A Retrospective Review of Outcomes of Fibromyalgia Patients Following Physical Therapy Treatments

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ABSTRACT. Objectives: Clinical outcomes for fibromyalgia syndrome [FMS] patients treated with physical therapy interventions have traditionally been unsatisfactory. In an attempt to help our FMS patients, we began to use Upledger's cranial sacral therapy [CST] techniques, along with muscle energy techniques [MET] to correct dysfunctions of the pelvis, sacrum and/or spine. After nearly two years of therapy for some patients, reports of remarkable improvement prompted us to conduct a systematic, retrospective, outcome review of our medical records regarding all patients with FMS.

Methods: Twenty-three patients diagnosed with FMS were treated with Upledger's CST techniques at a physical therapy clinic for a period varying from 1 month to 21 months. Charts from the physical therapist and from the referring physician were studied to gather information regarding the types of treatment, pain levels, activity levels, and any comments regarding the quality of life.

Results: Eighty-seven percent of our FMS patients receiving CST also received MET. Sixty-five percent were initially found to have faulty craniosacral rates, which were normalized with treatment. Following treatment, 61 percent reported pain levels decreased by 50 percent or more. Fifty two percent reported decreased requirement of medications. Four patients progressed to pain free status requiring no medication. Quality of life improvements were noted by 65 percent. Of those whose FMS symptoms had forced reduced employment, three returned to full time work and three reported decreased work absenteeism.

Conclusions: Upledger's CST techniques, in combination with MET, appear to be effective in treatment of FMS. A clinical design for further study of these interventions is provided.

KEYWORDS. Fibromyalgia treatment, physical therapy, cranial sacral therapy [CST], muscle energy techniques [MET], pain reduction, work attendance/absenteeism, quality of life, cranial suture mobility

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INTRODUCTION

This report was prompted by our observations (1) of convincingly positive responses to our outpatient physical therapy treatment combination of Upledger's craniosacral therapy [CST] techniques (2), Greenman's muscle energy techniques [MET] (3) and a follow-up home program. Since 1990, our outpatient physical therapy clinic has treated patients diagnosed with fibromyalgia syndrome [FMS]. Despite the wide range of treatment modalities/techniques utilized between 1990 and April 19, 1999, which included moist heat, electrical muscle stimulation, myofascial release, scar mobilization, spinal mobilization, MET, cervical traction, customized home programs, ultrasound, aquatic therapy, and trigger point therapy including ischemic pressure, spray and stretch with fluoromethane, and strain-counter-strain–the treatments yielded only minimal and temporary decreases in symptoms.

In 1999, one of the authors [MS] was trained in Upledger's craniosacral therapy [CST] 10-step protocol (2), a series of gentle, non-invasive techniques that mobilize and normalize the motion of the cranial bones and the sacrum. This treatment approach is based on the osteopathic theory, developed by Sutherland in 1939 (4), of the movement of the bones of the cranium in a rhythmic manner, and a corresponding motion at the sacrum. Upledger specifically mentions the use of this treatment for patients with chronic pain problems in his textbook [and suggests the addition of mobilization of any somatic dysfunctions to CST techniques]. Contraindications to use of CST are as follows: acute intracranial hemorrhage, intracranial aneurysm, recent skull fracture, and herniation of the medulla oblongata (2).

Shortly before attending this seminar, the author [MS] observed decreased cranial-sacral rhythms in three staff members with FMS, using the "dural tube rock and glide" technique taught by John Barnes in his Myofascial Release Seminars (5). After correcting this dysfunction using Barnes' techniques to allow a normal rock and glide motion, all three [3] staff members reported feeling better. The first staff member, who had been receiving formal physical therapy for six months with only minimal improvement, was very verbal not only about the extent of symptomatic improvement but also the fact that the improvement remained for an entire week. This serendipitous finding, along with the lack of any other satisfactory intervention, led our clinic to begin the use of CST with our FMS patients.

Among the treatment techniques available for inclusion in a treatment regime, our staff uses muscle energy techniques where appropriate to correct movement restrictions at the pelvis, sacrum and spine. Our clinic uses techniques described by Greenman (3), which he describes as "a manual medicine treatment procedure that involves the voluntary contraction of a patient muscle in a precisely controlled direction, at varying levels of intensity, against a distinctly executed counterforce applied by the operator." The MET procedures can be used, for among other conditions, "to mobilize an articulation with restricted mobility" (3). The concept of restricted mobility, or hypomobility, [which we refer to as movement restrictions in this paper], and various physical therapy interventions [mobilization, exercise, MET] can be found in references such as Mailiand (6), Kessler and Hertling (7), Cailliet (8), and Magee (9).

As CST is based on the theory of movement of the cranium and sacrum, we included Greenman's MET to correct movement restrictions, if needed, at the pelvis, sacrum and spine in the treatment sessions. Upon initiating this combination of techniques with our fibromyalgia patients, positive results were observed. Several of our patients reported decreased pain within the typical 45-minute treatment session. This decrease in pain–ranging from two to six points on the visual analog scale, was found to last from several hours to several days. Patients also reported decreased "fibro fog," improved energy levels, and decreased need for pain medications impacting quality of life issues and work attendance. We had not been able to achieve these results with any other intervention or combination of interventions. Over the course of several months, we observed similar results across our patient population, and the decision was made to make this combination of CST/MET interventions the treatment of choice for this diagnosis. As patients' improvement progressed, home programs were developed.

Having observed overall, consistent and positive results from this treatment combination, we concluded that a retrospective review of patient records should be undertaken. It must be pointed out that the resultant data were not based on a prospective design but were merely the voluntary exchange of clinical information between the health care professionals and the reports of efficacy by the patients

METHODS

Patient Population. The charts of 23 patients referred to PT for evaluation and treatment with a diagnosis of fibromyalgia syndrome were examined. These charts were selected based on the referring diagnosis, without regard to the final outcome of the treatment sessions. Patient records from the physical therapist's charts and the outpatient medical records were reviewed and data obtained to determine quantifiable effects. Treatment and charting were completed by five physical therapists and two physical therapist assistants, all of whom were trained in the techniques by the author [MS]. Charted data variables included types of treatment, pain levels, activity levels, quality of life comments and the pharmacy records of the third author's patients. Due to varying referral dates, all patients received CST at some point in their physical therapy. Six patients with referral dates prior to April 20, 1999 were initially treated with the more traditional approaches; their treatment protocols were changed to CST/MET after April 20, 1999. The remaining 17 patients were referred for treatment after April 20, 1999, and therefore received the CST/MET/home program combination.

Movement Restrictions. At the initial examination, spinal motion was examined seeking evidence for strain on the dural tube that might be attributed to its attachments along the spinal canal.

Pain. The Visual Analogue Scale was used for determining pain level. Each patient was asked to indicate their maximum pain the past seven days, that is, the worst they felt; their lowest, or "best pain," and their average or "usual daily pain" levels for the same time period. These levels were recorded during the evaluation visit, and within the last week of treatment.

Treatment. As noted in the introduction, PT treatments given prior to the CST/MET combination were carried out in the traditional manner, but since they had produced minimal temporary results they are not the focus of this paper.

The usual course of treatment normally required MET for correction of movement restrictions in the early sessions. The need for movement restriction corrections decreased to the point of no longer being required during the course of the CST/MET treatment combination.

Following correction of any movement restrictions, the CST 10 step protocol was then carried out, with a slight adjustment. Based on both our clinical observation and verbal feedback from our patients, we altered the sequence of the 10 step CST protocol, so that the occipital cranial base [OCB] technique was followed by techniques for the temporal bone and the temporomandibular joint, followed by working upwards towards the top of the head. For ease of documentation, our clinic converted Upledger's cranial rate norms to six to ten seconds per cycle. Values greater than ten seconds per cycle were considered faulty. Home exercise programs had a two-fold purpose: to afford maximum flow of cerebrospinal fluid within the dural tube and afford the patient's system a more relaxed state between appointments. The programs included techniques to achieve a dural tube stretch and horizontal planes releases. Additional home techniques were assigned as per individual patient needs.

RESULTS

Table 1 shows the demographics of the 23 study subjects, who were referred to the physical therapy clinic over a period of 29 months. The majority were female with an age range from 28 to 61 years of age. They had experienced symptoms for two to 40 years, starting as early as childhood in some. Despite this long symptomatic duration, the diagnoses of FMS had been made only one to seven years before the initiation of CST/MET therapy.

TABLE 1. Demographics of 23 Fibromyalgia Syndrome Patient Subjects Receiving Physical Therapy Interventions for Their Body Pain Symptoms

Category	Findings
Gender:	Female 21; Male 2
Age:	28-61 years
Duration of FMS symptoms:	2-40 years
Onset of symptoms:	Childhood to 2 years prior to start of care
Date diagnosed with FMS:	1992-1998
Years between diagnosis and CST/MET treatment:	1-7 years

Abbreviations: FMS = fibromyalgia syndrome; CST/MET = Upledger's cranial sacral therapy and muscle energy techniques

TABLE 2. Observations Regarding 23 Fibromyalgia Syndrome Patient Subjects Receiving Physical Therapy for Body Pain Symptoms

Measure	Frequency
Impaired Balance Ability	10 patients
Cranial rate at evaluation	70% of patients: 10-76 sec/cycle
Appointment compliance	50%-88%

Abbreviations: % = percent; sec = seconds

TABLE 3. Physical Therapy Treatments Required for 23 Fibromyalgia Syndrome Patient Subjects

Required correction	% of patients
Pelvic dysfunction, including pelvic rotations and flares	65%
Sacral torsions	39%
Movement restrictions of the spine corrected	
Cervical spine	52%
Thoracic spine	52%
Lumbar spine	61%
Ribs	22%

Table 2 shows other clinical findings associated with the study subjects. Since these data were gathered from clinic charts, and the variables were not systematically sampled, as would have been done in a prospective study, some of the data is not available from some of the charts. Ten patients were reported to have a decreased ability to balance, as was tested with a single leg stance test.

Eighty-seven percent of our patients had documentation of movement restrictions requiring MET. Within that group, the types of restrictions were broken down into subgroups by the locations of the limitations, as detailed in Table 3.

Responses to Treatment. Charted notes consistently indicated responses to treatment. On the other hand, there was no uniform list of specific questions, so some variables were not available from some patients.

Responses to treatments within each treatment session included comments by the patients regarding relaxation, and at times, decreased pain. Several patients reported "lightheadedness" or dizziness, which lasted less than 5 minutes, immediately following the treatment. Patients remained at the clinic until these symptoms resolved. These reactions were usually noted in the first several sessions, and were not unpleasant enough for the patient to stop treatment. One [1] patient reported she felt worse after treatment and stopped therapy. Three [3] patients reported to their physicians that the PT did not help, which is why they stopped treatment. Another [1] reported that the first few treatments gave her a headache, but then the headaches stopped and the treatments continued with benefit.

One patient began her course of treatment at our clinic while she was on leave of absence from her job in another city. She improved so much that she was able to return to work. She was given a referral for continued therapy at a clinic close to her job. She returned to our clinic approximately 6 weeks later to continue therapy with us. She stated that the CST techniques used at the other clinic were different than ours, and that ours [Upledger's] seemed to give her more relief.

At the final treatment session, all patients presented without movement restrictions. Final cranial rates were recorded in 65% of the patients. One [1] patient had a rate outside the normal range [16 seconds/cycle]. The others in this group had normal rates, ranging from 7 to 10 seconds/cycle.

Pain levels, summarized in Table 4, were reduced with time in therapy in nearly all the patients. It should be noted that the patients were taking their prescribed pain medications when they documented the initial pain levels. Not only are the pain levels lower at the final

TABLE 4. Visual Analog Pain Levels in Fibromyalgia Syndrome Patients Treated Open-Label with Upledger's Cranial Sacral Therapy Techniques and Muscle Energy Techniques to Correct Dysfunctions of the Pelvis, Sacrum and/or Spine

Pre-Treatment Pain Levels			
	Worst	Best	Usual
Mean	9.29	4.07	6.38
Standard Deviation	1.0071	1.5915	1.6850
Range	6-10	1-6	5-10
Post-Treatment Pain Levels			
Mean	5.17	1.00	2.28
Standard Deviation	1.9462	1.1094	1.7318
Range	3-8	0-3	0-6

assessment but this lowering of the pain level was achieved despite a verbally-reported reduction of concomitant medication in half of the patients. Efforts to confirm the verbal report in the reduction of medication by checking pharmacy records proved futile because the time period was too short for pharmacy records to have changed.

Figure 1 shows the pain levels for each patient pre- and post-treatment. The data indicates pain levels reported as 0/10 above the x-axis. The pain levels were reported to have decreased by 50 percent or more by 61 percent of the patients. Over half [52 percent] of the patients verbally reported they were able to decrease medications. Ten patients reported being pain free [with reduced and/or no medications] during the course of treatment.

The first date reported as being pain free was also recorded. The time interval from initiation of CST treatment to the date first noted to be pain free ranged from 0.5 weeks to 22 weeks, with a mean of 6.5 weeks. Two of the patients first achieved a pain free status at 14 and 22 weeks respectively following initiation of CST. The remaining eight patients first achieved the pain free status on an average of 3.7 weeks after initiation of CST. Four of the 10 patients progressed to a consistently pain free status, with no medication, by the end of treatment.

It had not been our experience that any patients achieved pain free status with any other PT intervention we had tried before initiating the CST/MET regimen. That point is illustrated with one patient who reported having symptoms for 20 years. She began her course of PT treatment 12/11/98. The treatment regimen at that time included stretches, MFR, trigger point massage, manual cervical traction, scar mobilization, modalities, cortisone injection, and aquatics. In her chart were her recorded comments made on 4/14/99: reports some decreased pain, but "not ready to accept symptoms as they are now." The patient was on leave of absence from her job due to her FMS symptoms. The CST treatments were initiated after 4/20/99. She reported she feeling better after just two CST treatments, and returned to full-time work by the end of the year with low pain levels, decreased usage of pain medications, and decreased reactivity to cold exposure.

Additional Symptoms. "Fibro Fog" improved in four patients. Eight patients reported improved energy levels, with increasing levels of activity. Five indicated improved attendance at work. Sensitivity to weather changes was reported to be decreased in several of the patients.

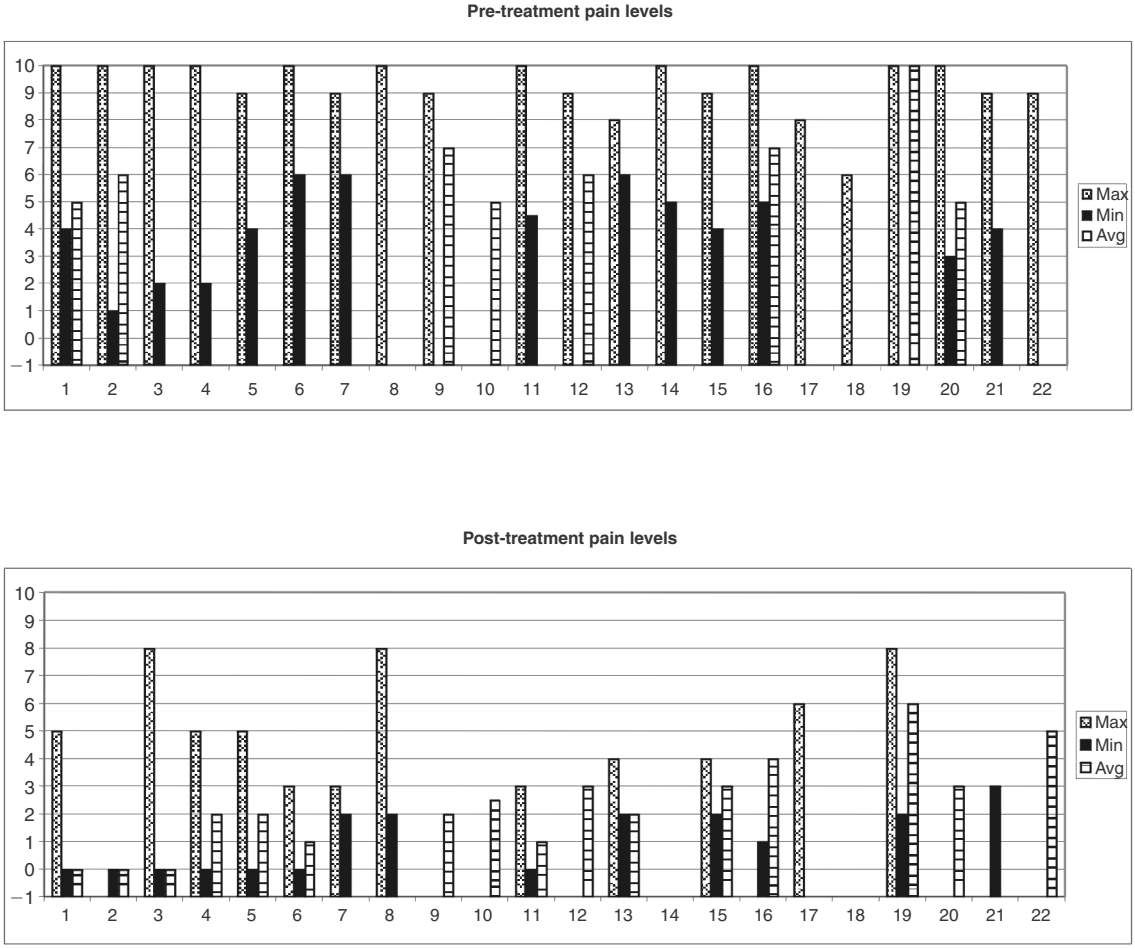
Quality of Life. Sixty-five percent of the patients reported improvements in their quality of life. Examples of quality of life issues and comments that were included in the PT and/or MD charts included the following:

One patient, initially bed-bound and requiring outside assistance, was able to return to caring for her family. Another commented that she was now able to walk the mall like normal, "I haven't been able to do that in four years." She stopped psychological counseling for depression because she felt it was no longer needed.

A third patient, in the summer of 1999, had to hire someone to mow her yard, but by the summer of 2000 was able to mow it herself. Another, who was on disability and reported being unable to function despite her analgesic medications, was able to return to full-time employment.

Two women were able to resume traveling with their husbands and no longer suffered the pain they had regularly experienced before CST/MET treatment.

FIGURE 1. Visual analog pain levels in fibromyalgia syndrome patients treated open-label with Upledger's cranial sacral therapy techniques and muscle energy techniques to correct dysfunctions of the pelvis, sacrum and/or spine.



Notes: Pain levels not available for patient #23; X-axis is each patient; Y-axis is VAS pain scale

DISCUSSION

This is a small population of FMS patients and may not be entirely representative of all FMS patients in the general population.

The goal of manual manipulation therapy is the use of the therapist's hands in the patient-management process, following instructions and maneuvers to achieve maximal, painless movement of the musculoskeletal [motor] system in postural balance. The osseous skeleton is viewed as a series of building blocks stacked one on top of the other, starting with the bones of the foot and ending with the skull. The most important element of the postural structural model, according to Greenman's experience, has been the pelvic mechanics in the walking cycle. The pelvis becomes the cornerstone of the postural structural model (3).

Upledger's techniques are based on the theory that the cranial sutures allow movement throughout life, and that the production and reabsorption of cerebrospinal fluid [CSF] in the ventricles of the brain generates a cyclic motion of widening and narrowing of the cranium (2). By virtue of the dural membrane's connection to both the lining of the cranial vault and the sacrum, this motion is transmitted to the sacrum, which responds with a rhythmic rocking along the dural tube. Upledger theorized that this sets up a circulatory mechanism of the CSF (2). Cranial bones have been shown to move apart with small increases in intracranial volume (10). The National Aeronautical and Space Administration has sponsored studies to develop a non-invasive measurement of intracranial pressure, and a promising device is being tested using ultrasound to detect changes in cranial distance, which is correlated with changes in the pressure (11).

There have been criticisms of CST on the based on the limited interrater reliability of palpation of cranial motion (12,13). Green, Martin, Bassett and colleagues (14) "found insufficient evidence to support craniosacral therapy" yet they acknowledged that "research methods that could conclusively evaluate its effectiveness have not been applied to date." Limited studies would suggest that external manipulation of the cranial bones could affect cranial diameter (15) and structures of the brain (16,17).

It is neither our purpose, nor expertise, to prove or disprove CST theory. What we cannot ignore is the outcomes of this treatment approach as evidenced in this paper. Janet Travell, upon discovering trigger points, remarked "I did not discard the observation based on the grounds that I could not explain it" (18). We strongly believe that the results we have presented, while not fully understood at this time, can become a foundation upon which future research can be based. We believe the following discussion offers interesting overlaps in theories, which would provide additional opportunities for future research.

Patients with FMS are known to show decreased blood flow to certain specific areas of the brain (19,20). Upledger's theory states that these techniques increase fluid and blood flow in the brain (2). Cranial manipulation was shown to affect blood-flow velocity oscillation in its low-frequency Traube-Hering-Mayer components when measured a study by Sergueff, Nelson, and Glonek (21), who concluded that cranial manipulation affects the autonomic nervous system.

Some abnormalities in the metabolism and transmission of CNS serotonin in FMS have been found (22). The CST theory claims that the cranial rhythm pumps the cerebral spinal fluid through the brain and down the spinal canal, where the pumping action of a rocking sacrum pumps the CSF back to the brain (2). If the pumping action is faulty [over 10 seconds per cycle] or insufficient, the serotonin may not be effectively distributed through the system. All FMS patients seen at our clinic presented with prolonged cranial rhythms, which as per Upledger (2), would result in at least a very slow pumping action. Many of the FMS patients also had a faulty dural tube rock and glide, which may interfere with a normal distribution the CSF down the dural tube to the sacrum.

The dural tube is attached to the cranium, to several levels through the spine, and at the sacrum. The dural tube functions at its optimum when it is free of restrictions. Pelvic, sacral and spinal movement dysfunctions can result in torsions, restrictions and other impingements of the dural tube. Muscle energy techniques are essential in correcting the movement dysfunctions, and allowing the dural tube its maximal freedom. Also, if the sacrum is not free to move, it follows that the sacral rocking would be impeded, affecting the circulation of the CSF.

Substance P is known to increase the sensitivity of the nerve to painful stimuli, and is found in elevated amounts in the CSF of patients with fibromyalgia (23,24). We have considered that if the substance P is "sitting" on the nerve root, and is not being "washed away" by a sufficient CSF flow, then substance P could accumulate on the nerve root, increasing sensitivity to painful stimuli.

The anatomical relationship of the foramen magnum and the spinal canal is being addressed by the surgical, osteopathic, and chiropractic professions. Surgery has been performed on patients with Chiari malformation to enlarge a stenosis at the foramen magnum/C1 junction

(25). The junction of the foramen magnum and C1 is addressed in CST techniques. The CST methodology purports that the occiput can become lodged forward on C1, in effect narrowing the space through which the dural tube [filled with CSF] and spinal cord pass. It is conceivable that, although the spinal cord is not compressed or impinged, the misalignment of the foramen could produce a sort of "kink-in-the-hose" [the dural tube], thus disturbing the flow, or restricting the amount of CSF that can freely pass. This misalignment could lead to muscle splinting of the upper cervical muscles, inflammation surrounding the cervical vertebra resulting in mechanical irritation of the nerves, or possibly affect the circulation to the brain (26).

The National Upper Cervical Chiropractic Association [NUCCA] focuses on this area of the body, believing that the brain stem and/or spinal cord can become restricted as it passes through the narrow passageway within the bones of the spine, with faulty positioning of the skull on the atlas. This restriction can disrupt or distort the flow of brain messages that control, maintain and monitor all body functions. When the head and neck are not in alignment, brain health and healing messages cannot pass freely up and down the spinal cord to all parts of the body (27). Patients with traumatic cervical spine injury were found to be 13 times more likely to develop FMS than a control group of patients suffering leg fractures (28).

Based on the results obtained from our own clinical experiences, we believe that Upledger's craniosacral therapy techniques, in combination with muscle energy techniques to correct movement restrictions of the pelvis, sacrum and/or spine, and an appropriate home program, provide effective treatment for painful FMS symptoms.

We are hopeful that this retrospective review of patient charts will stimulate further research into these interventions. Our recommendations would be an experimental longitudinal study of two randomly assigned matched groups; one group receiving the adjusted Upledger 10-step Protocol combined with muscle energy techniques; and the control group receiving a placebo intervention, such as the therapist only monitoring the cranial motion in the same hand positions as the 10-step protocol. The subjects should be individuals who meet the 1990 ACR classification criteria for FMS. We recommend matched groups allowing comparisons including but not limited to gender, key FMS-related symptoms, and the duration of those symptoms. It is possible that the intervention groups should be stratified by craniosacral rate and quality of dural tube rock and glide. Due to the low percentage of males with FMS, we recommend a minimum of 100 subjects. If the number of physical therapists and available facilities can facilitate the subjects we would encourage a larger number of subjects to increase the application of outcomes to the population.

The length of treatment should be six months with a six-month follow-up period. Total involvement time for the subject would be one year. If the experimental group demonstrates improvement, then the subjects in the control group would be brought back and given the same six-month treatment as the experimental group received with a six-month follow-up. Due to this population's response to seasonal weather changes, this recommendation would allow each group to receive the treatment during the similar seasonal conditions.

The frequency of treatment should be three times a week. Once the subject has maintained pain levels of four out of ten for one week, the frequency of treatments can be decreased to two times a week. Once the patient has maintained pain levels of two out of ten for one week, the frequency should be reduced to one session per week. Any reasons for deviating from this frequency outline should be noted.

All assessment instruments should be reported as nominal, ordinal, using Likert scales when possible. Initial and final evaluations would be carried out by a member of the research staff who is effectively blinded to which intervention group the subject has been assigned.

Subjects should complete the following instruments:

1. an intake questionnaire which includes demographics; socioeconomic status; education level, gender, age, body size, date of symptom onset, reason for onset, duration of symptoms, date diagnosed, current

symptoms, current pain levels, employment status/disability status, work attendance, and quality of life. An example of this would be the Fibroquest Questionnaire (29).

2. a daily pain worksheet, which includes physical symptoms, mental/cognitive emotional symptoms, possible exacerbating conditions, changes in medications for FMS, appointment compliance, and commitment to a home therapy program. An example of this would be the daily pain diary worksheet by Craig de Araiza (30).
3. an exit questionnaire would include the information obtained in the initial assessment.

The initial and final evaluations by the physical therapist, blinded to the intervention group assignment, should include pain levels, cranial rate, mechanical dysfunctions in the pelvis, sacrum or spine, balance abilities, and the presence of scars. Daily treatment notes should include pain levels pre- and post-treatment, any reaction to treatment as reported by the subject, reported commitment to home program, MET and CST techniques performed, craniosacral rate prior to CST and after CST, and quality of dural tube rock and glide.

If the ANOVA results indicate that the treatment group has experienced improvement, multiple regression analysis should be conducted to identify variables that might predict treatment success.

If the researcher wishes to compare the pharmacy records to patientverbal reports of medication, we suggest conducting pill counts on a prospective basis.

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