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Factors Associated With Perceived Control and the Relationship to Quality of Life in Patients with Heart Failure

Seongkum Heo, PhD, RN [Assistant Professor],
University of Arkansas for Medical Sciences, College of Nursing

Terry A. Lennie, PhD, RN [Professor],
University of Kentucky, College of Nursing

Susan J. Pressler, PhD, RN [Professor],
University of Michigan, School of Nursing

Sandra B. Dunbar, DSN, RN [Professor],
Emory University, School of Nursing

Misook L. Chung, PhD, RN [Associate Professor], and
University of Kentucky, College of Nursing

Debra K. Moser, DNSc, RN, FAAN [Professor and Gill Chair of Nursing]
University of Kentucky, College of Nursing

Abstract

Background and Purpose—Health-related quality of life (HRQOL) is as important as survival to patients with heart failure (HF). Perceptions of loss of control are common in HF and negatively affect HRQOL. Knowledge of modifiable factors associated with perceived control could guide the development of interventions to improve perceived control and thus HRQOL. Accordingly, this study examined factors related to perceived control and the relationship between perceived control and HRQOL.

Methods—Patients (N = 232, mean age 61 ± 12, 67% male, 78% Caucasian) provided data on HRQOL (Minnesota Living with Heart Failure questionnaire), perceived control (Control Attitudes Scale-Revised), and factors possibly associated with perceived control (knowledge and barriers [Heart Failure Knowledge and Barriers to Adherence Scale], attitudes [Dietary Sodium Restriction Questionnaire], and social support [Multidimensional Scale of Perceived Social Support]). Patients also provided data on depressive symptoms, which were a covariate of HRQOL. Hierarchical multiple regression analysis was used to analyze the data.

Results—Fewer barriers to following a low sodium diet, more positive attitudes toward following a low sodium diet, and better social support were related to higher perceived control ($F = 7.54$, $R^2 = .17$, $p < .001$). Perceived control was independently associated with HRQOL, controlling for depressive symptoms, New York Heart Association functional class, age, gender, and all variables possibly associated with perceived control ($F = 29.67$, $R^2 = .55$, $p < .001$).

Address for correspondence: Seongkum Heo, PhD, RN, Assistant Professor, University of Arkansas for Medical Sciences, College of Nursing, 4301 W. Markham Street (#529), Little Rock, AR 72205, Phone 501-686-5375, sheo@uams.edu.

Conclusions—Interventions targeting attitudes and barriers to a low sodium diet and social support may improve perceived control and, in turn, HRQOL.

Keywords

heart failure; perceived control; attitudes; barriers; quality of life

Introduction

Health-related quality of life (HRQOL) is poor in patients with heart failure (HF), and poor HRQOL is an important issue for these patients.[1, 2] Many patients have physical symptoms,[3, 4] depressive symptoms[5, 6] and impaired functional status,[4, 7] which are closely related to poor HRQOL.[3, 4, 6–8] Thus, it is important to improve physical and depressive symptoms and functional status to improve HRQOL. Perceived control can affect all of these variables, and patients with HF commonly perceive a loss of control.[9] Lower levels of perceived control have been shown to negatively affect physical and depressive symptoms, function, and HRQOL in several populations, including patients with cardiac diseases. The effect of perceived control on physical symptoms has rarely been examined in patients with HF, but higher levels of perceived control are associated with less severe asthma symptoms.[10] Higher levels of perceived control are also related to less depressive symptoms in patients with HF, myocardial infarction, and coronary heart disease.[11, 12] Further, HF patients with higher levels of perceived control have been shown to walk longer distances than those with lower levels of perceived control.[13] Finally, higher levels of perceived control have been associated with better HRQOL in patients with HF and in patients with asthma.[9, 10] These findings demonstrate the importance of perceived control for physical and depressive symptoms, physical function, and HRQOL.

To improve perceived control in patients with HF, the first step is to identify modifiable factors associated with perceived control. In order to control HF and HF symptoms, patients with HF need to follow treatment regimens that include adhering to a low sodium diet, managing body weight, and recognizing and managing symptoms.[14, 15] Thus, knowledge about, barriers to, and attitudes toward the treatment regimens can affect patients' perceptions of how they control HF and HF symptoms. In addition, it has been suggested that social support may affect perceived controls in adults, African-American women, and patients with rheumatoid arthritis.[16–18] Thus, the current study examined whether knowledge, barriers, attitudes, and social support were related to perceived control, and whether perceived control was related to HRQOL in patients with HF. We hypothesized that modifiable factors would be associated with perceived control, and perceived control would be associated with HRQOL.

Methods

Study design, Sample, and Setting

Baseline data collected in three longitudinal observational studies were used in this cross-sectional correlational study. The first author and two co-authors of the current study were the principal investigators of the studies. The purpose of Study 1 was to examine the

relationships among body fat, nutritional intake, symptoms, and HF outcomes. The purpose of Study 2 was to examine the relationships among body mass index, nutrition, inflammation, symptoms, and HF outcomes.[19] The purpose of Study 3 was to examine the relationship between depressive symptoms and HF outcomes.[20] Patients for the three studies were enrolled during similar time periods using similar inclusion and exclusion criteria. Patients were recruited from outpatient clinics in Southern and Midwestern cities in the United States. They were included if they had a diagnosis of HF confirmed by medical record review, were stable on current medication for two clinic visits or for 3 months, and were able to read and speak English. Patients were excluded if their HF originated from valvular heart disease or pregnancy, or if they had had a myocardial infarction or stroke within the previous 3 months, because these might affect HF progress and patient outcomes, including HRQOL and hospitalizations. Patients were also excluded if they had severe cognitive or psychiatric problems because it might be difficult for such patients to collaborate in data collection. Sample size was decided based on the recommendations of Pedhazur and Schmelkin (30 subjects per independent variable)[21] and Hair et al. (15 to 20 subjects per independent variable).[22] We excluded 4 of 236 cases because of missing data. Thus, 232 patients were included in the final analyses.

Procedure

Institutional review board approval was obtained from the University of Kentucky, Indiana University, and Emory University. Eligible patients were confirmed through medical record reviews by trained research associates, one of the authors, or referral from clinicians at hospitals in three cities in the USA. Written informed consent was obtained from all participants. Baseline data on HRQOL, perceived control, knowledge of HF management and barriers to a low sodium diet, attitudes toward a low sodium diet, social support, depressive symptoms, and sociodemographic and clinical characteristics were collected at patients' homes, in the hospitals, or the general clinical research centers of the hospitals, using questionnaires, medical record review, and patient interviews.

Measures

Health-related quality of life was defined as individuals' perceptions of the effects of HF on their daily lives[23] and was assessed by the Minnesota Living with Heart Failure Questionnaire, which is the most commonly used disease-specific quality of life instrument for patients with HF.[24] This instrument consists of 21 items and uses a 6-point Likert scale (0 to 5). Total scores range from 0 to 105, with higher scores indicating poorer HRQOL. Reliability and validity have been supported in several psychometric studies.[24, 25] In the current study, Cronbach's alpha was .93, indicating an acceptable level of internal consistency reliability.

Perceived control was defined as individuals' perceptions of their ability to exert control over their own lives and health including their clinical condition. Perceived control was assessed by the 8-item Control Attitudes Scale-Revised,[11] which uses a 5-point Likert scale (1, *totally disagree* to 5, *totally agree*). The total score is calculated by adding the ratings of all items after reversing the ratings of two items. Possible scores range from 8 (*no perceived control*) to 40 (*highest level of perceived control*), with higher scores indicating better

perceived control. Reliability has been supported in patients with coronary disease, cardiac disease, and HF; Cronbach's alphas in all samples were greater than .70.[11] Construct validity has been supported by findings of the expected relationships to anxiety and depressive symptoms.[11] In the current study, Cronbach's alpha was .80.

Knowledge was defined as information and understanding about HF and HF management. Barriers were defined as difficulties in following the treatment regimens. Knowledge and barriers were assessed by the Knowledge and Barriers subscales of the Heart Failure Knowledge and Barriers to Adherence Scale.[26] The knowledge subscale consists of 13 items, uses a 5-point Likert scale (1, *bad* to 5, *good*), and assesses patients' knowledge of fluid accumulation in the body, symptoms (edema, dyspnea, cough, and weight gain), symptom management, body weight control, smoking, drinking, and activities. Total score is calculated by summing the ratings after reversing some items, and total scores range from 13 to 65, with higher scores indicating better knowledge. Internal consistency reliability for the knowledge subscale has been supported.[26] In the current study, Cronbach's alpha was .72. Validity has been supported by demonstration of a relationship between knowledge and self-care.[26] The barriers subscale assesses barriers to following a low sodium diet: high cost, too much time to prepare low sodium foods, lack of knowledge, bad taste, lack of resources for getting low sodium foods outside the home, lack of support from others, lack of willpower, and no cooking. The subscale includes 12 items and uses a 5-point Likert scale (1, *not at all* to 5, *a lot*). The total score is calculated by summing the ratings after reversing all items. Total scores range from 12 to 60, with higher scores indicating fewer barriers. In the current study, Cronbach's alpha was .81.

Attitudes were defined as individuals' beliefs about the outcomes of a behavior[27] and were assessed by the Attitude subscale of the Dietary Sodium Restriction Questionnaire.[27] This instrument consists of 6 items and uses a 5-point Likert scale (1, *strongly disagree* to 5, *strongly agree*). The items assess the importance of following a low sodium diet and positive outcomes of following this diet (e.g., reducing symptoms and feeling better). One example is "Eating a low-salt diet will keep fluid from building up in my body." The total score is calculated by summing the ratings, and scores range from 6 to 30, with higher scores indicating more positive attitudes. Internal consistency reliability and construct validity have been supported.[27] In the current study, Cronbach's alpha was .85.

Social support was defined as individuals' perceptions of support from family, friends, and significant others and was assessed by the Multidimensional Scale of Perceived Social Support.[28–30] This instrument consists of 12 items and uses a 7-point Likert scale (1, *very strongly disagree* to 7, *very strongly agree*). Total scores range from 12 to 84, with higher scores indicating higher levels of support. Reliability has been acceptable: Cronbach's alphas have been greater than .70.[30, 31] Construct validity has been supported by strong factorial validity.[30] In the current study, Cronbach's alpha was .94.

The severity of depressive symptoms during the past 2 weeks was assessed using the Beck Depression Inventory-II (BDI-II),[32, 33] which consists of 21 items with a 4-point Likert scale (0 to 3). Total scores range from 0 to 63, with higher scores indicating more severe depressive symptoms.[33] Internal consistency reliability and construct validity have been

shown to be acceptable with both psychiatric and non-psychiatric patients.[33–36] In the current study, Cronbach's alpha was .91.

Data on sociodemographic and clinical characteristics, including New York Heart Association (NYHA) functional class, age, and gender, were collected using Demographic Characteristics and Clinical Characteristics questionnaires. The Clinical Characteristics questionnaire included the Charlson Comorbidity Index to assess comorbidities.[37, 38]

Data Analysis

Descriptive statistics, including means with standard deviations and frequencies with percentages, were used to describe sociodemographic and clinical characteristics of the sample. Pearson correlation and t-test were used to determine bivariate relationships of knowledge, barriers, attitudes, social support, and demographic factors to perceived control. Hierarchical multiple linear regression with enter method was used to determine factors related to perceived control and the relationships of perceived control to HRQOL. In order to determine factors related to perceived control, knowledge, barriers, attitudes, and social support were entered into the first model, and then age and gender were added to the model. In one HF study,[13] age did not differ between patients with low and high perceived control. However, in the current study, age was associated with perceived control in bivariate analysis. Thus, we controlled for age in the regression analysis. Even though gender was not associated with perceived control in the prior study[13] and in the current study, we also controlled for gender to determine whether it played a role in multivariate relationships. To determine the relationship of perceived control to HRQOL, perceived control was entered into the first model, and then knowledge, barriers, attitudes, and social support were added. Lastly, depressive symptoms, NYHA functional class, age, and gender were added. Depressive symptoms,[19] NYHA functional class,[20] age,[20] and gender[39] were selected as covariates based on the literature. For all analyses, significance was set at $p \leq .05$.

Results

Two hundred thirty-two patients were included in the current study. The mean age of the sample was 61.2 years (standard deviation: ± 11.6). Approximately 67% were male, and the majority were Caucasian (78%). Most (78.9%) had mild or moderate functional impairment (NYHA functional class II/III). Other demographic and clinical characteristics are shown in Table 1.

Relationships of Knowledge, Barriers, Attitudes, and Social Support to Perceived Control

In bivariate analyses, knowledge, barriers, attitudes, social support, and age were related to perceived control (Table 2). In hierarchical multiple linear regression analysis, fewer barriers to following a low sodium diet, more positive attitudes toward a low sodium diet, and more social support were related to higher levels of perceived control, controlling for age and gender ($F = 7.539$, $p < .001$; Table 3). These three variables explained 16.7% of the variance in perceived control.

Relationship Between Perceived Control and Health-Related Quality of Life

In hierarchical multiple linear regression analysis, perceived control was associated with HRQOL ($F = 98.222$, $R^2 = .299$, $p < .001$; Table 4). The significant relationship remained after controlling for knowledge, barriers, attitudes, social support, depressive symptoms, NYHA functional class, age, and gender ($F = 29.667$, $p < .001$). Higher perceived control, less severe depressive symptoms, and less impaired NYHA functional status were related to better HRQOL, and the model explained 54.6% of the variance in HRQOL.

Discussion

In the current study, perceived control was associated with HF-specific quality of life, explaining approximately 30% of the variance in HRQOL; further this relationship remained even after controlling for covariates. These findings suggest the importance of perceived control for HRQOL in this population. The findings are consistent with the findings of a prior asthma study[10] and a prior HF study.[9] For example, in Banerjee et al. study,[9] perceived control was significantly associated with HRQOL, controlling for sociodemographic, clinical, and psychological factors. The significant relationship observed between perceived control and HRQOL in patients with HF and asthma suggests that perceived control should be a focus of interventions targeting HRQOL. This is particularly important for patients with HF because improvement in HRQOL is as important as longer survival.[2]

Even though this study did not examine the mechanism through which perceived control was associated with HRQOL, some prior studies have suggested that perceived control may affect HRQOL through its impact on symptoms and functional status. For example, in asthma patients, higher levels of perceived control were associated with less severe asthma symptoms.[10] Among patients with HF and other cardiac diseases, those with higher levels of perceived control had less depressive symptoms than those with lower levels of perceived control.[11, 12] In addition, in a HF study by Dracup et al.,[13] patients with higher levels of perceived control walked longer distances than those with lower levels of perceived control. In a study of older adults with HF by Heo et al.,[1] symptom status was the strongest factor associated with HRQOL. Depressive symptoms and functional status have been associated with HRQOL in patients with HF both in prior studies and in the current study.[4, 6, 40–42] Thus, these studies suggest the importance of perceived control for HRQOL and a possible mechanism for the effects of perceived control for HRQOL through effects on symptoms and functional status.

The findings of the current study also provide valuable information on factors affecting perceived control. More positive attitudes toward following a low sodium diet, fewer barriers to following a low sodium diet, and more social support were significantly associated with higher levels of perceived control. However, knowledge about how to manage HF and HF symptoms was not related to perceived control. Similarly, in a HF study by Hwang et al.,[43] knowledge was not associated with perceived control in bivariate analysis. These findings of the current and prior studies suggest that patients' perceptions of the positive outcomes of a behavior and the barriers to performing the behavior are more important than simple information to improve perceived control. Even though knowledge, but not attitudes or barriers, was more frequently assessed and was the focus of many HF

intervention studies,[44–47] one HF intervention study has shown promising results for improvements in attitudes and barriers.[48] In this study, Sethares et al. provided a tailored message intervention based on the Health Belief Model and focused on benefits of and barriers to self-care. Patients' perceptions of the benefits of following a low sodium diet and monitoring for signs and symptoms improved after the intervention (all ps < .05), and barriers to following a low sodium diet and monitoring for signs and symptoms decreased (all ps < .05). Thus, HF interventions targeting improvement in perceived control need to focus on attitudes and barriers.

Social support from family, peer, or health-care providers has been a component of several HF interventions,[47, 49–51] but interventions to improve social support have not been frequently examined. In one of the few studies to date, Burg et al. examined the effects of cognitive therapy on perceived social support in patients who had experienced myocardial infarction.[52] Patients were randomly assigned to the intervention group or the usual care group. Among patients with low perceived social support, the intervention was designed to modify factors affecting low perceived social support, including cognitive, environmental, and behavioral factors. In patients with both low perceived social support and depressive symptoms, cognitive therapy for depression was added to the intervention for low perceived social support. Perceived social support improved regardless of treatment assignment. In a HF observational study by Bennett et al.,[53] changes in social support predicted changes in 12-month HRQOL. These findings show that social support can be improved, and improved social support can be related to improvement in HRQOL. However, causal relationships of barriers, attitudes, and social support to perceived control have not been examined in HF.

Even though these causal relationships have not been examined in HF, perceived control has been improved through education and counseling in HF and other populations.[54–56] For example, Tullmann et al. (2007) provided a structured education and counseling intervention to patients with myocardial infarction, and this led to higher perceived control and knowledge and more positive attitudes.[54] Westlake et al. (2007) who provided web-based HF management education also found that perceived control improved.[55]

Limitations and Implications

Caution is needed in generalizing the findings of the current study to other races because the majority of the sample were Caucasian. In addition, the sample was relatively young. Thus, the associations of knowledge, barriers, attitudes, and social support to perceived control and the relationship of perceived control to HRQOL may differ in other races and older age groups from those found in the current study. Also, this study used a cross-sectional design, so causal relationships among the variables could not be examined. Further studies using longitudinal study designs are needed to determine whether improvements in attitudes, barriers, and social support result in improvements in perceived control. Despite its limitations, the current study provides important information to researchers and clinicians who are taking care of patients with HF on factors affecting perceived control and the relationship between perceived control and HRQOL in patients with HF.

Implications for Practice

- Assess and manage perceived control to maintain good HRQOL or improve HRQOL.
- patients' attitudes toward and barriers to following a low sodium diet and provide interventions to improve them.
- Assess patients' social support and possible resources of social support, and provide more social support if necessary.

Conclusion

Patients' perceptions of the outcomes of and barriers to self-care and patients' social support appear to be more closely related to perceived control than information or knowledge about HF and HF symptoms. Perceived control is an important factor associating with HRQOL. Thus, interventions targeting attitudes, barriers, and social support may improve perceived control and, in turn, HRQOL.

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Table 1

Characteristics of the Study Sample (N = 232)

Characteristics	**Mean (± Standard Deviation)**
Age	61.2 (±11.6)
Education (Years)	12.9 (±3.3)
Left ventricular ejection fraction	34.3 (±14.0)
Charlson Comorbidity Index	3.5 (± 2)
	Number (%)
Gender (male)	155.0 (66.8)
Marital status (married)	136.0 (58.6)
Ethnicity (Caucasian)	181.0 (78.0)
Heart failure etiology (Ischemic)	125.0 (53.9)
New York Heart Association functional classification	
Class I	20.0 (8.6)
Class II	83.0 (35.8)
Class III	100.0 (43.1)
Class IV	29.0 (12.5)

Table 2

Bivariate Relationships of Knowledge, Barriers, Attitudes, Social Support, and Demographic Factors to Perceived Control

Variable	Perceived control		
	Statistics		p value
Knowledge	Pearson's r	.141	.031
Barriers	Pearson's r	.291	< .001
Attitudes	Pearson's r	.322	<.001
Social Support	Pearson's r	.236	<.001
Age	Pearson's r	.156	.018
Gender	t-test	.048	.962

Table 3

Multivariate Relationships of Knowledge, Barriers, Attitudes, and Social Support to Perceived Control, After Controlling for Age and Gender

Variables	Standardized Beta	t statistics	R^2	F	p value
Knowledge	.020	.318	.162	10.992	< .001
Barriers	.242	3.823†			
Attitudes	.178	2.749*			
Social Support	.178	2.852*			
Knowledge	.028	.429	.167	7.539	< .001
Barriers	.223	3.402*			
Attitudes	.186	2.830*			
Social Support	.161	2.503*			
Age	.074	1.155			
Gender	−.016	−.254			

*p < .05.

†p < .001

Table 4

Relationships of Perceived Control to Health-Related Quality of Life, After Controlling for Covariates

Variables	Standardized beta	t statistics	R^2	F	p value
Perceived Control	−.547	−9.911†	.299	98.222	< .001
Perceived Control	−.524	−8.859†	.338	23.103	< .001
Knowledge	−.019	−.337			
Barriers	−.165	−2.830*			
Attitudes	.140	2.391*			
Social Support	−.042	−.739			
Perceived Control	−.259	−4.623†	.546	29.667	< .001
Knowledge	.005	.111			
Barriers	−.095	−1.870			
Attitudes	.069	1.377			
Social Support	.025	.520			
Depressive Symptoms	.457	8.131†			
NYHA functional class	.206	4.242†			
Age	−.004	−.076			
Gender	−.019	−.420			

*p < .05.

†p < .001.

NYHA = New York Heart Association