Nurse Education Today xxx (2016) xxx–xxx

Contents lists available at ScienceDirect

Nurse Education Today

journal homepage: www.elsevier.com/nedt

Stress-related biobehavioral responses, symptoms, and physical activity among female veterans in the community: An exploratory study

Hsiao-Lan Wang *, Constance Visovsky, Ming Ji, Maureen Groer

University of South Florida College of Nursing, 12901 Bruce B. Downs Blvd., MDC22, Tampa, FL 33612, United States

ARTICLE INFO

Article history:
Received 10 November 2015
Received in revised form 29 May 2016
Accepted 5 June 2016
Available online xxxx

Keywords:
Veteran health
Females
Symptoms
Stress response
Physical activity

ABSTRACT

Background: Female veterans experience multiple stresses during their lifetime. Some of them seek care in the civilian community. Common physical and psychological symptoms among female veterans include pain, fatigue, sleep quality, and depression. Physical activity has the potential to improve their well-being.
Objectives: This study was guided by the concept of allostasis. The purpose of the study was to determine the associations among stress-related biobehavioral responses and symptoms as well as to determine if physical activity moderated these associations among female veterans.
Design/Settings/Participants/Methods: A cross-sectional and exploratory design was implemented among 82 female veterans (46 ± 10.57 years old) at a community event. Self-reported questionnaires and blood and hair samples were collected. Descriptive statistics and multivariate analyses were applied in this secondary data analysis.
Findings: Female veterans experienced moderate perceived stress and greater body mass index, C-reactive protein, and hair cortisol levels at the same time as they reported moderate levels of pain and fatigue, poor sleep quality, and considerable depressive symptoms. The findings showed that greater body mass index was significantly associated with more severe pain and poor sleep quality. Physical activity negatively moderated the relationship between perceived stress and pain.
Conclusion: Female veterans need services to manage body weight and help them engage in physical activity. Nurse educators are responsible for instructing nurses to properly identify female veterans in the civilian community facility and to provide care in a respectful manner.

1. Introduction

There are growing numbers of female veterans in the United States unlike at any previous time in history. According to the U.S. Department of Veterans Affairs (VA), in 2013, the overall population of female veterans was estimated to comprise 2.5 million (10.3%) of all living veterans (U.S. Department of Veterans Affairs, Office of Policy and Planning, 2013a). About 15% of current active duty military personnel are females (U.S. Department of Health and Human Services, Health Resources and Services Administration, 2013b). Half of living female veterans are from the Gulf War Era, Operation Enduring Freedom (OEF, Afghanistan), Operation Iraqi Freedom (OIF, Iraq), and Operation New Dawn (OND, Iraq). In the American Community Survey, a higher percentage of female veterans than male veterans were Black (20.3% vs. 10.6%) or Hispanic (8.2% vs. 6.2%) and were divorced, separated, or widowed (34.5% vs. 24.6%) (National Center for Veterans Analysis and Statistics, 2015e). Female veterans tended to be worse off economically than male veterans. There were greater percentages in poverty (10.6% vs. 6.9%), with no income (7.6% vs. 2.9%), and in households receiving a government funded nutritional assistance program (12.1% vs. 6.4%).

Female veterans experienced stress from multiple sources (Street et al., 2009). They had more trauma exposure prior to, during, and after their military service relative to males (Kelley et al., 2015). Before deployment, traumatic events may have happened during childhood, adolescence, young adulthood, or during military service before deployment. About half of female veterans reported physical or sexual abuse before they began their military service (Street et al., 2009). Childhood physical abuse significantly predicted poorer physical health, as well as greater depressive and post-traumatic stress disorder symptoms among female veterans (Mercado et al., 2015). Childhood sexual abuse led to their having three times more likely occurrence of intimate partner violence (Iverson et al., 2013). During deployment, female veterans faced combat exposure and military sexual trauma (i.e., sexual harassment, and sexual assault) while being separated from family and friends (Street et al., 2009). Female veterans were less likely to experience combat exposure than male veterans (Kelley et al., 2015), but female veterans were more likely to experience military sexual trauma than males (Barth et al., 2015). Military sexual trauma predicted more post-traumatic stress symptoms among female

* Corresponding author.
E-mail address: hwang5@health.usf.edu (H.-L. Wang).

http://dx.doi.org/10.1016/j.nedt.2016.06.017
0260-6917/

veterans who had experienced combat exposure (Cobb Scott et al., 2014). After deployment, female veterans encountered role adjustments in the family and searching for veteran identity in civilian society (Wooten, 2012). For those discharged from military service, financial and occupational difficulties may be part of their daily life challenges. Compared with male veterans, a greater percentage of female veterans were unmarried (National Center for Veterans Analysis and Statistics, 2015e). And they were more likely to experience physical and sexual intimate partner violence than nonveteran women in the civilian environment (Iverson et al., 2013). The prevalence of posttraumatic stress disorder (PTSD) and its negative influence on family and social function among OEF/OIF veterans during post deployment has been reported as showing no gender differences (Fang et al., 2015; Fulton et al., 2015).

While female veterans experience many stresses in their life span, 43% of female veterans were not receiving Veteran Affairs (VA) healthcare, which is higher than for males (U.S. Department of Veterans Affairs, 2015c; National Center for Veterans Analysis and Statistics, 2015e). There are some reasons why female veterans obtain their healthcare from civilian community healthcare providers: The Affordable Care Act allows veterans to get health insurance coverage from facilities other than the VA; they leave military service due to military down-sizing; and the McCain-Sanders Veterans Bill has expanded veterans' access to healthcare (Brown et al., 2014). When these female veterans visit community healthcare providers, their chief complaints have not all been related to combat. According to the 2014 Joining Forces Wellness Week Webinar, the common physical and psychological symptoms that brought veterans to healthcare providers were pain, fatigue, sleep quality, and depression. Biobehavioral responses to stress lead to multiple chronic diseases (Beckie, 2012). But whether stress-related biobehavioral responses are related to these common symptoms in female veterans is not clear.

The Center for Disease Control and Prevention (CDC) recommends that adults between the ages of 18 and 64 engage in moderate activity for 150 min per week or vigorous activity for 75 min per week (Center for Disease Control and Prevention, 2015d). As expected, veterans (46%) are more likely to meet this recommendation than non-veterans (42%), based on a national survey (Littman et al., 2009). A systematic review has shown that physical activity improves the well-being of combat veterans through active coping and being active again, PTSD symptom reduction, positive affective experience, ecotherapeutic benefits in nature, and quality of life (Caddick and Smith, 2014). Physical activity has also been found to mitigate multiple symptoms among individuals with chronic disease (Adamson et al., 2015; Bouillet et al., 2015; Cruickshank et al., 2015; Despres, 2015; Serhiyenko and Serhiyenko, 2015). So there is a need to know whether physical activity can moderate the relationship between stress-related biobehavioral responses and common symptoms (i.e., pain, fatigue, sleep disturbance, and depression) in female veterans.

1.1. Conceptual Framework

Allostasis is a model that provides explanatory power for the relationship of stress-related biobehavioral response and physical/psychological health (Beckie, 2012). The concept was originally introduced as a modification of the homeostasis concept, which had been the guiding paradigm for understanding physiological adjustments to change (Sterling and Eyer, 1988). Allostasis, similar to homeostasis, is the process of achieving and maintaining stability in the internal environment (Beckie, 2012). The critical difference is the recognition in the allostasis model that stability is achieved through change, and that physiological and behavioral states change in response to external environmental and developmental perturbations, leading to a state of adaptation outside of the normal physiological ranges. Allostasis allows for the flexibility of organisms to respond to changing conditions and developmental stages, with recognition of the roles of primary mediators in maintaining the allostatic state.

Primary mediators in allostasis include stress hormones, the immune system, and neurological responses, as these factors are involved in rapid response to stress experienced by the person. Sustained activity of these mediators ultimately produces a particular allostatic state (McEwen and Wingfield, 2003). The primary mediators, while helpful to the stress response in the short run, may result in disease states when sustained over time. These effects are the “costs” of maintaining an allostatic state longer than is optimal for health. The key to the allostatic state concept is that over time, continued demand on allostatic state requirements may produce an allostatic load on the organism, which results in cumulative effects that directly or indirectly contribute to disease and senescence (Stewart, 2006).

Our conceptual framework was built on the concept of the allostatic model (Beckie, 2012) (Fig. 1). The allostatic model predicts that stress, experienced in this case by female veterans, may lead to allostatic states characterized by high levels of stress hormones, interruption of metabolic regulation, and a shift towards a pro-inflammatory state, all of which can increase the risk for a number of chronic symptoms. In our study, we conceptually defined the allostatic states as stress-related biobehavioral responses which represent metabolic regulation (body mass index and total cholesterol), pro-inflammatory state (C-reactive protein), and stress hormones (hair cortisol). Hair cortisol, instead of saliva cortisol, was chosen because it is a better indicator of chronic stress system dysfunction, which is similar to what female veterans have experienced (Iglesias et al., 2015). We also included subjective perceived stress. Symptoms were conceptualized as health outcomes affected by the allostatic states. Four major symptoms frequently found among female veterans were considered to be influenced by stress-related biobehavioral responses. These symptoms included pain, fatigue, sleep quality, and depression. We proposed that physical activity could mitigate these symptoms in female veterans in a similar way to in individuals with chronic disease. We conceptualized that physical activity was a moderator interacting with stress-related biobehavioral responses which affect the relationships among stress-related biobehavioral responses and symptoms.

In the parent study, we found a group of female veterans who reported moderate posttraumatic stress related to military experience (Duffy et al., 2015). From the same study, we proposed a secondary data analysis based on our conceptual framework. Therefore, the purpose of this current study was to: (1) determine the associations among stress-related biobehavioral responses (body mass index, total cholesterol, C-reactive protein, hair cortisol, and perceived stress) and symptoms (pain, fatigue, sleep, and depression) and (2) determine if physical activity moderates these associations. The parent study recruited female veterans at a community event. Therefore, our analysis would provide knowledge to community healthcare providers about the relationships among stress-related biobehavioral responses, symptoms, and physical activity in female veterans.

Based on the conceptual framework, two hypotheses were proposed:

Hypothesis 1. Stress-related biobehavioral responses have positive relationships with symptoms.

Hypothesis 2. Physical activity negatively moderates the relationships among stress-related biobehavioral responses and symptoms.

2. Methods

2.1. Study Design

The original parent study was cross-sectional and exploratory in nature without defined hypotheses and had the goal of establishing an infrastructure for longitudinal follow-up of a cohort of female veterans

Please cite this article as: Wang, H.-L., et al., Stress-related biobehavioral responses, symptoms, and physical activity among female veterans in the community: An exploratory stu..., Nurse Educ. Today (2016), http://dx.doi.org/10.1016/j.nedt.2016.06.017