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Pain and heart failure: Unrecognized and untreated

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Abstract

Background—Although evidence exists to support the presence of pain in advanced stages of heart failure (HF), the pain experience in the early phases of this progressive disease is poorly documented, and therefore, poorly understood. The current study was conducted to: 1) examine the prevalence of pain in cohort of patients with chronic HF (New York Heart Association class I–IV); and 2) determine the relationship between pain and QOL.

Methods and results—Data were obtained from 300 patients (mean age 54.2±12.7 years; 72% male; 65% Caucasians; time since HF diagnosis 4.6±4.8 years). Two-thirds of the patients (67%) reported some degree of pain; the prevalence of pain increased as functional class worsened ($p<.009$). Differences in QOL outcomes for patients experiencing pain vs. no pain were statistically significant for physical and overall QOL. Pain accounted for 20% of the variance in QOL ($p<.001$) even after adjusting for age, gender, and functional class.

Conclusions—Our findings suggest pain is present in a majority of patients with HF. Given the potential deleterious effects of untreated pain on QOL in patients with HF, it is important that healthcare providers assess patients for this often-unrecognized symptom.

Keywords

Heart failure; Pain; Symptom management; Palliative care

Chronic heart failure (HF) continues to affect an ever-growing portion of the population in the United States, with advancements in cardiovascular care and the aging of the nation both enhancing the magnitude of the problem [1]. Current evidence indicates that HF progresses from risk factors for cardiac dysfunction, develops to asymptomatic changes in cardiac structure and function, and evolves into clinically-overt HF, which leads to functional decline and death [2]. Symptoms mark progressive functional decline in patients with chronic HF, but they can also contribute to worsening HF [3,4]. The delay to treatment of HF symptoms such as pain is important because symptoms occur with prolonged periods of high cardiac filling pressure caused by fluid overload. Increased ventricular filling pressure leads to increased damage to the myocardium and to further ventricular remodeling [3,4]. Thus, ignoring the symptoms of HF are costly to the patient's individual health status and to the health care system; early attempts to detect and manage symptoms and prevent symptomatic HF are vital to the care of this progressive disease [5].

Symptoms traditionally considered to be related to chronic HF such as dyspnea, edema, and angina, have received a large amount of attention by researchers [6–9]. However, the symptom of pain in this population is not well understood. Pain is a concept that goes back into distant

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history and is something that is faced by every person in different degrees and at different times in their lives [10]. A definition of pain, adopted by the International Association for the Study of Pain and the American Pain Society, is: “an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage” [11]. Thus, pain throughout the paper will refer to any unpleasant feeling from any known etiology.

Although evidence exists to support the presence of pain in advanced stages of HF [7–9,12] the pain experience in the early phases of this progressive disease is poorly documented, and therefore, poorly understood. Data exists to support the inverse relationship between pain and quality of life (QOL) outcomes in patients with end-stage HF, [13] but the prevalence of pain in otherwise “asymptomatic” patients with chronic HF has not been determined. Furthermore, the prognostic implications of pain on QOL in patients with chronic HF are unknown. Existing knowledge that diminished QOL confers worse prognosis in patients with chronic HF [14] underscores the importance of a better understanding of the pain experienced by patients across the HF trajectory. The current study was conducted to: 1) examine the prevalence of pain in a cohort of patients with chronic HF (New York Heart Association [NYHA} classes I–IV); and 2) determine the relationship between pain and QOL in this sample.

1. Methods

1.1. Design, setting, and study participants

A cross-sectional, correlational design was used. A convenience sample of 300 patients with chronic HF receiving care at a single university-based, tertiary HF clinic was recruited to participate in the study. Inclusion criteria included 18 years of age or older; able to read, write, and speak English; had a left ventricular ejection fraction of less than 40% documented by echocardiography or ventriculography; and had symptoms of HF for six months or longer. Patients were excluded if they lacked the cognitive capabilities to respond to the data collection procedures as assessed by the Mini-Cog, a simple test that consists of the clock drawing test and a three item recall test. [15,16] This screening test can be administered in less than 4–5 min, requires no special equipment and is uninfluenced by educational level. The test is given by asking the patient to listen for, remember and repeat three unrelated words. The patient is then asked to draw a clock face with all of the numbers on the face, and then to draw the hands to a specific time. The patient is then asked to repeat the three words. One point is given for each correctly remembered word (score of 0–3 possible). The clock is considered correctly drawn when all of numbers are put on the clock face, and the hands indicate the correct time. A score of 0 or a score of 1–2 with an incorrectly drawn clock is a positive screen for dementia. A score of 1–2 with a correctly drawn clock or a score of 3 indicates a test that is negative for dementia [15,16]. Cognitive screening evaluation was completed at the time informed consent was obtained. The study was reviewed and approved by the appropriate Institutional Review Board.

1.2. Procedures

Patients who agreed to participate in the study were asked to sign an informed consent. A questionnaire packet was given to them to complete during their routine clinic visit. Participants were allowed to complete the questionnaire during their clinic visit or at home, in which case they were provided with a pre-stamped, pre-addressed envelope to mail back to the data collection center. On average, the self-administered questionnaire took approximately 10–20 min to complete.

Sociodemographic data (i.e., gender, age, race, education, marital status, and employment status) were obtained through a simple self-administered form. Information pertaining to

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medical history (i.e. NYHA class, ejection fraction, HF etiology, and co-morbidities)) was obtained through self-reports and verified by chart reviews.

Symptoms and functional limitations related to dyspnea or fatigue were measured using the Goldman Specific Activity Scale, a tool that evaluates symptoms during 21 specific activities that have known metabolic equivalents (METS) of energy expenditure [17]. The following ordinal classes were used: class I = able to perform activity equivalent to ≥7 METS exercise capacity without limiting symptoms; class II = 5 to 7 METS; class III = 2 to 5 METS; and class IV is equal to <2 METS.

Pain was assessed using a single item question on the Medical Outcomes Study 36-item Short Form Health Survey (SF-36). The question asked patients to report how much pain they experienced during the past 4 weeks. A six-point Likert scale was used to measure patient responses with scores ranging from no pain (0) to extreme pain (5). Responses to this question were recoded as “yes” (when patient reported any pain) or “no” (when patients reported absence of pain). Although the SF-36 has used been extensively in the HF population to measure QOL with high validity and reliability, [18] the psychometric properties of a single item question on pain has not been previously reported.

Quality of life, defined as the degree to which aspects of patients' physical, social, functional, and emotional well-being are impacted by health, [19] was measured using the Minnesota Living with HF Questionnaire (LHFQ). This 21-item tool asked participants to indicate the extent to which various symptoms they have experienced in the previous month prevented them from living as they wanted to. The items can be combined to form an overall HRQOL score as well as physical health (eight items) and emotional health (five items) scores. The physical subscale contained items associated with the fatigue and dyspnea of HF. The emotional subscale consisted of items such as being worried or feeling down. An additional eight items included questions about other areas of life affected by HF and were used to compute the overall HRQOL score [20]. Response options are presented as six-point ordinal scales ranging from 0 (no) to 5 (very much), with a total maximum score of 105 (40 for physical and 25 for emotional health); a lower LHFQ score indicates better HRQOL. The LHFQ has been shown repeatedly to be internally consistent (with alpha coefficients usually >0.90 in clinical samples) and stable over a short period of time [18,20].

1.3. Data analysis

Descriptive statistics and measures of frequencies were used to characterize the study population. Categorical data are summarized as a percent of the group total and comparison between groups were based on the [2] test for association. Continuous variables are summarized as mean±SD, and comparisons between groups were based on ANOVA models. Correlations between levels of pain, functional class, and QOL (physical, emotional, overall) were analyzed using Pearson's correlation coefficients. Variables that achieved univariate significance of <0.10 or variables that were considered theoretically important were included in a step-wise regression analyses to determine the predictive power of pain on QOL; four variables were entered in blocks in a hierarchic fashion. The sociodemographic variables (age, gender) were entered first as a block, followed by clinical variables (NYHA class, co-morbidities) and finally pain. Criteria for entry and removal of variables were based on the likelihood ratio test with enter and remove limits set at $p \leq 0.05$ and $p \geq 0.100$.

2. Results

The sample consisted of 300 patients (mean age 54.2±12.7 years; 72% male; 65% Caucasians) who were diagnosed with HF an average of 4.6±4.8 years (range 1–18 years) prior to study participation. The demographic and clinical characteristics of sample are summarized in Table

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1. There were no sociodemographic characteristics that distinguished those who reported pain from those who did not report pain. The ejection fraction and number of co-morbidities were comparable between patients with or without pain.

Approximately two-thirds of the patients (67%) reported some degree of pain. The prevalence of pain increased as functional class worsened ($p<.009$); eighty-nine percent of patients with chronic HF in class IV ($n=32$); 69% class III ($n=92$); 69% in class II ($n=66$); and 35% class I ($n=12$) reported experiencing pain (Table 2). Since the presence of co-morbidities may be highly related to the outcome of interest, a post-hoc analysis was done to determine whether the number of co-morbidities differed between the 4 NYHA classes; no significant differences were observed.

Differences in QOL outcomes for patients experiencing pain vs. no pain were statistically significant for physical QOL (20.2±11.3 vs. 10.2±9.6, $p<.04$) and overall QOL (47.3±25.1 vs. 25.6±22.6, $p<.04$). Similar trends were noted for the emotional QOL scores with presence of pain correlating with worse QOL, but these differences were not statistically significant (9.4 ±6.9 vs. 5.5±6.3).

The correlational matrix for key variables is presented in Table 3. We observed a correlation between presence of pain and functional class, physical and overall QOL. Post-hoc analyses revealed that there was no significant relationship between pain severity and HF medications prescribed based on the Comprehensive HF Society of America Management Guidelines [21] (e.g. beta-blocker, angiotensin-converting enzyme inhibitor, statin, and diuretic). The number of co-morbidities reported by participants were associated with pain severity ($r=.221$, $p<.001$); there were positive relationships between pain severity and presence of other debilitating chronic illnesses like hypertension ($r = .152$, $p = .04$), emphysema ($r = .146$, $p = .04$), and diabetes ($r = .186$, $p = .011$). The multiple regression model for overall QOL is presented on Table 4; presence of pain accounted for 20% of the total variance in QOL even after adjusting for age, gender, NYHA class, and number of co-morbidities. Posthoc analysis was done to test for multicollinearity among the variables and demonstrated that functional status and presence of pain had unique effects on QOL.

3. Discussion

Pain management for the chronically ill has been identified as a priority for clinicians. While the presence of pain is obvious in many conditions, pain in patients with chronic HF can be insidious and unnoticed; it is rare for HF clinicians to assess or recognize pain as being a typical HF symptom (e.g. dyspnea, fatigue, palpitations, and chest pain) even though it is included as a NYHA class defining characteristic. For example, in a review of five classic cardiology texts, [22–26] none listed pain as a typical symptom of HF. Besides the accepted prevalence of angina, pain manifests itself in many ways in this patient population, often long before the disease process progresses to severe functional and physiological decline [7]. Unexpected sources of pain related to HF and the medications used to control it include: constipation, visceral ischemia, musculoskeletal fatigue, mucositis, ascites related pain, and skin breakdown secondary to prolonged edema [9]. In an attempt to optimize the treatment of other HF symptoms, the issue of pain is often exacerbated.

Our findings confirm the magnitude of pain reported in previous studies in HF [8,27]. However, a novel finding in the current study was that pain is common in all stages of the HF trajectory and not only in the advanced phases as identified in these earlier studies. These results illuminate the fact that pain assessment and management are essential components of care for the patient with chronic HF beginning at the time of diagnosis. Besides the obvious benefits

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of pain management, adequate control of pain may increase medication compliance and treatment adherence, further limiting the detrimental effects of chronic HF [7].

In addition to the physical ramifications of pain, QOL was negatively affected by the presence of pain suffered by patients with chronic HF, even after controlling for age, gender, functional class, and co-morbidities. However, it is important to note that pain refers to pain at any site and may actually be pain at multiple sites, based on medical history, and old injuries not documented in the medical record. Therefore, a thorough assessment of pain (e.g. severity, frequency, site, and possible association with other medical conditions) and timely management of pain potentially reduces the negative impact on QOL.

Overall, it seems intuitive that pain and symptom management would top the priority list of care for all patients, especially for patients with advanced HF (NYHA class III–IV). Unfortunately, the complex nature of chronic HF allows for treatment to become convoluted. In an attempt to maintain and preserve the heart function, pain control for issues like constipation and ascites can become secondary. The first step in improving management of pain in patients with chronic HF is identification of the location, severity, and frequency of pain in this population, its possible causes, and association with other problems [28]. As curative care options become limited, palliation may become the priority. Patients entering palliative and hospice care programs are more likely to have pain managed effectively [29].

There are several study limitations that must be noted. First, the cross-sectional nature of the study design limits any conclusions that can be drawn with regard to the causal mechanisms underlying the observed associations. Second, we recognize that the use of a single-item question to assess pain is an unusual approach to pain assessment; the psychometric data for this single item has not been measured in patients with HF. However, the use of a single-item questionnaire is not new in other chronic disease states like cancer; the National Comprehensive Cancer Network Practice Guidelines for Symptom Management (e.g., pain, fatigue, and distress) recommend use of a similar single-item screening as part of their treatment algorithms [30]. Third, specific information about pain (e.g. onset, location, duration, characteristics) were not obtained. Pain factors may be important in explaining the association between pain and QOL, as well as in identifying the cause of the pain as cardiac. Finally, the HF cohort used for the study was composed of patients who were receiving care at single university-based, tertiary HF clinic associated with a transplant program and therefore they were not clearly representative of the general HF population. Also, patients in our study were considerably younger than the average, community-dwelling patient with chronic HF or patients seen in cardiology practices [31], so our findings may not be applicable to elderly patients with HF, despite the fact that age did not seem to contribute to pain in our analyses. Attempts to include a less homogeneous sample in future studies examining pain and QOL are warranted to better understand and generalize our findings. Other limitations of the study include the possibility of obtaining less accurate sociodemographic and clinical data from medical records rather than interviewing patients; charts may be missing data that could have supported non-cardiac or non-HF pain. Finally, the Goldman Specific Activity Scale focuses on being able to carry out activities of daily living; it does not ask patients to respond based on the classic NYHA classification symptoms of dyspnea, fatigue, palpitations and chest pain. Therefore, it is possible that functional class is not based on HF alone, but may be based on HF and any other condition that also limits functional status.

4. Summary

Unlike dyspnea and fatigue, pain other than chest pain is often not considered a classic symptom of HF. Our findings suggest that it is present in a majority of patients with chronic HF and that it increases in prevalence as patient's functional status worsens. Pain is also significantly related

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to the physical dimension of a patient's QOL, as well as the total QOL experience. Given the potential deleterious effects of untreated pain on QOL in patients with HF, it is important that healthcare providers assess patients for pain and determine its relationship to HF using standardized tools, careful interviews, or both [28]. Current guidelines are silent on the issue of treatment of pain until patients are in an advanced stage of HF with severe cardiac decompensation that is unresponsive to treatment. Future research is needed to examine other possible causes of pain (e.g. chronic conditions) and how these conditions can interfere with functional status and QOL that has nothing to do with symptoms directly related to HF. Overall, healthcare providers can improve the QOL and decrease the psychological distress associated with pain by a thorough assessment that consistently addresses this symptom and ensures that suffering does not remain hidden.

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Table 1

Demographic and clinical characteristics of the sample

	Total (*N*=300)	**Reported pain (*n*=202)**	**Reported no pain (*n*=98)**	***p* value**
Sociodemographic variables				
Age, years, (mean±SD)	54.2±12.7	55.7±13.3	55.3±13.3	.851
Gender, male, *n* (%)	222 (74.0)	152 (75.2)	70 (71.4)	.735
Race, White, *n* (%)	196 (65.3)	130 (64.3)	66 (67.3)	.314
Marital status, Married, *n* (%)	198 (66.0)	136 (67.3)	62 (63.3)	.331
Education, ≤HS graduate, *n* (%)	84 (28.0)	56 (27.7)	28 (28.6)	.814
Employed, yes, *n* (%)	94 (31.3)	60 (29.7)	34 (34.7)	.377
Clinical variables				
EF, % (mean±SD)	32.3±12.0	32.5±12.8	34.9±13.0	.863
Co-morbidities, # (mean±SD)	2.5±1.8	2.6±1.6	2.4±1.6	.417
HF Etiology, ischemic, *n* (%)	104 (34.6)	68 (33.6)	36 (36.7)	.815
Co-morbidities, *n* (%)				
Hypertension	45.3	45.3	45.3	.561
Diabetes	25.6	19.8	31.4	.115
Emphysema	8.0	9.9	6.1	.403
Dyslipidemia	49.4	43.0	55.8	.127
Former smoker	60.4	57.1	63.5	.434
Current smoker	8.7	8.1	9.3	.500
History of CAD	44.2	44.9	46.5	.521
Hypertension	45.3	45.3	45.3	.561

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Table 2

Pain and functional status (*N*=300)

Functional class	Class I	Class II	Class III	Class IV	Total
Pain, no/yes					
No	22 (22.4%)	30 (30.6%)	42 (42.9%)	4 (4.1%)	98 (32.7%)
Yes	12 (5.9%)	66 (32.7%)	92 (45.5%)	32 (15.8%)	202 (67.3%)
Total	34 (11.3%)	96 (32.0%)	134 (44.7%)	36 (12.0%)	300 (100%)

Chi-square for presence or absence of pain and functional class ($p<.009$).

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Table 3

Correlational matrix for the key variables (*N*=300)

Variable	Pain	Functional class	Physical QOL[a]	Emotional QOL[a]	Overall QOL[a]
1. Pain	1.000				
2. Functional class	.283†	1.000			
3. Physical QOL[a]	.542†	.384†	1.000		
4. Emotional QOL[a]	.371†	−.257†	.633†	1.000	
5. Overall, QOL[a]	.553†	−.359†	.942†	.808†	1.000

† *p*<.001.

[a] Minnesota Living with Heart Failure Questionnaire; higher scores indicate greater symptom interference and lower QOL.

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Table 4

Predictors of overall quality of life (*N*=300)

Variable	Adjusted r^2	*F*	*p*
Functional status	.120	8.360	.005
Presence of pain	.209	7.823	.007