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Quality of Life and Family Function are Poorest When Both Patients with Heart Failure and Their Caregivers Are Depressed

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Abstract

**Background:** Patients with heart failure (HF) and their family caregivers commonly experience depressive symptoms associated with low quality of life (QOL) at the individual level. However, there is a lack of knowledge about how QOL and family function are associated with depressive symptoms at the dyad level.

**Objectives:** To compare QOL and family function among dyads stratified by depressive symptoms.

**Methods:** Outpatients with HF and their primary caregivers completed the Beck Depression Inventory-II for depressive symptoms, the Short-form 36 for physical and mental QOL, and the McMaster Family Assessment Device for a family function. Analysis of variance was used to compare QOL and family function among the four dyad groups.

**Results:** A total of 91 dyads were categorized into 4 groups: neither member having depressive symptoms (43.9%), only the caregiver having depressive symptoms (13.2%), only the patient having depressive symptoms (23.1%), and both members having depressive symptoms (20.9%). Dyads without depressive symptoms had the highest levels of physical and mental QOL among the groups. The dyads with both members having depressive symptoms had the lowest levels of physical and mental QOL (P<.001) and the lowest levels of general family functioning, problem-solving ability, and communication ability (P<.001). Intermediate levels of QOL were seen in dyads with only one member having depressive symptoms, and a similar pattern of intermediate scores was found in all three subscales of family function.

**Conclusion:** Dyads with both members having depressive symptoms may be at greatest risk of having poor QOL and low family functioning.

**Keywords:** family function, heart failure, depression, QOL
Introduction

Heart failure (HF) is a growing syndrome affecting an estimated 26 million people worldwide and resulting in more than 1 million hospitalizations annually in both the United States and Europe. As most patients with HF receive informal support from their family and family caregivers are a valuable and essential resource for patients managing their HF. They support self-care activities, including following a complex treatment regimen, symptom monitoring, diet changes, and physical activities. Caregivers also assist in navigating the healthcare system, scheduling appointments, and accessing services. According to family stress theory and the interdependence theory, a diagnosis of HF and management HF could be primary stressors for patients and family caregivers, and a family comprises multiple members affecting each other’s lives and well-being. Interactions between patients with HF and their family caregivers are necessary and inevitable in HF management. Family members have a naturally reciprocal and interdependent relationship with patients.

Depressive symptoms are the most common psychological distress experienced by both patients with HF and their family caregivers. According to two systematic reviews, globally prevalence of depressive symptom was 41.9% in 156 studies of patients with HF and the prevalence of depressive symptom ranged from 6% to 64% in 26 studies of caregivers of patients with HF. Thus, there is accumulated evidence of the high prevalence of depressive symptoms in patients or caregivers at individual levels. However, there is unknown knowledge on the prevalence of depressive symptoms at the dyad level. A few researchers investigated depressive symptoms in patients with HF and caregiver dyads. They reported similar depressive symptoms or correlations of depressive symptoms levels within dyad members, but the prevalence of depressive symptoms at the dyad level was not reported.
There is accumulating evidence that depressive symptoms individual depressive symptoms are associated with poor health outcomes for patients with HF or caregivers. Quality of life is well-recognized as an essential outcome in both patients and family caregivers. A few researchers recently investigated how individual depressive symptoms are associated with poor health outcomes for both patients with HF and caregivers.\textsuperscript{9, 11} Family function is also an essential outcome in patient-caregiver dyads. Family function includes problem solving and communication and is essential to effective caregiving in HF management. A caring and warm relationship within the family can positively influence health outcomes. A distressed relationship has a negative impact on physiological outcomes in both patients and caregivers\textsuperscript{2}. One family member’s illness may be viewed as a crisis and distress, significantly disrupting family functioning and dynamics.\textsuperscript{3} Distressed spouses report lower levels of marital intimacy and poorer family functioning. Family function may be negatively affected by the presence of depressive symptoms in one or both partners. However, there is limited knowledge about whether families with a depressed family member exhibit more dysfunction than families without a depressed family member.

This study was guided by family stress theory\textsuperscript{3} and interdependence theory\textsuperscript{4} with a gap in the literature of dyadic research. Diagnosis of HF and management HF are primary stressors for patients as well as family caregivers. They are in an interdependent relationship to manage HF. Still, there is a lack of investigation about the association of depressive symptoms with outcomes at the dyad level. There is less evidence of how dyad members’ QOL and family function are affected when one or both patients and caregivers experience depressive symptoms. Therefore, the purpose of this study was to compare the QOL and family function among dyads categorized into four groups by the presence of depressive symptoms in the dyad members: neither member
having depressive symptoms, only the caregiver having depressive symptoms, only the patient having depressive symptoms, and both members having depressive symptoms.

**Methods**

*Participants and design*

In this cross-sectional and descriptive study, we used only baseline data of both patients and primary caregivers who participated in a longitudinal observational dyadic study that we collected data at baseline and 12 months follow-up. Eligibility for patient participants included being a community-dwelling outpatient with a confirmed diagnosis of chronic HF and no hospitalization event within three months. We excluded patients with HF who were referred for heart transplantation or who had a terminal illness such as cancer, end-stage HF, or obvious cognitive impairment (i.e., Alzheimer’s disease, dementia, or stroke). Caregivers were eligible if they were the primary caregiver identified by a patient with HF. Caregivers who had life-limiting comorbidities, including HF, cancer/other terminal illness, or apparent cognitive impairment were excluded. We recruited patient-caregiver dyads from two community hospitals and an academic medical center in Central Kentucky. "The investigation conforms with the principles outlined in the Declaration of Helsinki" (Br Med J 1964;ii:177).

*Procedures*

After institutional review board approval (IRB # 05-0212-P3G), trained research nurses screened eligible patient-caregiver dyads referred by health providers from outpatient clinics. We approached eligible dyads through face-to-face contact in the cardiology outpatient clinics or by phone. After both eligible patients and caregivers signed individual consents, they completed questionnaires without communicating with each other. The patient’s severity of HF was
assessed using the New York Heart Association class (NYHA class) during face-to-face interviews by trained research nurses. Research nurses obtained clinical information for patients using a structured questionnaire, medical chart review, and a brief interview.

**Measures**

**Depressive symptoms.** The Beck Depression Inventory-II (BDI-II) was used to measure depressive symptoms in both dyad members. The BDI-II includes 21 items that are rated from 0 to 3. The total score ranges from 0 to 63, with higher scores indicating higher levels of depressive symptoms. In this study, we used a cut-point of 14 to indicate the presence of depressive symptoms. A recent meta-analysis reported that the optimal cut-point of 14.4 had a sensitivity of 0.86 and specificity of 0.78. The internal consistency of Cronbach’s alpha was high at .931 for patients and .913 for caregivers in this study.

**Quality of life.** The Short Form -36 (SF-36) was used to measure the quality of life. The SF-36 had 36-items with two summary scores representing physical and mental well-being that were computed from 8 subscales. The scores for each summary scores range from 0 to 100, with higher scores indicating better QOL. The SF-36 is a valid and reliable measure of physical and mental well-being that has been used in multiple populations, including patients with HF and caregivers. Cronbach’s alphas of the eight subscales indicate adequate internal consistency for patients (range: .803 - .946) and caregivers (range: .893 - .939) in this study.

**Family function.** The McMaster Family Assessment Device (FAD) was used to measure function. The FAD has three subscales: problem-solving (6 items; evaluation on family’s ability to resolve problems), communication (9 items; evaluation on the effectiveness of the verbal communication in exchange of information between family members), and general family
function (12 items; overall levels of family function). All 27 items are rated on a 4-point scale from 1 (‘strongly agree’) to 4 (‘strongly disagree’), and the high mean scores for each subscale indicate poor or unhealthy family function. The three subscales' reliabilities (Cronbach’s alpha) in this study were adequate for the general family function (.735 for patients, .900 for caregivers), problem-solving (.751 for patients, .842 for caregivers), and communication (.821 for patients, .849 for caregivers).

**Demographic and clinical variables.** Demographic data were obtained by brief interview and medical chart review using a structured questionnaire to collect age, gender, ethnicity and education, and clinical variables, including left ventricular ejection fraction, comorbidity, and medication prescriptions.

**Data analysis**

Descriptive statistics, including frequency, percentile, mean, and standard deviation, were used to describe sample characteristics. Paired sample t-tests were used to describe differences and similarities of demographic characteristics (i.e., age, sex, and education), depressive symptoms, family function, QOL within the patients, and caregiver dyads. For the analysis, the dyads were categorized into four groups based on depressive symptoms using the cut point from the BDI-II: neither member having depressive symptoms, caregiver only having depressive symptoms, patients only having depressive symptoms, and both members having depressive symptoms. One-way analysis of variance (ANOVA) with Tukey post-hoc testing with an adjusted p-value of 0.05 was used to compare QOL and family function among the four dyad groups. We also compared demographic characteristics among four groups to describe the groups. With 91 subjects (either patients or caregivers) and an alpha level of .05, the power of the ANOVA test to detect a significant difference in mean among the four groups was at least 89% with a large
effect size \((f = 0.40)\). We also conducted Pearson correlations for depressive symptoms, family function, and quality of life between patients and caregivers and within the stratified dyads to describe shared variance within the dyads.

**Results**

**Characteristics of patients with HF and caregivers**

A total of 91 patients and caregiver dyads \((N=182\) individuals) participated in this study (Table 1). Most participants were white (patients 90%, caregivers 91.2%) and married (patients 74.7% and caregiver 74/7%). The majority of the patients were male (62.6%), and caregivers were female (76.7%). On average, family caregivers were 5.4 years younger than patients with HF (56.7 vs. 62.1, respectively; \(P < 0.001\)). Caregivers were primarily spouses (71.4%). Most caregivers lived in the same household as patients (91.2%). One-third of caregivers (30.8 %) worked full- or part-time. The mean ejection fraction of patients with HF was 38.8% (SD =15.7). Most patients were NYHA class II (34.3%) or III (45.7%) and few patients had NYHA class I (15.7%) or IV (4.3%). Only 5 patients had HF diagnosis less than 1 year. Most patients with HF has a comorbidity of hypertension (72.5%) or diabetes (44%). The proportion prescribed antidepressant was similar in patients (16.5%) and caregivers (12.1%).

Table 2 presents the results of within-dyad comparisons. Patients reported higher levels of depressive symptoms \((P =.011)\) and lower levels of physical QOL \((P <.001)\) than caregivers. There was no difference in the mean scores of mental QOL and family function between patients and their caregivers. This indicates that two members within a dyad experienced a similar level of mental well-being, general family functioning, problem-solving, and communication ability. Patients’ depressive symptoms, QOL, and family function were significantly correlated with caregivers’ depressive symptoms (Pearson correlation \(r\) range .280 - .458, \(P <.001\), Table 2). The
correlations of each variable within the stratified dyad members present in Table 2. Among the stratified dyads, significant correlations in depressive symptoms (r = .356, P = .026) and general family function (r = .374, P = .019), problem solving (r = .387, P = .015), and communication (P = .001) within the dyad members with neither member having depressive symptoms. For the dyads with only caregivers having depressive symptoms, there were significant correlations of general family function (r = .653, P = .021) and problem-solving (r = .632, P = .028) within two dyad members. There was only a significant correlation of physical well-being within two dyad members for the dyad with only patients having depressive symptoms (r = .469, P = .032). However, there was no significant correlation of variables within two dyad members when both members had depressive symptoms.

**Dyad groups stratified by the presence of depressive symptoms**

Thirty percent of patients and 25% of caregivers had at least mild depressive symptoms (BDI-II ≥ 14). There were 39 dyads (43.9%) with neither member having depressive symptoms; 12 dyads (13.2%) with only caregivers having depressive symptoms; 21 dyads (23.1%) with only patients having depressive symptoms and 19 dyads (20.9%) with both members having depressive symptoms. There was no significant difference in dyad members’ age, marital status, education level, ethnicity, and spousal relationship among the four groups (Table 3). The only significant difference among the groups was the sex distribution of patients (P = .012): 83% of patients in the dyad with only caregivers having depressive symptoms were male, whereas 33% of patients in the dyads with the only patient having depressive symptoms were male (P = .012). The sex distribution of caregivers among the four groups was not statistically significant (P = .088). However, 91.7% of caregivers in the dyads with only caregivers having depressive symptoms were male, whereas only 25% of caregivers in the dyads with both members having depressive symptoms were male (P = .012).
symptoms were female, while 57% of caregivers in the dyads with only patients having depressive symptoms were female.

**Comparisons of quality of life among the dyad groups**

The dyads with neither member having depressive symptoms reported the highest physical and mental well-being among the four groups. The dyads with both members having depressive symptoms reported the lowest physical and mental well-being among the groups. In the dyads with only the caregiver having depressive symptoms, caregivers reported the lowest physical and mental well-being among the groups. There were significant differences in mean scores of the physical and mental well-being of patients and caregivers among the four dyads (Table 4).

Post-hoc comparisons for patients revealed that patients’ physical well-being in dyads with neither member having depressive symptoms was significantly better than those of patients in dyads with both having depressive symptoms ($P < .05$) and dyads with only patients having depressive symptoms ($P < .05$). Mental well-being was reversed for patients among four dyad groups ($P < .05$). Patients’ mental well-being in dyads with only patients having depressive symptoms was lower than dyads with only caregivers having depressive symptoms ($P < .05$).

Post-hoc comparisons for caregivers showed that caregivers in dyads with only caregivers having depressive symptoms had significantly lower physical well-being than dyads with neither having depressive symptoms ($P < .05$). Caregivers in dyads with only caregivers having depressive symptoms also had the lowest mental well-being among the group. Their mental well-being was significantly lower than caregivers in dyads with neither having depressive symptoms ($P < .05$) or dyads with only patients having depressive symptoms ($P < .05$), but similar levels of mental well-being as dyads with both having depressive symptoms.
Comparisons of family function among the dyad groups

A similar pattern of difference among the groups was found in all three family function subscales (Table 4). Patients and caregivers in the dyads with both having depressive symptoms had the highest mean scores of general family functioning, problem-solving ability, and communication ability among the groups. This indicates that the dyads had an unhealthy family function, low family ability to resolve problems, and lack of verbal communication. The post-hoc test (Table 4) shows that patients in dyads with both having depressive symptoms had worse general family function than the other groups ($P < .05$). They also had significantly less problem-solving ($P < .05$) and communication ability ($P < .05$) than dyads with neither having depressive symptoms and dyads with only caregivers having depressive symptoms. Patients in dyads with only patients having depressive symptoms reported worse family function than patients in dyads with caregivers having depressive symptoms. There were no significant differences in patients’ general function, problem-solving, and communication between dyads with neither having depressive symptoms and dyads with only caregivers having depressive symptoms.

Caregivers in dyads with both having depressive symptoms reported significantly worse general family function scores, problem-solving scores, and communication scores than dyads with neither having depressive symptoms. Interestingly, there was no significant difference in general function, problem-solving, and communication between caregivers in dyads with only caregivers having depressive symptoms and caregivers in dyads with only patients having depressive symptoms.

Discussion

Similar to previous studies on the prevalence of depressive symptoms in HF, the prevalence of depressive symptoms at individual levels for patients with HF and their family
caregivers are substantial in this study. The most compelling finding is that one in every five dyads reported that both dyad members experienced depressive symptoms, while one in every three dyads reported at least one dyad member with depressive symptoms. Although they accumulated evidence of similar levels of depressive symptoms and interdependent relationships between patients and caregivers, there was no reported rate of depressive symptoms of the dyad as a unit.\textsuperscript{9-11} Substantial prevalence of dyads’ depressive symptoms in this study suggests the importance of screening for depressive symptoms in both patient and caregiver members of the dyads, not only at the individual level since the risk of poor outcomes, such as poor QOL and family function are well known. This assessment could easily be done at the HF clinic using validated short instruments like the BDI-II.\textsuperscript{12}

We aimed to compare QOL and family function outcomes among the four dyad groups stratified by depressive symptoms. Overall, when both dyads members had depressive symptoms, their mental well-being was the worst among the dyad groups. In contrast, the dyads without depressive symptoms reported the best QOL among the groups. We also found similar results for family function among dyads. Family function is critical in managing HF as they need to respond to various self-care tasks within the dyad. Previous studies demonstrated the associations of depressive symptoms with QOL and family function at individual levels, either caregivers or patients\textsuperscript{7,17-19}. Our study findings add strong evidence that depressive symptoms of dyads significantly affected dyad members’ QOL as well as family function at the dyad level.

Interestingly, physical well-being was worst for caregivers in the dyads with only caregivers having depressive symptoms. Similar results were reported for depressed cancer caregivers who had worse physical well-being than the population norm.\textsuperscript{19} Poor physical well-being in the caregivers could be explained by several factors related to their caregiving: shorter
nighttime sleep duration, lack of engagement in their own self-care (i.e., exercise, healthy diet), or lack of stress management. In particular, low engagement in leisure activities or physical activity and poor social support was associated with the increased risk of cardiovascular disease in caregivers to patients with dementia. Further research is needed to explore whether such factors contribute to the physical well-being of caregivers of patients with HF who have depressive symptoms.

Notably, when only one dyad member, either caregivers or patients, had depressive symptoms, caregivers in those dyads experience similar mental well-being and family function levels. This finding suggests that improving depressive symptoms for both dyad members is essential to enhance the QOL and family function in both dyad members. Although screening depressive symptoms for patients has been recommended and reinforced in practice, screening needs for both dyad members have not been well-established. Unfortunately, system barriers to implementing depressive symptoms assessment limit assessment for caregivers in clinical settings. Research is needed to provide additional evidence to support routine screening of depressive symptoms screening in both dyad members. For example, identifying whether depressed dyads have the worst clinical health outcomes (i.e., mortality or hospitalization) or adherence to HF management or self-care behavior using longitudinal observations should be explored. Developing and testing intervention programs improving depressive symptoms of both dyad members is also needed.

Several limitations may affect the generalization of the study findings. Overall, there was an unequal sex distribution within dyad members. The majority of the patients were men with female spouses as caregivers and across the stratified dyad groups. There were also few female patients with male caregivers. Because most participants in this study were white, caution should
be used in generalizing the results to other racial or ethnic groups. We also found that diabetes and hypertension are common comorbidities of patients in this study. Patients with HF can be living with other chronic illnesses. Such comorbidities can attribute to poor quality of life and family function and vulnerability to depressive symptoms independent of HF diagnosis. Further investigation is needed to explore whether having comorbidities can moderate the associations of depressive symptoms with quality of life and family function. Because of the cross-sectional design, we cannot conclude a causal relationship of depressive symptoms with QOL and family function.

CONCLUSION

We sought to increase our understanding of how depressive symptoms within dyad members affect their QOL and family function at the dyad level. This study demonstrated that depressive symptoms are substantial in patients with HF and caregivers, and dyads’ depressive symptoms were associated with low QOL and unhealthy family function within dyad members. The findings suggest that the screening and management of depressive symptoms for a dyadic and family-oriented approach are needed. In addition, interventions targeting family function are also needed to improve depressive symptoms and quality of life in heart failure dyads.

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