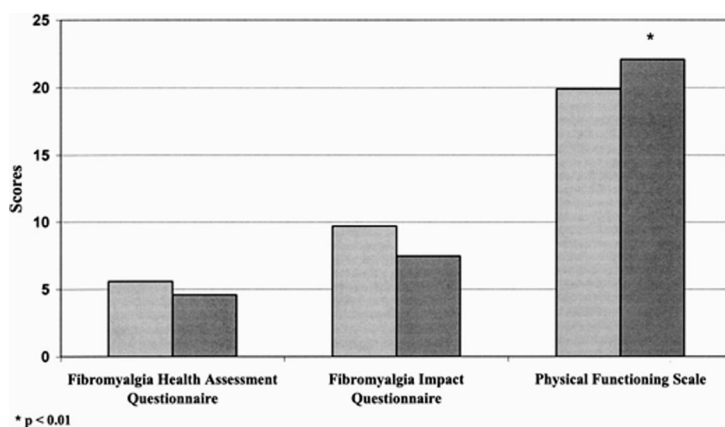


FIGURE 1 Scores on Fibromyalgia Health Assessment Questionnaire, Fibromyalgia Impact Questionnaire, and Physical Functioning Scale before and after the rehabilitation program.

TABLE 1 Scores on Fibromyalgia Health Assessment Questionnaire, Fibromyalgia Impact Questionnaire, and Physical Functioning Scale before and after the rehabilitation program

<i>n</i> = 20	Pretreatment Mean	Posttreatment Mean	<i>P</i> Value
Fibromyalgia Health Assessment Questionnaire score	5.6	4.6	0.40
Fibromyalgia Impact Questionnaire score	9.0	7.4	0.14
Physical Functioning Scale score	20.1	22.0	<0.01

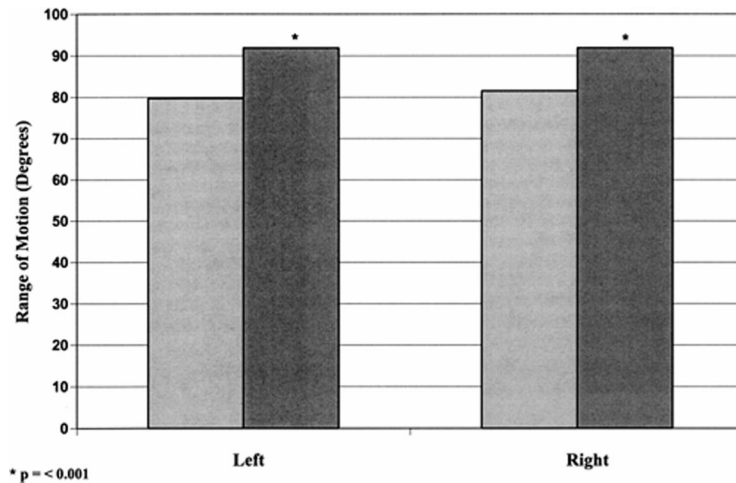


FIGURE 2 Straight-leg raise data before and after the rehabilitation program.

TABLE 2 Range of motion data before and after the rehabilitation program

<i>n</i> = 20	Pretreatment Mean, degrees	Posttreatment Mean, degrees	<i>P</i> Value
Straight-leg raise, right	79.7	91.9	<0.001
Straight-leg raise, left	81.5	91.9	<0.001
Cervical flexion	51.8	60.0	0.007
Cervical extension	55.2	58.1	0.20
Cervical side bending to the right	39.5	44.4	0.016
Cervical side bending to the left	42.5	46.5	0.006
Cervical rotation to the right	70.8	78.9	0.02
Cervical rotation to the left	71.0	78.2	0.03
Lumbar flexion	114.9	115.9	0.04
Lumbar extension	30.1	36.5	<0.001
Lumbar side bending to the right	33.9	34.6	0.40
Lumbar side bending to the left	34.6	34.5	0.47

may also decrease functional impairment and disability as measured by the PFS, FHAQ, and FIQ.

This study did not directly examine the role of other treatments for fibromyalgia such as oral medications, trigger-point injections, acupuncture, or treatment of other musculoskeletal precipitants of fibromyalgia symptoms. These treatments were only employed before enrollment in the program, and oral medications were not changed during the course of the study. Patients were enrolled in the program only after all medication and interventional treatments were optimized to avoid confounding improvements observed during the treatment program. It is likely

that these medical interventions contributed to the overall success of the program

There are several limitations to this preliminary study. The absence of a control group leaves the possibility of “placebo” (e.g., attention) effect contributing to the observed improvements. However, the study utilized a before-and-after design, and all subjects complained of chronic symptoms. It is therefore likely that the observed functional improvements were due to the program itself.

Although statistically significant improvements were not found in the FIQ and FHAQ results, favorable trends were observed for both of these scales. The

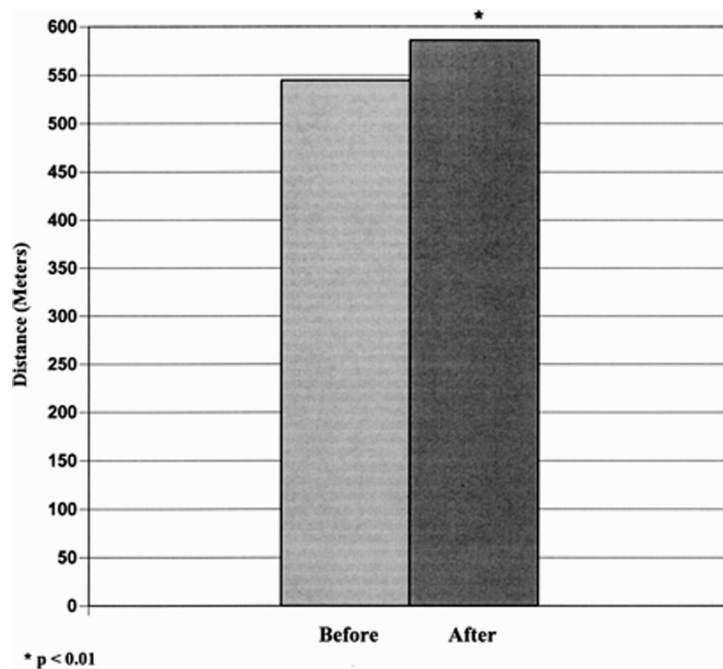


FIGURE 3 Six-minute walk test distance before and after the rehabilitation program.

TABLE 3 Six-minute walk test data before and after the rehabilitation program

<i>n</i> = 20	Pretreatment Mean	Posttreatment Mean	<i>P</i> Value
Borg scale score	12.2	12.3	0.39
Distance, feet	1787.6	1924.7	<0.001

small size of our study population may have introduced a type II error, and the failure to achieve statistical significance may reflect inadequate statistical power. A larger confirmatory study is needed to clarify these observed trends.

Our study did not include long-term follow-up for participants. Fibromyalgia is a chronic condition, with fluctuating symptoms over time. Our data do not allow us to draw any conclusions regarding the long-term effects of the treatment intervention, an important research question.

The patient population studied is unlikely to be representative of all fibromyalgia patients in the community because it was drawn from a tertiary referral center with special expertise in this condition. As a result, it is likely that participants were more severely distressed by fibromyalgia and possibly more motivated to seek treatment. Nonetheless, we believe that our study population was sufficiently representative of fibromyalgia patients seeking medical attention that its results may be reasonably extended to a broader population of these patients.

Our study emphasized education and functional goals. Our therapists were instructed to focus on function instead of pain. Patients were clearly in-

formed that the goal of the program was not to decrease pain but to improve function. We were able to motivate patients to participate in the program, despite their chronic pain issues, by focusing on function. Although a focus on function is common in multidisciplinary pain programs, this approach is not common among fibromyalgia treatment programs. Patients and practitioners may be tempted to decrease exercise intensity or to stop exercise if pain or symptoms are exacerbated. Our treatment program outlines a detailed exercise prescription for use with this patient population and suggests that despite previously studied acute increases in fibromyalgia pain with exercise, these patients will benefit from continued intensive therapy.

CONCLUSIONS

Multiple measures of functional outcome were used in this study to evaluate our fibromyalgia rehabilitation program. This study helps to clarify the preferred exercise prescription for this challenging patient population, and our results demonstrate that participation in a functionally oriented 8-wk treatment program improves physical function, endurance, and flexibility in fibromyalgia patients as mea-

sured by the PFS, range of motion testing, and 6-min walk test. In addition, non-statistically significant improvements in perceived impairment and disability were seen on the FIQ and FHAQ scales. The treatment program was well tolerated by all participants,

and our results support the use of a combination of education and exercise for fibromyalgia patients. In addition, our data suggest that focusing on functional goals instead of pain may be beneficial to this patient population.

APPENDIX 1: EXERCISE PRESCRIPTION

Educational session:

On the first day, each group received a 25-min introductory presentation from the physiatrist/medical director on the role of exercise in the treatment of fibromyalgia. The presentation addressed the importance of stretching, strengthening, aerobic exercise, and injury prevention for fibromyalgia patients. In addition, clinical research supporting exercise in fibromyalgia was distributed to patients.

Relaxation:

Weeks 2–8: Either Feldenkrais or Tai Chi exercises were done for the last 15 mins of each session. Relaxation training, breathing, and balance were taught at each session.

Physical therapy:

Weeks 1–4: Sessions began with aerobic exercise, followed by stretching exercises. Then simple

dynamic lumbar and pelvic stabilization exercises were performed.

Weeks 4–8: Exercise was progressed. Duration and intensity of aerobic exercise was increased, and dynamic stabilization exercises were introduced. Upper body conditioning and higher level tasks using Physioball®, Theraband®, and light weights were incorporated.

Occupational therapy:

Weeks 3–8: Beginning at week 3, two occupational therapy sessions per week were incorporated. Each session was approximately 20 mins. The therapist reviewed principles of pacing, ergonomics, activity modification, performance of activities of daily living, household tasks, work tasks, stretch breaks, biomechanics, and maximization of functional activities.

Program length:	Three sessions per week for 8 wks
Duration of each session:	120 mins
Disciplines included:	Physical therapy, occupational therapy, and physiatry

APPENDIX 2: MODIFIED FIBROMYALGIA IMPACT QUESTIONNAIRE FUNCTIONAL ABILITY SCALE

Instructions:

Please circle the number that best describes how you did overall for the past week. If you do not

normally do something that is asked, choose NA (not applicable). Response options: Were you able to do this activity Always (0), Most times (1), Occasionally (2), or Never (3)?

1. Do shopping?	0	1	2	3	NA
2. Do laundry using a washer and a dryer?	0	1	2	3	NA
3. Prepare meals?	0	1	2	3	NA
4. Wash dishes/cooking utensils by hand?	0	1	2	3	NA
5. Vacuum a rug?	0	1	2	3	NA
6. Make beds?	0	1	2	3	NA
7. Walk several blocks?	0	1	2	3	NA
8. Visit friends and relatives?	0	1	2	3	NA
9. Do yard work?	0	1	2	3	NA
10. Drive a car?	0	1	2	3	NA

**APPENDIX 3: MODIFIED SF-36:
PHYSICAL FUNCTIONING SCALE**

Instructions:

The following items are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much? Response options: Yes, limited a lot (1); Yes, limited a little (2); No, not limited at all (3).

1. Vigorous activities such as running, lifting heavy objects, participating in strenuous sports?	1	2	3
2. Moderate activities such as moving a table, pushing a vacuum cleaner, bowling, or playing golf?	1	2	3
3. Lifting or carrying heavy groceries?	1	2	3
4. Climbing several flights of stairs?	1	2	3
5. Climbing one flight of stairs?	1	2	3
6. Bed making, kneeling, or stooping?	1	2	3
7. Walking more than 1 mile?	1	2	3
8. Walking several blocks?	1	2	3
9. Walking one block?	1	2	3
10. Bathing or dressing yourself?	1	2	3

APPENDIX 4: MODIFIED FIBROMYALGIA HEALTH ASSESSMENT QUESTIONNAIRE: HEALTH ASSESSMENT SCALE OF FUNCTIONAL ABILITY

Instructions:

Please check the response that best describes your usual activities DURING THE PAST WEEK. Each response category asks the same questions: are you able to. . .? Response options: without any difficulty (0), with some difficulty (1), with much difficulty (2), and unable to do (3).

Dressing and grooming:				
1. Dress yourself, including shoelaces and buttons?	0	1	2	3
Arising:				
2. Stand up from a straight chair?	0	1	2	3
Hygiene:				
3. Wash and dry your body?	0	1	2	3
Reach:				
4. Reach and get a 5-pound object such as a bag of sugar from just above your head?	0	1	2	3
5. Bend down and pick up clothing off the floor?	0	1	2	3
Activities:				
6. Run errands and shop?	0	1	2	3
7. Get in and out of a car?	0	1	2	3
8. Do chores such as vacuuming or yard work?	0	1	2	3

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