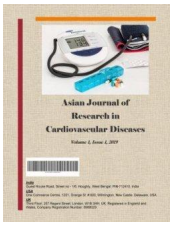

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The Impact of Symptom Distress on Demoralization in Patients with Advanced Heart Failure

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Background: Life quality of patients with advanced heart failure was strongly impacted by symptom distress. Illness trajectory of end-stage heart faliure varies significantly, and the unpredictable compensation imbalance may be life threatening and lead to death. At the end stage, physical activities and functions were strongly influenced by symptom distress, the resulting helplessness, hopelessness, and loss of meaning in turn affect the mental state and prognosis.
Specific Aim: To investigate the factors correlated to symptom distress and demoralization in patients with advanced heart failure.
Methods: In the cross-sectional correlation study, data was collected by conventional sampling with structured questionnaires. SPSS 23.0 for Windows/PC was used for descriptive and inferential statistical analysis.
Results: In the total 71 participants, 43.7% were categorized as high demoralization (DSMV score>30). Regression analysis revealed significant correlation between symptom distress and

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demoralization (R2=48%, β=.402, p<.001) under the predictive effect of controlled variables. The higher score the symptom distress, the more severe the demoralization.
Discussion: Advanced heart failure is a complex disease characterized by multiple comorbidities, significant symptom distress, limitations in physical functions, and impacts on mental health. Early clinical identification and evaluation should be promoted to establish demoralization-related care to improve patients' quality of life.

Keywords: Advanced heart failure; symptom distress; demoralization.

1. INTRODUCTION

With the changes in the population structure, ischemic heart disease has ranked the 1st leading cause of death globally according to the World Heath Organization [1]. Heart failure (HF) is a complex clinical syndrome which can result from any structural or functional cardiovascular disorder, and was singled out as an emerging epidemic since 1997 [2]. There are approximately 6 million people in the United States suffered from heart failure, and about 650,000 newly diagnosed heart failure cases annually [3]. According to American Heart Association, the number of people diagnosed with HF will rise approximately 50 percent from 2012 to 2030, and the total number of patients with HF will exceed 8 million by then. In addition, the estimated HF patients will reach one-fifth of the population over 65 years of age, and HF will account for one-ninth of cause of death by 2050 [4].

The HF trajectory is unpredictable and is characterized by an increase in symptom burden over time. The unanticipated and rapid decline of cardiac function and physiological state usually result in sudden death [5]. Epidemiological studies have reveled 24% readmission rate of HF patients three months after discharge and among them, 13.5% had died [6]. Symptom burden has led to readmission and increased hospitalization, and significantly impacted the quality of life. Previous studies have shown that physical symptoms and functional status were highly associated with quality of life of HF patients [7,8,9], and physical symptom status predicted quality of life [10,11]. HF patients are suffered from the systemic symptoms such as shortness of breath (dyspnea), persistent cough or wheeze, build-up of body fluid (edema), fatigue, loss of appetite or nausea, confusion and inability to think clearly, fast heart rat, etc. [12,13]. The symptoms come and go and have become the greatest impact on patients' quality of life. The severity of symptoms is also an important indicator of survival rate [14]. The symptoms of the end-stage HF are dyspnea/breathlessness, pain, fatigue, edema, depression, etc. In average, end-of-life HF patients may experience six to seven clinical symptoms, however, most of them are not well managed or controlled [15,16,14].

End-stage HF patients may experience physiological and psychological manifestations similar to those experienced by terminally ill cancer patients, symptom distress such as breathlessness, fatigue, and pain, impact both physical activity and psychological state. Previous studies have unraveled depression and anxiety as the common psychological distress in end-stage HF patients, and deterioration of both symptoms were found in HF patients close to death [17,18]. 60% of HF patients suffered from mild or more severe depression, which was negatively associated with quality of life [19]. Patients' perception of life quality also affected their mental well-being and treatment compliance [20]. Therefore, symptom experience could be an indicator of the quality of life [21].

Many studies have suggested the life quality of advanced HF patients were strongly impacted by symptom distress. Illness trajectory of advanced HF varies significantly, and the unpredictable compensation imbalance may be life threatening and lead to death [22,23,24]. Previous studies of the experience of changes in daily activities in HF patients revealed that symptom distress led to limited physical activity, and the resulting decline in functional status may indicate the end of life [25]. The severity of symptoms brings about the restriction of daily activities, which in turn results in disability, loss of self-control, social isolation, inability to share feelings, and a prolonged state of hopelessness, helplessness, lack of meaning and purpose caused by the inability to cope with the end-of-life stress, which was derived from changes in the disease condition, experience of dying, treatment-related pain, role changes, and economic burden. Previous studies have shown existential distress,

i.e., hopelessness and loss of meaning in life, in terminally ill patients, manifested in spiritual dilemma and emotional pain, and therefore, clinically, the hidden desire of hastened death may be noticed at this stage [26,27,28].

Demoralization is a state of feeling characterized by low morale and poor stress-coping ability, and will lead to loss of meaning and goal of life under the pessimistic, helpless, and hopeless situation. Kissane et al. [27] defined "demoralization" as facing stressful event or physical illness, the experience of persistent loss of coping ability, together with feelings of helplessness, meaninglessness, incompetence, and diminished self-esteem. In the initial stage, patients will ask for help, however, if there isn't enough help to release the stress, then the feelings of helplessness and hopelessness exacerbate and patients suffer the loss of control of their life gradually, eventually lose the meaning and purpose of survival, and in the severe cases, the emergence of suicidal intention and wish to die [26]. Clarke et al. have proposed in 2000 that depression, demoralization and sense of guilt were separate dimensions from the analysis of physiological and psychological symptoms in a group of inpatients with severe illness, including cancer. When the major manifestation was depressed mood, the clinician were able to aware the emotional changes due to patients' tears and reported sadness actively. However, if it manifested as demoralization, meaninglessness, helplessness and hopelessness, the patients did not speak out, and their psychological suffering was often overlooked. Lots of studies have uncovered strong correlation between hopelessness and suicide, and the correlation was more significant than that between depressive symptoms and suicide [26].

Psychosocial risk factors are correlated with both hospitalization rate and prognosis of HF patients. According to their responses to the comprehensive questions encompassing major life events, work-related stress, social networks, vital exhaustion, and sleep medications, almost one-fourth of the HF patients experienced a certain degree of vital exhaustion. The score of vital exhaustion was positively associated with the risk of heart failure in a dose-response manner. In the clinical manifestations, fatigue and depression were the major factors for psychosocial risks in HF patients. Disease-related social isolation such as living alone, single, lack of social support, and social networks were correlated with the hospitalization of HF patients. An increased risk of re-hospitalization was found in patients experienced fatigue and depression, the same population were more prone to psychological distress, including hopelessness, depression, and low self-esteem, and also poor prognosis and high risks for psychological disorders and suicidal ideation [29-34]

Symptom distress in patients with advanced heart failure includes losing endurance due to breathing difficulty, fatigue, and pain, all of which affect the physical activity and impact the psychological and emotional state. The worsening of the symptoms restricts daily activities and leads to disability, loss of self-control or social isolation. Taken together, the emotional distress in chronic, end-stage patients is not depression, but the emotional shock resulting from inability to cope with the illness and the uncertainty in the face of death. Most of the domestic and foreign studies on demoralization focused on cancer patients, however, there are limited information about the demoralization in patients with heart failure, another group of terminally ill population, suffering from huge symptom and psychological distress, and further investigation is required.

2. METHODOLOGY

A cross-sectional correlation research design was used in this study and the data was collected via structured questionnaires.

2.1 Research Subjects and Sampling

Convenient sampling was adopted in this study. The patients were first screened for inclusion and exclusion criteria, and those met the criteria were recruited by the medical staff in the outpatient clinics. After the description of the research process, those who agreed and signed the informed authorized were incorporated as research subjects.

Inclusion Criteria: (a) ICD-9-CM diagnosis for heart failure. (b) Clinical diagnosis NYHA class III or IV, ICD code 50.84, or LVEF≦30%. (c) 20 years of age or older. (d) Clear consciousness. (e) Able to communicate in Mandarin and Hokkien. (f) Able to fill out questionnaires on his/her own or with assistance.

Exclusion Criteria: (a) Unable to fill out the questionnaire due to disease state or cognitive dysfunction. Severe illness. (b) Complete dependence in daily activities due to disease state or cognitive dysfunction. (c) Unable to answer questions due to severe physical and mental distress, for example, fainting, pain, wheezing, crying, and fatigue.

2.2 Research Tools and Sample Size

Data was collected with structured questionnaires. The research tools include demographic data, the Chinese version of the Memorial Symptom Assessment Scale-Heart Failure (MSAS-HF), and the Demoralization scale-Mandarin Version, DS-MV.

Symptom distress was assessed by Memorial Symptom Assessment Scale-Heart Failure, MSAS-HF), including 26 general symptom questions and additional six HF-specific questions [35].

Demoralization was measured by the Demoralization Scale-Mandarin Version (DS-MV) which has been evaluated for the reliability and validity [36]. The questionnaire contains 24 items and covers 5 dimensions, i.e., loss of meaning, dysphoria, disheartenment, helplessness, and sense of failure, to specifically present the phenomenon and natural course of demoralization.

2.3 Data Processing and Statistical Analysis

After the data is collected, decoded, registered and filed, the SPSS 23.0 for Windows/PC package software was used for statistical analysis, and significance was set at α=0.05. According to the study aim, descriptive or inferential statistical analysis was carried out as follows.

Descriptive Statistics: Continuous variables were described by mean and SD. Distribution of categorical variables was analyzed by number (n) and percentage (%).

Inferential Statistics: Independent t-test, One Way ANOVA, Pearson's correlation coefficient, and multiple linear regression were applied as inferences about the correlation.

3. RESULTS

3.1 Demographic Characteristics

Seventy-one advanced HF patients were recruited in this study for the descriptive analysis of demographic data, i.e., age, gender, educational level, marital status, employment status, religious belief, left ventricular ejection fraction (LVEF), New York Hear Association, functional classification (NYHA Fc), permanent pacemaker (PPM), and Charlson comorbidity index (CCI).

The demographic characteristics of advanced HF patients were shown in Table 1. The average age was 52.04 years (SD = 12.96), with the highest proportion between 46 and 60 years old (22.54%). There were 54 males (76.06%) and 17 females (23.94%). The majority of the participants were at the high school level of education (40.85%), followed by college/university or above (30.99%). Most of the patients were married (69.01%). For the employment status, the great majority were employed (52.11%), unemployed the next (47.89%), and then part-time workers (7.04%). Most advanced HF patients were Catholic (61.97%).

The average LVEF of patients with advanced HF were 23.55 (SD = 5.2). 50 (70.42%) and 21 (29.58%) patients were in class III and IV using the NYHA Fc classification, respectively. Most of the end-stage HF patients did not have PPM (76.06%).

The average CCI score of advanced HF patients was 2.56 (SD = 1.45).

3.2 Descriptive Analysis of Symptom Distress and Demoralization

Descriptive results of symptom distress and demoralization were summarized in Table 2. Symptom distress appeared within one week was investigated for the MSAS-HF scaling. Approximately 50% patients experienced dry mouth, cough, feeling drowsy, difficulty sleeping and worrying. 40% participants reported itching, lack of energy, palpitations, feeling irritable, shortness of breath, dizziness, and feeling nervous.

For demoralization, the average score of DSMV was 29.23 (SD=12.77). According to Hung et al., high demoralization was defined as total score

Table 1. General characteristics of patients with advanced heart failure (N=71)

Characteristics	Item	Number (n)	Percentage (%)
Age	Mean (standard deviation)	71	52.04 (12.96)
Age group	Under 45	20	28.17%
	45-60	33	46.48%
	Above 61	18	25.35%
Gender	Male	54	76.06%
	Female	17	23.94%
Educational level	Below junior high school	20	28.17%
	High school	29	40.85%
	College/University or above	22	30.99%
Marital status	Married	49	69.01%
	Other	22	30.99%
Employment status	Unemployed	34	47.89%
	Employed	37	52.11%
Religious belief	Catholic	44	61.97%
	Other	27	38.03%
Left Ventricular Ejection Fraction (LVEF)	Mean (standard deviation)	71	23.55 (5.2)
	III	50	70.42%
New York Heart Association, Functional classification (NYHA Fc)	IV	21	29.58%
	No	54	76.06%
Permanent Pacemaker (PPM)	Yes	17	23.94%
Charlson comorbidity index (CCI)	Mean (standard deviation)	71	2.56 (1.45)

higher than 30.27 (Hung et al., 2010). In this study, 31 (43%) advanced HF patients were categorized as high demoralization (Table 3).

3.3 Variance Analysis of Demographic Characteristics on Symptom Distress and Demoralization

Variance analysis of demographic characteristics on symptom distress and demoralization was shown in Table 2. Significant effect on MSAS-HF score was found in age group, educational level, and NYHA scale ($p=0.047$, 0.001, and <0.001, respectively). Lower symptom distress was found in patients under 45 years of age (37.42), as compared to higher symptom distress in patients between 46 and 60 years (61.85). Post-hoc analysis indicated no significant effect in both age groups ($p>0.05$). Here we also unraveled more severe symptom distress in advanced HF patients at high school level (68.90) than those at the level of college/university or above (30.45), and in patients in class IV (74.48) than those in class III (40.32) of NYHA functional classification.

Significant effect on DSMV score was found in age group, educational level, employment status, and NYHA Fc ($p=0.017$, 0.002, 0.004, and <0.001, respectively). Higher level of demoralization was revealed in patients above 61 of age (33.61) than those under 45 (22.65); in patients below junior high school or at high school level (32.70 and 32.79) when compared to those at college/university level or above (21.36); and in unemployed patients (33.74) as compared to those employed (25.08); and in NYHA Fc class IV patients (38.24) than those in class III (25.44).

3.4 Linear Regression Analysis of Predictors of Demoralization in Patients with Advanced Heart Failure

To explore the factors predicting existential distress, linear regression analysis was carried out to investigate the correlation between existential distress and symptom distress, age, educational level, employment status, and NYHA Fc scale (Table 3), with demoralization as the dependent variable, symptom distress, age, education, employment, and NYHA function class as independent variables. Age, education, employment and NYHA function class were set up as dummy variables in the first place, then entered multiple linear regression analysis. All variance inflation factors (VIF) were between

1.01 and 1.11, suggesting a low degree of multicolinearity for the prediction factors in this model. Significant correlation was found between each predictor and the demoralization model (F=8.3, p<.001). Based on the size of the coefficient, symptom distress significantly explained the demoralization state (B = .137, p = .001). The explanatory power of the regression model is 48% (R2=.48), suggesting significant correlation between symptom distress and existential distress.

4. DISCUSSION

The specific aim of this study is to investigate the impact of symptom distress on demoralization in patients with advanced heart failure. The end stage of progressive disease has huge consequences on patients' physiological and psychological state. Previous studies have mainly focused on exploring the correlation between the degree of symptom and depression. Demoralization is different from depression,

Table 2. Variance analysis of demographic characteristics on symptom distress (MSAS) and demoralization (DSMV) (n=71)

Variable	Memorial symptom assessment scale - heart failure (MSAS-HF)				Demoralization scale - mandarin version (DS-MV)		
	n	mean (SD)/ correlation coefficient	t / F	p value	mean (SD)/ correlation coefficient	t / F	p value
Age group[b]			3.21	0.047		4.35	0.017
Under 45 (1)	20	37.20 (31.32)		NS	22.65 (12.05)		
46-60 (2)	33	61.85 (42.01)			30.82 (12.41)		
Above 61 (3)	18	44.17 (29.79)			33.61 (11.95)		3>1
Gender[a]			0.61	0.547		0.26	0.799
Male	54	51.94 (39.18)			29.44 (12.76)		
Female	17	45.59 (32.45)			28.53 (13.15)		
Education level[b]			8.04	0.001[†]		7.1	0.002
Below junior high school (1)	20	45.60 (27.41)			32.70 (9.02)		1>3
High school (2)	29	68.90 (43.44)		2>3	32.79 (13.14)		2>3
College/University or above (3)	22	30.45 (24.36)			21.36 (12.06)		
Marital status*			0.74	0.463		0.54	0.591
Married	49	52.63 (36.42)			29.78 (13.48)		
Other	22	45.50 (40.40)			28.00 (11.20)		
Employment status[a]			1.29	0.2		3.01	0.004
Unemployed	34	56.41 (38.60)			33.74 (11.92)		
Employed	37	44.92 (36.21)			25.08 (12.23)		
Religious belief			-0.49	0.626		-0.42	0.678
Catholic	44	48.70 (34.21)			28.73 (12.24)		
Other	27	53.22 (42.99)			30.04 (13.78)		
Left Ventricular Ejection Fraction (LVEF)[c]	71	0.087		0.469	0.167		0.163
New York Heart Association, Functional classification (NYHA Fc)[a]			-3.82	<0.001		-4.31	<0.001
III	50	40.32 (32.42)			25.44 (11.16)		
IV	21	74.48 (38.71)			38.24 (12.01)		
Permanent Pacemaker (PPM)[a]			-0.75	0.455		-1.16	0.25
No	54	48.54 (38.25)			28.24 (13.47)		
Yes	17	56.41 (35.69)			32.35 (9.93)		
CCI[c]	71	0.193		0.107	0.214		0.074

a: Independent t test; b: One-way ANOVA (Scheffe's post hoc test); c: Pearson's correlation coefficient; †: Variance unequal (Robust ANOVA with Games-Howell method); NS: not significant

Table 3. Linear regression analysis of predictors of demoralization in patients with advanced heart failure (n=71)

Selected variable	**B**	**β**	***t***	***p***	**VIF**
constant	22.439		5.457	0.000	
age					
46 - 60	1.109	0.044	0.371	0.712	1.679
above 61	5.019	0.172	1.281	0.205	2.190
educational level					
below junior high	-1.194	-0.042	-0.342	0.734	1.860
college/university and above	-5.007	-0.183	-1.598	0.115	1.582
employment status					
employed	-3.300	-0.130	-1.178	0.243	1.477
NYHA Fc IV	5.790	0.208	1.992	0.051	1.327
symptom distress	0.137	0.402	3.508	0.001	1.591
R2	.48				
Ajd	.422				
F	8.3***				
df	(7,63)				

albeit not diagnosed as depression, most patients were demoralized with diminished ability to cope with the illness, which in turn affected the prognosis and death ideation. The facts that heart failure has multiple symptoms, high prevalence, and serious consequences for the life, rendered the resulting physiological and psychological stress, and loss of control of life the risk factors of demoralization.

Correlation analysis of symptom distress revealed that advanced heart failure manifested itself in multiple symptoms, and nearly 30% patients suffered from 15 symptoms. Here we show that symptom distress was correlated with age, educational level and NYHA Fc. Most of related studies in the past focused on patients over 65 years of age. In this study, 42% of the participants were between 46 and 60 years, and the percentage of those older than 61 years appeared low (29.79%). Previous studies have indicated that younger HF patients typically have ischemic heart disease or dilated cardiomyopathy, the fact that heart failure is the potential end stage of all cardiac diseases may explain the lowered age in this study [37,38]. The correlation with educational level showed higher distress in patients at high school level when compared to those having college/university degree, which is consistent with previous finding that people who were more educated had better self-care abilities, and therefore lower symptom distress [39]. The higher the NYHA Fc class, the more the symptom distress. Previous studies showed that recurrent symptoms have become the major factors affecting the quality of life during the progression of advanced heart failure, and the severity of symptoms was also an important indicator of survival [14]. In average, HF patients may experience six to seven clinical symptoms at the end of life, and the symptom distress has led to physical and psychological burden [15,16,14]. The symptoms of HF patients are very complex, Huang et al. (2019) reported advanced HF patients presented with symptom clusters, which could be divided into typical and atypical symptoms. Psychological conditions such as anxiety and depression could exacerbate the symptoms, and patients with better self-awareness were more effective in symptom management, whereas patients with typical symptoms had a higher level of outcome risk than those with atypical symptoms [40].

Here we showed the average score of demoralization in advanced HF patients was 29.23 (SD=12.77), and there were 43% participants presented with high demoralization. Most of the studies of demoralization were focused on cancer patients, and their results also showed increase in the range of average score and prevalence were positively associated with disease progression and severity, and the prevalence of demoralization in end-stage patients in the hospice wards could be as high as 81.7% [41,42]. To date, studies investigating the demoralization in HF patients available are quite limited, our results revealed the association between demoralization and age, educational level, employment status, and cardiac function classification (p=0.017, 0.002, 0.004, <0.001), and is consistent with the finding of Vehling et al. that older patients were unable to cope with the illness because of loss of hope and sustenance

in the treatment and low intention of future goals [43]. Previous study of employment status revealed the same, i.e., demoralization was less frequent in patients who were employed based on the direction and purpose for the future as well as social connection [44].

Multiple linear regression analysis revealed symptom distress as the major prediction factor of demoralization ($\beta = .402$, $p = .001$), and has 48% explanatory power for the gross demoralization. The result indicated the higher the symptom distress, the more severe the demoralization. Heart failure is a complex disease characterized by multiple comorbidities, significant symptom distress, and limitation in physical functions. Advanced HF patients suffered more physical symptoms, stronger depression, and worse spiritual well-being than patients with metastatic cancers [45]. Increased re-hospitalization due to symptom exacerbation has rendered the prognosis of heart failure unpredictable. No typical trajectory in end-stage progression was identified in HF patients, and imbalanced compensation could be life-threatening and result in sudden death [22,23], (Murray et al., 2005). The more serious the threat from physical symptoms and functional decline, the higher extent the illness interferes with the patient's life, and the decline in self-control will then scale up the degree of demoralization. Therefore, symptom self-management and the observation of demoralization state must be further implemented in clinical healthcare to reduce the risk of hospitalization and death.

5. CONCLUSION

Here we investigated the impact of symptom distress on demoralization in patients with advanced heart failure in the outpatient clinics. Among the total 71 patients, the average age was 52 years, 76% were male, and the majority was at high school education or below, married, and in class III of NYHA Fc scale. 90% participants experienced symptom distress via MSAS-HF scaling, and 43.7% patients were categorized as high demoralization. Variance analysis revealed more sever symptom distress in advanced HF patients with lower educational level and in class IV of NYHA Fc; and higher demoralization level in those above 61 of age, lower educational level, and in NYHA Fc IV. Multiple linear regression analysis unraveled significant correlation between symptom distress and demoralization under the predictive effect of controlled variables. The higher score the symptom distress, the more severe the demoralization.

6. STUDY LIMITATION AND RECOMMENDATION

This study is limited by cross-sectional conventional sampling and restricted investigation in HF outpatients. Inpatients suffer more significant physical and mental distress, and due to the fact that end-stage HF symptoms are highly variable, single data collection in outpatient clinics may not be able to reveal the causes and time sequence of disease distress and restricts the interpretation of the results. It is recommended to incorporate demoralization into the healthcare evaluation, so as to refer the patients to a well-judged care in a timely manner.

7. IMPLICATION OF THE STUDY

Heart failure is a complex syndrome which can result from any structural or functional cardiovascular disorder. The population of people suffer from HF is still growing and advanced HF patients may undergo symptom distress and impacts on mental health similar to those experienced by other terminally ill patients. To our knowledge, this is the first study investigating the correlation between symptom distress and demoralization in advanced HF patients and we revealed symptom distress as the major prediction factor for demoralization in this population. Demoralization is highly associated with life quality at both physiological and psychological level, and our study helps to identify advanced HF patients who experience demoralization in clinical practice, as well as to develop appropriate interventions to improve the prognosis and the quality of life.

CONSENT AND ETHICAL APPROVAL

This study was approved by the institutional review board of the medical center of recruitment (IRB approval number: B-ER-107-006). Upon received the IRB approval.The research began the process of data collection after obtaining consent from physicians at the outpatient clinics. The researchers conducted the study in accordance with the research ethical principles.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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