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ORIGINAL ARTICLE

Impact of a short-term, mindfulness-based stress reduction program on the well-being of infertile women: a mixed-method study

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ABSTRACT

Background: Mind-body skills groups represent an experiential approach to teaching antistress techniques that can enable a person to achieve mindfulness, self-awareness and self-reflection, to engage in self-care. This study examined whether a short-term mindfulness-based stress reduction (MBSR) program improved the well-being of infertile women.

Methods: A cohort of 25 women was enrolled at a public academic center of reproductive medicine, while on the waiting list for *in vitro* fertilization (IVF). The MBSR intervention consisted of 12 weekly sessions of mindfulness meditation, relaxation, autogenic training, biofeedback and guided imagery. The participants completed a qualitative, open-ended questionnaire and the Psychological General Well-Being Index (PGWBI) questionnaire to assess anxiety, depressed mood, positive well-being, self-control, general health and vitality, before and after the intervention period. Data were analyzed by paired *t*-test and by 95% confidence interval.

Results: The qualitative analysis revealed 5 central themes in patients' responses to the questionnaires: connections, self-discovery, stress relief, learning and consciousness. Total PGWBI score increased by 17% (mean difference 14.1 ± 3.9 points, $p<0.01$), and all subscales improved after the intervention course compared with the preintervention values.

Conclusions: Both qualitative and quantitative assessment suggest that a 12-week MBSR program may improve the general well-being of infertile women awaiting IVF.

Keywords: Antistress program, Infertile women, Mindfulness

Introduction

Women are delaying their decision of motherhood and are consequently facing a greater likelihood of not having a successful pregnancy (1). As defined, infertility is the inability to conceive after 12 months of unprotected sexual intercourse for women under 35 years or 6 months for women over 35 years (2, 3). Currently about 8 million people worldwide are having difficulties conceiving (4), which is highly stressful particularly for women (5, 6). Infertility and pelvic pain can be the predominant symptoms of endometriosis, a disease that affects a minimum of 10% of women in their reproductive years (7).

Infertility can be associated with chronic stress, especially due to psychological difficulties (8). Women who seek fertility treatment to become pregnant undergo a heavy toll on their bodies physically and emotionally as well as on their finances, even if the cause of infertility is due to their partner (9, 10). Patients with infertility can experience psychological symptoms similar to those associated with cancer, hypertension and cardiac rehabilitation (11). Psychological problems are very common in infertile couples, ranging from 25% to 60% (12), and can be perceived as depression, anxiety, interpersonal problems, suppressed anger, frustration and feelings of inferiority and guilt (13, 14). Inversely, evidence suggests that preconception stress increases the risk of infertility (15) and that women undergoing *in vitro* fertilization (IVF) treatment may achieve higher pregnancy rates when they are engaged in behavioral therapy groups (16) or treated with fluoxetine and psychotherapy (17).

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The use of mindfulness-based stress reduction (MBSR) therapies to reduce psychological symptoms of distress and to enhance quality of life has been steadily increasing in various settings in both mental and health care (18-20). These MBSR interventions aim at the cultivation of a nonjudgmental awareness of whatever is happening at each successive moment of perception (18). Research over the past 2 decades supports the idea that mindfulness meditation – practiced for reduction of stress and constituting the core of the MBSR program – exerts beneficial effects on physical and mental health, and cognitive performance (21), including symptoms of general distress (22-24), worry, rumination, anxiety (25), depressive symptoms (22, 23), sleep quality (26, 27), pain (19) and quality of life (24, 28, 29).

Therefore, the aim of this study was to investigate whether a short-term MBSR program would improve the well-being of infertile women awaiting IVF.

Methods

Study design and ethical approval

A cohort of 25 women was enrolled at a public academic center of reproductive medicine in Belo Horizonte, Brazil, while on the waiting list for IVF. The project was reviewed and approved by the institutional review board (Comitê de Ética em Pesquisa da UFMG), and all subjects provided informed consent prior to entering the study.

The inclusion criteria were age 18-40 years, being on the IVF waiting list, availability to attend at least 8 of the 12 scheduled intervention sessions and recalling that they felt distressed at least "regularly" or "often" in the previous 4 weeks. Severe psychopathology (e.g., suicidal ideation) was an exclusion criterion.

Intervention

The MBSR program followed the Georgetown University School of Medicine (GUSOM) protocol, as described elsewhere (30, 31). The groups had 8-10 participants and 1 leader, and they met for 2 hours every week over 12 consecutive weeks. Each session included relaxation techniques, controlled breathing, autogenic training, biofeedback, guided imagery and several forms of meditation, as well as drawings and written exercises for self-awareness and self-expression (30, 31) (Fig. 1). Sessions began with a brief meditation and a "check-in" that provided an opportunity for self-expression (Fig. 2). All members of the group shared aspects of their daily experiences, discussed any issues they had had and explored any insights they had had about themselves. Participants were also compelled to share 1 positive event that had happened in their lives the past couple of days, in their exercise practice, diary writing and mindfulness practice.

Outcome assessment

Before and immediately after the MBSR program, participants were surveyed about the impact of the techniques on self-awareness, self-reflection and stress management.

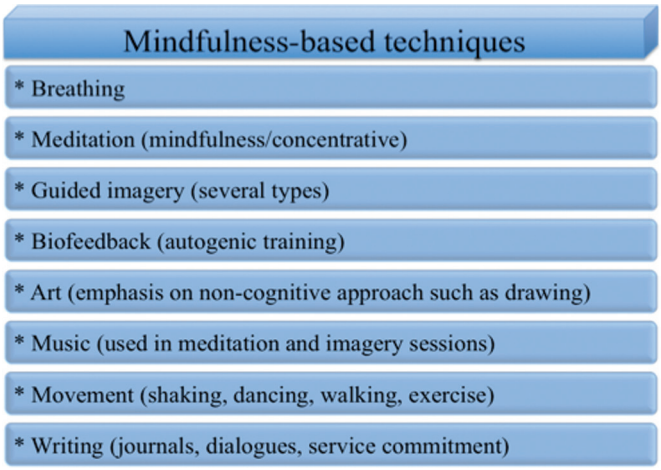

Fig. 1 - Techniques used in the mindfulness-based stress reduction (MBSR) program.

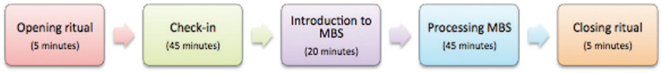

Fig. 2 - Protocol of mindfulness-based stress reduction (MBSR) sessions.

A mixed method (qualitative and quantitative tools) was used to assess the main study outcome, which was general well-being.

The qualitative survey was adapted from the GUSOM protocol (30) to gain information about self-discovery and stress reduction, and comprised the following questions:

Q1. What did the MBSR course mean to you?
Q2. Has the MBSR course helped you as a professional and a person?
Q3. Do you believe the MBSR techniques will contribute to your work as a professional?
Q4. Have the MBSR techniques changed your personal and professional relationships?
Q5. Did the leader create a nonjudgmental and safe place for the MBSR group?
Q6. Did the leader have enough knowledge and skills to facilitate the MBSR groups?

The quantitative assessment was carried out with the Psychological General Well-Being Index (PGWBI) tool (32). The PGWBI questionnaire has 22 self-administered items, rated on a 6-point scale, and assesses psychological and general well-being in 6 dimensions: anxiety, depressed mood, positive well-being, self-control, general health and vitality. Each domain is defined by a minimum of 3 and a maximum of 5 items. The scores for all domains can be summarized to provide a total score, which reaches a maximum of 110 points, representing the best achievable well-being, and the lower scores indicating more severe distress. It took approximately 10 minutes for each participant to complete the PGWBI questionnaire.

Statistical analysis

Each subscale score and the global PGWBI scores obtained before and after the intervention were summarized as means ± standard error and 95% confidence intervals, and differences between means were checked for statistical significance using a paired Student's *t*-test. The sample size was calculated to detect a minimum difference of 10 points in the total PGWBI score, with statistical power of 80% and type I error of 5%.

Results

Qualitative results

Patient responses to open-ended questions about their experiences during the course pointed to heightened self-awareness and a greater understanding of the importance of self-care as well as development of coping skills to deal with the demands of fertility treatments. The qualitative analysis revealed 5 central themes in patients' responses to the questionnaires: connections, self-discovery, stress relief, learning and consciousness.

Many patients expressed feelings of being isolated and alone during the process of assisted reproduction treatment (ART). They stated that the MBSR group helped dispel these feelings, allowing them to get to know other women they would not otherwise have had a chance to meet. Patients felt that the group provided a safe place to express their feelings and share thoughts about themselves and their relationships. Expressions of feelings about their experiences of infertility and its treatment provided a much-needed outlet, as exemplified in the following statement:

> *I have no words to describe the way the program helped with my personal life. As part of the group I learned that now I can talk about my problem (infertility) without having feelings of insignificance. I know that I am not excluded and do not feel like a victim anymore.*

Patients stated that the MBSR sessions helped them physically and emotionally. They reported a positive impact on their personal lives due to reduced stress levels. They saw the benefit in their personal and professional relationships, as exemplified in the statements:

> *The program certainly helped me with my personal life in many ways: it brought me peace necessary to continue on the road…*
> *The techniques helped me improve my behavior in situations where emotional balance was especially needed.*

Quantitative results

Total PGWBI score increased by 17% (mean difference 14.1 ± 3.9 points, $p<0.01$), and all subscales improved after the intervention course compared with the preintervention values. A null hypothesis of no difference between the means was clearly rejected for all dimensions ($p<0.05$), except for self-control ($p = 0.131$). In addition, the 95% confidence interval for mean score change excluded zero for all dimensions (except self-control) and for the global PGWBI score (Tab. I).

Discussion

The role that stress plays in infertility remains controversial (33). The majority of research regarding the linkage between stress and infertility has been derived from cross-sectional studies of couples undergoing infertility treatment, with few derived from prospective cohorts (34). After a pioneering study conducted in the United Kingdom (35), with prospective evaluation of stress in relation to time-to-pregnancy (TTP), Lynch et al demonstrated a temporal association between alpha-amylase (a sympathetic adrenomedullary biomarker of stress) and both TTP and infertility (15).

Obversely, infertility is an important cause of stress, and women submitted to infertility treatments need professional support to cope with the disease burden and treatment challenges. Several clinical trials have begun to establish the efficiency of mindfulness meditation, the main mindfulness-based technique of the MBSR program, on disorders such as depression (36) and generalized anxiety (37). According to recent studies on brain activity following mindfulness meditation, the effects of this practice on neural function might

TABLE I - PGWBI subscale scores and global index before and after the study intervention

Subscale	PGWBI items	Before	After	Difference	95% CI	t	p Value
Anxiety	5, 8,17,19, 22	18.0 ± 0.9	22.9 ± 0.8	4.9 ± 1.0	2.8-7.0	4.85	0.000
Depressed mood	3, 7, 11	13.0 ± 0.6	14.2 ± 0.5	1.2 ± 0.6	0.0-2.4	2.12	0.044
General health	2, 10, 13	12.4 ± 0.6	14.2 ± 0.5	1.7 ± 0.6	0.4-3.0	2.78	0.010
Positive well-being	1, 9, 15, 20	14.9 ± 0.6	17.6 ± 0.6	2.7 ± 0.7	1.3-4.2	3.84	0.001
Self-control	4, 14, 18	12.0 ± 0.6	13.1 ± 0.6	1.1 ± 0.7	0.3-2.5	1.56	0.131
Vitality	6, 12, 16, 21	14.5 ± 0.7	17.0 ± 0.8	2.5 ± 1.1	0.2-4.7	2.28	0.032
Global index score	1-22	84.8 ± 3.1	99.0 ± 3.3	14.1 ± 3.9	6.1-22.2	3.63	0.001

Values are means ± standard error, unless specified otherwise.
CI = confidence interval; PGWBI = psychological general well-being index.

be mediated by stress reduction (21). Despite the fact that various studies have demonstrated the importance of the mind-body connection and fertility, the psychosocial aspects of infertility have not yet been fully addressed.

In the present study, the women on the waiting list for IVF procedures who participated in a 12-week MBSR program provided reflective and intuitive comments about their experience as patients, individuals and future mothers. The central themes of connections, self-discovery, learning and stress relief, as well as their attitudes toward ART suggested that MBSR groups benefited patients in several ways. These included making the stress of infertility and ART more manageable, enhancing their awareness, presenting the opportunity for self-care and improving a sense of community and social support among patients. However, the participants in these elective groups were highly self-selected. Further investigation is needed to evaluate whether the intervention is effective for unselected patients undergoing fertility treatments in general, and in particular whether this translates to long-term outcomes such as self-care and better response for IVF and other ART techniques.

Our results in this specific subpopulation of infertile patients suggest that MBSR groups are a valuable experiential approach to promoting self-awareness, self-reflection and self-care. Increased mindfulness accounts for changes in mood and perceived stress that explain, in part, the positive impact of MBSR interventions on stress coping. Further investigation needs to use longitudinal, randomized and actively controlled research designs and larger sample sizes to advance the understanding of the mechanisms of MBSR program as a complementary treatment to ART. If supported by rigorous research studies, the practice of mindfulness meditation – the main MBSR technique – might be promising to facilitate the cultivation of a healthy mind and increased well-being for infertile women undergoing ART.

Disclosures

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