Heart failure and comorbid diabetes mellitus or chronic obstructive pulmonary disease: Effects on mood in outpatients

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Heart failure (HF) is positively associated with mortality [1,2], hospital admissions [2], impaired health status [3], and is frequently accompanied by comorbidities, such as diabetes mellitus (DM) and chronic obstructive pulmonary disease (COPD) [4,5]. Comorbid DM and COPD have been found to add to the morbidity in HF in terms of increased mortality [6] and rates of hospitalization [4], lower quality of life [5,7], and poorer physical health status [8].

Depressive symptoms and anxiety are common in HF patients [9,10] and are likely to co-occur [11,12]. However, to date no studies have examined the effects of comorbid conditions on anxious and depressive symptoms simultaneously in HF. The course of anxiety and depression have shown to be stable over time in patients undergoing a percutaneous coronary intervention (PCI) [13], receiving an ICD [14], after a myocardial infarction (MI) [15], and atrial fibrillation [16]. Little is known about the stability of these symptoms in HF patients. One clinical trial in HF showed that depressive symptoms tended to be stable over a 6-month period in patients in the control condition [17]. The aims of the current study in HF outpatients were to examine (1) the stability of depressive symptoms and mixed anxiety and depressive symptoms after a 12-month period in patients with and without comorbid DM and or/COPD, and (2) the associations between comorbid DM and/or COPD and depressive symptoms, and mixed anxious and depressive symptoms at 12 months.

The sample comprised 350 consecutive HF outpatients (response rate = 70%) recruited between March 2003 and October 2008 from the three hospitals in the southern regions of the Netherlands. Inclusion criteria have been described elsewhere [18]. The mean age of the sample was 66.0 ± 10.4 years, with 250 patients (71.2%) being men. The study was approved by the medical ethics committees of all three hospitals, and was conducted according to the Helsinki Declaration. All patients provided written informed consent and completed the 21-item Beck Depression Inventory (BDI) [19] and the 4-item Symptoms of Anxiety-Depression Index (SAD_4) [20] at inclusion and 12 months, to assess depressive symptoms and mixed symptoms of anxiety and depression, respectively.

Twelve-month changes in depressive symptoms and mixed anxiety and depressive symptoms for the total sample, and for HF patients with and without comorbid DM or COPD were tested using paired samples *t*-tests. Effect sizes (Cohen's *d*) were calculated to evaluate clinical relevance of changes [21]. The impact of HF with and without comorbid DM or COPD on depressive symptoms and mixed anxiety and depressive symptoms at 12 months were examined by linear regression analyses. Multivariable analyses were adjusted for age, gender, current working status, marital status, educational level, cardiac history, NYHA-class, and LVEF.

In total, 30.9%($n = 108$) of patients were diagnosed with comorbid DM and/or COPD. Mean depressive symptoms (8.85 ± 6.12 vs. 8.04 ± 6.05, $t(349) = 3.45$, $p = .001$) and mixed anxious and depressive symptoms (2.28 ± 2.90 vs. 1.93 ± 2.82, $t(349) = 2.73$, $p = .007$) significantly decreased over 12 months for the total sample. The clinical relevance of these changes were negligible to small ($d = 0.12$). No differences were observed in baseline depressive symptoms (8.57 ± 6.21 vs. 9.49 ± 5.65, $t(348) = -1.29$, $p = .19$) and in mixed symptoms (2.02 ± 2.79 vs. 2.39 ± 2.94, $t(348) = 1.12$, $p = .27$) in patients without or with comorbidities. The prevalence of depressive symptoms (BDI-score ≥ 10) was 36.3% (127/350) in the total sample, and did not differ in patients without and with comorbidities (34.3%(83/342) vs. 40.7%(44/108), $\chi^2 = 1.34$, $p = .25$). The prevalence of mixed anxiety and depressive symptoms was 24.3% (85/350), and no differences emerged in patients with and without comorbidities (23.1%(25/108) vs. 24.8%(60/242), $\chi^2 = 0.11$, $p = .74$). Depressive symptoms significantly decreased over 12 months in both the HF group with (9.49 ± 5.66 vs. 8.50 ± 5.26, $t(107) = 2.04$, $p = .04$) and without comorbidities (8.57 ± 6.31 vs. 7.84 ± 6.37, $t(241) = 2.81$, $p = .005$). Mixed anxious and depressive symptoms decreased significantly in the group without comorbidities (2.39 ± 2.94 vs. 2.04 ± 3.02, $t(241) = 2.29$, $p = .02$), but not in those with comorbidities (2.02 ± 2.94 vs. 1.66 ± 2.28, $t(107) = 1.49$, $p = .14$). The clinical relevance of all changes was negligible to small ($d = 0.18$, 0.12, 0.12, and 0.14, respectively). In univariable analyses, comorbidities were neither associated with depressive symptoms ($B = -.06$, 95%CI [−.08 to .02], $p = .24$) nor with mixed symptoms ($B = .05$, 95%CI [−.12 to .33], $p = .35$). Results were similar in multivariable analyses (Table 1).

Table 1
Multivariable associates of depressive symptoms and mixed anxiety and depressive symptoms.[a]

	Depressive symptoms[b]			Mixed anxiety and depression symptoms[c]		
	B	95%CI	*p*	B	95%CI	*p*
HF with comorbid DM and/ or COPD	.03	−.07 to .13	.59	−.07	−.16 to .004	.21
Age	−.01	−.13 to .11	.89	−.07	−.18 to .06	.29
Female gender	.08	−.03 to .18	.17	−.05	−.15 to .06	.41
Having a job	−.07	−.19 to .05	.25	−.003	−.12 to .12	.96
Having a partner	−.11	−.22 to .003	**.04**	−.07	−.17 to .04	.23
Higher educational level	.09	−.02 to .19	.12	.18	.07–.29	**.001**
Cardiac history[d]	.08	−.03 to .18	.16	.04	−.07 to .15	.47
NYHA-class III	.14	.03–.24	**.01**	.09	−.02 to .19	.12
LVEF	.08	.03–.18	.15	.03	−.08 to .13	.61

COPD = Chronic obstructive pulmonary disease, DM = Diabetes mellitus, HF = heart failure, LVEF = Left ventricular ejection fraction, NYHA = New York Heart Association functional class.
[a] Adjusted for all other variables in the model.
[b] assessed by means of the BDI.
[c] assessed by means of the SAD_4.
[d] History of CABG, PCI or MI.

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Comorbid DM and/or COPD was common in HF outpatients, with 30.9% having either or both comorbidities. Comorbidities were neither associated with increased levels of depressive symptoms nor with mixed anxious and depressive symptoms. Although symptoms statistically decreased during 12 months, clinical relevance was negligible to small. Our findings corroborate studies demonstrating that comorbid DM is not associated with clinical depression [10]. Depression and anxiety have been shown to be relatively stable over time across cardiac conditions [13–16], including HF [17], which was confirmed in this study. The presence of comorbidities did not affect these findings. Our findings are in contrast with studies suggesting that comorbid COPD or DM may be associated with increased depressive symptoms [5,22] and clinically relevant depression [10], which may be explained by the administration of different instruments. The results are opposed to the finding that comorbid diabetes was associated with clinical anxiety in HF patients [10]. Although we did not have information on clinical anxiety and depression, the SAD_4 has been shown to be indicative for the presence of clinically relevant anxiety and depression [20]. Caution is required in the interpretation of the results for several reasons. Due to the small number of cases, comorbid DM and/or COPD were combined into a single group, which hampered our ability to examine differential associations of these conditions. Second, no information was collected on the presence of clinical diagnoses. Finally, information on co-morbid conditions was obtained from medical records. Strengths of the current study comprise the use of the psychometrically sound instruments, the prospective and multicenter design. In summary, the present study found that comorbid DM and/or COPD was common in HF outpatients, and that these comorbidities were neither independently associated with depressive symptoms nor with mixed anxious and depressive symptoms at 12 months. Depressive symptoms and mixed anxious and depressive symptoms were clinically stable over time. Future studies need to further explore the effects of comorbidities in HF on patient-centered outcomes.

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