Psychother Psychosom 2012;81:375–377
DOI: 10.1159/000341179

Prevalence of Allostatic Overload Syndrome in Patients with Chronic Cardiovascular Disease

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Allostasis, the ability to maintain stability through change, is a fundamental process through which organisms actively adjust to both predictable and unpredictable events. When allostatic systems are turned on and turned off again efficiently and not too frequently, the body is able to cope effectively with challenges that it might not otherwise survive. However, in a number of circumstances allostatic systems may either be overstimulated or not perform normally, and this condition has been termed ‘allostatic load’, or the price of adaptation [1]. Findings from several studies suggest that it is associated with worse health conditions and plays a significant role in the susceptibility, course, and outcome of cardiovascular (CV) diseases [2]. Recently, Fava et al. [3] introduced clinimetric criteria for assessing allostatic overload syndrome (AOS) based on: (a) current identifiable sources of distress in the form of acute or chronic stress (the stressor is judged to tax or exceed the individual’s coping skills when its full nature and circumstances are evaluated), and (b) psychiatric symptoms (DSM-IV) or psychosomatic symptoms (DCPR) or significant impairment in social or occupational functioning or in psychological well-being occurring within 6 months after the onset of the stressor.

This study aimed to investigate the prevalence of the AOS of Fava et al. [3] in patients with chronic CV disease and its relationships with psychosomatic syndromes (Structured Interview for Diagnostic Criteria for Psychosomatic Research; DCPR [4]), psychopathology (Structured Clinical Interview for DSM-IV; SCID [5]), illness representations (Illness Perception Questionnaire-Revised; IPQ-R [6]), and psychosocial functioning (12-item Short Form Health Survey; SF-12 [7]). To evaluate AOS, recent and chronic stress, environmental mastery, sleep, somatization, and psychological distress were carefully evaluated in the clinical interview.

Consecutive outpatients with essential hypertension and coronary heart disease (CHD) were enrolled between January and December 2011. Patients with severe CV comorbidity, psy-

chosis, oncology and autoimmune diseases, cognitive impairment, and current alcohol or any other substance abuse were excluded. For all patients, body mass index (BMI) and blood pressure were recorded at the entry. All patients gave their informed consent. The study was approved by the local ethics committee. Because of refusal to participate, clinical problems, and other difficulties, 116 of 138 patients (84%) entered the study (84 with essential hypertension and 32 with CHD). The clinical characteristics and scale scores of patients with and without AOS are shown in table 1.

No differences in CV and sociodemographic variables were found between the two groups, except for younger age in the AOS patients. Patients with AOS showed significant poorer mental functioning (SF-12 MCS), higher scores on the IPQ-R consequences (perception of severity and effects of the illness on individual life) and emotional representations (emotional reactivity to the illness) subscales, and a higher prevalence of DSM-IV diagnoses. Furthermore, a 2-fold significant higher prevalence of DCPR clusters of abnormal illness behavior, irritability, and somatization (though the latter was near to statistical significance) was found in the AOS group compared to the comparison group. It is noteworthy that DCPR demoralization was more than 5-fold higher in AOS patients than in those without AOS. Also, the DCPR syndrome of illness denial was diagnosed 3 times more frequently in the AOS (31%) group than in the comparison (10%) group [$\chi^2(1) = 4.82$, $p = 0.03$]. Logistic regression analysis was used with AOS as the dependent variable and DSM and DCPR syndrome illness representation, psychosocial functioning, and sociodemographic characteristics as independent variables. The final model was statistically significant ($\chi^2 = 31.46$, $p < 0.001$; Cox and Snell $R^2 = 0.24$) and AOS was found to be independently predicted by DCPR demoralization [$B = 1.807$ (SE 0.849); Wald statistic 4.530 (d.f. = 1), $p = 0.03$; Exp (B) = 6.090 (95% CI 1.154–32.153)] and SF-12 MCS [$B = -0.099$ (SE 0.040); Wald statistic 5.978 (d.f. = 1), $p = 0.01$; Exp (B) = 0.906 (95% CI 0.837–0.981)].

In this exploratory study we showed for the first time, to our knowledge, the prevalence of AOS in outpatients with chronic CV illness. Within this sample, AOS is characterized by poorer psychosocial functioning, higher rates of psychopathology, and a higher disease-related emotional burden (perception of the impact of the illness on individual life) with associated correlates of abnormal illness behavior, somatization symptoms, and irritability. It is of interest that AOS partially and independently overlapped with demoralization, a feeling state characterized by an inability to cope with problems, hopelessness, and helplessness [8] which may dramatically increase the subjective perception of being overloaded by stressful demands, as shown by the association

Table 1. Sociodemographic and clinical characteristics of the sample with and without AOS

	AOS (n = 13)	Non-AOS (n = 103)	χ^2 (d.f. = 1)	t (d.f. = 114)	P
M:F (%)	7:6 (53.8:46.2)	58:45 (56.3:43.7)	0.03		0.87
Age, years	60.08 (9.55)	66.78 (9.72)		2.35	0.02
Years of education	8.92 (3.55)	7.22 (3.74)		1.55	0.12
Median duration of illness, months	96	60			0.77 ^a
BMI	28.81 (5.40)	28.69 (5.89)		0.07	0.94
Systolic blood pressure	132.50 (11.65)	138.69 (13.86)		1.22	0.22
Diastolic blood pressure	82.50 (7.07)	82.20 (8.04)		0.10	0.92
Heart rate	68.88 (15.41)	71.23 (11.79)		0.52	0.60
DSM-IV diagnoses, %	5 (38.5)	15 (14.56)	4.62		0.03
Mood disorders	3	11			
Anxiety disorders	1	4			
Adjustment disorder	1	–			
<i>DCPR syndromes, %</i>					
Abnormal illness behavior cluster	9 (69.2)	40 (38.8)	4.37		0.04
Somatization cluster	5 (38.5)	17 (16.5)	3.62		0.06
Irritability cluster	10 (76.9)	36 (35.0)	8.50		0.004
Demoralization	8 (61.5)	11 (10.7)	21.80		0.000
Alexithymia	9 (69.2)	54 (52.4)	1.31		0.25
<i>IPQ-R scales</i>					
Identity	1.70 (1.55) [0–6]	1.09 (1.25) [0–7]		1.60	0.11
Timeline	25.62 (5.32) [15–30]	25 (6.12) [6–30]		0.35	0.33
Consequences	14.92 (4.01) [9–22]	11.80 (4.11) [6–23]		2.60	0.01
Control (personal)	21.70 (6.18) [10–29]	19.47 (7.37) [6–30]		1.04	0.30
Control (treatment)	19.70 (2.46) [13–23]	18.93 (2.83) [13–25]		0.93	0.36
Illness coherence	13.54 (3.82) [9–21]	13.20 (3.42) [7–22]		0.33	0.74
Timeline cyclical	11.62 (4.94) [4–20]	10.21 (3.76) [4–17]		1.22	0.22
Emotional representations	16.77 (9.36) [6–30]	10.84 (5.58) [6–27]		3.31	0.001
<i>SF-12</i>					
SF-12 MCS (mental)	35.61 (10.39) [20.91–59.50]	50.53 (9.39) [21.53–64.84]		5.33	0.000
SF-12 PCS (physical)	45.10 (10.34) [25.64–66.23]	46.85 (9.69) [20.53–63.91]		0.61	0.54

Values are expressed as means (SD) unless otherwise indicated. Scale score ranges are indicated in brackets.

^a Wilcoxon signed rank test.

with the mental component score of SF-12. Recently, Offidani and Ruini [9] found a much higher prevalence of AOS (41%) compared to our results (11%). The marked difference with the report of Offidani and Ruini [9] might be likely due to a number of reasons including sampling (they recruited blood donors on a voluntary basis vs. consecutive CV outpatients), procedure (they recruited healthy volunteers who might be more interested in participating in a psychological evaluation because of experienced distress), age (they recruited younger subjects aged an average of 37 years while our patients had a mean age of 66), work status (more than half of their subjects were employed while two third of our subjects were retired, with a consequent different weight of work-related stress), and assessment instruments (they did not use SCID and DCPR but cut off criteria to self-report scales).

Our study includes obvious limitations due to its preliminary nature such as a limited sample size, cross-sectional design, lack of assessment of biological (e.g. erythrocytes, leukocytes, triglycerides, cholesterol, cortisol, C-reactive protein, glucose, and insulin), metabolic (waist-hip ratio), and behavioral (smoking status, diet, alcohol, and coffee consumption) data that are relevant for both CV illness and allostatic load. Nonetheless, our findings show that a reliable evaluation of allostatic overload may help to identify those conditions that, by exceeding individual resources, may constitute a danger to health such as demoralization. The relevance of diagnosing AOS is particularly important in cardiology because of the established association of chronic stress with negative prognostic factors. Furthermore, diagnosing AOS may help target treatment to psychological functions enhancing well-being outcomes [10].

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