



## Saliva DHEAS changes in patients suffering from psychopathological disorders arising from bullying at work

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### ABSTRACT

**Background:** Psychological disorders arising from bullying at work (BW) are common. The relationship between these disorders and putative markers is not well established.

**Aims:** To measure saliva dehydroepiandrosterone sulphate (DHEAS) and saliva cortisol as putative markers in individuals suffering from BW.

**Methods:** Forty one subjects suffering from BW were screened for mental distress at the institute of occupational health in Clermont-Ferrand, France. They were compared with 28 psychologically healthy controls (group C). The conditions causing BW were recorded. The hospital anxiety and depression (HAD) scale, the Beech questionnaire and the visual analogic scale (VAS) of stress were used to determine the psychological consequences of BW. Saliva samples were collected at awakening (7 am), 30 and 60 min after awakening, and then every 2 h until bed time (11 pm).

**Results:** The BW group had significantly higher scores on the HAD scale, higher stress on the VAS, and a higher score on the Beech questionnaire. They also had a significantly higher saliva concentration of DHEAS. There was no significant difference between groups in cortisol levels at any time, nor in area under the curve (AUC) and cortisol awakening response (CAR). There was a significant positive correlation between HAD and VAS scores and DHEAS levels, but not between cortisol levels or AUC or CAR.

**Conclusion:** In contrast to saliva cortisol levels, saliva DHEAS levels are modified after psychological distress arising from BW. This discrepancy probably arises from the stability conferred by the very long half life of DHEAS of about 15 h.

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### 1. Introduction

Bullying at work (BW) is an emerging problem which has led to the provision of consultations for mental disorders in centres of occupational health (Brousse et al., 2008). BW can be defined as repeated behaviour aimed at or resulting in a deterioration in working conditions likely to undermine the rights and dignity of the employee targeted, affect their physical or mental health, or compromise their career paths (Brousse et al., 2008).

The prevalence of BW varied from 3% to 8%:5% and 6% in employees working in Finnish hospitals (Kivim ki et al., 2003), 4% in a random sample of Finnish social welfare and health care

workers aged 25–64 (Kauppinen, Aaltonen, & Lehtinen, 1997), 3% in assistant nurses from hospitals and nursing homes, and 8% in employees in a sample of 2105 health care workers in Norwegian studies (Einarsen & Skogstad, 1996). Almost 40% of employees experienced BW when a broader definition was used in a study of a British National Health Services Community Trust, and 42% had witnessed the BW of others (Quine, 1999).

BW produces anxiety, burn-out, depression and suicidal ideas, a cluster of pathologies considered as resulting from stress (Brousse et al., 2008). As a result, the hypothalamic–pituitary–adrenal (HPA) axis, which plays a major role in conveying the central stress response to the peripheral body systems, is activated. Cortisol and dehydroepiandrosterone sulphate (DHEAS) are secreted by the adrenal gland in response to this activation. Cortisol is the standard biological marker to assess the degree of stress (Lac & Chamoux, 2003; Mason, 1968; Taverniers, Van Ruysseveldt, Smeets, & Von Grumkow, 2010). However, previous studies have reported that it is poorly correlated with burn-out and anxiety (for review, see Danhof-Pont, Veen, & Zitman, 2010). The neurosteroid DHEAS is a highly specific individual marker of the hormonal milieu

*Abbreviations:* AUC, area under the curve; C, controls; CAR, cortisol awakening response; CV, coefficient of variation; DHEAS, dehydroepiandrosterone sulphate; HAD, hospital anxiety and depression scale; LIPT, Leymann inventory of psychological terror system; BW, bullying at work; SE, standard error; VAS, visual analogue scale.

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(Thomas et al., 1994). Some studies have connected a rise in DHEAS levels with pathologies frequently induced by BW situations (Brousse et al., 2008), such as anxiety and depression (Assies et al., 2004; Boudarene, Legros, & Timsit-Berthier, 2002; Hsiao, 2006), and burn-out (Mommersteeg, Heijnen, Kavelaars, & van Doornen, 2006; Mommersteeg, Keijsers, Heijnen, Verbraak, & van Doornen, 2006; Sonnenschein et al., 2007).

Cortisol and DHEAS can now be assayed in saliva, and hence their salivary levels have been suggested for use as stress markers (MacLaughlin et al., 2011).

In the current pilot study, the modification of HPA axis was assessed by measuring saliva cortisol and saliva DHEAS in patients with psychopathological disorders induced by BW. BW seems to be an appropriate model to study these stress markers because it produces stress, anxiety, depression, and burn-out.

## 2. Methods

### 2.1. Participants

Sixty-seven individuals (characteristics in Table 1) were divided into two groups: a BW group of 41 patients (13 males and 28 females), complaining of and being identified as exposed to psychological harassment at work, and a control group (C) of 28 psychologically healthy individuals (nine males, 19 females). Only patients having given written informed consent were included in the study. The protocol was approved by the Regional Ethics Committee. Exclusion criteria were: age <18 years, endocrine disease, pregnancy, recent extraprofessional deleterious life events (such as death of a near relation and divorce) and personality disorders as diagnosed by a senior psychiatrist and a senior physician.

The BW group included workers referred to the clinic against a background of presumed BW (Brousse et al., 2008). They were addressed on consultation for mental distress in the institute of occupational health in Clermont-Ferrand (France) by their general practitioner or their occupational physician. These patients were included over a period of six consecutive months. First, BW was established as actually occurring. The assessment was based on socio-demographic, occupational and clinical data compiled during two interviews, one with a psychologist and a nurse, who supervised the tests, and a second with an occupational physician and a psychiatrist to confirm the pathological signs. The definition of

bullying was based on the leyman inventory of psychological terror (LIPT) questionnaire [17]. Bullying behaviour was recorded using the LIPT index of 45 different tactics that potentially figure in the workplace bullying process. These behaviours are classified as tactics designed to prevent the target from expressing themselves, to isolate the target and to ignore them or discredit them in their work. Workplace bullying was defined as repeating one or more of the 45 listed behaviours at least once a week over a 6-month period (Niedhammer, David, & Degioanni, 2006).

Controls (C,  $n = 28$ ) were healthy subjects enrolled during routine preventive consultations of occupational medicine. They were matched with the BW group for age and socio-professional categories (Table 1). They were assessed to be without psychiatric disorder on the basis of a standardised evaluation by the same psychiatrist and occupational physician as above.

### 2.2. Psychological measurements

The psychological consequences of BW were assessed in terms of perceived stress and symptoms of anxiety, burn-out, depression and suicidal ideas. Stress was evaluated using the Chamoux-Simard visual analogue scale (VAS) (Chamoux, Paris, Merle, & Regeard, 2001; Lesage & Berjot S., 2011). This test evaluates the perceived stress level of individuals at work, at home and in life in general on a horizontal, non-calibrated line of 100 mm, ranging from very low (0) to very high (100). Patients presenting a VAS >60 mm were considered as stressed (Chamoux et al., 2001). The validated French language version (Lépine, Godchau, Brun, & Lemperiere, 1985) of the hospital anxiety and depression (HAD) scale (Zigmond & Snaith, 1983) was used to measure levels of anxiety and depression. The scale comprises two subscales, the first related to symptoms of depression and the second to symptoms of anxiety (Herrmann, 1997). A score >10 on each of the two subscales indicates pathological disorders (Zigmond & Snaith, 1983). This scale gives reliable indications as to the intensity of manifestations of depression or anxiety in response to life events. We used the Beech scale of stress in the workplace (Beech, Burns, & Sheffield, 1982) to screen for neuroticism or excessive emotional sensitivity to adverse life events. This questionnaire, which is widely used for evaluating mental health in the workplace, comprises 53 yes-or-no closed response items. It is used to identify the dominant personality factors involved in the response to stressful life events, particularly neuroticism.

**Table 1**  
Characteristics of subjects, group bullying at work (BW) and controls, in terms of sex ratio, age, socio-professional category, smoking, alcohol, physical activity and psychotropic treatment. Significance was accepted at  $p < 0.05$ .

	Control group	BW group	p-Value
Number of subjects	28 (9 M 19F)	41 (13 M 28F)	-
Sex ratio (F/M)	2.11	2.15	NS
Age	46.0 ± 10.4	46.3 ± 8.45	NS
Socio-professional categories:			
Senior management	1 out of 28: 4%	2 out of 41: 5%	
Middle management	5 out of 28: 18%	4 out of 41: 10%	
Skilled workers	20 out of 28: 71%	32 out of 41: 78%	NS
Unskilled workers	2 out of 28: 7%	3 out of 41: 7%	
Smoking (>1 cigarettes/day)	11 out of 28: 39%	13 out of 41: 32%	NS
Alcohol (>3 drinks/day for men and >2 drinks/day for women)	1 out of 28: 4%	9 out of 41: 22%	$p < 0.0001$
Physical activity >3 h/week	19 out of 28: 68%	10 out of 41: 24%	$p < 0.0001$
Psychotropic drugs	2 out of 28: 7%	32 out of 41: 78%	$p < 0.0001$
Suicidal ideas	0 out of 28: 0%	27 out of 41: 66%	$p < 0.0001$
Suicide attempts	0 out of 28: 0%	3 out of 41: 7%	$p < 0.05$
Psychological care	0 out of 28: 0%	11 out of 41: 27%	$p < 0.0001$

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