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Ill-being and well-being in patients with masked hypertension: a controlled study

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**Ill-being and well-being in patients with masked hypertension:  
a controlled study**

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There are no conflicts of interest.

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## To the Editor

Psychosocial and psychosomatic characteristics of patients with masked hypertension (MH) have been poorly investigated,<sup>1-4</sup> with contrasting findings. Some studies reported that depression<sup>1,3</sup> and hypochondriasis<sup>3</sup> were more frequently associated with MH than normotension and white-coat hypertension. Other researchers<sup>4</sup> found that MH patients were less affected by depression and type-A personality than other hypertensive patients. Moreover, studies on MH and stress mainly focused on work-related stressors, ignoring other chronic/acute stressful life-events<sup>5</sup> and allostatic overload (AO),<sup>6,7</sup> a psychosomatic syndrome associated with greater cardiovascular risk among patients with essential hypertension (EH).<sup>7</sup> Finally, since literature supports a link between psychological well-being and biological correlates,<sup>8,9</sup> especially in cardiac settings, well-being should be explored in MH population.

Based on gaps in the literature, this study aimed to 1) evaluate ill-being and well-being in patients with MH; 2) explore psychological differences with EH patients and normotensive subjects (NS).

## Methods

The sample included 10 consecutive MH patients enrolled at the ESH-Excellence Centre for Hypertension of Sant'Orsola Hospital (Bologna, Italy), 10 patients with EH recruited at the Division of Cardiology, Bellaria Hospital (Bologna, Italy), and 10 NS from general population, matched for age and sex. MH was diagnosed when blood pressure was lower than 140/90mmHg during clinical examinations, higher on average ambulatory blood pressure measurements performed with SpaceLab 90207(version 1.03.16).<sup>10</sup>

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Structured Clinical Interview for DSM-5-SCID-5<sup>11</sup> (psychiatric distress), Semi-Structured Interview on the Diagnostic Criteria for Psychosomatic Research-DCPR-SSI<sup>12,13</sup> (psychosomatic suffering), and PsychoSocial Index-PSI<sup>14,15</sup> (stressors, AO, well-being), were administered.

ANOVA and  $\chi^2$  test applied to contingency tables were run.

## Results

*Table 1* describes socio-demographic and clinical profile of MH patients. Stressors linked to MH included loneliness, being under pressure at work, illness/bereavement of family member/close friend, and significant life-changes (*Table 1*). Following these chronic/acute stressful life events, 40% of MH patients developed AO (*Table 2*).

70% of MH patients reported ill-being (at least one DSM-5/DCPR diagnosis). Compared with EH and NS groups, MH patients were significantly more likely to show a DSM-5 diagnosis (*Table 2*), especially anxiety disorders ( $\chi^2=6.240$ ,  $p=0.04$ ). As to DCPR syndromes, a higher prevalence was associated with EH (*Table 2*).

Significant differences between the three groups as to PSI psychological distress, stress and well-being were found (*Table 2*): MH patients showed higher distress (MH-EH:  $p=0.012$ ; MH-NS:  $p=0.001$ ) and stress (MH-EH:  $p=0.047$ ; MH-NS:  $p=0.033$ ), lower well-being (MH-EH:  $p=0.002$ ; MH-NS:  $p=0.003$ ).

## Comment

The majority of MH patients were characterized by severe ill-being and impaired well-being, even greater than those associated with EH. In particular, findings from this study showed that only MH

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was associated with clinically relevant anxiety according to current psychiatric nosography. Moreover, MH patients self-reported significantly higher psychological distress, stress and lower well-being, compared with EH and control groups. As to stress, this study gave new insights on a variety of stressful life events that might affect health of MH patients, who are likely to develop AO,<sup>6,16</sup> a condition that derives from chronic exposure to heightened neural/systemic physiologic responses to daily stressful experiences exceeding individual coping resources.<sup>16</sup>

This study presents some limitations, such as the small sample size (possibly because 90% of the patients referred by the GP to the ESH-Excellence Centre for Hypertension were already taking anti-hypertensive drugs) and the cross-sectional design that does not allow causal inferences. Despite these limits, this is the first study that included a comprehensive assessment of the psychosocial profile of MH patients, which appears to be more compromised than in other types of hypertension. Since these psychological characteristics are associated with negative course of medical illness,<sup>17-20</sup> they should be included in the assessment of MH patients in order to be recognized and addressed.

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## References

1. Kayano H, Koba S, Matsui T, *et al.* Impact of depression on masked hypertension and variability in home blood pressure in treated hypertensive patients. *Hypertens Res* 2015;**38**:751-757.
2. Terracciano A, Scuteri A, Strait J, *et al.* Are personality traits associated with white coat and masked hypertension? *J Hypertens* 2014;**32**:1987-1992.
3. Hanninen, MA, Niiranen TJ, Puukka PJ, Mattila AK, Jula AM. Determinants of masked hypertension in the general population: the Finn-Home study. *J Hypertens* 2011;**29**:1880-1888.
4. Konstantopoulou AS, Konstantopoulou PS, Papargyriou IK, Liatis ST, Stergiou GS, Papadogiannis DE. Masked, white coat and sustained hypertension: comparison of target organ damage and psychometric parameters. *J Hum Hypertens* 2010;**24**:151-157.
5. Trudel X, Brisson C, Gilbert-Ouimet M, Milot A. Psychosocial Stressors at Work and Ambulatory Blood Pressure. *Curr Cardiol Rep* 2018;**20**:127.
6. Fava GA, Guidi J, Semprini F, Tomba E, Sonino N. Clinical assessment of allostatic load and clinimetric criteria. *Psychother Psychosom* 2010;**79**:280-284.
7. Guidi J, Lucente M, Piolanti A, Roncuzzi R, Rafanelli C, Sonino N. Allostatic overload in patients with essential hypertension. *Psychoneuroendocrinology* 2020;**113**:104545.
8. Ryff CD, Singer BH, Love GD. Positive Health: connecting well-being with biology. *Philos Trans R Soc Lond B Biol Sci* 2004;**359**:1389-1394.
9. Ryff CD, Love GD, Urry HL, *et al.* Psychological well-being and ill-being: Do they have distinct or mirrored biological correlates? *Psychother Psychosom* 2006;**75**:85-95.
10. Williams B, Mancia G, Spiering W, *et al.* 2018 ESC/ESH Guidelines for the management of arterial hypertension: The Task Force for the management of arterial hypertension of the

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European Society of Cardiology and the European Society of Hypertension: The Task Force for the management of arterial hypertension of the European Society of Cardiology and the European Society of Hypertension. *J Hypertens* 2018;**36**: 1953-2041.

11. First MB, Williams JBW, Karg RS, Spitzer RL. *Structured Clinical Interview for DSM-5 Disorders, Clinical Version (SCID-5-CV)*. Arlington, VA: American Psychiatric Association, 2015.
12. Fava GA, Freyberg HJ, Bech P, *et al*. Diagnostic criteria for use in psychosomatic research. *Psychother Psychosom* 1995;**63**:1-8.
13. Rafanelli C, Roncuzzi R, Finos L, *et al*. Psychological assessment in cardiac rehabilitation. *Psychother Psychosom* 2003;**72**:343-349.
14. Sonino N, Fava GA. A simple instrument for assessing stress in clinical practice. *Postgrad Med J* 1998;**74**:408-410.
15. Piolanti A, Offidani E, Guidi J, Gostoli S, Fava GA, Sonino N. Use of the PsychoSocial Index: a sensitive tool in research and practice. *Psychother Psychosom* 2016;**85**:337-345.
16. Fava GA, McEwen BS, Guidi J, Gostoli S, Offidani E, Sonino N. Clinical characterization of allostatic overload. *Psychoneuroendocrinology* 2019;**108**:94-101.
17. Gostoli S, Bonomo M, Roncuzzi R, Biffi M, Boriani G, Rafanelli C. Psychological correlates, allostatic overload and clinical course in patients with implantable cardioverter defibrillator (ICD). *Int J Cardiol* 2016;**220**:360-364.
18. Gostoli S, Roncuzzi R, Urbinati S, Morisky DE, Rafanelli, C. Unhealthy behaviour modification, psychological distress, and 1-year survival in cardiac rehabilitation. *Br J Health Psychol* 2016;**21**:894-916.
19. Rafanelli C, Offidani E, Gostoli S, Roncuzzi R. Psychological correlates in patients with different levels of hypertension. *Psychiatry Res* 2012;**198**:154-160.

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20. Rafanelli C, Roncuzzi R, Milaneschi Y. Minor depression as a cardiac risk factor after coronary artery bypass surgery. *Psychosomatics* 2006;**47**:289-295.

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**Table 1 Socio-demographic and clinical variables of MH patients**

	N (%)	Mean $\pm$ SD
Age		52 $\pm$ 6.07
Sex		
	<i>Male</i>	2 (20%)
	<i>Female</i>	8 (80%)
Weight (kg)		76.70 $\pm$ 19.26
Height (cm)		167.39 $\pm$ 7.07
Body Mass Index		27.15 $\pm$ 5.48
Alcohol	8 (80%)	
Smoke	6 (60%)	
Caffeine	7 (70%)	
Physical activity	5 (50%)	
Pharmacotherapy		
	statins	1 (10%)
	vitamin D	1 (10%)
	contraceptive	1 (10%)
	diuretic	1 (10%)
	gastrointestinal medications	1 (10%)
Blood Pressure		
<i>Office measurements</i>		
	Systolic	128.91 $\pm$ 6.34
	Diastolic	81.77 $\pm$ 4.75
<i>Ambulatory measurements</i>		
<i>24h</i>		
	Systolic	125.70 $\pm$ 6.11
	Diastolic	82.10 $\pm$ 3.69
<i>Daytime</i>		
	Systolic	130.11 $\pm$ 6.47
	Diastolic	85.89 $\pm$ 5.08
<i>Overnight</i>		
	Systolic	116.67 $\pm$ 11.14
	Diastolic	72.44 $\pm$ 7.03
Stressors		
	Loneliness	7 (70%)
	Work	6 (60%)
Illness/bereavement of a family member or close friend	5 (50%)	
Significant changes in life	5 (50%)	
Family/relationships	3 (30%)	
Economic/legal problems	1 (10%)	

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**Table 2 Comparison between patients with masked hypertension (MH), patients with essential hypertension (EH), and healthy normotensive subjects (NS) in terms of psychiatric (DSM-5), psychosomatic (DCPR) diagnoses and psychosocial variables scores (PsychoSocial Index)**

	Patients with MH	Patients with EH	NS	$\chi^2$	<i>P</i> value
<b>Psychiatric diagnosis</b>					
AT LEAST ONE DSM DIAGNOSIS	5 (50%)	1 (10%)	0 (0%)	8.750	0.013
Past major depressive episode	3 (30%)	1 (10%)	0 (0%)	1.920	0.383
Persistent depressive disorder	2 (20%)	0 (0%)	0 (0%)	4.286	0.117
Generalized anxiety disorder	3 (30%)	1 (10%)	0 (0%)	4.038	0.133
Panic disorder	1 (10%)	0 (0%)	0 (0%)	2.069	0.355
Agoraphobia	0 (0%)	1 (0%)	0 (0%)	2.069	0.355
Social anxiety disorders	1 (10%)	0 (0%)	0 (0%)	2.069	0.355
<b>Psychosomatic syndromes</b>					
AT LEAST ONE DCPR SYNDROME	6 (60%)	9 (90%)	1 (10%)	13.125	0.001
Irritable mood	2 (20%)	2 (20%)	0 (0%)	2.308	0.315
Type A behavior	2 (20%)	1 (10%)	0 (0%)	2.222	0.329
Healthy anxiety	2 (20%)	1 (10%)	1 (10%)	0.577	0.749
Persistent somatization	2 (20%)	3 (30%)	0 (0%)	3.360	0.186
Illness denial	1 (10%)	2 (20%)	0 (0%)	2.222	0.329
Demoralization	1 (10%)	4 (40%)	0 (0%)	6.240	0.044
Conversion symptoms	1 (10%)	0 (0%)	0 (0%)	2.069	0.355
Alexithymia	0 (10%)	5 (50%)	0 (0%)	12.000	0.002
Allostatic overload	4 (40%)	2 (20%)	2 (20%)	1.364	0.506

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				<i>F</i>	<i>P value</i>
<b>PsychoSocial Index</b>					
Psychological distress	13 ± 6.43	7.20 ± 3.68	4.70 ± 3.71	7.925	0.002
Abnormal illness behavior	1.10 ± 1.20	0.30 ± 0.67	1 ± 1.05	1.900	0.169
Stress	4.40 ± 1.51	2.90 ± 1.85	2.50 ± 1.43	3.881	0.033
Well-being	6 ± 1.33	8 ± 1.63	7.90 ± 0.74	7.637	0.002

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