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Treating fibromyalgia with mindfulness-based stress reduction: Results from a 3-armed randomized controlled trial ☆

Stefan Schmidt [a,c,d,e,*], Paul Grossman [b], Barbara Schwarzer [a], Susanne Jena [a], Johannes Naumann [a], Harald Walach [c,d]

[a] Department of Environmental Health Sciences, University Medical Center, Freiburg, Germany
[b] Psychosomatic Medicine, University of Basel Hospital, Basel, Switzerland
[c] Institute for Transcultural Health Studies, European University Viadrina, Frankfurt (Oder), Germany
[d] Samueli Institute, European Office, Brain, Mind and Healing Programme, Germany
[e] Heymans Chair of Exceptional Human Experiences, University for the Humanistics, Utrecht, The Netherlands

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ABSTRACT

Mindfulness-based stress reduction (MBSR) is a structured 8-week group program teaching mindfulness meditation and mindful yoga exercises. MBSR aims to help participants develop nonjudgmental awareness of moment-to-moment experience. Fibromyalgia is a clinical syndrome with chronic pain, fatigue, and insomnia as major symptoms. Efficacy of MBSR for enhanced well-being of fibromyalgia patients was investigated in a 3-armed trial, which was a follow-up to an earlier quasi-randomized investigation. A total of 177 female patients were randomized to one of the following: (1) MBSR, (2) an active control procedure controlling for nonspecific effects of MBSR, or (3) a wait list. The major outcome was health-related quality of life (HRQoL) 2 months post-treatment. Secondary outcomes were disorder-specific quality of life, depression, pain, anxiety, somatic complaints, and a proposed index of mindfulness. Of the patients, 82% completed the study. There were no significant differences between groups on primary outcome, but patients overall improved in HRQoL at short-term follow-up ($P = 0.004$). Post hoc analyses showed that only MBSR manifested a significant pre-to-post-intervention improvement in HRQoL ($P = 0.02$). Furthermore, multivariate analysis of secondary measures indicated modest benefits for MBSR patients. MBSR yielded significant pre-to-post-intervention improvements in 6 of 8 secondary outcome variables, the active control in 3, and the wait list in 2. In conclusion, primary outcome analyses did not support the efficacy of MBSR in fibromyalgia, although patients in the MBSR arm appeared to benefit most. Effect sizes were small compared to the earlier, quasi-randomized investigation. Several methodological aspects are discussed, e.g., patient burden, treatment preference and motivation, that may provide explanations for differences.

1. Introduction

Fibromyalgia is a frequently diagnosed pain disorder primarily affecting women and showing high comorbidity with other functional somatic disorders and depression [47]. So far, no distinct cause or pathology has been identified. Recent research indicates that fibromyalgia patients may manifest dysfunctional pain processing of central origin [1] and, possibly, impaired cardiovascular autonomic regulation [36]. Pharmacological treatment of the disorder has proved difficult, perhaps because of its nonspecific pathophysiology. Thus, central nervous agents, such as tricyclic antidepressants [25], selective serotonin, and norepinephrine reuptake inhibitors [3,41] or pregabalin [16], have been found to be moderately successful, but only for relatively short periods of time [15]. Only a few nonpharmacological interventions appear to confer even moderate benefits, i.e., mainly cardiovascular exercise, cognitive–behavioral therapy and patient education [18], or a combination of these [23]. However many of these benefits are also short-lived.

Another proposed behavioral intervention for fibromyalgia is *mindfulness-based stress reduction* (MBSR), an 8-week, structured group program using mindfulness meditation techniques and mindful yoga exercises [27]. MBSR aims to help participants to develop nonjudgmental awareness of moment-to-moment experience, importantly within a context of openness, kindness, tolerance, and acceptance of perceptible sensory, mental, and emotional phenomena. A body of evidence indicates that MBSR can improve coping and health-related quality of life (HRQol) in many chronic conditions, including chronic pain [20,37].

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* Corresponding author. Address: Department of Environmental Health Sciences, University Medical Center Freiburg, Breisacherstr. 115b, 79106 Freiburg, Germany. Tel.: +49 761 270 83050; fax: +49 761 270 83430.
E-mail address: stefan.schmidt@uniklinik-freiburg.de (S. Schmidt).

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So far, 8 trials have assessed MBSR, specifically, or mindfulness-based techniques in combination with other educational/behavioral techniques among patients with fibromyalgia. Studies in the latter category were either uncontrolled [14] or did not find significant differences in the primary outcome [4,33]. Of the 5 trials directly evaluating MBSR, one showed clinical improvement but was uncontrolled [29]; a later trial with a nonrandomized wait-list control group reported significant differences on several fibromyalgia-related visual analogue scales (VAS), the Fibromyalgia Impact Questionnaire (FIQ, $P = 0.05$) and the symptom checklist SCL90 ($P = 0.0001$) [19]. A third randomized investigation with wait-list controls showed significant improvements in depression [42], and a fourth uncontrolled trial study provided indications of significant changes in psychophysiological variables [32]. Finally, the fifth study is the direct forerunner of the current investigation [21]. In a quasi-randomized design, 39 female fibromyalgia patients received MBSR; 13 control patients were assigned to an active control procedure designed to match for nonspecific effects of MBSR. MBSR showed strong effects in comparison to the control group for HRQoL (effect sizes ranged from $d = 0.52–1.12$), pain ($d = 1.10$), depression (0.39), anxiety (0.67), and coping abilities (0.34–0.88). In a 3-year observational follow-up, the MBSR group of patients maintained significant improvement in all these variables, compared with preintervention. On the basis of these positive findings, we decided to replicate and extend this study, adding an additional control group.

Health-related quality of life (HRQoL) was chosen in this trial as the primary outcome, because severely impaired HRQoL is a central feature of fibromyalgia for some people, and relatively strong effects on HRQoL have been observed in earlier studies of MBSR and fibromyalgia [21].

2. Methods

2.1. Design

A 3-armed randomized trial was conducted in which female patients were randomly assigned to (1) MBSR, (2) an active control intervention aimed at equating the nonspecific features of MBSR, or (3) a wait-list control group. The primary endpoint was a measure of HRQoL (see also below) at short-term follow-up, 8 weeks postintervention.

We hypothesized that (1) active treatments, i.e., MBSR and active control, would yield greater improvement than wait-list control, and (2) MBSR patients would manifest greater benefits than patients with the active control intervention. The primary outcome was overall score of HRQoL related, in general, to chronic disorders. Secondary outcomes were disease-specific (fibromyalgia) QoL, sleep quality, anxiety, depression general complaints, and pain sensation. All measures were assessed by means of standardized and validated self-report inventories.

Baseline measurements were completed after determination of eligibility (preintervention *baseline*, 0 weeks), and patients were subsequently allocated to one of the 3 study arms. Patients were again assessed after the 8-week intervention or waiting period (*end of intervention*). Patients were then asked to continue to practice their mindfulness exercises and homework for an additional 8 weeks, and they were evaluated a third time at *short-term follow-up*. Changes in outcome variables from preintervention to short-term follow-up were used for the main outcome analysis.

Sample size was determined on the basis of our meta-analysis of controlled MBSR trials, in which we found a mean effect size of $d = 0.53$ [20]. This effect size results in $1\text{-}\beta = 0.89$ ($\alpha = 0.05$) for $N = 60$ patients per group or $N = 180$ patients overall. With maximal attrition assumed to be 20%, the power remains $1\text{-}\beta = 0.82$.

2.2. Participants

Women 18–70 years of age who currently had fibromyalgia, as defined by the American College of Rheumatology (ACR) criteria [48], were eligible for the trial. Additional inclusion criteria were command of the German language and motivation to participate. Exclusion criteria were life-threatening diseases, evidence of suppressed immune functioning, or participation in other clinical trials. Participants were recruited via patient self-help groups, news media, and referrals from general practitioners, rheumatologists, and the University of Freiburg Medical Center Interdisciplinary Pain Unit. During an intake examination at the hospital, patients were evaluated for all eligibility criteria and were examined by an experienced physician who used ACR criteria to confirm diagnosis of fibromyalgia.

Informational brochures were then provided that briefly described the 2 interventions as alternative behavioral treatments potentially capable of enhancing the well-being in fibromyalgia patients. No suggestion was made about the superiority of either treatment. Information was collected concerning ongoing medical, pharmacological, psychotherapeutic, or other interventions for the disorder, but patients were not asked to discontinue any treatments. This study was approved by the University of Freiburg Ethics commission, and all patients completed informed consent before enrollment.

2.3. Interventions

Consenting eligible patients were randomly assigned to 1 of 3 study arms: the experimental intervention (mindfulness-based stress reduction [MBSR]), an active control intervention, and a wait-list group. Patients in the intervention arms were told that 2 new innovative treatments were to be compared, one based on the concept of mindfulness (entailing meditation and yoga lessons, as well as homework), and the other based on health support techniques (entailing relaxation and stretching exercises, as well as homework). The active control group was referred to as the relaxation group. All patients participating in one of the 2 active treatment arms were also offered participation in their treatment of choice after completion of the trial.

2.3.1. MBSR

The MBSR intervention was closely based on the original program [26] and was identical to that used in the earlier investigation [21]. The intervention comprised an 8-week structured program with groups of up to 12 patients, taught by a single instructor. Participants took part in one 2.5-h session every week, and an additional 7-h all-day session on a weekend day. Each session covered specific exercises and topics within the context of mindfulness practice and training. These included various types of formal mindfulness practice, mindful awareness of dynamic yoga postures, and mindfulness during stressful situations, and social interactions. The all-day retreat included a combination of previously used and newly introduced mindfulness exercises. Upon enrollment, participants were asked to commit themselves to daily homework assignments of 45–60 min. Instructors were 2 women with university level degrees in educational counseling who had undergone MBSR training provided by the UMass Medical Center for Mindfulness, Worcester, MA. Each had at least 7 years of previous experience teaching MBSR, as well as experience teaching fibromyalgia patients.

Pre- and postintervention 1-h personal interviews were conducted by each instructor to establish rapport and to help patients formulate realistic individual goals for the intervention. Postintervention interviews addressed participants' personal experiences