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Physiological correlates of burnout among women

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Abstract

Objectives: The purpose of this study was to investigate the immune, endocrine, and metabolic correlates of burnout among women. **Methods:** Forty-three participants with high and 20 participants with low scores for the Shirom–Melamed Burnout Questionnaire were compared in terms of subjective symptoms, job strain, social support, plasma levels of prolactin, tumor necrosis factor alpha (TNF-α), transforming growth factor beta (TGF-beta), C-reactive protein (CRP), neopterin, serum levels of dehydroepiandrosterone sulphate (DHEAs), progesterone, estradiol, cortisol, and glycated hemoglobin (HbA1C) in whole blood. **Results:** Besides reporting more job strain, less social support at work, and higher levels of anxiety, depression, vital exhaustion (VE), and sleep impairments, participants with high burnout manifested higher levels of TNF-α and HbA1C, independent of confounders including depression. **Conclusions:** Among women, burnout seems to involve enhanced inflammatory responses and oxidative stress.

Keywords: Burnout; Women; Psychosocial; Cytokines; Glycated hemoglobin

Introduction

Work situations characterised by high demands, a low degree of control, and poor social support are known to elicit a state of distressful psychophysiological arousal that may lead to negative health consequences [1]. During the past decade, pervasive organisational changes have contributed to dramatic increases in stress-related disorders in the Swedish labour force, particularly among women working in the public sector [2–4]. One condition accounting for women's increasing levels of disability is the "burnout syndrome." The most common definition of this disorder was given by Maslach and coworkers [5–9], who conceptualised it as a constellation of emotional exhaustion, depersonalisation, and diminished personal accomplishment, mostly prevalent among employees doing "people work." Emotional exhaustion is the core element of the syndrome. Personality characteristics, e.g., trait anxiety, may facilitate the onset of burnout, which, in turn, has been related to increased reports of anxiety, depression, sleep disturbances, somatic symptoms, and impaired health behaviours [9–17]. The discriminant validity of depression and burnout has been demonstrated in a number of studies, but is still a topic for debate [9,10].

Shirom [18], Shirom et al. [20], and Melamed et al. [19,21] argue that the unique content of burnout is the chronic depletion of an individual's energetic resources, i.e., a syndrome encompassing emotional exhaustion, physical fatigue, and mental weariness, as a consequence of long-term stress exposure. Viewed from this perspective, burnout shows a conceptual proximity to the chronic fatigue syndrome (CFS), as defined in internal medicine [22], and to "vital exhaustion" (VE), a state characterised by unusual fatigue, increased

Abbreviations: BMI, body mass index; DHEAs, dehydroepiandrosterone sulphate; TGF-β, transforming growth factor beta; TNF-α, tumor necrosis factor alpha; CRP, C-reactive protein; HbA1C, glycated hemoglobin

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irritability, and feelings of demoralisation [23]. VE often precedes cardiac events and has been shown to increase the risk of restenosis after angioplasty [24,25]. Data suggest that insufficient hypothalamic–pituitary–adrenal axis (HPA axis) activity and increased cytokine release characterise both CFS and VE [26–31]. There is growing evidence of a negative impact of burnout on physical health (e.g., [19–21]), but studies on this topic are still few. Some studies have examined the relations between burnout, as measured with the Maslach Burnout Inventory (MBI) [7], and immune function. High personal accomplishment, was related to higher numbers of total lymphocytes, and CD3, CD4, and CD8 T cells [32], while depersonalisation was related to a lower natural killer cell activity and a lower proportionality of CD57+ CD16+ to total lymphocytes [33]. Söderfelt [34] reported a negative association between emotional exhaustion and the immunoglobulins A (IgA) and G (IgG). Lerman et al. [35], who employed the Shirom–Melamed Burnout Questionnaire for the assessment of burnout, found that high scores for this instrument were associated with a greater leukocyte adhesiveness/aggregation. Studies examining cortisol levels in relation to burnout have yielded mixed results. Melamed et al. [21] found elevated evening levels of salivary cortisol in blue-collar workers reporting burnout symptoms lasting for at least 6 months. In a study by Pruessner et al. [36], participants scoring high on burnout showed a lower overall cortisol secretion during three consecutive mornings of saliva sampling and a greater suppression of cortisol secretion after dexamethasone administration. Studies employing blood samples have failed to show relationships between s-cortisol and burnout, as measured with the MBI [34], and with the burnout subscale of the Stress Profile [37].

The aim of the present study was to more fully investigate the physiological correlates of burnout by comparing working women with low and high levels of burnout as assessed with the Shirom–Melamed Burnout Questionnaire [19–21], with respect to several immune, metabolic, and endocrine variables. Tumor necrosis factor alpha (TNF-α) and transforming growth factor beta 1 (TGF-β1) were studied since elevated levels of these cytokines may induce fatigue, malaise, and other sickness behaviours, and have been implicated in the aetiology of VE, CFS, and major depression [28–31,38]. Additional immune parameters included C-reactive protein (CRP), an indicator of inflammation of infectious or noninfection origin, and neopterin, a stress-reactive indicator of cell-mediated immunity. Cortisol levels were expected to be lower in participants with high burnout, since it has been shown that fatigue states are often characterised by insufficient HPA axis activity [26,27].

We also expected to find higher levels of glycated haemoglobin (HbA1C, an integrated estimate of glucose during the preceding 6–12 weeks) among participants with high burnout. HbA1C levels increase in response to psychosocial stress, e.g., job strain, prolonged examination stress, and decrease in response to ameliorations in psychosocial conditions [39–43].

Plasma levels of prolactin were expected to be higher in participants scoring high on burnout, since this adenohypophyseal hormone is known to increase in response to psychosocial stress in both animals and humans [44,45], and is believed to mirror ''powerless'' situations [46]. Dehydroepiandrosterone sulphate (DHEAs) is a precursor of sex hormones, e.g., testosterone and oestrogen, and is believed to play an important role in anabolism [47]. Data indicate that levels of this hormone increase when psychosocial conditions improve [48,49]. Concentrations of DHEAs were, thus, expected to be lower in participants scoring high on burnout. In addition, we investigated differences in estradiol and progesterone since these gonadal steroids seem to act as anxiolytics [50,51] and reduce stress responses from the cardiovascular and noradrenergic systems [52]. Stress, on the other hand, is known to inhibit the reproductive axis hormone secretion [53–56]. Therefore, we expected to find lower levels of these hormones in premenopausal participants with high burnout, also when considering menstrual phase and use of hormonal compounds. This study was part of a project evaluating the effectiveness of a worksite intervention against stress. We focused on women in the public sector, since this group is particularly afflicted by stress-related disorders due to unfavourable psychosocial conditions at work [2–4].

Methods

Participants

All white-collar employees ($n = 213$) at three Social Insurance Offices were screened using the Shirom–Melamed Burnout Questionnaire [19–21] and other questionnaires (see below). One hundred and sixty-four participants (response rate 77%) completed the questionnaire. Twenty-five of the respondents were males and were thus excluded from the analyses. Two participants were excluded due to missing data. The remaining 137 were invited to participate in the antistress intervention. Sixty-three individuals were selected and were allocated to a low ($n = 20$) and a high burnout group ($n = 43$) based on quartile splits (lower ≤ 2.75; upper ≥ 3.75) of the overall index of the Shirom–Melamed Burnout Questionnaire. The participants with low burnout did not take part of any intervention, but were recruited for the purposes of the present study, i.e., a cross-sectional investigation of the physiological concomitants of burnout. There were no differences between the original sample and the study sample in terms of marital status, education, work assignments, or working hours (all $P > .26$). The mean age of the study sample was 48 ± 6 years, and the majority (75%) was married or cohabiting. More than half of the sample (58%) had a low educational level (elementary school). No participants were on sick leave during the period of data collection. Participation in the study was based on informed consent. The study was approved by the local ethical committee.