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Effect of mindfulness based stress reduction on immune function, quality of life and coping in women newly diagnosed with early stage breast cancer

Linda Witek-Janusek [a,*], Kevin Albuquerque [b], Karen Rambo Chroniak [c], Christopher Chroniak [c], Ramon Durazo-Arvizu [d], Herbert L. Mathews [e]

[a] *Niehoff School of Nursing, Loyola University of Chicago, Maguire Center, Room 2840, 2160 South First Avenue, Maywood, IL 60153, USA*
[b] *Cardinal Bernardin Cancer Center, Loyola University of Chicago Medical Center, Maywood, IL 60153, USA*
[c] *Insight Center for Stress Management and Integrative Psychotherapy, Chicago, IL 60603, USA*
[d] *Preventive Medicine, Stritch School of Medicine, Loyola University of Chicago, Maywood, IL 60153, USA*
[e] *Department of Microbiology and Immunology, Stritch School of Medicine, Loyola University of Chicago, Maywood, IL 60153, USA*

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Abstract

This investigation used a non-randomized controlled design to evaluate the effect and feasibility of a mindfulness based stress reduction (MBSR) program on immune function, quality of life (QOL), and coping in women recently diagnosed with breast cancer. Early stage breast cancer patients, who did not receive chemotherapy, self-selected into an 8-week MBSR program or into an assessment only, control group. Outcomes were evaluated over time. The first assessment was at least 10 days after surgery and prior to adjuvant therapy, as well as before the MBSR start-up. Further assessments were mid-MBSR, at completion of MBSR, and at 4-week post-MBSR completion. Women with breast cancer enrolled in the control group (Non-MBSR) were assessed at similar times. At the first assessment (i.e., before MBSR start), reductions in peripheral blood mononuclear cell NK cell activity (NKCA) and IFN-γ production with increases in IL-4, IL-6, and IL-10 production and plasma cortisol levels were observed for both the MBSR and Non-MBSR groups of breast cancer patients. Over time women in the MBSR group re-established their NKCA and cytokine production levels. In contrast, breast cancer patients in the Non-MBSR group exhibited continued reductions in NKCA and IFN-γ production with increased IL-4, IL-6, and IL-10 production. Moreover, women enrolled in the MBSR program had reduced cortisol levels, improved QOL, and increased coping effectiveness compared to the Non-MBSR group. In summary, MBSR is a program that is feasible for women recently diagnosed with early stage breast cancer and the results provide preliminary evidence for beneficial effects of MBSR; on immune function, QOL, and coping.

Keywords: Breast cancer; NK cell activity; Cytokines; Coping; Optimistic coping; Supportant coping; Quality of life; Psychoneuroimmunology

1. Introduction

Cancer diagnosis of any type evokes fear and dread, but for women a diagnosis of breast cancer is an especially devastating emotional experience (Shapiro et al., 2001; Stark and House, 2000), as breast cancer is the second leading cause of deaths due to cancer in American women (ACS, 2007). Anxiety, fear, depression, and uncertainty are prevalent at diagnosis (Northouse, 1992; Spiegel, 1996, 1997; Stark and House, 2000; Witek-Janusek et al., 2007) and distress typically intensifies with treatment burden (Berger, 1998; Nail and Winningham, 1995; Schreier and Williams, 2004; Theobald, 2004). The emotional response to breast cancer is independent of disease stage, as women diagnosed with non-invasive breast cancers also experience powerful emotions (Witek-Janusek et al., 2007; Northouse, 1992;

* Corresponding author. Fax: +1 708 216 9574.
E-mail address: ljanuse@luc.edu (L. Witek-Janusek).

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Rakovitch et al., 2003). The emotional impact of a cancer diagnosis and the rigors of cancer treatment adversely affect quality of life (QOL) and this may persist beyond treatment (Longman et al., 1999). Evidence demonstrates that psychosocial variables during diagnosis and treatment are key predictors of both short-term and long-term quality of life (Carver et al., 2005, 2006) and emphasize the importance of early psychosocial intervention for individuals diagnosed with cancer.

Emotional distress activates neuroendocrine stress–response systems and increases stress hormone secretion (Chrousos and Gold, 1992; Chrousos, 2000). Stress hormones are well known to alter immune function (Kiecolt-Glaser et al., 2002; Sanders and Kavelaars, 2007; Schoneveld and Cidlowski, 2007). Breast cancer diagnosis and treatment leads to psychological and immunological disturbance. Women who report greater subjective stress after breast cancer surgery, but prior to adjuvant therapy, have lower basal and interferon (IFN) augmented NK cell activity (NKCA) and reduced T cell proliferative response to mitogens (Andersen et al., 1998, 2004). We have previously shown that this stress-induced immune dysregulation begins early in the diagnostic phase, as women stressed by the experience of breast biopsy have lower production of IFN-γ but increased production of IL-4, IL-10, and IL-6, when compared to non-biopsied control women (Witek-Janusek et al., 2007). This increase in IL-4 and IL-10 is similar to results of other studies in non-cancer populations that demonstrated stress-associated shifts in Th1/Th2 cytokine balance toward a Th2 response (Maes et al., 1999; Marshall et al., 1998).

Integrative approaches to promote wellness and reduce the distress associated with cancer are increasingly considered as essential components of cancer care. Mindfulness based stress reduction (MBSR) is a program that shows promise as an approach to not only mange the emotional distress that accompanies disease, such as cancer, but to also produce biological benefits that may promote health and contribute to cancer control (Grossman et al., 2004). MBSR, as developed and propagated by Jon Kabat-Zinn, stems from contemplative Eastern spiritual practices that use meditation to cultivate conscious awareness (i.e., mindfulness) of one's experience in a non-judgmental or accepting manner (Kabat-Zinn, 1990). In predominately non-controlled studies of individuals with a variety of medical conditions, MBSR has been shown to assist individuals to more skillfully manage emotions and somatic reactivity to life stressors (Bishop, 2002; Grossman et al., 2004). Speca and colleagues have demonstrated, using a randomized wait-list control design, that MBSR benefits individuals who continue to harbor emotional distress well beyond their cancer diagnosis and treatment. In that study, MBSR was effective at reducing symptoms of stress and mood disturbance compared to the control group (Speca et al., 2000). A follow-up of the combined group of MBSR participants (immediate intervention group and the wait-list MBSR participants) from the Speca et al. study showed that although the greatest psychological benefit was observed at completion of the program, effects persisted at 6 month (Carlson et al., 2001) and at 1-year follow-up (Carlson et al., 2007). A series of uncontrolled evaluations in cancer patients showed that MBSR improved QOL, increased sleep quality (Carlson et al., 2003), and attenuated disturbed cortisol secretory patterns (Carlson et al., 2004, 2007).

Given that MBSR reduces psychological distress, it is possible that it may also reverse stress-associated immune dysregulation in cancer patients. Optimal immune function is important for cancer control, especially at times when tumor burden is removed by surgery and immune mechanisms become more essential in defending against any nascent tumor cells (Avraham and Ben-Eliyahu, 2007; Lutgendorf et al., 2007). The preponderance of evidence supports the importance of optimal immune function in individuals with cancer. Therefore, interventions that not only reduce psychological stress but also support immune function are advantageous to individuals with cancer.

Previously, we have shown that breast cancer diagnosis and treatment produce an increase in psychological distress (anxiety and mood disturbance) accompanied by immune dysregulation. The immune dysregulation included an increase in production of IL-4 and IL-6 and reduced NKCA and IFN-γ production (Nagabhushan et al., 2001; Witek-Janusek et al., 2007). The dysregulation in immune function was dissociated from treatment effects and was likely due to the psychosocial distress evoked by a diagnosis of cancer and its treatment. We also conducted a study in HIV+ men to evaluate the immune effects of MBSR. We found that MBSR normalized aspects of immune function that were dysregulated in these men (Robinson et al., 2003). Others have also reported evidence of immune benefits of MBSR. Well individuals experiencing job-related stress who participated in MBSR showed reductions in anxiety and negative affect and significantly greater antibody responses to the influenza vaccine when compared to a control group. In that study MBSR participants also exhibited increased brain electrical activity indicative of positive mood and the magnitude of change in brain activity predicted the magnitude of change in immune response (Davidson et al., 2003). Evidence from uncontrolled studies of cancer patients, who were evaluated well-beyond diagnosis, also suggests that MBSR may affect the immune system (Carlson et al., 2003, 2007).

Given that few studies have evaluated the immune effects of MBSR in cancer patients, and to our knowledge no studies have evaluated the effects of MBSR for recently diagnosed breast cancer patients, we conducted this study. The purpose was to determine the feasibility of MBSR for women undergoing diagnosis and treatment for breast cancer and to initially assess the effect of MBSR on immune function, quality of life, and coping effectiveness in these women. We enrolled women who had completed surgery for early stage breast cancer and assessed outcomes over