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Global stress response during a social stress test: Impact of alexithymia and its subfactors

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Summary
Objectives: Alexithymia is a personality trait characterized by difficulties in identifying, describing and communicating one's own emotions. Recent studies have associated specific effects of this trait and its subfactors with hypothalamo-pituitary-adrenal (HPA) axis markers during stress. The aim of this study was to analyze the association between alexithymia and its subfactors with HPA and sympatho-adrenal medullar (SAM) activity. Stress was induced experimentally using a public-speaking paradigm. Salivary cortisol, alpha-amylase (AA), chromogranin A (CgA) and heart rate (HR) were collected during the defined periods of baseline, stress, and recovery in 19 males and 24 female healthy university students.
Results: Subjects reacted to the stressor with a significant cortisol and SAM response. Subjects scoring high on alexithymia reacted significantly more intensely than low scorers in basal anticipatory as well as peak cortisol and area under the curve. Regression analyses revealed that the increased HPA activity was related to only one alexithymia subfactor, the difficulty in differentiating feelings and distinguishing them from bodily sensations and emotion arousal.

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Conclusion: Alexithymia and its subfactors were specifically related to cortisol responses. This research should be replicated with more subjects and should take into account more parameters reflecting sympathetic and/or parasympathetic activation, as well as HPA axis. Factors such as coping strategies and the perception of the situation as a challenge have also to be explored.

1. Introduction

Alexithymia, a common personality trait, is normally distributed in the general population (Franz et al., 2008). It is characterized by a difficulty in identifying, describing, and expressing one's emotions (Sifneos, 1973). It has been related to certain stress-related psychological disorders such as pain syndromes (Huber et al., 2009) or eating disorders (Keating et al., 2013). Besides a global alexithymia score, the Toronto Alexithymia Scale (Bagby et al., 1994), measures three subfactors: namely, difficulties in identifying feelings (DIFF), difficulties in describing feelings (DDF), and externally oriented thinking or a preoccupation with the details of external events (EOT). Alexithymia can be considered as a stress vulnerability factor, possibly by altering stress responses, indeed, impaired psychosomatic processing attributed to alexithymia induces alterations in physiological parameters (De Timary et al., 2008). On the one hand, some authors have suggested that the influence of alexithymia on the expression of stress-related pathological states might involve poor resistance to stress. This idea was described as the ''alexithymia-stress hypothesis'' (Martin and Pihl, 1985). On the other hand, Papciak et al. (1985) proposed the ''decoupling hypothesis'', which states a mismatch between physiological arousal and emotional awareness in alexithymic individuals under stressful situation.

Job interviews are commonly reported as stressful experiences, mainly psychosocial in nature (Campisi et al., 2012). It has been shown that the use of a potent laboratory stress protocol reproducing job interview (i.e., the Trier Social Stress Test, TSST, Kirschbaum et al., 1993) activates the sympathetic—adrenomedullary (SAM) system, and the hypothalamic—pituitary—adrenocortical (HPA) axis (Nater et al., 2005). Both systems interact in managing the adaptive response to stressful events, and biomarkers of these systems can be evaluated non-invasively in saliva, this method allows repeated samples in a short time (Lac, 2001; Filaire et al., 2009; Tanaka et al., 2012). Activation of the HPA axis induces the secretion of cortisol, which stimulates the mobilization of the energy needed to overcome the stressor. Therefore, cortisol is considered as the main biomarker in stress research (Hellhammer et al., 2009).

Besides the endocrine secretions of cortisol, the physiological response to psychological stressors implies the activation of the SAM, with a sympathetic activation resulting in the release of noradrenaline from sympathetic nerve terminals and adrenaline and noradrenaline from the adrenal medulla, which result in a range of rapid physiological and behavioral responses such as increases in heart rate (HR) and blood pressure and heightened vigilance (Goldstein, 1987; Obayashi, 2013). Direct measurements of salivary adrenaline and noradrenaline seem not to reflect SAM activity (Schwab et al., 1992). However, salivary alpha-amylase (sAA) appears as a promising marker, as non-invasive and easily obtainable (Nater et al., 2005; Granger et al., 2007) since Ehlert et al. (2006) provided evidence through pharmacological manipulation of the SAM system. In fact, these authors showed that yohimbine administration activates not only autonomic parameters but also sAA via adrenergic mechanisms, suggesting that sAA might be an indirect indicator of the central sympathetic system. Alpha-amylase, one of the principal salivary proteins appearing as a number of isoenzymes, is produced by the serous acinar cells of the parotid and submandibular glands. Amylase accounts for 10—20% of the total salivary gland-produced protein content and is mostly synthesized by the parotid gland (Zakowski and Bruns, 1985). The secretion of AA by acinar cells of the salivary glands is regulated by the autonomic neuronal pathways. Psychosocial stress increases sAA secretion (Filaire et al., 2009, 2010; Tanaka et al., 2012).

Another interesting protein is the Chromogranin A (CgA), a soluble protein that is stored and co-released by exocytosis with catecholamines from the adrenal medulla and sympathetic nerve endings (Dimsdale et al., 1992); thus, it is considered to be a valuable indicator of sympatho-adrenal activity (Taupenot et al., 2003). Recently, salivary CgA was shown to be produced by the human submandibular gland and secreted into saliva (Saruta et al., 2005), making it a sensitive and reliable index of psychological stress. Some authors reported a rapid and sensitive elevation of salivary CgA in response to psychosomatic stressors such as public speaking (Nakane et al., 1998). Salivary CgA has gained attention as a novel stress marker. Whereas cortisol has long been assayed as a stress marker that reflects both mental and physical stress, concentrations of salivary CgA correlate only with mental stress (Nakane et al., 1998). Thus, CgA and alpha-amylase appear as potential non-invasive tools for evaluating the SAM following psychological stress.

There were few publications on alexithymia and HPA system until now. Lindholm et al. (1990) have reported an association between alexithymia and a positive dexamethasone suppression test. Conversely, McCaslin et al. (2006) found no association between alexithymia and cortisol reactivity to a video stress challenge. De Timary et al. (2008) noted that an increased cortisol level before being exposed to social stressor was associated with high scores in the DDF scale (difficulties in describing feelings). These authors suggested that alexithymia modulates cortisol concentration, possibly by affecting the anticipatory cognitive appraisal of situations. In the same study, these authors also observed that DIFF subfactor (difficulties in identifying feelings) was negatively correlated to cortisol. Recently, Härtwig et al. (2013) noted that alexithymic individuals have a lower cortisol awakening response (CAR), this parameter is a valid measure of basal HPA-system activity and considered as an