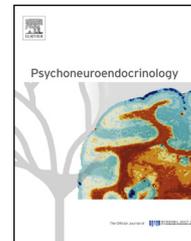




Available online at www.sciencedirect.com

SciVerse ScienceDirect

journal homepage: www.elsevier.com/locate/psyneuen



Perceived stress at work is associated with attenuated DHEA-S response during acute psychosocial stress

Anna-Karin Lennartsson^{a,b,*}, Töres Theorell^c, Mark M. Kushnir^{d,e,f},
Jonas Bergquist^{d,f}, Ingibjörg H. Jonsdottir^{a,b}

^a The Institute of Stress Medicine, Gothenburg, Sweden

^b The Department of Neuroscience and Physiology, University of Gothenburg, Göteborg, Sweden

^c Stress Research Institute, Stockholm University, Stockholm, Sweden

^d Analytical Chemistry, Department of Chemistry – BMC and SciLife Lab, Uppsala University, Uppsala, Sweden

^e ARUP Institute for Clinical and Experimental Pathology, Salt Lake City, UT, USA

^f Department of Pathology, University of Utah School of Medicine, Salt Lake City, UT, USA

Received 29 August 2012; received in revised form 22 January 2013; accepted 23 January 2013

KEYWORDS

DHEA-S;
DHEA;
Cortisol to DHEA-S ratio;
Prolonged stress;
Work stress;
Acute stress response

Summary

Background: Dehydroepiandrosterone (DHEA) and dehydroepiandrosterone sulfate (DHEA-S) have been suggested to play a protective role during acute psychosocial stress, because they act as antagonists to the effects of the stress hormone cortisol. This study aims to investigate whether prolonged psychosocial stress, measured as perceived stress at work during the past week, is related to the capacity to produce DHEA and DHEA-S during acute psychosocial stress. It also aims to investigate whether prolonged perceived stress affects the balance between production of cortisol and DHEA-S during acute psychosocial stress.

Method: Thirty-six healthy subjects (19 men and 17 women, mean age 37 years, SD 5 years), were included. Perceived stress at work during the past week was measured by using the Stress-Energy (SE) Questionnaire. The participants were divided into three groups based on their mean scores; Low stress, Medium stress and High stress. The participants underwent the Trier Social Stress Test (TSST) and blood samples were collected before, directly after the stress test, and after 30 min of recovery. General Linear Models were used to investigate if the Medium stress group and the High stress group differ regarding stress response compared to the Low stress group.

Results: Higher perceived stress at work was associated with attenuated DHEA-S response during acute psychosocial stress. Furthermore, the ratio between the cortisol production and the DHEA-S production during the acute stress test were higher in individuals reporting higher perceived stress at work compared to individuals reporting low perceived stress at work. There was no statistical difference in DHEA response between the groups.

* Corresponding author at: Carl Skottsbergs gata 22 B, 413 19 Göteborg, Sweden. Tel.: +46 31 342 07 15; fax: +46 31 41 42 73.
E-mail address: anna-karin.lennartsson@vgregion.se (A-K. Lennartsson).

Conclusions: This study shows that prolonged stress, measured as perceived stress at work during the past week, seems to negatively affect the capacity to produce DHEA-S during acute stress. Given the protective functions of DHEA-S, attenuated DHEA-S production during acute stress may lead to higher risk for adverse effects on psychological and physiological health, particularly if stress exposure continues.

© 2013 Elsevier Ltd. All rights reserved.

1. Introduction

Levels of dehydroepiandrosterone (DHEA) and dehydroepiandrosterone sulfate (DHEA-S) are known to increase during acute psychosocial stress (Morgan et al., 2004; Izawa et al., 2008; Lennartsson et al., 2012). DHEA and DHEA-S are, besides from being sex steroid precursors, anabolic steroids, and thus they have a regenerative and protective role (Theorell, 2008, 2009; Maninger et al., 2009). Considering this, acute stress-induced DHEA and DHEA-S have been suggested to play a protective role during acute stress, as an antagonist to the effects of the stress hormone cortisol (Hechter et al., 1997; Morgan et al., 2004). DHEA and DHEA-S are, as well as cortisol, produced in the adrenal cortex in response to adrenocorticotropic hormone (ACTH). Cortisol and DHEA are produced in different sections of the adrenal cortex; the zona fasciculata area secretes cortisol while the zona reticularis area secretes DHEA and DHEA-S (Nguyen and Conley, 2008). We recently investigated changes in DHEA and DHEA-S levels in response to acute psychosocial stress (Trier Social Stress Test) in healthy men and women between 30 and 50 years (Lennartsson et al., 2012). Elevated levels of DHEA and DHEA-S in response to the stressor were found in both men and women, along with significantly increased ACTH, cortisol, heart rate, systolic blood pressure, and diastolic blood pressure. The magnitude of the DHEA and DHEA-S responses did not differ between men and women, but there was large inter-individual variation in the magnitude of stress-induced increase of DHEA (5–196%) and DHEA-S concentrations (2–47%) in general. These inter-individual differences were associated with degree of ACTH response (for DHEA only) and age of the participants. While cortisol production does not vary with age, production of DHEA and DHEA-S is age-dependent; peak concentrations are observed in young adulthood and thereafter levels decline with increasing age (Labrie et al., 1997; Kushnir et al., 2010a). These changes are associated with functional and morphological changes in the zona reticularis area in the adrenal cortex (Hornsby, 1997; Parker et al., 1997). Thus, not surprisingly, our study found that older individuals had lower capacity to produce DHEA and DHEA-S also during acute psychosocial stress than younger subjects. Besides the effects of ageing, different types of prolonged stress are suggested to negatively affect the function of the zona reticularis and thus inhibit the production of DHEA and DHEA-S (Mason et al., 1968; Hornsby, 1997; Theorell, 2009). It has also been suggested that the balance between cortisol and DHEA-S levels could be affected during prolonged stress (Theorell, 2009). A high cortisol to DHEA ratio is unfavourable and has been found to be associated with e.g. chronic stress (Jeckel et al., 2010), depression (Young et al., 2002), and cognitive disorders (Ferrari et al., 2001). While there is one study on DHEA-S response in rhesus

monkeys exposed to an acute stressor (“restraint chair stress”) during 2 h every day for seven days, which was defined as chronic stress, there is, to our knowledge, no publication available that has examined the effects of prolonged psychological stress on DHEA and DHEA-S production during acute stress in humans. This study aims to investigate whether prolonged psychosocial stress, measured as perceived stress at work during the past week, affects the capacity to produce DHEA and DHEA-S during acute psychosocial stress. It also aims to investigate whether prolonged perceived stress affects the balance between production of cortisol and DHEA-S during acute psychosocial stress.

2. Methods

2.1. Participants

Thirty-six healthy subjects (19 men and 17 women, mean age 37 years, SD 5 years), were included. The subjects were recruited from a cohort study, surveying psychosocial work environment and health, and through advertising in a local daily newspaper. To be included in the study, subjects had to be between 30 and 50 years of age, and only individuals reporting “no stress symptoms at all” or “very little stress symptoms” on a single perceived stress item (Elo et al., 2003) were included. These criteria were selected in order to avoid inclusion of individuals suffering from chronic stress symptoms, since this group of participants was originally intended to serve as a healthy control group to be compared with patients with stress-related exhaustion. Exclusion criteria were as follows: body mass index below 18.5 kg/m² or over 30 kg/m², high blood pressure (SBP above 160 mmHg or DBP above 90 mmHg), current infection, folate (vitamin B12) deficiency (high homocysteine), known systemic disease such as diabetes or thyroid disease or known psychiatric disorder. As the menstrual cycle and the use of estrogens are known to affect the physiological response to acute stress (Kirschbaum et al., 1999; Kajantie and Phillips, 2006), women taking estrogens as well as pregnant, nursing or postmenopausal women were excluded from the study. Subjects who were taking psychoactive medications or medications that might affect the HPA axis function were also excluded. The study was approved by the Regional Ethical Review Board in Gothenburg, Sweden, and was conducted according to the Helsinki Declaration. All participants gave written informed consent before entering the study.

2.2. Trier social stress test

Within one to six months after screening, the participants underwent the TSST, a standardized laboratory stress test that was set up according to the original design of Kirschbaum

متن کامل مقاله

دریافت فوری ←

ISIArticles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات