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Quality of Life and Depressive Symptoms in the Elderly: A Comparison Between Patients With Heart Failure and Age- and Gender-Matched Community Controls

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ABSTRACT

Background: Comparisons of heart failure (HF) patients with an unselected healthy sample in terms of quality of life (QoL) and depressive symptoms might prove misleading. We compared QoL and depressive symptoms of a HF population with an age- and gender-matched sample of community dwelling elderly.
Methods and Results: Data were collected from 781 HF patients (36% female; age 72 ± 9; New York Heart Association II-IV) and 781 age- and gender-matched community-dwelling elderly. Participants completed the Medical Outcome Study 36-item General Health Survey, the Cantril's Ladder of life, and the Center for Epidemiological Studies-Depression scale (CES-D). Analysis of variance techniques with Welch F test and chi-square tests were used to describe differences in QoL and depressive symptoms between different groups. For both men and women with HF, QoL was reduced and depressive symptoms were elevated when compared with their elderly counterparts (CES-D ≥16: 39% vs. 21%, $P < .001$). HF patients had more chronic conditions—specifically diabetes and asthma/chronic obstructive pulmonary disease. Impaired QoL and depressive symptoms were most prevalent among HF patients with comorbidities. Prevalence was also higher in HF patients in the absence of these conditions.
Conclusions: HF has a large impact on QoL and depressive symptoms, especially in women with HF. Differences persist, even in the absence of common comorbidities. Results demonstrate the need for studies of representative HF patients with direct comparisons to age- and gender-matched controls. (*J Cardiac Fail 2009;15:17−23*)
Key Words: Mental health, comorbidity, men and women, cardiology.

Heart failure (HF) is a devastating disease with high morbidity and mortality and a lower 5-year survival rates than many common cancers such as breast and prostate cancer.[1]

Additionally, HF is associated with diminished quality of life (QoL) by contributing to severe physical, role, social, and functional impairment as well as increased psychologic distress.[2,3] Major depression and depressive symptoms are common in patients with HF and even depressive symptoms in the absence of a confirmed diagnosis of depression increases the risk of noncompliance, short-term worsening, clinical events, and mortality.[4−6] Depressive symptoms may have a stronger association to QoL than severity of cardiac function or functional impairment.[7]

Most studies of HF patients involve a relatively young cohort of male HF patients participating in medical clinical trials conducted at specialty tertiary care settings with stringent selection criteria.[8] Referral and selection biases thus yield samples that are not representative of the present HF population with its growing representation of elderly, female patients. Earlier, we showed that survival rates in a community sample of HF patients were worse than the known survival rates in clinical trials, with worse outcomes for males vs. females,[9] illustrating the importance of

recruiting samples outside the clinical trial population. Furthermore, assessment of measures of QoL and functioning often involve comparison to a normative population, rather than more comparable elderly living in the community.[10] These community-dwelling elderly often suffer from several chronic diseases and have faced age-related life events (eg, loss of a spouse, retirement) that might affect their QoL and psychosocial status as well.

We are not aware of any published direct comparisons of QoL and depressive symptoms in a HF sample vs. an age- and gender-matched community-dwelling elderly control group. The purpose of the present study is to (1) examine whether there are differences in QoL and depressive symptoms between HF patients and an age- and gender-matched population of community-dwelling elderly and (2) determine how taking account of chronic health conditions commonly comorbid with HF qualify the answers to this question?

Methods

Study Population

HF Population. Baseline data of patients hospitalized for HF and participating in the COACH (Coordinating study evaluating Advising and Counseling in Heart failure) study were used. COACH is a randomized clinical trial conducted in 17 centers in the Netherlands and studied the effect of outcome and counseling in HF patients.[11,12] Patients were included in the COACH study between October 2002 and February 2005 when they were hospitalized for symptomatic HF confirmed by the cardiologist and had documented underlying heart disease. All patients were admitted for HF (New York Heart Association II-IV). Patients were at least 18 years of age, with evidence of structural underlying heart disease. Patients were excluded if they were enrolled in a study requiring additional visits to research health care personnel. Other reasons for exclusion were invasive intervention (percutaneous transluminal coronary angiography, coronary artery bypass graft, heart transplantation, valve replacement) within the last 6 months or planned during the following 3 months; or terminal disease or an active psychiatric diagnosis that hindered them from participating.

A cardiologist and a research nurse approached all patients. After written informed consent, patients completed questionnaires and were interviewed by an independent interviewer not involved in care for these patients. The Central Ethics Committee approved the study and the investigation conforms to the principles outlined in the Declaration of Helsinki.

Elderly Population Living in the Community. Nine local district council offices in different areas in the Netherlands were asked for a random sample of addresses of 500 to 1000 subjects of at least 55 years of age who were not living at the same address. Between July and August 2005, 5500 questionnaires were distributed accompanied by a letter in which the subjects were invited to complete the questionnaires and return it in a prestamped envelope. Anonymity and confidentially was guaranteed. After 3 weeks, a reminder letter was send to everyone, which resulted in a response of 45%.

Study Measures

Quality of Life. QoL was assessed by the Medical Outcome Study 36-item General Health Survey (RAND-36), a self-report questionnaire of general health status. It is a well-validated generic, 36-item questionnaire that includes 9 health concepts that represent dimensions of QoL: physical functioning, role limitations because of physical functioning, bodily pain, general health perception, vitality, social functioning, and role limitations from emotional functioning, mental health, and perceived health change. Each domain has a score between 0 and 100; a higher score means better health.[13,14]

Well being was assessed by the Cantril Ladder of life. This is a single-item measure that is used to assess global well being. Patients were asked to rate their sense of well being on a ladder, with 10 reflecting the best possible life imaginable and 0 reflecting the worst possible life imaginable. A higher score indicates better well being.[15]

Depressive Symptoms. The Center for Epidemiological Studies Depression Scale (CES-D) was used to assess depressive symptoms. The CES-D is a 20-item, self-report questionnaire designed to measure depressive symptoms in the general population and has been widely used with the medical ill. A total sum score is used (0−60), with higher scores indicating more depressive symptoms. A cutoff of 16 is generally used to define patients with clinically significant distress and the need for evaluation for clinical depression.[16,17]

Chronic Conditions. In HF patients, data on what were presumed to be chronic conditions commonly comorbid with HF (diabetes, hypertension, rheumatoid arthritis, stroke, asthma/chronic obstructive pulmonary disease [COPD], and existing renal disease) were collected from the medical patients' charts. In the community-dwelling elderly, these were obtained by self-reported questionnaires in which information about 19 active medical problems was provided.

Statistical Analyses

The 2 populations were matched by age and gender to have a fair test of differences.[18] First, descriptive statistics were used to characterize both samples. For continuous variables means and standard deviations and for categorical variables, frequencies with percentages were used. Second, differences on QoL between the 2 populations were tested by independent samples t-tests. Differences in dichotomized depressive symptoms were analyzed with chi-square test. Third, subgroup analyses were performed for gender. Scores on QoL and depressive symptoms were corrected for differences in age and number of comorbidities. Analysis of variance techniques for continuous variables and chi-square tests for depressive symptoms were used. Because the homogeneity of variance was violated according to the Levine's test, Welch F tests were performed. Furthermore, QoL and depressive symptoms were examined in subjects with and without chronic conditions in general and specifically for subjects with and without diabetes and asthma/COPD. The relative risk for depressive symptoms in both populations according to gender and chronic conditions were obtained by logistic regression analyses. Outcomes were considered statistically significant when $P < .05$.

Results

Response Rate

For the COACH study, 2957 patients with HF were screened. A total of 1049 patients agreed to participate in the study and gave informed consent. From the 5500 questionnaires distributed among community-dwelling elderly,

2512 were returned. In total, 781 HF patients and 781 community-dwelling elderly were matched on age and gender. Because of the process of matching, 268 HF patients were not analyzed. These HF patients were younger and more often female and their QoL was slightly worse on social functioning, role limitations because of physical functioning, and perceived health change ($P < .05$). All other domains of QoL, including well being and depressive symptoms, were similar in both groups.

Characteristics

Matched samples were on average 72 ($\pm$ 9) years of age and 36% were women. In the HF population, 39% was living alone compared with 30% in the elderly population ($P < .001$) (Table 1). In patients with HF, more chronic conditions were present (Table 2). At discharge, most HF patients were in New York Heart Association functional Class II and III (51% and 45%, respectively). In total, 40% had ischemic HF. Patients with HF were on regular HF medication at discharge (Table 1). In total, 73% of the HF patients reported more than 2 chronic conditions, whereas this was 4% in the elderly. Most reported comorbidities among HF patients were hypertension, asthma/COPD, and diabetes. In the elderly population, most subjects reported hypertension, rheumatoid arthritis, and diabetes.

Quality of Life and Depressive Symptoms

Total Population. Without exception, all measures of QoL indicated significantly impairment among the HF patients compared with the matched elderly (Table 3). The largest differences between the 2 populations occurred in physical functioning and vitality ($P < .001$). In the

Table 1. Clinical Characteristics of the Heart Failure Population

	(n = 781)
NYHA functional class at discharge	
II	51%
III	45%
IV	4%
LVEF	34% ± 14
Mean SBP mm Hg	119 ± 21
Mean DBP mm Hg	68 ± 12
Etiology	
Ischemic heart failure	43%
Median index hospital stay (days)	10 (7−16)
Mean duration of heart failure (y)	2.7 ± 4.5
Medication (at discharge)	
ACE/ARB	86%
Diuretics	96%
β-blockers	65%
Laboratory values	
Median (IR) BNP (pg/dL)	454 (205−872)
Mean serum sodium (mg/dL)	139 ± 4
Mean hemoglobin (mmol/L)	8.1 ± 1.2

NYHA, New York Heart Association class; SBP, systolic blood pressure; DBP, diastolic blood pressure; ACE/ARB, angiotensin-converting enzyme inhibitor or angiotensin receptor blocker; IR, interquartile range; BNP, B-type natriuretic peptide.

Table 2. Chronic Conditions in a Heart Failure Population and an Age- and Gender-Matched Population of Community-Dwelling Elderly

	Heart Failure Patients (n = 781)	Community-Dwelling Elderly (n = 781)	P Value
Hypertension	43%	30%	<.001
Asthma/chronic obstructive pulmonary disease	30%	9%	<.001
Diabetes mellitus	29%	12%	<.001
Stroke	11%	2%	<.001
Rheumatoid arthritis	7%	18%*	<.001
Renal disease†	8%	1%	<.001
Number of chronic conditions 0 1 2 >2			<.001
0	—	50%	
1	100%	33%	
2	27%	14%	
>2	43%		

*Besides rheumatoid arthritis, other inflammation of the joints was also included.

†documented as comorbidity.

dimension role limitations due to physical functioning, the HF patients scored very low and the difference in mean score between the 2 populations was even more pronounced (19 ± 34 in HF patients vs. 66 ± 41 in the community-dwelling elderly, $P < .001$).

As measured with the Cantril's Ladder of Life, well-being was significantly lower in the HF population vs. the community-dwelling elderly (6.3 vs. 7.2, $P < .001$). In the HF population 39% reported depressive symptoms vs. 21% of the community-dwelling elderly ($P < .001$) (Table 3).

Because living situations were different between the 2 populations and living alone has been shown to be associated with lower QoL, additional analyses were performed on QoL and depressive symptoms in which we adjusted for living alone, but differences between the 2 populations remained the same. Using β-blockers or having an implantable cardioverter defibrillator did not effect QoL and CES-D score ($t = 0.62$, $P = .53$) in our HF patients.

Gender. Men with HF had significantly impaired QoL compared with the age-matched elderly men. In total, 36% in men with HF and 17% of the elderly men reported the presence of depressive symptoms ($\alpha^2 = 141.1$, $P < .001$) (Table 4).

In women with HF, all domains of QoL were significantly impaired compared with the age-matched counterparts from the community. Depressive symptoms were present in 45% of HF women; in elderly women, the presence was 29%.

Men and women with HF had significantly lower QoL on all domains and higher depressive symptoms when compared with their elderly gender-matched counterparts (Table 4). Within both strata, women had significant lower QoL on several domains and more depressive symptoms than men. Women with HF had more impaired QoL on

Table 3. Quality of Life and Depressive Symptoms of a Heart Failure Population and an Age- and Gender-Matched Population of Community-Dwelling Elderly

	Heart Failure Patients (n = 781)	Community-Dwelling Elderly (n = 781)	
	Mean ± SD	Mean ± SD	P value
Medical Outcome Study 36-item General Health Survey domains			
Physical functioning	35 ± 26	67 ± 27	<.001
Role limitations physical	19 ± 34	66 ± 41	<.001
Bodily pain	66 ± 33	79 ± 22	<.001
General health perceptions	44 ± 18	60 ± 19	<.001
Vitality	40 ± 24	64 ± 19	<.001
Social functioning	54 ± 31	79 ± 24	<.001
Role limitations emotional	51 ± 45	77 ± 37	<.001
Mental health	66 ± 23	75 ± 17	<.001
Perceived health change	26 ± 24	46 ± 18	<.001
Well being	6.3 ± 1.8	7.2 ± 1.4	<.001
Depression			
Depressive symptoms*	39%	21%	<.001
Center for Epidemiological Studies-Depression scale	15 ± 10	10 ± 9	<.001

*Center for Epidemiological Studies-Depression scale ≥ 16.

physical functioning, vitality, mental health, well being, and depressive symptoms than men with HF, even when adjusted for age and number of comorbidities.

In both HF men and women, the risk for depressive symptoms is more than doubled of that of their age-comparable counterparts, resulting in an odds ratio of 2.71 (95% CI 2.02 to 3.64, $P < .001$) for men with HF compared with their male counterparts and an odds ratio of 2.02 (95% CI 1.42 to 2.86, $P < .001$) for women with HF compared with elderly women.

Chronic Conditions

Diabetes and COPD. The prevalence of asthma/COPD and diabetes was much higher in the HF population compared with the non-HF population. In HF patients, 30%, and in the elderly, 9% reported asthma/COPD and diabetes was present in 29% of HF patients vs. 12% in the elderly living in the community ($P < .001$). HF patients in the presence of these 2 comorbidities had worse QoL than those without. The less-impaired HF patients without these chronic conditions were nonetheless worse off than the elderly and specifically those elderly with diabetes or asthma/COPD.

Patients with HF both with and without chronic conditions had significantly lower QoL on all domains than the cohort of community dwelling elderly (Fig. 1). HF patients without additional chronic conditions such as asthma/COPD, rheumatoid arthritis, diabetes, renal disease, hypertension, or stroke, showed impaired QoL specifically in physical functioning, role limitations, vitality, mental health, social functioning, and well being. The QoL of HF patients without chronic conditions was also lower in most QoL domains (physical functioning and role limitations, vitality, social functioning, and well being) when compared with the QoL of elderly with several chronic conditions.

Depressive symptoms in HF patients with additional chronic conditions were higher compared with elderly without and with 1 major chronic condition. However, in elderly with 2 or more chronic conditions, depressive symptoms were more often reported and bodily pain and general health perceptions were more impaired (Table 5; Fig. 1). The unadjusted odds ratio for depressive symptoms in HF patients without additional chronic conditions is 2.48; with additional chronic conditions, the odds ratio is 3.79

Table 4. Quality of Life and Depressive Symptoms of Patients With Heart Failure and Community Dwelling Elderly Divided by Gender

	Heart Failure Men (n = 503)	Community-Dwelling Men (n = 503)	Heart Failure Women (n = 278)	Community-Dwelling Women (n = 278)	F test
Medical Outcome Study 36-item General Health Survey domains	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	
Physical functioning	38 ± 26	68 ± 26	32 ± 25	60 ± 28	182.2*, †
Role limitations physical	21 ± 35	67 ± 39	20 ± 32	60 ± 42	175.1*
Bodily pain	68 ± 32	79 ± 21	65 ± 24	73 ± 24	19.03*
General health perceptions	45 ± 18	59 ± 19	46 ± 19	58 ± 18	107.46*
Vitality	43 ± 23	65 ± 19	38 ± 24	59 ± 19	133.9*
Social functioning	56 ± 30	79 ± 22	55 ± 32	75 ± 27	80.4*
Role limitations emotional	52 ± 45	77 ± 35	54 ± 46	70 ± 40	37.4*
Mental health	69 ± 22	77 ± 16	64 ± 24	70 ± 22	27.1*
Perceived health change	26 ± 23	46 ± 18	26 ± 25	46 ± 19	107.4*
Well being	6.5 ± 1.8	7.2 ± 1.3	6.1 ± 1.9	7.0 ± 1.4	38.8*
Depression					
Center for Epidemiological Studies-Depression scale‡	14 ± 10	9 ± 7	16 ± 12	12 ± 9	38.7
	36%	17%	45%	29%	$\alpha^2 = 141.1$*

*$P < .001$.
†Quality of life scores were adjusted for age and number of comorbidities.
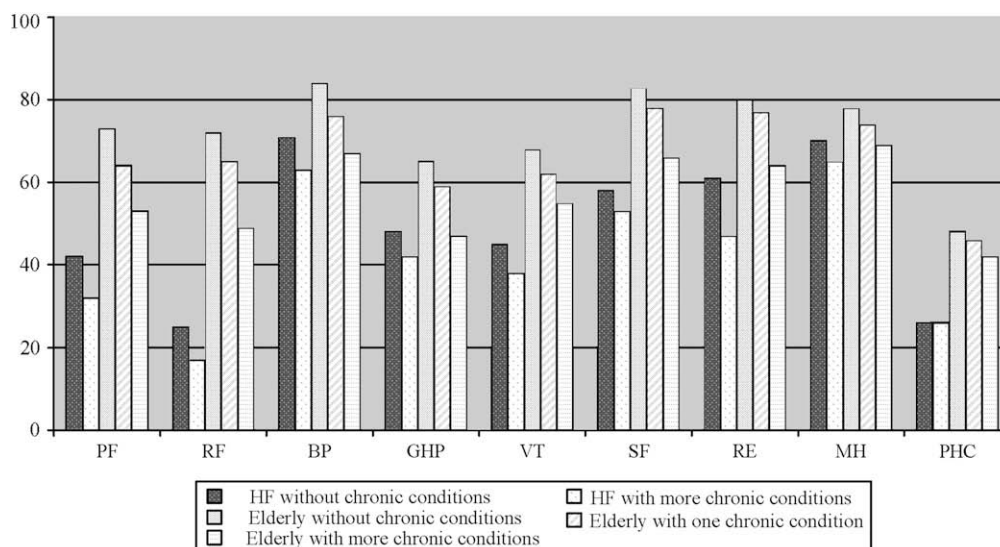‡Center for Epidemiological Studies-Depression scale ≥ 16.

Fig. 1. Quality of life of heart failure (HF) patients and community dwelling elderly according to number of chronic conditions and adjusted for age and living alone. PF, physical functioning; RF, role limitations due to physical functioning; BP, bodily pain; GHP, general health perception; VT, vitality; SF, social functioning; RE, role limitations due to emotional functioning; MH, mental health; PHC, perceived health change.

compared with community-dwelling elderly without chronic conditions.

Discussion

QoL of patients with HF was significantly impaired on all dimensions when compared with an age- and gender-matched community residing sample. Patients with HF consistently scored significant lower in the area of physical health (physical functioning, role limitations from physical functioning, vitality). Women had more impaired QoL compared with their female counterparts and so did men. We found that QoL declines with an increasing burden of comorbidity in both those with and without HF. However, patients with HF and comorbidities were worse off than the comparable elderly population with comorbidities.

Our findings are consistent with findings from other studies in which QoL of HF patients was significantly more impaired than the QoL of a general population sample,[3,19] a healthy elderly population sample,[20] and when compared with patients with other chronic disorders.[21]

Elevations in depressive symptoms in the HF population were more common and almost double compared with the age- and gender-matched sample. These higher rates of depressive symptoms in HF patients have been reported earlier,[22–25] but in 2 of these studies[22,24] highly selective

Table 5. Demographic Characteristics, Well Being, and Depressive Symptoms of Patients with HF and Community-Dwelling Elderly Divided by Numbers of Chronic Conditions

	HF Patients Without Chronic Conditions (n = 208)	HF Patients With More Chronic Conditions (n = 573)	Community-Dwelling Elderly Without Chronic Conditions (n = 392)	Community-Dwelling Elderly With 1 Chronic Condition (n = 261)	Community-Dwelling Elderly With More Chronic Conditions (n = 128)	
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	P value
Age	70.4 ± 9.4	72.9 ± 8.6	72.6 ± 8.9	72.3 ± 8.5	73.8 ± 8.1	.003
Sex(F)	32%	37%	34%	35%	41%	.44
Living alone	38%	40%	28%	31%	31%	.002
Well being[†]	6.2 ± 1.9	6.4 ± 1.8	7.3 ± 1.3	7.1 ± 1.4	6.8 ± 1.4	<.001
Depression						
Center for Epidemiological Studies-Depression scale[†]	13 ± 9	16 ± 11	8 ± 7	10 ± 8	13 ± 9	<.001
Depressive symptoms*,[†]	32%	42%	16%	22%	38%	<.001
OR depressive symptoms (95% CI)	2.48 (1.67–3.69)	3.79 (2.76–5.02)	1.0	1.43 (0.96–2.13)	3.24 (2.07–5.06)	

OR, odds ratio; CI, confidence interval.
Chronic conditions studied: diabetes, stroke, arthritis, hypertension, renal disease, asthma/chronic obstructive pulmonary disease.
*Center for Epidemiological Studies-Depression scale ≥ 16.
[†]Adjusted for age and living alone.

patient samples from university hospitals of consecutive HF patients who were severely ill were used, which are not comparable with the present HF population. The strength of our study was that the HF sample used was recruited from 17 hospitals, with broad selection criteria, reducing referral bias so that the sample is more representative of the HF population living in the community. The present results are comparable to some of our earlier findings among HF patients from a community sample. We found that they were low on various QoL measures and remained at that level after the disease developed.[25]

Overall the substantial impact of HF on QoL is more pronounced in women: women with HF are more impaired in physical health, mental health, and well being than men with HF and report more depressive symptoms.[26] Friedman et al[27] previously found that women were more impaired by HF than men, especially in physical functioning, but the patients under study were recruited from an acute care setting. Riedinger et al[28] studied QoL in women compared with a normative group and patients with other chronic conditions. But the results of this study are limited by the origin of its respondents who were recruited from medical trials (ie, Studies Of Left Ventricular Dysfunction) In a prospective study in which data before onset of the disease were available as well as QoL data after the onset, we saw clear gender differences, indicating that females did worse compared with males, both at baseline (before onset) and after the onset.[25]

The present study allowed some differentiation of the effects of HF vs. commonly comorbid conditions. When additional chronic conditions are present, QoL is impaired in both HF patients and matched controls. The risk for depressive symptoms in both HF patients and matched elderly with more chronic conditions is more than 3 times higher than in elderly without chronic conditions. Even in the absence of asthma/COPD and diabetes, HF patients have lower QoL and more depressive symptoms than age- and gender-matched controls. In a study, de Jong et al[29] concluded that somatic/affective depressive symptoms were confounded by somatic health status yet were prospectively associated with cardiac prognosis even after somatic health status was controlled, which implies higher risk for adverse events in patients with depressive symptoms. They recommended to treat depression after a somatic illness because it probably reduces somatic/affective symptoms and therefore might increase the prognosis. Although this was found in patients after myocardial infarction, it could explain why HF patients with or without comorbidities have more depressive symptoms and low QoL compared with their matched elderly and why it is important to treat depressive symptoms. This differentiation of the effects of HF and commonly associated comorbid conditions is a distinctive feature of the present study. Despite the high prevalence of these comorbid conditions, patients suffering from them are often excluded from the clinical trials that serve as database for our understanding of HF.

Hospitalization could be of influence on QoL of this HF population; however, HF patients have to deal with these sometimes frequent and frightening exacerbations during the course of HF. There is evidence that QoL in general improves as time from discharge increases.[30] However, despite improving after hospital discharge, QoL remains poor and is worse than that seen in most patients with other chronic and cardiac diseases.[31]

There were 2 limitations to the assessment of chronic conditions in this study. First, the list was not intended as an overall measure of chronic health conditions. The list was by no means exhaustive, but limited to conditions likely to have substantial comorbidity in the HF population and was documented as comorbidity in the chart. Although these conditions are relevant to sorting the effects of HF on QoL and depressive symptoms from the effects of comorbid conditions, the conditions underestimate the total disease burden for both HF patients and community controls. A second limitation is that, whereas the comorbid conditions in HF patients were assessed by chart review, assessment in the community-dwelling elderly population were derived from self-reported questionnaires. However, several studies indicate a good correspondence between medical records and physician reports vs. adult respondent self-reports.[32]

Conclusion

Our data demonstrate the burden of HF on all components of QoL in a clinical representative HF sample and provide direct comparisons to age- and gender-matched controls living in the community. The burden is related to the common presence of comorbid conditions, but also occurs in the absence of them. HF guidelines acknowledge the impact of HF on QoL because improving QoL is the main goal in the treatment of chronic HF. The study also showed the high amount of depressive symptoms in HF women and patients with more chronic conditions. Results underscore the need to detect symptoms of depression in an early stage and for the subgroup that is clinically depressed, ensuring appropriate treatment according to established guidelines.

Acknowledgments

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