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Effects of Guided Imagery on Outcomes of Pain, Functional Status, and Self-Efficacy in Persons Diagnosed with Fibromyalgia

Victoria Menzies, R.N., Ph.D.[1], **Ann Gill Taylor, R.N., Ed.D., F.A.A.N.**[2], and **Cheryl Bourguignon, R.N., Ph.D.**[2]

[1]Florida International University, School of Nursing, Miami, FL.

[2]Center for the Study of Complementary & Alternative Therapies, University of Virginia School of Nursing, Charlottesville, VA.

Abstract

Objectives—(1) To investigate the effects of a 6-week intervention of guided imagery on pain level, functional status, and self-efficacy in persons with fibromyalgia (FM); and (2) to explore the dose-response effect of imagery use on outcomes.

Design—Longitudinal, prospective, two-group, randomized, controlled clinical trial.

Setting and subjects—The sample included 48 persons with FM recruited from physicians' offices and clinics in the mid-Atlantic region.

Intervention—Participants randomized to Guided Imagery (GI) plus Usual Care intervention group received a set of three audiotaped guided imagery scripts and were instructed to use at least one tape daily for 6 weeks and report weekly frequency of use (dosage). Participants assigned to the Usual Care alone group submitted weekly report forms on usual care.

Measures—All participants completed the Short-Form McGill Pain Questionnaire (SF-MPQ), Arthritis Self-Efficacy Scale (ASES), and Fibromyalgia Impact Questionnaire (FIQ), at baseline, 6, and 10 weeks, and submitted frequency of use report forms.

Results—FIQ scores decreased over time in the GI group compared to the Usual Care group (p = 0.03). Ratings of self-efficacy for managing pain (p = 0.03) and other symptoms of FM also increased significantly over time (p = <0.01) in the GI group compared to the Usual Care group. Pain as measured by the SF-MPQ did not change over time or by group. Imagery dosage was not significant.

Conclusions—This study demonstrated the effectiveness of guided imagery in improving functional status and sense of self-efficacy for managing pain and other symptoms of FM. However, participants' reports of pain did not change. Further studies investigating the effects of mind-body interventions as adjunctive self-care modalities are warranted in the fibromyalgia patient population.

Address reprint requests to: Victoria Menzies, R.N., Ph.D., Florida International University, School of Nursing, 1200 S.W. 8th Street, HLS II, 467, Miami, FL 33199, menzies@fiu.edu.

INTRODUCTION

Fibromyalgia (FM) is the second most common diagnosis in rheumatology clinics, and its estimated prevalence in persons 18 and older in the United States ranges from 3.7 to 6 million.[1,2] Prevalence is higher in women than men and increases with age.[2–4] Although its pathogenesis is not clear, fibromyalgia is characterized by widespread musculoskeletal pain accompanied by multiple tender points, fatigue, and diminished functional capacity.[5–7] Conventional treatment of FM is limited to symptom management. Drug therapy is frequently used to minimize pain, relieve depression, and improve sleep; however, drug therapy has limited success and brings unwanted side effects.[8–10] Thus, in the hope of finding more effective treatment, many persons with FM turn to complementary and alternative practices and products (CAPPs) as an adjunct to conventional health care.[9,10]

Cognitive behavioral therapies (CBTs) constitute one type of nonpharmacologic complementary practice.[11] The clinical rationale for using CBTs is that altering patterns of negative thoughts and dysfunctional attitudes leads to more positive thoughts, emotions, and behavior changes, including improved self-management.[11–13] The assumption underlying cognitive behavioral interventions is that persons' perceptions and evaluations influence their emotional and behavioral reactions to their conditions.[12,14]

Because persons with FM suffer a chronic disease with no known cure, they may believe that the pain and accompanying difficulties in function are uncontrollable. In persons diagnosed with FM, pain has been shown to be influenced by psychosocial factors, as well as by the individual's level of self-efficacy.[15–17] Further, self-efficacy has been found to improve in persons with FM who received cognitive behavioral interventions for symptom management.[13,18,19] Pain perception, however, is not simply a function of physical injury, but is the result of a complex interaction of sensory and cognitive processes and, as such, perhaps can be modulated by both pharmacologic and non-pharmacologic interventions.[20–26] An objective of CBT interventions in patients with FM, thus, is to target the psychologic aspects of this disorder to improve patient function and reduce disability.[13,27]

Guided imagery is one component of CBT that frequently is used. Imagery has been defined as a dynamic, psychophysiologic process in which a person imagines, and experiences, an internal reality in the absence of external stimuli.[28] What makes imagery clinically relevant is that a person who uses imagery may experience an affective, behavioral or physiologic (i.e., psychophysiologic) response without a real stimulus event.[28–30] Thus, mental imagery may be used to alter one's physiologic process, mental state, self-image, performance, or behavior.[21,28,31]

Many researchers have reported that CBT with guided imagery as one component produced significant improvements in functional status and/or self-efficacy and reductions in individuals' pain, emotional distress, and tender point measures.[13,32,33] However, recent reviews of treatments for persons with FM[34,35] have reported that although complementary modalities such as CBTs may be helpful to patients with FM, these interventions have not been adequately evaluated for their incremental effect. Most studies to date have investigated guided imagery as a component of CBTs for FM. Two studies investigated guided imagery as the sole CBT intervention in persons with FM. Fors and Götestam[36] investigated whether a patient education intervention or a pleasant scene guided imagery intervention decreased reports of pain in persons diagnosed with FM. In another study in persons with FM, Fors, Sexton, and Götestam[37] compared pain ratings in three groups (a guided instruction in pleasant imagery and relaxation group, a group receiving imagery focused on pain alleviation, and a control condition of a blank tape with no instructions).

These studies demonstrated that pain ratings improved significantly only in those who used the pleasant imagery. Because only two studies investigated imagery as a sole CBT intervention and the only outcome variable was pain, further studies were warranted. Therefore, the purpose of this study was to investigate the effects of guided imagery on pain perception, functional status, and self-efficacy in persons with FM.

METHOD

Study design

This prospective, longitudinal, two-group randomized controlled clinical trial examined the effectiveness of guided imagery, as an adjunctive modality, in improving self-report of pain, functional status and self-efficacy in persons diagnosed with FM.

Participants

The study sample ($N = 48$) was recruited from physicians' offices and clinics in the University of Virginia Health System. The study protocol was approved by the Investigational Review Board (IRB) of the University of Virginia Health System. Volunteers who agreed to participate signed an informed consent form and were screened for eligibility. Inclusion criteria included age ≥ 18, diagnosis of FM, Mini-Mental Status Examination (MMSE) score >25, and a Fibromyalgia Impact Questionnaire (FIQ) score >20. The MMSE[38] was used to screen out participants who had cognitive impairment. MMSE scores range from 0 to 30, with higher scores indicating higher cognitive functioning. The reliability of the MMSE has been tested in both psychiatric and neurologic populations with test-retest reliability over a 24-hour period in these samples of at least 0.89.[39] Validity is well established.[38–40] The baseline FIQ was used to screen out participants with adequate functional status. The FIQ is a scale that assesses one's ability to move and perform tasks associated with daily activities, thus, scores greater than 20 indicated some level of disability. Exclusion criteria were presence of other systemic rheumatologic conditions or, a major communicative disorder. Self-reported diagnosis of FM was confirmed by the participant's primary physician or rheumatologist.

After signing the consent and completing baseline questionnaires, study participants were randomized with equal probabilities into Usual Care plus guided imagery (GI) or Usual Care alone groups. A random number table was used to generate the order of the group assignments, which were placed in unmarked envelopes. Thus, the next available assignment was not known until the new participant had been recruited and the investigator opened the envelope to reveal group assignment. Fifty individuals were screened; two were excluded because their FIQ scores were <20, leaving 24 participants in each group.

Intervention

The intervention for the study consisted of three guided imagery audiotapes that were used by study participants in the GI group during a 6-week treatment period and a 4-week follow-up period. Guided imagery audiotapes and audiotape cassette players were provided to each participant in the experimental group. The length of time for guided imagery audiotapes used in previous research studies has ranged from 12.5 to 21.5 minutes[41–43]; therefore, a 20-minute relaxation or imagery audiotape was considered to be of sufficient duration to elicit a relaxation and/or imagery response in persons with FM.

The first tape of the three-tape series was a training tape to develop familiarity with relaxation and imagery. Participants were guided through muscle relaxation and release of tension, and encouraged to experience an overall sense of well-being. Study participants also were trained to learn a conditioned response, the signal breath,[44] to elicit relaxation. The

first tape was practiced daily for 2 weeks (weeks 1 and 2). The second tape was a shortened version of the signal breath relaxation script, followed by imagery of a pleasant scene. Participants were encouraged to become familiar with the surroundings of their imagery (elicit sensory involvement), imagine themselves strong and healthy, and emerge from their imagery with a sense of well-being. The second tape was practiced daily for 2 weeks (weeks 3 and 4). The third tape also reinforced the signal breath conditioning for relaxation. The tape reminded participants that they could imagine anything they wanted; therefore, they were instructed to imagine themselves walking onto a theater stage where they were to perform actions and behaviors that represented how they would most like to be were they free of all symptoms of FM (end state imagery). The third tape was practiced daily for 2 weeks (weeks 5 and 6). Participants were instructed to use tapes as frequently as they wished in any week and at least daily for 6 weeks. During a 4-week follow-up (weeks 7–10), participants could choose to use any of the three tapes in any order and were requested to use at least one of the tapes once daily.

MEASURES

Pain

Pain was assessed using the Short-Form McGill Pain Questionnaire (SF-MPQ).[45] The SF-MPQ, which takes 2 to 5 minutes to complete, captures sensory (11 items) and affective (four items) pain, present pain rating intensity (PPI), and pain on a visual analogue scale (VAS) (10-cm line). Sensory pain (SP) scores range from 0 to 33; affective pain (AP) scores range from 0 to 12. A total pain score (0–45) is derived by adding the SP and AP subscale scores,[46],[47] with higher scores indicating more pain. Reliability and validity are well established.[45–48]

Functional status

Functional status was measured by the Fibromyalgia Impact Questionnaire (FIQ),[49] which is composed of 19 items that ask respondents to rate their status within the last week; it takes approximately 5 minutes to complete. Total scores range from 0 to 80, with higher scores indicating more negative impact. Test-retest reliability coefficients for each item on the FIQ ranged from a low of 0.56 for pain to a high of 0.95 for physical function.[49] Reliability and validity have been established.[49],[50] Construct validity was demonstrated by comparison with the Arthritis Impact Measurement Scale (AIMS).[51]

Self-efficacy

Self-efficacy (SE) was assessed using the self-administered Arthritis Self-Efficacy Scale (ASES),[52] which takes approximately 10 minutes to complete. The ASES has 20 items in three subscales: (1) self-efficacy for pain management (PSE); (2) self-efficacy for managing other symptoms (OSE); and (3) self-efficacy for function (FSE). The function subscale was not used in this study because function was assessed with the FIQ, which is more specific to FM. Subjects are asked to rate their confidence in being able to perform given tasks. Subscale scores range from 10 to 100, with higher scores indicating greater self-efficacy.[19],[52] The PSE and OSE subscales were adapted for FM by replacing the word “arthritis” with the word “fibromyalgia,” as used by other researchers.[53],[54] Reliability and validity of the ASES have been established.[52],[53],[55] In the current study, coefficient alphas for PSE were 0.85 (baseline), 0.89 (week 6), and 0.90 (week 10) and for OSE, 0.88 (baseline), 0.91 (week 6), and 0.94 (week 10), reflecting adequate internal consistency with the subscales adapted for FM. The ASES has been successfully used in other studies of persons diagnosed with FM.[53–57]

Dosage

To assess the dose-response effect of imagery use on outcomes, participants in the GI group reported daily use (number of practices) of each tape on a specifically designed frequency-of-use form. This form was accompanied by a stamped, addressed envelope and participants were asked to mail the completed forms to the investigators on a weekly basis.

DATA ANALYSIS STRATEGIES

Descriptive statistics were calculated for all variables. To test for group differences at baseline, chi-square analyses were conducted on categorical variables and *t*-tests were used for continuous variables. Repeated measures analyses of variance (ANOVA) were used to determine differences over time between the groups on all study variables (SF-MPQ Total and its four subscales; FIQ; PSE and OSE). Multiple regression analyses were used to examine the influence of imagery dosage on the study outcome variables (baseline and week 6 scores for FIQ, PSE, OSE), after controlling for absorption and baseline values.

RESULTS

The sample consisted of 48 adults with FM who had a mean age of 49.6 years (SD = 10.53); all but one were female. Education levels ranged from some high school to master's degrees. Race was predominantly white (43 white; four black; one other). The majority of participants were married or living as married (54.2%), and 37% were employed full-time. Income levels ranged from less than $14,000 to more than $50,000; 47.7% reported an income above $50,000. The groups were not significantly different at baseline on demographics or study outcome variables (see Table 1 for means and standard deviations [SD] for study outcome variables at baseline, week 6, and week 10).

Pain

There were no significant differences over time between the GI and the Usual Care alone groups in SF-MPQ total scores (F[1,44] = 1.16, p = 0.29) or the scores on its four subscales, the sensory pain (F(2,88) = 0.53, p **B** 0.59), the affective pain (F(2,86) = 1.44, p = 0.24), the VAS (F(2,88) = 0.66, p = 0.52), and the PPI (F(2,88) = 1.21, p = 0.30). Not only were the differences statistically nonsignificant, but these differences were small enough to not be considered as clinically important differences in pain between the two groups.

Functional status

There were significant differences over time in the functional status of the GI group compared to the Usual Care alone group (F[2,88] = 3.80, p = 0.03). The GI group improved in FIQ scores from baseline to 6 weeks and maintained that improvement from 6 to 10 weeks (see Table 1). There were no significant changes in the Usual Care alone group.

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Self-efficacy

Self-efficacy for managing pain (PSE)—There were significant differences in self-efficacy for managing pain between the GI and the Usual Care alone groups (F[2,88] = 3.72, p = 0.03). The GI group significantly improved their self-efficacy for managing pain from baseline to 10 weeks (see Table 1), whereas the Usual Care alone group did not show any difference over time.

Self-efficacy for managing other symptoms (OSE)—There were also significant differences in self-efficacy for managing other symptoms between the GI and the Usual

Care alone groups (F[1.7, 76.6] = 9.0, $p < 0.01$). The GI group significantly improved their self-efficacy from baseline to 6 weeks as well as from 6 to 10 weeks (see Table 1), whereas the Usual Care alone group did not demonstrate any differences over time.

Dosage

Over the 6 weeks of the study, the frequency of guided imagery practice by participants in the GI group ranged from 37 to 136 times, with a median of 44 times. Frequency of practice over the 4 weeks of follow-up ranged from 10 to 102 times, with a median of 28 times. Multiple regression analyses demonstrated that the amount of tape use (dosage) from baseline to week 6 did not significantly influence week 6 FIQ, PSE, or OSE scores. Similarly, the amount of tape use (dosage) from week 6 to week 10 did not significantly influence week 10 FIQ, PSE, or OSE scores.

DISCUSSION

Functional status

In this study, functional status significantly improved in the GI group at 6 weeks and the improvement was maintained at 10 weeks, compared to the usual care alone group who did not exhibit significant changes. No other studies have investigated the effects of imagery (as sole CBT intervention) on functional status in persons with FM. However, the few studies that have investigated the effects of guided imagery (as one component of CBT) on functional status in patients with FM also reported significantly improved functional status, although follow-up findings varied.[33],[58] Tension-reducing imagery practice included as one component of a 4-week CBT intervention significantly improved general physical functioning; however, at 12 months post-treatment, 75% of the patients receiving CBT had no lasting improvements in functional status.[33] However, in an 8-week uncontrolled pilot study, guided imagery (as one CBT component) significantly improved functional status (FIQ) both at post-treatment and at 4-month follow-up.[58]

Self-efficacy

In the current study, self-efficacy for managing both pain and other symptoms significantly improved in the GI group compared to the usual care alone group. This finding agrees with other similar studies of FM samples.[55],[58–60] For example, Singh et al.[58] reported significant improvements in sense of control over the experience of pain (though not pain intensity). Buckelew et al.[55] found significant differences in self-efficacy for function, but not self-efficacy for pain. These studies, however, used multimodal CBT interventions, whereas in the current study, guided imagery was the sole intervention.

Pain

The guided imagery intervention was not effective in modulating any measures of pain in this study. These results are consistent with suggestions by other researchers that the pain experience may or may not be satisfactorily ameliorated through any one treatment modality, including cognitive behavioral strategies such as guided imagery.[25],[61],[62] Individuals diagnosed with FM may have become so accustomed to chronic pain that guided imagery could not produce responses that might be observed in individuals unaccustomed to such pain.[63],[64] The subjective, private nature of pain, and the subjective nature of FM symptoms in general[3],[34],[64] confound efforts to assess why the guided imagery intervention did not decrease reported pain, yet significantly increased GI participants' functional status and sense of self-efficacy for managing pain. When these findings are compared to the results reported in studies by Fors and Götestam[36] and Fors et al.,[37] the validity of the outcome being attributable to imagery alone is considered limited by the inclusion of music

on the audiotaped imagery scripts[37] and by the inclusion of patient information related to pain management prior to the 30-minute intervention.[36] Music alone has been shown to have a relaxing and potentially analgesic-inducing effect,[65],[66] thus, the inclusion of music with the imagery script confounded the findings of previous studies. Having patient information prior to a procedural intervention is a form of cognitive rehearsal[67] and may, in itself, have influenced *a priori* the patients' sense of control over the pain. Both studies were also limited by the lack of follow-up to determine if the application of the imagery intervention produced long-term effects.

By monitoring and rehearsing various mental images related to improved physical functioning, participants may have gained a feeling of control.[68] Researchers have noted that an individual's sense of self-efficacy promotes self-management behaviors, whereas in turn, the successful use of self-management techniques may increase self-efficacy.[32] Other researchers have suggested that high self-efficacy influences one's ability to control symptom reports, including pain.[55] However, that did not seem to be the case in the current study. Although functional status and self-efficacy for managing pain and other symptoms improved, reports of pain were not significantly reduced in the GI group.

This finding reflects the findings of a meta-analysis,[69] which noted that changes in pain level did not parallel changes in other variables of interest, "including activity level, (and) … rated ability to cope with pain. … "[70](p. 16) Individuals in the current study were apparently unable to change their pain perception, yet they experienced an enhanced belief that they could cope with the pain and other symptoms of FM, with FIQ scores reflecting improved physical function.

The study included a small sample ($N = 48$) of volunteers diagnosed with FM, the majority of whom had higher education levels and incomes, perhaps limiting generalizability. However, the sample was similar in age, gender, race, marital status, and education to other studies involving persons with FM.

DIRECTIONS FOR FUTURE RESEARCH AND EDUCATION

Future studies are needed to explore why pain was not significantly lessened in this study. Because pain is subjective and complex and is rarely constant, measuring individual pre- and post-test pain thresholds of participants with objective assessments such as pain dolorimetry across the length of a study would strengthen the findings. Participants also could be asked to record daily pain perceptions with a valid and reliable pain instrument such as the VAS. Additionally, because analgesic intake is known to influence pain intensity, it would be appropriate to include a validated medication index to register daily medication intake as a predictor variable.[71]

It may be, of course, that too much is being asked of guided imagery as a pain management strategy. The study findings, however, do suggest that one can use GI interventions to improve self-efficacy for managing pain and other symptoms related to FM and improve physical functioning in this population. Because there is no cure on the horizon for FM, it is critical for nurses and other health care professionals to maximize the effectiveness of symptom management. Researchers have shown that people with FM need to be empowered to manage their symptoms,[8],[16],[57] and empowerment has the potential to affect positively both the psychological and physiologic state of these persons.

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Table 1

Differences in Outcome Variables Between Groups Over Time

Outcome variable	Guided imagery mean (SD)	Usual care alone mean (SD)	*p*-Values
SF-MPQ total			
Baseline	16.55 (1.60)	16.46 (1.53)	
Week 6	14.27 (1.95)	17.25 (1.86)	0.38
Week 10	13.86 (1.82)	17.21 (1.74)	
SF-MPQ—Sensory			
Baseline	12.59 (1.25)	12.54 (1.19)	
Week 6	11.23 (1.43)	12.88 (1.37)	0.59
Week 10	11.18 (1.37)	13.13 (1.31)	
SF-MPQ—Affective			
Baseline	3.96 (0.55)	3.74 (0.54)	
Week 6	3.05 (0.65)	4.57 (0.63)	0.24
Week 10	2.68 (0.54)	4.09 (0.53)	
SF-MPQ—VAS			
Baseline	5.79 (0.45)	6.36 (0.44)	
Week 6	4.89 (0.55)	6.20 (0.52)	0.52
Week 10	5.06 (0.46)	5.79 (0.44)	
SF-MPQ—PPI			
Baseline	2.32 (0.23)	2.13 (0.22)	
Week 6	2.09 (0.22)	2.13 (0.21)	0.30
Week 10	2.05 (0.19)	2.33 (0.19)	
FIQ			
Baseline	53.69 (2.28)	52.99 (2.18)	
Week 6	40.49 (3.25)	48.83 (3.16)	0.03
Week 10	39.73 (3.03)	49.17 (2.90)	
PSE			
Baseline	51.91 (4.72)	50.75 (4.52)	
Week 6	58.25 (4.82)	45.75 (4.61)	0.03
Week 10	64.73 (4.69)	49.83 (4.49)	
OSE			
Baseline	50.46 (4.66)	53.61 (4.46)	
Week 6	61.59 (4.56)	49.38 (4.37)	<0.01
Week 10	70.99 (4.16)	51.81 (3.98)	