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The morning salivary cortisol response in burnout

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Abstract

Objectives: The aim of the present study was to examine the free salivary cortisol response to awakening in men and women reporting low, moderate, and high levels of burnout. **Methods:** Twenty-two patients on sick leave due to burnout were compared with 22 working participants with low and 20 working participants with intermediate scores on the Shirom–Melamed Burnout Questionnaire (SMBQ), with regard to the free salivary cortisol response to awakening. Saliva samples were collected upon awakening and at +15, +30, and +60 min thereafter. **Results:** Female burnout patients had higher cortisol levels than did the females with low burnout at awakening and at +15, +30, and +60 min after awakening. They also had a greater area under the curve (AUC) for salivary cortisol than did the female participants with low burnout. Male participants with moderate levels of burnout had higher cortisol levels at +60 min after awakening compared with males with low burnout. **Conclusions:** The results of the present study indicate a dysregulation in hypothalamic–pituitary–adrenocortical axis (HPA axis) activity, characterised by elevated morning salivary cortisol levels, among female burnout patients. Among males, increased cortisol levels were observed among participants with moderate levels of burnout, but not among patients or healthy controls.

Keywords: Burnout; Stress; Salivary cortisol; HPA axis; Gender differences

Introduction

Burnout, or "the chronic depletion of an individual's energetic resources", is a syndrome encompassing emotional exhaustion, physical fatigue, and mental weariness, as a consequence of longstanding stress [1–4]. Viewed from this perspective, burnout is conceptually similar to such conditions as the chronic fatigue syndrome (CFS), fibromyalgia, and "vital exhaustion" (VE), a state characterised by unusual fatigue, increased irritability, and feelings of demoralisation, and which often precedes cardiac events and increases the risk of restenosis after angioplasty [5–7].

There is a growing interest in the role of the hypothalamic–pituitary–adrenocortical axis (HPA) in states characterised by excessive fatigue. Cortisol levels in plasma increase within 15 min following acute stress, but return to basal levels once effective coping is established. Permanent or repeated exposure to stressors with which one cannot adequately cope may contribute to a prolonged activation of the HPA axis, leading, in turn, to abnormal elevations in the levels of circulating glucocorticoids [8–14]. It has been proposed that with time, longstanding strain on the HPA axis may lead to hypocortisolism [15–18]. Although the mechanisms underlying this type of dysregulation in humans are not well understood, data indicate that such conditions as posttraumatic stress disorder (PTSD), CFS, fibromyalgia, and VE are characterised by excessively low levels of cortisol [19–31]. Some studies, however, have failed to demonstrate differences in cortisol levels between CFS patients and controls [32], and others [33] have even reported the opposite pattern, i.e., raised salivary cortisol in CFS.

Very little is known about HPA function in burnout, and the published results are contradictory, showing both insignificant, negative, and positive associations between burnout and cortisol. Studies employing single blood samples have failed to demonstrate associations between

Abbreviations: HPA axis, hypothalamic–pituitary–adrenocortical axis; BMI, body mass index; CFS, chronic fatigue syndrome; VE, vital exhaustion.

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cortisol and burnout, as measured with various indices [34–36]. Hellhammer [37] observed that nurses suffering from burnout and multiple physical complaints exhibited low morning levels of salivary cortisol and elevated levels of this hormone in the afternoon and evening. In a study by Pruessner et al. [38], teachers scoring high on burnout showed a lower overall salivary cortisol secretion during three consecutive mornings of saliva sampling and a greater suppression of cortisol secretion after dexamethasone administration. In a study conducted among military personnel, Morgan et al. [39] found that high levels of burnout were related to flattened diurnal secretory cycles, as manifested by lower morning levels and higher evening levels of cortisol, respectively. Moch et al. [40] observed a reduction of urine free-cortisol excretion in 16 female burnout patients who were compared with healthy controls.

Melamed et al. [4] reported elevated daytime levels of salivary cortisol in blue-collar workers with chronic symptoms of burnout, i.e., lasting for at least 6 months. Similarly, De Vente et al. [41] observed elevated heart rate as well as increased morning salivary cortisol levels in burnout patients in comparison with healthy controls.

To our knowledge, the study by De Vente et al. [41] is the only one that has examined the free salivary cortisol response to awakening among burnout patients. The awakening cortisol response is well suited to uncover subtle dysregulations in HPA activity in that it is stable and not influenced to a high degree by age, smoking, use of oral contraceptives, sleep duration, or using/not using an alarm clock [42–45]. The aim of the present study was therefore to further examine this indicator of HPA activity in male and female burnout patients, as compared with individuals reporting low and moderate levels of burnout. Based on the findings of De Vente et al. [41], it was hypothesised that burnout patients would manifest higher morning levels of salivary cortisol than would participants with low or moderate burnout.

Material and methods

Participants

The study comprised three groups with varying levels of burnout. Participants with high burnout scores (n=22) were recruited from a larger sample of 93 consecutive patients who were being assessed for inclusion in an investigation of the effects of a treatment package against burnout. We selected 9 men and 13 women who met the criteria for adjustment disorder, as set forth in the *Diagnostic and Statistical Manual of Mental Disorders, fourth edition* ([46]; DSM-IV), but were free from comorbid depression. In Sweden, adjustment disorder (DSM-IV 309.xx; ICD-10 F43.xx) is one of the diagnoses given most frequently to individuals who are unable to work due to symptoms of burnout [47]. Two of these participants suffered from comorbid panic disorder without agoraphobia, and one from personality disorder (unspecified). All patients were on sick leave due to burnout from their employment as white-collar workers in the private sector.

Participants with low (n=22) and moderate burnout (n=20) were recruited from a larger project investigating the psychometric properties of a new, Internet-based questionnaire [The Karolinska Stress Scale (KSS), unpublished data]. Out of 450 white-collar employees working at a private Swedish food manufacturing company, 330 were screened for symptoms of burnout by means of the KSS (response rate 73%). In conjunction with filling out the KSS, participants were asked to participate in a study

Table 1
Sociodemographic and lifestyle variables for participants with low (LB), moderate (MB), and high burnout (HB)

	LB (n=22)	MB (n=20)	HB (n=22)
Age			
Mean±S.D. (years)	41±10	39±9	42±9
Gender, n (%)			
Males	9 (41)	11 (55)	9 (41)
Females	13 (59)	9 (45)	13 (59)
Marital status, n (%)			
Unmarried/single	2 (9)	4 (20)	8 (36)
Married/cohabiting	18 (82)	14 (70)	13 (59)
Divorced/separated	2 (9)	2 (10)	1 (5)
Education, n (%)			
Elementary school	2 (9)	1 (5)	2 (9)
High school	3 (14)	9 (45)	8 (36)
University	17 (77)	10 (50)	12 (55)
Sick leave, n (%)			
None	15 (68)	10 (50)	0
1–7 days	4 (18)	7 (35)	0
8–30 days	2 (9)	3 (15)	1 (5)
31–90 days	0	0	3 (13)
>90 days	1 (5)	0	18 (82)**
BMI			
Mean±S.D.	24.56±3.99	24.69±3.40	24.95±3.64
Sedentary lifestyle, n (%)	3 (14)	7 (35)	9 (41)
Present smoker, n (%)	1 (5)	6 (30)	4 (18)*
Medication, n (%)			
Antidepressants	0	0	4 (18)*
Sedatives	0	1 (5)	0
Hypnotics	0	0	2 (9)
Antiinflammatory	1 (5)	4 (20)	0*
Thyroidea hormone substitute	1 (5)	2 (10)	0
Blood pressure lowering	1 (5)	0	1 (5)
Menstrual phase, n (%)	LB	MB	HB
(females)	n=13	n=9	n=13
Follicular	1 (8)	2 (22)	0
Luteal	2 (16)	2 (22)	3 (23)
Menstrual	5 (38)	2 (22)	2 (15)
Uncertain	2 (15)	1 (11)	4 (31)
Postmenopausal	3 (23)	2 (22)	4 (31)
Oral contraceptives	4 (31)	0	4 (31)
Oestrogen replacement	0	0	3 (23)

*P<.05.
** P<.001.