Psychoneuroendocrinology (2013) 38, 356—366

Available online at www.sciencedirect.com

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A longitudinal study of cortisol responses, sleep problems, and psychological well-being as the predictors of changes in depressive symptoms among breast cancer survivors

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Received 3 February 2012; received in revised form 26 June 2012; accepted 26 June 2012

KEYWORDS
Depression;
Sleep problems;
Cortisol responses;
Attachment styles;
Meaning in life;
Psychological well-being

Summary
Objective: This study examined whether the changes in sleep problems, attachment styles, meaning in life, and salivary cortisol over the course of 14 months were the predictors of changes in depressive symptoms in women with breast cancer at post-treatment stage.
Methods: The study included 76 participants who completed active breast cancer treatment with longitudinal data collected at five points, including baseline assessment (T0) and the four follow-ups after baseline: T1 (in the 2nd month), T2 (in the 5th month), T3 (in the 8th month), and T4 (in the 14th month). The self-reported questionnaires included the Medical Outcomes Study Sleep

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0306-4530/$ — see front matter
http://dx.doi.org/10.1016/j.psyneuen.2012.06.010

(MOS-Sleep) scale; the Beck Depression Inventory-II (BDI-II); the Experiences in Close Relationships-Revised (ECR-R) scale for measuring anxiety and avoidance dimensions of attachment style; and the Meaning in Life Questionnaire (MLQ), consisting of the MLQ-Presence scale and the MLQ-Search scale. The participants collected their salivary cortisol at home at six time points: upon waking, 30 and 45 min after waking, and at 1200 h, 1700 h, and 2100 h.

Results: Higher scores on for anxiety-related attachment style and the sleep problems index at baseline were associated with more severe initial depressive symptoms after the age, BMI, cancer, and treatment variables were controlled. The presence of meaning in life at baseline was negatively correlated with initial depressive symptoms. Moreover, the decreases in the presence of meaning in life over the course of 14 months predicted more severe depressive symptoms. In addition, the persistent increases of cortisol level at 2100 h across 14-month follow-ups predicted worsening depressive symptoms.

Conclusions: Lacking presence of meaning in life as a predictor for severe depressive symptoms demonstrates that breast cancer survivors who lack psychological well-being are more likely to be depressed. The persistent elevation of cortisol levels at night also indicates breast cancer survivors to be at high risk of depression.

1. Introduction

A review study (Fann et al., 2008) reported that about 10–25% of the incidences of major depression during the first year after breast cancer treatment are underrecognized and undertreated. About 30% of women continue to report psychological distress, especially depression during survivorship (Holzner et al., 2001). Depression often leads breast cancer survivors to discontinue follow-up treatments (Giese-Davis et al., 2011). Increases of cortisol levels were found to occur in depressed patients with metastatic breast cancer (Giese-Davis et al., 2006). In a long-term follow-up study (Sephton et al., 2000), abnormal stress responses of diurnal cortisol patterns significantly predicted breast cancer patients' earlier mortality. Moreover, a correlation has been found between increases in depressive symptoms during the first year after metastatic breast cancer treatment and shorter survival times (Giese-Davis et al., 2011). Nevertheless, there is a lack of long-term follow-up studies examining what factors predicted the severity of depressive symptoms among breast cancer survivors.

Breast cancer patients have shown higher cortisol levels than healthy participants (Porter et al., 2003; Abercrombie et al., 2004; McGregor and Antoni, 2009). Higher cortisol levels indicated a maladaptive manifested in the abnormality of psychobiological stress response of the hypothalamic-pituitary-adrenal (HPA) axis (McEwen, 2000). Hyperactivity of HPA axis function in breast cancer patients might be related to increases in depressive symptoms because elevated cortisol levels are regarded as part of the pathology for major depressive disorder (MDD) (Bhagwagar et al., 2002; Sjögren et al., 2006). However, one cross-sectional study (Vedhara et al., 2006) did not support the correlation between cortisol responses and depression among breast cancer survivors. Because of the contradictory results, a long-term follow up study is needed to clarify whether the persistent increases in cortisol levels predict more severe depressive symptoms in breast cancer survivors.

One review study (Bower, 2008) reported that sleep problems commonly cause distress and are associated with depressed mood in breast cancer survivors. A study of insomnia found higher HPA axis activity in the evening and the first half of the night (Vgontzas et al., 2001). Higher HPA axis function is correlated with depressive symptoms (Bhagwagar et al., 2002; Sjögren et al., 2006). Nevertheless, insufficient information is available as to whether increased sleep problems during a long-term follow up would predict severe depressive symptoms.

In regard to psychological factors in relation to depression, attachment theory describes the nature of emotional bonds in close interpersonal relationships. Secure attachment style is related to positive regulation of emotions (Fraley et al., 2000). Secure attachment styles deliver a protective effect in buffering the impact of physical distress on depressive symptoms (Rodin et al., 2007). The studies on terminal cancer (Hunter et al., 2006) and metastatic cancer patients (Rodin et al., 2007) indicated that anxious attachment style was positively correlated with depressive symptoms. The results suggest that the patients with anxious attachment style might have a negative impact on the regulation of emotions as a result of increases of depressive symptoms. Because this may also play a role in depression after breast cancer, a longitudinal study is required to explore the role of insecure attachment styles as a predictor for depressive symptoms in breast cancer survivors.

In addition to exploring the negative psychological factor, a recent study (Wood and Joseph, 2010) found that people with lower levels of positive well-being were more likely to be depressed 10 years later. The positive psychological well-being includes the concept of making sense of purpose in life. The positive perceptions of meanings in life are negatively associated with depression in the general population and patients with chronic illness (Steger et al., 2009; Steger, 2012). The results suggest that sense of life as meaningful could be a protective factor from depressive symptoms as people confronting with stress events. One factor that has not been examined is the hypothesis of the reduction of meaning in life over a period of time. This may be an important predictor of increasing depressive symptoms in breast cancer survivors.

In summary, higher cortisol levels likely occur in breast cancer survivors. However, it is unknown whether cumulative abnormal cortisol stress responses predict severity of depressive symptoms among breast cancer survivors, or whether other factors mentioned above play significant roles as well.