THERAPEUTIC RECREATION JOURNAL Vol. 35, No. 1, 57–69, 2001

Aquatic Therapy In Community-Based Therapeutic Recreation: Pain Management In a Case of Fibromyalgia

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The purpose of this case report was to describe the effects of an aquatic exercise program with an individual with fibromyalgia. A 59 year old female school teacher with fibromyalgia participated in an aquatic therapy program for a period of four and one-half months in a community-based therapeutic recreation setting. Shortly after participation was initiated, she reported relief from acute pain. Later, improvement in the degree to which pain interfered with functional activities was noted. In particular, she reported returning to work on a half-time basis and regained the stamina to participate in her favorite recreation and social activities. Findings from this case are consistent with those obtained from larger clinical trials using exercise interventions with persons diagnosed with fibromyalgia. Implications for community-based therapeutic recreation are discussed.

KEY WORDS: *Aquatic Therapy, Community-Based Therapeutic Recreation, Fibromyalgia, Pain Disability Index (PDI), Self-Efficacy, Sleep Deprivation, Visual Analog Scale (VAS)*

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Fibromyalgia affects five million people in the United States alone, about two percent of the population (Arthritis Foundation, 1997). Its persistent nature and unknown etiology qualify it as a chronic condition to be managed and controlled rather than cured.

Many persons with fibromyalgia improve with time, although the explanation for such improvement is uncertain. Whether the natural history of the disorder includes abatement of symptoms or whether lifestyle change plays a role in remission remain in question. Granges, Zilko, and Littlejohn (1994) found that research participants with fibromyalgia reported improvement in a two year follow-up study. However, regular aerobic exercise has also been associated with a reduction in fibromyalgia symptoms over protracted time (Granges et al., 1994; Wigers, 1996).

Taken together, the chronicity of the disorder, in conjunction with the clear need to arrange for long-term interventions, urge the use of non-pharmacological pain and symptom management techniques. Recently, the same conclusion was reached by the Rossey et al. (1999) team in their meta-analysis of fibromyalgia intervention studies.

One consistently recommended intervention for fibromyalgia is exercise. Because community-based therapeutic recreation (TR) programs may deliver exercise programs to persons with disabilities residing in a municipality, they are well positioned to help people manage chronic conditions which require an on-going program of intervention, such as fibromyalgia. This case report not only chronicles the effectiveness of aquatic therapy with a person with fibromyalgia, it also serves to demonstrate the feasibility of such a program within the context of an existing community TR program.

Following completion of their successful exercise intervention study with fibromyalgia patients, Martin et al. (1996) recommended that "... these programs be offered in the community and designed to be followed at home" (p. 1053). Earlier, Beaudouin and Keller (1994) suggested that TR's role in the community may expand in the future because of the changing nature of illness. In association with the aging of society, chronic conditions, such as fibromyalgia, have become the norm. Accordingly, the need for sustained intervention and lifestyle change are equally clear for persons afflicted with chronic conditions. Owing to the prevalence of fibromyalgia, community-based TR programs may contribute measurably toward the development of a long-term, low cost, outpatient response to this disorder by delivering interventions like aquatic therapy. Promoting lifestyle changes that lead to the adoption of a regular exercise habit often requires sustained encouragement, support, and structure. Like Maggie (pseudonym), the participant in this case, others with fibromyalgia may only need the structure provided by a regularly scheduled aquatic therapy program and the support provided by qualified personnel to make an exercise habit an attainable lifestyle change.

Background of the Case

An elementary understanding of the etiology of fibromyalgia and the potential effectiveness of aquatic therapy provide a background for understanding this case. Profiles of the practitioners, the community-based setting, and the case participant reveal how this intervention was implemented.

Fibromyalgia

Fibromyalgia is a syndrome that manifests as generalized muscle aches with pain localized over several "tender points." Tender points are associated with anatomical landmarks around the neck and shoulders, elbows, hips, lower back, knees, and occasionally other sites. Most people with fibromyalgia (90%) also have difficulty sleeping soundly and report fatigue and malaise. The latter is exhibited as a spike in depressive symptoms, heightened anxiety, or even disturbed concentration. Less frequently, persons with fibromyalgia report headaches or visceral discomfort. Fibromyalgia is essentially diagnosed by rul-

ing out other conditions and etiologies (see Arthritis Foundation, 1997).

Unlike arthritic pain, fibromyalgia pain is not associated with a joint—it is muscular in nature, sometimes accompanied by pain at or near the attachments of tendons to bones. The Arthritis Foundation counts fibromyalgia among the arthritis-like disorders that it serves. The Arthritis Foundation also provides substantial information for those with fibromyalgia and professionals who work with fibromyalgia cases (see their website at www.arthritis.org).

Although the direct cause of fibromyalgia is not known at present, several factors are associated with its onset. Frequently, the person presenting with fibromyalgia reports a stressful event in temporal proximity to the onset of symptoms. The stressful event may be in the form of physical trauma (e.g., an accident causing injury) or a psychologically stressful life event (e.g., financial problems, marital difficulties, death of a significant other, etc.). Infectious disease, such as the flu, may trigger the onset of symptoms as well.

Treatment is generally palliative, ordinarily consisting of some combination of medication, relaxation, and self-management as well as exercise. Medications are usually non-narcotic and prescribed with the intent of attenuating pain and aiding sleep. With particular attention to the latter treatment recommendation, cardiovascular exercise and stretching are advised. Accordingly, an aquatic therapy program was designed which featured substantial amounts of stretching and muscle toning exercise, and later included cardiovascular conditioning as the participant tolerated progression to a more demanding workout.

Aquatic Therapy

This report is the result of the implementation of a community-based intervention using aquatic therapy with a participant who was diagnosed with fibromyalgia. The intervention was designed to complement treatment from the participant's primary care physician who employed pharmacological agents to treat the condition. Both the intervention by the participant's physician and the aquatic intervention by the authors were aimed at the relief of symptoms, with an expectation of functional improvements secondary to pain management.

More specifically, the aquatic therapy program used exercises to improve overall fitness with special attention to muscle fitness in the form of strength and endurance. Improved function subsequent to pain control was expected, especially in the areas of household management and the ability to return to work.

Buoyancy and hydrostatic pressure make movement easier and less painful in an aquatic environment than comparable land-based programs (Becker & Cole, 1997). Most people float because they have a mass and density less than the weight of the water they displace. Practitioners using aquatic-based exercise correctly reason that movement in a buoyant environment is easier and less stressful on the musculo-skeletal systems, making movements less painful. Weight bearing movements that would be painful on land are less apt to be painful in the water with the body part submerged. Accordingly, aquatic exercises are typically performed in neck to waist deep water. The buoyancy and hydrostatic pressure of water also provide support for painful body parts and reduce the person's apprehension about falling or sustaining further injury. Finally, water provides a source of graded resistance conducive to improvement in muscular strength and endurance when the limbs are moved repeatedly through a range of motion over the course of an extended period of time (e.g., 10 to 15 repetitions).

Community Practice Setting and Practitioners

The first author is aquatic therapy and rehabilitation industry certified, as well a certified therapeutic recreation specialist (CTRS). He took primary responsibility for directing the intervention program. In consultation with the participant's rheumatologist and aquatic exercise literature (Arthritis Foundation,

1996a, 1996b, 1997; Koury, 1996), an exercise program was designed for the participant. Progression to more challenging exercises was based on improvement in the client's fitness and improvement in the client's symptoms. A detailed description of the aquatic therapy program is provided below.

An undergraduate TR student (second author) worked on a one-to-one basis with the participant under the direction and supervision of the first author. The first author was present at all sessions. Both authors completed assessments throughout the intervention periods described below.

A community recreation department pool was available afternoons during less busy lap-swim times, giving the therapists an opportunity and the physical space necessary to implement a program of aquatic therapy for the individual. The participant was charged $5.00 per session to cover expenses (regular pool admission fee was $1.75).

Case Participant's Biographical and Demographic Information

Maggie was a 59 year old junior high school teacher who was diagnosed with fibromyalgia syndrome in late November of 1999. She reported general muscular pain, with "tender points" in the shoulders and neck. The pain was significant enough to interfere with important activities in her life, including remunerated employment as a teacher and work around her home. The pain proved to be chronic and was associated with nonrestorative sleep. As a result, she had to take sick leave from employment and frequently had to take naps during the day because of fatigue. She reported that the condition interfered with her favorite recreation activity, reading, because she could not stay awake and concentrate.

Medications were prescribed by her physician for various symptoms associated with Maggie's condition throughout the time she participated in the aquatic therapy program. Medications were prescribed for these conditions as follows: (a) for pain (November–January), (b) for sleep and depressive symptoms (November–May), and (c) for inflammation (December–May). She was referred by her physician (a rheumatologist) in December 1999 to an on-going aquatic therapy program conducted in cooperation with the community-based TR program in a medium-sized, midwestern college municipality.

Maggie participated in the aquatic therapy program from December 27, 1999 through May 5, 2000. She completed 41 of the 44 total sessions made available to her. The sessions were organized into three intervals around regular term breaks for the local university. These sessions were provided December 27–January 14 (Maggie attended 8 of 9 sessions); January 31–March 10 (Maggie attended 16 of 18 sessions); and March 27–May 5 (Maggie attended 17 of 17 sessions). Typically, Maggie met with the authors on Monday, Wednesday, and Friday each week. Each session was 45 minutes in length.

Case Content

This aquatic therapy intervention for fibromyalgia focused on pain management, muscle fitness, and endurance. The CTRS/aquatic therapist and TR student applied the usual TR process of assessment, planning, implementation, and evaluation as follows.

Referral and Initial Strategy

Maggie contacted the first author on the advice of her physician in December 1999. Customarily, the aquatic therapy program was delivered on a three times per week basis for an interval of six weeks. The final aquatic therapy interval for 1999 was just being completed when Maggie contacted the first author. However, special arrangements were made that allowed Maggie to begin the program immediately after Christmas and to participate for an interval of three weeks over the university's holiday break. The reason for this exception was to permit Maggie to determine, for herself, whether aquatic therapy intervention

produced any benefits and to determine whether she could tolerate moderate intensity exercise against the backdrop of pain she was experiencing. Subsequent to her initial three week trial interval, she decided to continue based on her capacity to tolerate the exercise without additional pain and her self-perceived assessment of the benefits of the experience (i.e., she reported that she felt better).

Maggie also completed an information summary and consent document required by the university's Human Subjects Review Committee. The document described the program, advised her that she could discontinue participation at any time without penalty, and that she had the right to ask questions. The first author also consulted with Maggie's physician to determine whether any latent disorders were present that might contraindicate participation in a program of moderate intensity exercise. No latent conditions were noted; hence, the program was initiated in late December 1999.

Initial and On-going Assessments

Because pain is the most salient feature of fibromyalgia, it was assessed at almost every session before the participant entered the pool and after she exited the pool. Assessment of self-perceived pain was accomplished by using a visual analog scale (15 cm.) adapted from the Health Assessment Questionnaire (Ramey, Raynauld, & Fries, 1992). The poles of the scale are labeled "no pain" at one end and "very severe pain" at the opposite end. The respondent is asked to place a mark along the horizontal line according to how much pain she is feeling "right now." A numerical value is assigned to each response according to the number of centimeters from the left end of the line where the mark is placed (measurement begins at "no pain" = 0.0 cm.). The higher the number, the greater the amount of self-perceived pain. Use of a visual analog scale (VAS) to assess pain is common among studies of fibromyalgia syndrome (see review by White & Harth, 1996).

A second assessment of pain was more global in nature, derived from four administrations of the Pain Disability Index (PDI). The PDI was developed by Pollard (1984) to measure the extent to which pain interferes with seven daily activities: family/home responsibilities, recreation, social activity, occupation, sexual behavior, self-care, and life support activity. The PDI is a self-report instrument that employs a response scale (0 = "no disability" to 10 = "total disability") to elicit the participant's perception of the extent to which pain interferes with the above general life activities. Higher scores indicate more impairment. Hence, the PDI served as an indication of functional impairment associated with pain.

Pollard (1984) found that the PDI was effective in discriminating high from low disability among post-surgery patients. He also reported acceptable internal consistency for the PDI (*alpha* = 0.87). Later, Tait, Chibnall, and Krause (1990) further examined the reliability and validity of the PDI. They substantiated Pollard's conclusion in favor of the internal consistency of the PDI; Tait et al. found that all seven items of the PDI loaded on a single factor when an eigenvalue of one was used as a cutoff. The internal consistency was correspondingly high (*alpha* = 0.86). A two factor solution also yielded high internal consistency coefficients. In addition, criterion validity for the PDI was demonstrated by Tait and associates; respondents with higher PDI scores reported more psychological distress, more severe pain descriptions, and greater restriction of activities. Likewise, PDI scores were predicted by a combination of nine variables (e.g., time spent in bed) expected to correlate with higher pain-mediated disability; 54% of the variance in PDI scores was explained.

Maggie completed the PDI on December 27, January 18, January 31, and May 16. The first two administrations provided an indication of functional impairment associated with pain during the initial treatment interval (December 27–January 14). The latter two administrations of the PDI indicated the long term effectiveness of the program (January 31–May 5) in attenuating functional limitations associ-

ated with pain following prolonged exposure to aquatic therapy.

Planning and Implementation

Maggie began the program on December 27, 1999, and continued to participate on a regular basis through spring of 2000. Early programs emphasized stretching and range of motion exercise consistent with those recommended by the Arthritis Foundation (1996a, 1996b). A typical 45 minute session included the following variations.

- Maggie walked lengths of the pool forward, backward, side-step, on tip-toes, on heels (10 minutes).
- Maggie completed shallow water stretching and toning exercises, 10 repetitions of each of the following with each limb—hip flexion/extension, hip ab/adduction, hip rotation, quarter squats, tracing (scribing a 180 degree arc on the bottom of the pool with the tip of the toe), knee flexion/extension, toe raises, heel raises; 15 minutes).
- Deep water exercises were completed while Maggie was suspended in a flotation device. These exercises were prescribed on the basis of their capacity to tax the cardiovascular system and because they demanded muscular endurance. Each exercise was repeated for three bouts of 60 seconds of executing the movement followed by a 15 second rest period—flutter kicks (in vertical position), strides (with knees locked), bicycling, "jumping jacks" (15 minutes).
- Maggie completed abdominal exercises in deep water with her back to pool wall. One set of 10 repetitions of each exercise was completed—knees to chest, straight leg raises, and straight raises with ab/adduction (5 minutes).
- Occasionally, Maggie was given instruction at the end of a session on Ai Chi, a water relaxation technique based on its land-based counterpart—Tai Chi. However, because of Maggie's fatigue and the fact that the aquatic facility was not a warm-water pool (average water temperature was 85 degrees, making hypothermia likely if the participant remained quiet in the water), this technique was abandoned.

As Maggie demonstrated more strength, endurance, and less pain while exercising, the demands of the program were incremented in several different ways to induce a more sustained cardiovascular response or to promote strength development. Increments in exercise difficulty were always considered in consultation with the participant. To encourage muscle fitness and strength, resistance was added to shallow water stretching activities through the use of resistance bands. The tensile character of each of the bands used was described as mild resistance (senior citizen level) and moderate resistance (normal adult level). Mild or moderate resistance bands were used (depending on the difficulty of the exercise) in conjunction with the stretching and toning exercises listed above. Exercises for the upper extremities were added as Maggie reported that she could tolerate more. Significantly, Maggie insisted on working areas where she reported "tender points" upon her initial referral (i.e., shoulders and neck). Upper extremity exercises were repeated for 10 repetitions with each limb and included forearm flexion/extension, ab/adduction of the upper extremity at the shoulder, and upright rowing. About one time per week she abstained from upper extremity exercises because of some tenderness. This abstention was especially the case for ab/adduction of the arm at the shoulder, which was the focal point of her self-reported "tenderness."

Additional cardiovascular effort on Maggie's part was evoked by introducing a submersible step bench into her shallow water routine. Initially, she simply stepped up and down with each foot leading for 10 repetitions. Additional exercises with the step bench were introduced when either Maggie demonstrated

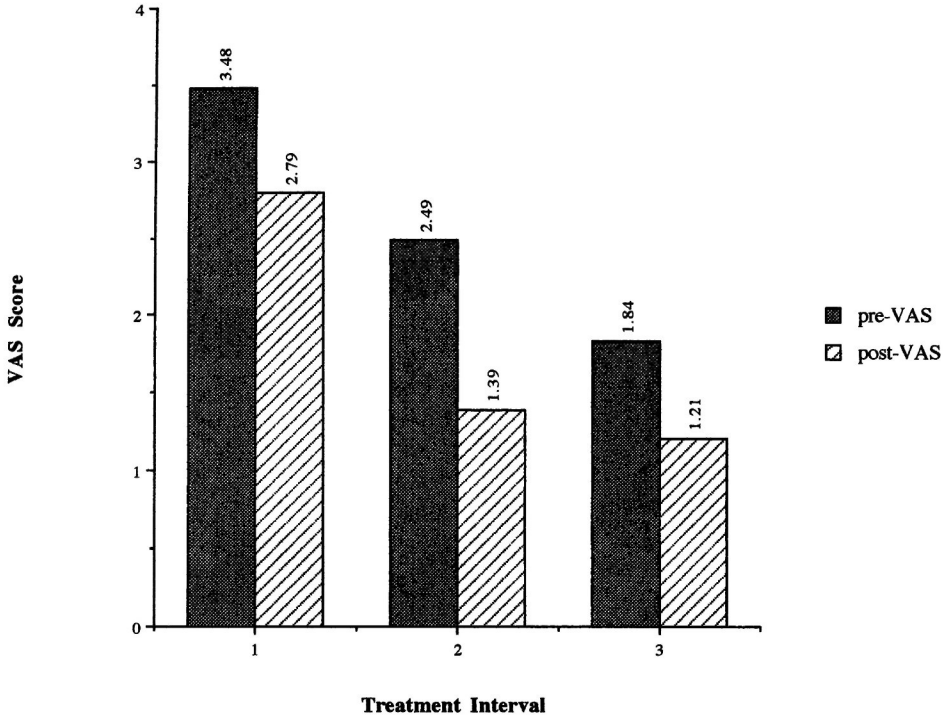

FIGURE 1. PRE-VAS (BEFORE ENTERING POOL) AND POST-VAS (AFTER EXITING POOL) SCORES

the capacity to tolerate more exercise of this type, or when Maggie herself requested additional work. Later exercises on the step bench included: side-steps, reverse knee extensions, "hamstring" stretching, stepping over the step bench, jumping up and down from the step bench.

Later, Maggie was encouraged to challenge herself with some swimming during every other session. Initially, she swam "short laps" (one lap at the deep end of the pool which constituted about ⅓ the length of a regular lap of 25 yards). On February 2, she completed a single short lap. By February 14, she was able to swim six short laps. By the beginning of March, she asked the second author to time her on swimming four continuous short laps. Following spring break (for the university), on March 31, Maggie swam one-half of a regular (25 yard) lap. By the end of the formal treatment sessions, the beginning of May, Maggie was able to swim five regular laps of the pool. A crawl stroke was used exclusively by Maggie in all the above swimming activities.

In late spring, she was advised by the first author that she was capable of continuing her participation in aquatic exercise on her own and that scheduled sessions with the program were no longer necessary.

Evaluation and Results

Figure 1 displays the findings for acute (daily) pain reported by Maggie via use of the VAS. Individual session assessments were collapsed into three clusters corresponding to the three treatment intervals to reduce the "clutter" caused by the high number of VAS assessments and to ease interpretation (32 as-

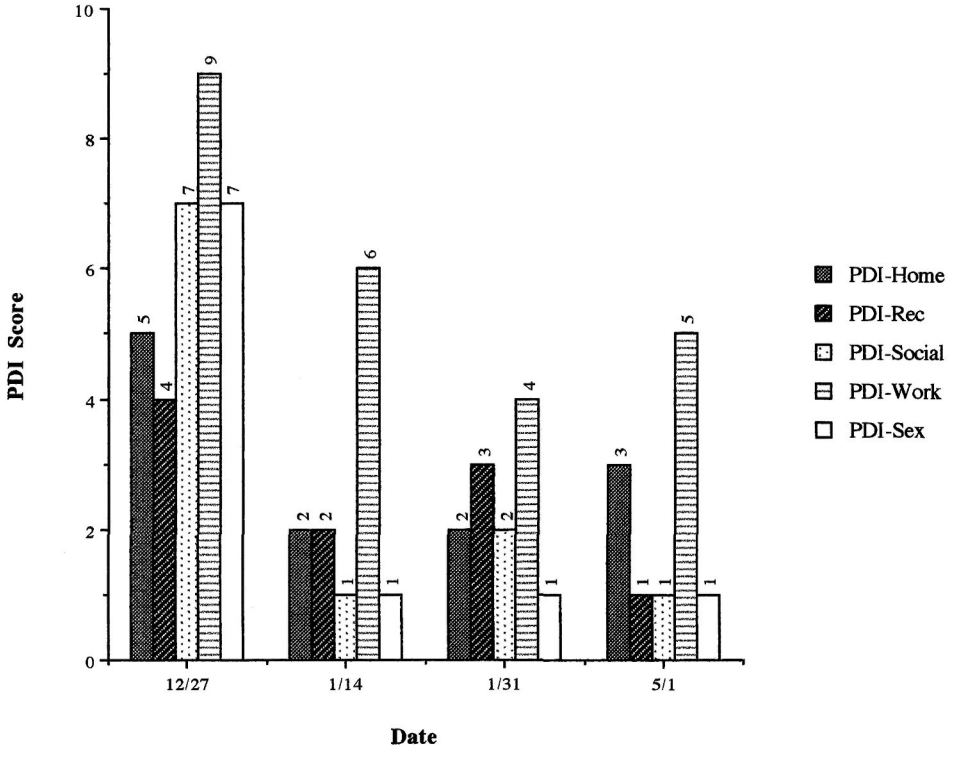

FIGURE 2. PERCEIVED DISABILITY INDEX (PDI) SCORES

sessments before entering the pool and 31 assessments after exiting the pool). There were occasional spikes in VAS responses early in treatment, when Maggie reported having a "bad day" (she rated scores of 6 to 9 of the maximum 15). Aside from the few spikes early in treatment, the averaged responses displayed in Figure 1 represent a typical session for each treatment interval.

Visual inspection of Figure 1 revealed a consistent pattern of reduction in reported pain subsequent to participation in the aquatic therapy program; that is, post-VAS scores (exiting the pool) were less, on the average, than pre-VAS scores (entering the pool). Furthermore, a substantial reduction in the average VAS score both before and after pool activities was observed in treatment interval two. This trend continued into treatment interval three. By treatment interval three, VAS pain scores both before and after aquatic therapy were negligible (see Figure 1).

Figure 2 pertains to the outcomes for functional impairment attributable to pain, as measured by PDI scores. Figure 2 displays only five of the seven PDI subscales because impairment in both self care and life support were negligible or absent from the onset of Maggie's treatment (i.e., resulting scores of 1 or 0). Each of the subscale scores dropped precipitously from the beginning to the end of treatment interval one (December 27–January 18), perhaps explaining Maggie's motivation to continue participation for the next two treatment intervals.

Of the five functional areas displayed in Figure 2, only the occupation category continued to be associated with any meaningful

amount of functional impairment. This situation may be because the work environment affords the individual less opportunity to self-regulate (e.g., take breaks when fatigued). The regimen of a public school teacher mandates an inflexible schedule of work, with little latitude for respite. Consistent with this interpretation of the PDI score for occupation, Maggie was able to return to work by the spring of 2000, but only on a part-time basis.

Maggie volunteered several written comments on the PDI questionnaires she completed on December 27, January 18, and May 16 that clarified her (PDI) reports of functional impairment associated with fibromyalgia. On the December 27 PDI questionnaire, she maintained that she had very little social life because she and her spouse were both teachers. No other comments were noted on the December 27 PDI questionnaire.

On the January 18 PDI questionnaire, Maggie wrote that unless she was on sick leave from work she would not have the energy for social activities and hobbies; instead she would fill her time with work-related activities. She also labeled herself a "workaholic" at this time, stating that "My workaholic problem has gotten way out of hand." She expressed appreciation for the frequent positive feedback provided by the authors, noting the motivational value of positive comments: "... instruction and feedback are incredibly important, especially during initial stages or painful days." Maggie closed with a comment that sheds light on the motivation she found through her participation during the first treatment interval that may well have prompted her continued participation, "The last thing I want to say is that it makes me feel good to know I can have fun and participate in my own 'treatment.'" This same statement from Maggie also suggests that frequent queries from the authors about her perceived pain, how she had felt the preceding day, or how she felt after the preceding session in the pool may have cultivated a sense of perceived control that proved to have a favorable effect on her attitude toward exercise (in spite of pain) and her continued participation (which showed excellent compliance).

No comments were noted on her January 31 PDI questionnaire, but Maggie made ample remarks on the final PDI assessment, completed after treatment interval three was over and returned on May 16. By this time, Maggie's perception of her pain had changed from direct experience of pain to apprehension about causing pain to return and lack of stamina, "... the circled ratings indicated lack of stamina and fear of pain more than actual, ever present pain." She also had recognized her limitations at work and seemed satisfied with the "new" arrangement at school, "I can work half-time doing almost everything I need to do, but I don't think I could do it if I were working full-time." A similar self-assessment was evident when she talked about her recreational and household pursuits, "I can do short bursts of gardening, but I can't kneel or squat comfortably. I probably can paint walls and wash windows, but I can't keep it up for the same periods of time [as before the onset of fibromyalgia]." She concluded that, "Energy spent in the water seems to result in energy gained for the next day."

Authors' Comments

Maggie experienced functional gains shortly after initiation of the program and continued to report a lessening of the impact of fibromyalgia along several functional dimensions (e.g., occupation, recreation, social activity, etc.) throughout the four plus months of treatment. This outcome is consistent with conventional clinical intervention studies (Burckhardt, Mannerkorpi, Hedenberg, & Bjelle, 1994; Martin et al., 1996; McCain, Bell, Mai, & Halliday, 1988; Wigers, 1996) with fibromyalgia using exercise to address symptoms and functional impairment. The most common finding of the larger sample intervention studies has been a reduction of patient-reported pain in conjunction with participation in exercise. For example, Wigers (1996) found that 30 minutes of vigorous exercise, three times per week correlated with

reports of decreased pain, greater work capacity, and fewer complaints about fatigue.

Where professional opinion differs is in the area of the type of exercise recommended. Maggie's program began with an emphasis on flexibility and muscle toning, consistent with Arthritis Foundation (1996a, b) recommendations for arthritis-related impairments in general. Later, as Maggie's fitness improved, more aerobic exercise (i.e., step bench, longer bouts of exercise in deep water, swimming) was included.

Hence, Maggie's program was in agreement with most research which points to a combination of flexibility and cardiovascular exercise as the optimum method of eliciting the most favorable response from a person with fibromyalgia. A 20 week cardiovascular exercise program (60 minutes per session and three sessions per week) implemented by McCain, Bell, Mai, and Halliday (1988) improved pain threshold significantly more than a flexibility exercise program of identical frequency. Martin et al. (1996) found that cardiovascular exercises combined with flexibility activities were superior to a comparable relaxation intervention in reducing the number of reported tender points and "myalgic scores" among fibromyalgia patients. Finally, Burckhardt, Mannerkorpi, Hedenberg, and Bjelle (1994) compared the effectiveness of a fibromyalgia self-management course alone to that of a fibromyalgia self-management course in combination with 6 hours of additional instruction in exercise (including two sessions on pool exercise). Burckhardt et al. discovered that, although both groups improved fibromyalgia self-efficacy scores, only the combination group reported less fibromyalgia impact at follow-up.

Regardless of the specific outcome related to various permutations of pain or functional impairment measures, aerobic exercise, or aerobic exercise in combination with flexibility exercise, have been preferred by researchers. However, dosages of aerobic exercise have varied considerably, from 20 minutes (Martin et al., 1996) to 30 minutes (Wigers, 1996) to one hour (McCain et al., 1988). Our intervention with Maggie replicated this pattern to the extent that both aerobic and flexibility exercises were employed, although the present program was on the low end of the recommended range for the cardiovascular component of the program. Accordingly, Maggie's results were similar with respect to acute pain and long-term relief from the functional impact of fibromyalgia.

The reason aerobic exercise is so commonly recommended for fibromyalgia relates to one of several presumed causes of the disorder. One of the leading explanations for fibromyalgia pertains to sleep deprivation. In this regard, research by Moldofsky and colleagues (1975) is frequently cited. While researching the effects of sleep deprivation in normal, asymptomatic adults, Moldofsky, Scarisbrick, England, and Smythe noted that respondents manifested symptoms similar to those that characterize fibromyalgia—muscle tenderness and pain accompanied by mood disturbance.

Moldofsky speculated that fibromyalgia may be a nonrestorative sleep syndrome. Moldofsky and Scarisbrick (1976) followed up on the sleep deprivation hypothesis with a second study. Once again, healthy sedentary adult respondents manifested fibromyalgia-like symptoms (increased muscle tenderness, muscle pain and stiffness, and fatigue) associated with selective sleep disturbance. Surprisingly though, the researchers were unable to produce fibromyalgia symptoms in a pilot study using three physically active adult distance runners. The three participants who participated in regular aerobic exercise did not develop pain symptoms in association with sleep deprivation.

Relative to the present case, Maggie did report disrupted, nonrestful sleep at night (author's journal notes), accompanied by fatigue and an inability to concentrate during the day. Likewise, following participation in aquatic therapy, Maggie reported resting better at

night, having more energy during the day, and the return of ability to concentrate both at work and during her favorite recreation activity—reading. Although Maggie's experience certainly does not prove that fibromyalgia is a sleep disturbance disorder, it adds to accumulating, correlational evidence which suggests that, at the very least, sleep deprivation is coincident with manifestation of fibromyalgia. Maggie's aquatic therapy experience further suggests that regular cardiovascular exercise may manifest its effectiveness by addressing a co-morbid condition—nonrestorative sleep.

The psychological impact of exercise intervention for persons with fibromyalgia merits attention as well. Maggie made specific mention of the fact that she appreciated the opportunity to "... participate in my own treatment" in her written comments on the PDI questionnaire. Verbal communication and behaviors during the aquatic therapy sessions that likely led to Maggie's perceptions of control included: (a) frequent encouragement from the authors; (b) requests for her opinions on program alterations; (c) responsiveness to Maggie's inquires about additional exercise on her own; and (d) daily adjustments in exercise dosage based on verbal reports from Maggie about pain, muscle tenderness, and fatigue while exercising.

Because fibromyalgia is sometimes studied as a psychosomatic illness, psychological outcomes take on added importance. Some researchers (Granges et al., 1994) maintain that psychological symptoms (e.g., depression) associated with fibromyalgia are more likely related to pain than etiology. Not surprisingly, White and Harth (1996) observed that their patients placed more emphasis on the management of psychological factors than their physicians. Taken together, these observations may explain why non-pharmacological treatments, such as Burckhardt et al.'s (1994) self-management and exercise interventions, produced marked improvements in the self-efficacy scores of their participants with fibromyalgia.

Likewise, Wigers (1996) found that respondents with fibromyalgia were more apt to report global subjective improvement at follow-up if they maintained a program of adequate physical activity after cessation of formal treatment. Wigers' results, especially, point to the critical need to engender perceptions of control and efficacy in participants with fibromyalgia. Because they will eventually "graduate" from scheduled intervention programs, participants will be left to their own devices to manage pain and other symptoms associated with fibromyalgia. If perceptions of self-regulation and confidence are encouraged throughout structured participation, then people with fibromyalgia will be more likely to continue to take responsibility for their own treatment, such as continuing exercise on a regular basis.

This independence, indeed, was our experience with Maggie. Maggie began to seek additional opportunities to exercise in the water on her own. By treatment interval three, she frequently worked out on her own one or more times on the weekend. When Maggie ceased scheduled participation in aquatic therapy, she continued to participate in regular exercise in the water on her own (as of this writing).

Implications

For reasons of practicality and safety (i.e., potential latent cardiovascular pathology among fibromyalgia clients who tend to be middle-aged to older adults), the present authors recommend the following strategies for community-based TR programs interested in working with fibromyalgia cases: flexibility, stretching, and muscle toning for 20 minutes followed by another 20 minutes or so of aerobic exercise of mild to moderate intensity (about the level of difficulty of taking a brisk walk). The cardiovascular interval may be implemented later as the person demonstrates the capacity to tolerate additional exercise of this type. As always, the preceding recommendation is based on the assumption that the par-

ticipant has obtained a physician's permission to embark on any program of vigorous cardiovascular exercise.

Further, our experience as therapists relating with the medical community has been very positive. Physicians and physical therapists have lent support to the aquatic therapy initiative with Maggie and other clients with chronic conditions. This support is in contrast to some impressions among TR practitioners that these parties are reluctant to cooperate with TR efforts. Several casual contacts with medical personnel, speaking at workshops, and taking the initiative to contact a participant's doctor produced results in the way of referrals of persons with chronic conditions, particularly those with musculo-skeletal and joint afflictions. We encourage TR practitioners to articulate their potential contributions to the rehabilitation, maintenance, and health promotion of persons with chronic conditions such as fibromyalgia. Because chronic conditions require an on-going team effort, health care personnel may look to partnerships with other therapies. TR may benefit from this change of attitude on the part of the health care community.

Finally, through the accumulation of scientific studies, TR may advance its credibility among the medical community. However, unlike well-funded health care professions, TR may have to rely on studies of the case report and single subject type. Nevertheless, repeating studies and replicating results will amass the type and strength of evidence needed to demonstrate TR's potential contributions. The present study employed one technique available to TR practitioners, aquatic therapy, but many other alternatives exist.

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