GENDER DIFFERENCES IN PERCEPTION OF DYSPNEA AND ITS RELATION TO MUSCLE WEAKNESS, FUNCTIONAL STATUS, DISABILITY IN ACTIVITIES OF DAILY LIVING, AND DEPRESSION IN ADULTS WITH HEART FAILURE—A SECONDARY ANALYSIS

by

MICHELLE TRAN

Presented to the Faculty of the Honors College of
The University of Texas at Arlington in Partial Fulfillment
of the Requirements
for the Degree of

HONORS BACHELOR OF SCIENCE IN NURSING

THE UNIVERSITY OF TEXAS AT ARLINGTON

May 2022

ACKNOWLEDGMENTS

I would like to acknowledge Dr. Yaewon Seo for working with me as my mentor and guiding me to become a better researcher. Dr. Seo has spent countless of hours showing me the ropes in research and has given me outpatient experience I never thought I would have. Dr. Seo gave me guidance in completing this thesis, but I take responsibility for any errors or omissions in this paper.

I would also like to acknowledge that Dr. Seo's studies were supported by four fundings, the Sigma Theta Tau Alpha Mu chapter, the FPB CWRU Alumni Association, the University of Nebraska Medical Center at Omaha Dean's Grant, and the Grant P20 NR011404 from the National Institute of Nursing Research, National Institute of Health.

I also want to send my thanks to Professor Christine Roberts and Dr. Lacy Foster, two professors of mine who helped shape my nursing career and are a part of my passion to excel in my nursing career and work on this project. Alongside my professors, I would like to acknowledge my peer, Analee Gonzales for being my partner in working on our Honors Senior Project together and Anna Ernest who was with us while surviving nursing classes.

Finally, I'd like to thank my family for helping me get through college and Adam Mackey for supporting me as I juggled nursing, Honors College, and work.

April 20, 2022

ABSTRACT

GENDER DIFFERENCES IN PERCEPTION OF DYSPNEA AND ITS RELATION TO MUSCLE WEAKNESS, FUNCTIONAL STATUS, DISABILITY IN ACTIVITIES OF DAILY LIVING, AND DEPRESSION IN ADULTS WITH HEART FAILURE—A SECONDARY ANALYSIS

Michelle Tran, B.S. Nursing

The University of Texas at Arlington, 2022

Faculty Mentor: Yaewon Seo

Although Heart Failure (HF) can occur in both women and men, some studies have shown that both genders do not present the same outcomes; however, there is an underrepresentation of the effect of gender on the relationship of HF and changes in activities of daily living. This study compared the effects of gender on dyspnea and other variables to determine differences between symptoms, disability, and other relationships. A secondary analysis of a cross-sectional descriptive study was conducted with 186 patients who were told to perform several tests to evaluate muscle weakness, functional status, depression, and disability. Instruments such as the 6-minute walk test were used to provide accurate scores. Results showed higher levels of dyspnea correlated with more depression in female patients and higher levels of dyspnea correlated with lower muscle

strength in male patients. These differences indicate that interventions targeting the findings may help improve patient outcomes.

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

LIST OF TABLES

CHAPTER 1

INTRODUCTION

1.1 Introduction of Heart Failure

The aging of the US population, medical advances for management of many cardiovascular conditions (e.g., myocardial infarction, hypertension), as well as changes in lifestyle contribute to the increase prevalence of heart failure (HF). According to the CDC, about 6.2 million Americans had HF in 2020, with an incident rate of 21 per 1000 people over the age of 65 (Virani et al., 2021). One notable issue with HF is that it is different in its morbidity and mortality between men and women (Azad et al., 2016). A general description of HF is a complex disorder that is a result of structural or functional impairments that alters the heart's ventricular filling and contractility, resulting in poor blood flow and congestion of the blood in the heart (De Bellis et al., 2019). HF may present with different variability between female and male populations, suggesting different that treatments may vary for each gender (Azad et al., 2016). Unfortunately, due to the lack of research that identifies the differences between both genders, there is not much information on different treatment options for women. Dr. Seo's quantitative study explored factors related to disability in activities of daily living and examined the effect of the diaphragmatic breathing training intervention on dyspnea, knee extensor, functional status, depression, and disability in patients with HF.

1.1.1 Problem Statement and Research Question

With the data collected from Seo's research, this study aimed to explore the differences between perception of dyspnea and how it would be related to other symptoms (muscle weakness, functional status), disability in activities of daily living, and depression that affected quality of life. To goal of this project is to extend knowledge on female HF and hopes to contribute to the shortage of women in literature works about HF and quality of life

CHAPTER 2

LITERATURE REVIEW

2.1 Etiology, Comorbidities, and Risk Factors of Heart Failure

The etiology of HF can play a major role in the prognosis and risk of mortality for the patient. Studies shown have found a correlation of gender and etiology. When discussing ischemic HF, studies report men having a higher change of developing this form of HF (Azad et al., 2016). The data also found that women would have hypertension as the most common etiological factor while myocardial infarction was the most common etiological factor for men.

Several comorbidities may be present in populations of HF as well. These include diabetes mellitus, iron deficiency and anemia, chronic obstructive pulmonary disease, depression, and lifestyle risk factors.

Diabetes mellitus is a common comorbidity that also has negative effects. (Hopper et al., 2016). Some studies compared the percentage of patients with HF and diabetes, indicating that there is inconclusive difference in men and women except for type 1 diabetes with which women were more likely to have (Hopper et al., 2016). However, diabetes mellitus also seems to have a three-fold higher risk in women than in men, which is only two-fold high (Marra et al., 2018).

Iron deficiency and anemia are common traits seen with HF patients. Anemia can result in higher morbidity and mortality risk for HF populations (Hopper et al., 2016).

Anemia is more commonly seen in female patients than in male patients, thus being a more common morbidity for women and giving women a higher risk in developing renal dysfunction (Hopper et al., 2016). Iron deficient patients are also more likely to develop worse outcomes in their development of HF due to the body's insufficient ability to create more red blood cells (Hopper et al., 2016).

Chronic Obstructive Pulmonary Disease (COPD) has a correlation with mortality in HF. COPD is more common in male patients compared to female patients (Hopper et al., 2016). One cause of COPD is smoking and as a result, studies show that men have a higher likelihood of having COPD. This number is changing, and men's prevalence of COPD is has decreased in recent decades. (Hopper et al., 2016). It is important to recognize if a patient with HF also has COPD since beta-blockers may potentially increase airway obstruction indicate to healthcare providers to avoid using beta-blockers with those patients (Hopper et al., 2016). Women also have a higher chance to develop shortness of breath, reduced exercise capacity, and pulmonary edema (Marra et al., 2018).

Depression is seen in many patients with HF and is often unnoticed or unrecognized in this population due to the symptoms that overlap (Hopper et al., 2016). Depression has a correlation with risk factors such as weight and smoking. Women present a higher burden of depression than men (Tam & Piña, 2019). This comorbidity may increase the non-adherence to medication and treatment options for patients.

Risk factors varied when looking at female and male patients. As previously mentioned, male patients were more likely to be smokers and were also observed to have alcohol-related cardiomyopathy (Azad et al., 2011). Women were more likely to have valvular heart diseases, high BMI, idiopathic cardiomyopathy, and high BMI (Azad et al.,

2011). Women also have smaller right ventricles, less blood volume, and higher contractility (Marra et al., 2018).

2.1.1 Symptoms

Regarding symptom perception, patients with HF noted that dyspnea was the most reported symptoms they faced (Heo et al., 2019). When observing for the severity of a patient's symptom perception, women were found to feel higher levels of burden (Jering et al., 2021). As these patients faced HF symptoms, levels of depression and anxiety increased with patients stating that their onset of HF is a result of increased emotional distress (Heo et al., 2019). Alongside the emotional distress was a belief that dominant symptoms, such as dyspnea, led to poor quality of life and performance (Heo et al., 2019). This indicates dyspnea's role in affecting the quality of life for many patients and being a good symptom to use analyzing its relationship with other symptoms.

Dyspnea can be described as the perception of sensations of difficulty breathing, occurring from performing activities to occurring from lying down and results in the patient struggling to effectively inspire adequately (Kupper et al., 2016). Multiple studies indicate dyspnea being of high prevalence among heart failure patients (Seo et al., 2008; 2011) (Heo et al., 2019). Dyspnea can be seen in HF patients upon exercising activities of daily living (ADLs) and thus further the degradation of their quality of life (Walthall et al., 2016). Common etiologies of dyspnea, especially in HF patients, are pulmonary congestion, muscular weakness in the chest or diaphragm, and related comorbidities such as obesity, COPD, and other respiratory illnesses (Kemp & Conte, 2012).

Skeletal muscle function plays an important role when determining a patient's muscle weakness and fatigue (Keller-Ross et al., 2019). There are varying results in studies

on whether HF plays a role in lower muscle strength, possibly due to the challenge of collecting such data and isolating other variables; however, one study found a potential link on how dyspnea in HF patients play a role in lower muscular strength. A relationship was found with changes in blood perfusion from poor oxygenation with altered muscle fiber distribution and metabolism, resulting in less muscle strength in HF patients (Keller-Ross et al., 2019).

One study suggests a pivotal role of nutrition on its effects on HF and disability in helping improve performance of ADLs (Lelli et al., 2020). Accounting for energy intake and muscle mass index, the study found that as nutrition intake declined, there was also a drop in physical function, resulting in more disability. Disability prevention plays an important role in maintaining quality of life. In HF patients, disability in ADLs may also result from activity intolerance and difficulty in mobility, which was related to physical deconditioning contributing to muscle strength, balance, dyspnea, and fatigue. Sustaining a physical capacity adequate to maintain independence in daily activities is a challenge for adults with HF. Some studies also suggest that female patients are more likely to express functional capacity impairment (Tam & Piña, 2019).

2.1.2 Significance of Research

Collecting the literature review still seem to show an underrepresentation of the women in HF studies. Despite both genders having similar distribution of HF cases, only 30% of all trials about cardiovascular disease had women enrolled with an even lower percentage only 17-23% of HF trials having women (Tam & Piña, 2019). Lack of knowledge about women's health affected by HF can result lack of treatment suggestions and lower quality of life (Tam & Piña, 2019). Again, the tradition of women being

underrepresented in HF trials results in lack of knowledge and gaps in treatment (Marra et al., 2018). There is also uncertainty on how to assess gender, and how it would impact the clinical outcomes (Marra et al., 2018).

CHAPTER 3

METHODOLOGY

3.1 Study Design

This study was a secondary analysis that was built on Seo's HF studies using data collected at baseline composed of dyspnea, muscle weakness on knee extensor, functional status, depression, and disability in activities of daily living. The original study used a cross-sectional design (n=151) and a repeated measure design (n=35) to collect and examine data from 186 HF patients.

3.1.1 Sample and Setting

In the parent study, using a convenient sample, 186 patients, who were New York Heart Association (NYHA) Functional Class II through IV (Criteria Committee, 1964), were recruited from four outpatient clinics: three academic medical centers in a mid-western urban area and one primary care specialty clinic in a rural community. Inclusion Criteria for this study included (a) >21 years of age, (b) diagnosed with stable HF and NYHA (New York Heart Association) Functional Class II (slight limitation during ordinary activity and comfortable at rest) through IV (moderate to marked limitations in activities or inability to perform activities), (c) cognitively intact as indicated by being able to describe what participation would involve, and (d) able to speak and read English. Exclusion criteria were that participants were not included if they had walking or mobility difficulties due to neuromusculoskeletal conditions (lower extremity amputation, severe Parkinson's disease) or severe pain from arthritis or intermittent claudication.

3.1.2 Procedures

Dr. Seo's studies were conducted after obtained approvals from each institute. Once informed consent was obtained, an appointment was made for the baseline data collection visit to assess knee extensor and distances walked in 6-minute on the ground level. Participants were recruited for the study during a routine clinic visit with their HF or cardiovascular specialist. All the self-administered questionnaires were mailed to each participant's home 7-10 days prior to the data collection time points. Participants were instructed to complete the questionnaires in their homes and bring the completed questionnaires with them to each in-person visit. No unique participant identifiers such as name or social security number in the database were used for this secondary analysis. The University of Texas at Arlington Institutional Review Board (IRB) approved the study as exempt from IRB review.

3.1.3 Measures

Demographic data, disease severity, and comorbidities were measured to describe the sample. Comorbidity was measured using the Charlson Comorbidity Index (CCI) (Charlson, Pompei, Ales, & MacKenzie, 1987).

There were several scales used to measure the variables Dyspnea was measured with 16 daily activities using a 10-point Likert scale, rated from "not at all" (0) to "dyspnea as bad as it can be" (10) associated with each activity. Sixteen daily activities were composed of three basic activities of daily living, five instrumental activities of daily living, and eight physical functions taken from The Older American Resource Services (OARS) (Duke University Center for the study of Aging and Human, 1978) and subcomponent of function of Late-Life Function and Disability Instrument (Haley et al., 2002). The

reliability and validity were tested in patients with HF (Seo et al., 2011; 2014). In the present study, Cronbach's alpha for reliability was .90. Muscle weakness on knee extensor was measured by a hand-held dynamometer. Mario and colleagues (1982) reported test-retest reliability from .69 to .80. Functional status was measured by the 6-minute walk test and subjects were asked to walk for six minutes at a normal pace on flat surface 20 meter long with minimal amount of encouragement (Guyatt et al., 1985). Depression was measured by the Beck Depression Inventory II and subjects rated the 21 items on a 4-point Likert scale from 0 to 3, and the ratings were summed for a total score (Beck, 1996). Disability was measured using two instruments by asking the degree of difficulty in ADLs in performing six basic ADLs (bathing, dressing, feeding, transferring, continence, and toileting) and seven instrumental activities of daily living (IADLs) (going shopping, using the transportation, using the telephone, preparing meals, doing housework, taking medication, and handling money) (Roberts, 1999).

Figure 3.1*:* Distribution of Sample Size by Gender by Percentage

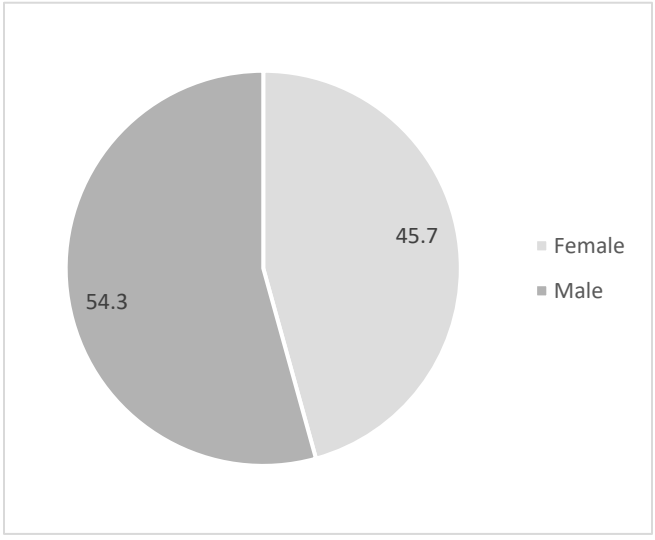

Figure 3.1 depicted the distribution of male and female patients in the present study. After collecting the sample size and separating it to its respective genders, there was a

relatively even distribution of male and female patients. 54.3% of the sample size were women, and 45.7% were men.

3.1.4 Data Analysis

Statistical Package for Social Science (SPSS /- PC+) was used to manage and analyze the data. Prior to inferential analyses, preliminary data analyses were conducted to clean data, clarify missing data, and examine outliers using central tendency, dispersion, and scatter-plot diagrams, and variations. Frequency distributions, means, and standard deviation were computed for all variables. Alpha of .05 was used to assess significance of testing the hypotheses. For testing the differences in variables between gender, the independent T-test was used. For examining the relationships between dyspnea and other variables, correlation coefficients were calculated by gender.

CHAPTER 4

RESULTS

4.1 Data Analysis

Table 4.1: Descriptive Statistics of Main Variables (N=186)

Variables	Mean ± SD/ N (%)	Range
Dyspnea (Sum)		
Basic Activities of Daily Living	5.42 (6.36)	00.00-30.00
Instrumental Activities of Daily Living	12.85 (8.87)	00.00-46.70
Physical Functioning	27.43 (16.71)	00.00-70.00
Muscle Weakness on Knee Extensor		
Lower	98 (52.7)	
Higher	88 (47.3)	
6-Minute Walk Distance (meter)	312.62 (112.91)	00.00-535.23
Disability (Average)		
Restriction in basic ADLs	2.80 (0.28)	.71-3.00
Restriction in instrumental ADLs	2.52 (0.47)	0.00-3.00
Modification in basic ADLs	1.44 (1.62)	0.00-8.71
Modification in instrument ADLs	1.98 (1.68)	0.00-6.95
Depression	12.85 (9.60)	0.00-49.00

Dyspnea was measured through performing of ADLs, IADLs, and physical functioning. There was a mean of 5.42 out of 30 for performing 3 ADLs (bathe, dressing, getting in and out of bed or chair), 12.85 out of 46.70 for 5 IADLs (shopping for groceries or clothes, walking one block, preparing own meals, taking medications, doing housework), and 27.43 out of 70 for 7 physical functioning tests (picking up a kitchen chair, reaching overhead while standing, making a bed, bending over from standing position, going up and down a flight of stairs; carrying objects 5-10 lbs when climbing stairs, going up two flights of stairs; walking 2-3 blocks). The mean for testing lower

muscular strength of the knee extensor was 98 and 88 for higher muscle strength. The average distance walked in the 6-minute walk test was 312.62 meters.

Disability was measured through restriction and modification upon performing ADLs and IADLs. Results showed a mean of 2.80 in performing ADLs with restriction out of 3 and 2.52 in performing IADLs with restriction. Restriction was tested with a 0-3 Likert scale where 0 represented complete inability to perform, 1 represented need for assistance, 2 represented difficulty but able to perform independently, and 3 represented the capability to perform without assistance. A 10-point Likert scale was used for measuring the ADLs and IADLs with modification with a mean of 1.44 for ADLs and 1.98 for IADLs. The mean of depression for the sample size was 12.85 out of 49, representing an average of slightly low depression ratings.

4.2: Differences Between Gender on Main Variables

Table 4.2: Gender Differences in Main Variables

Variables	Gender		F or X^2
	Male M (SD) or N (%)	Female M (SD) or N (%)	
Dyspnea			
Basic Activities of Daily Living	4.71 (5.93)	6.26 (6.79)	NS
Instrumental Activities of Daily Living	11.21 (7.87)	14.77 (9.61)	7.47**
Physical Functioning	23.92 (14.97)	31.53 (17.76)	9.73***
Muscle Weakness on Knee Extensor			
Lower	45 (44.6)	53 (55.4)	5.87*
Higher	56 (62.4)	32 (37.6)	
6-Minute Walk Distance (meter)	338,62 (108.38)	281.73 (110.96)	12.45***
Disability			
Restriction in basic ADLs	2.84 (0.25)	2.76 (0.31)	3.71*
Restriction in instrumental ADLs	2.59 (0.44)	2.44 (0.48)	4.61*
Modification in basic ADLs	1.21 (1.47)	1.73 (1.76)	4.76*
Modification in instrument ADLs	1.74 (1.61)	2.26 (1.72)	4.40*
Depression	11.57 (8.55)	14.34 (10.55)	3.80*

Note: *p < 0.05; **p < 0.01; ***p < 0.005

The data points of the sample were separated to its respective gender to determine any differences in symptoms. There were no major differences in the average of scores except that men had higher mean in their 6-minute walk distance and their higher muscle strength on knee extensor.

4.3: Correlation Matrix for Main Variables

Table 4.3: Correlation Matrix on 10 Variables for Men with Heart Failure

	1	2	3	4	5	6	7	8	9	10
1 bBDI Beck Depression Inventory – Total score b	1									
2 SumDys_PF	.563***	1								
3 SumDysbADL	.554***	.724***	1							
4 SumDysIADL	.595***	.758***	.795***	1						
5 M6mwt_meters	-.268*	-.231*	-.355***	-.247*	1					
6 aveADLsr average of 6ADLs_restriction	-.292**	-.476***	-.608***	-.495***	.380***	1				
7 avelADLsr average of IADLs_restriction	-.193	-.359***	-.449***	-.452***	.406***	.543***	1			
8 aveADLsm average of 6ADLs_modification	.416***	.600***	.762***	.640***	-.394***	-.649***	-.517***	1		
9 aveADLsm average of IADLs_modification	.417***	.593***	.594***	.662***	-.365***	-.538***	-.756***	.761***	1	
10 MS_LH	-.091	-.167	-.058	-.075	.119	.068	.117	-.144	-.154	1

* = p≤ .05; **= p≤ .01; ***≤ .005

Table 4.4: Correlation Matrix on 10 Variables for Women with Heart Failure

	1	2	3	4	5	6	7	8	9	10
1 bBDI Beck Depression Inventory – Total score b	1									
2 SumDys_PF	.393***	1								
3 SumDysbADL	.189	.721***	1							
4 SumDysIADL	.267**	.704***	.772***	1						
5 M6mwt_meters	.072	-.204*	-.277**	-.265**	1					
6 aveADLsr average of 6ADLs restriction	-.067	-.362***	-.516***	-.487***	.328***	1				
7 avelADLsr average of IADLs_restriction	-.234*	-.310**	-.338***	-.478***	.414***	.507***	1			
8 aveADLsm average of 6ADLs_modification	.199	.465***	.745***	.646***	-.326***	-.728***	-.473***	1		
9 aveADLsm average of IADLs_modification	.267**	.386***	.478***	.545***	-.447***	-.543***	-.742***	.739***	1	
10 MS_LH	-.209*	-.187	-.241*	-.216*	.092	.158	.023	-.223*	-.193	1

* = p≤ .05; **= p≤ .01; ***≤ .005

Table 4.5*:* Definitions for the Abbreviations in the Correlation Matrix

Abbreviation used in the Dataset	**Measurements**
1 bBDI Beck Depression Inventory – Total score b	Total Beck Depression score utilized to measure depression
2 SumDys_PF	Patient's Dyspnea related to Physical Functioning
3 SumDysbADL	Patient's Dyspnea related to performing activities of daily living (ADLs)
4 SumDysIADL	Patient's Dyspnea related to performing instrumental activities of daily living (IADLs)
5 M6mwt_meters	6-minute walk test to determine Functional Status
6 aveADLsr average of 6ADLs_restriction	Average of performing ADLs with restriction
7 avelADLsr average of IADLs_restriction	Average of performing IADLs with restriction
8 aveADLsm average of 6ADLs_modification	Average of performing ADLs with modification
9 aveADLsm average of IADLs_modification	Average of performing IADLs with modification
10 MS_LH	Musculoskeletal Strength on lower and higher knees

Looking at the data collected on Tables 4.3 and 4.4, there were some notable differences in the relationship between dyspnea and other symptoms in relation to gender. There were many symptoms that correlated with dyspnea that had similar results between men and women. When reviewing dyspnea with performing ADLs, there was no significant difference between men and women in with their performance in the 6-minute walk test or their performance of ADLs and IADLs with restriction and modification.

When testing for the patient's symptoms of dyspnea with performing IADLs, there was little to no difference between men and women in their association with the 6-minute walk test, their performance of ADLs and IADLs with restriction and modification, or their

musculoskeletal strength. However, there is a notable difference in the correlation score with the patient's musculoskeletal strength. The correlation score for male patients was 0.216 and the score for female patients was -0.075. There was also a notable difference in the correlation score with the patient's Beck Depression score. Male patients had a correlation score of 0.267 with a correlation score of .595 for females.

When testing for the patient's dyspnea in relation to physical functioning, there was little to no difference between men and women in their association with the 6-minute walk test, performance of ADLs and IADLs with restriction, and musculoskeletal strength. There was also little difference between performing ADLs with modification. However, there was a notable difference with performing IADLs with modification. Male patients had a correlation score of 0.386 while female patients had a correlation score of 0.593.

4.4 Comorbidities

Table 4.6*:* Frequency of Comorbidities Amongst each Gender

Comorbidity Tested	Overall	Gender	
		Male	Female
Charlson's Comorbidity Index, M (SD)	2.71 (1.39)	2.66	2.76
Comorbidities, Presence of			
Myocardial Infarction	72	**53**	19
Hypertension	122	66	56
Chronic Obstructive Pulmonary Disorder	46	27	19
Anemia	27	16	11
Diabetes	64	30	34
Hyperlipidemia	116	**70**	46

The CCI shows no significant variance between male and female patients; however, looking at the frequency, there is a huge disparity between hyperlipidemia and myocardial infarction between men and women. Men had a frequency of 53 out of 72 patients, while

women had a frequency of 19 out of 72 for myocardial infarction. For hyperlipidemia, there was a frequency of 70 men out of 116 patients with the condition in comparison to the 46 women out of 116 patients.

CHAPTER 5

DISCUSSION

In the secondary analysis there was a variance between men and women with HF in their relationship with dyspnea and depression, musculoskeletal strength, and disability in activities of daily living. Functional status did not seem to be different amongst men and women. A score of 0.595 in the correlation matrix for women when observing patient's dyspnea performing ADLs and level of depression indicated that female patients had a high and positive correlation. The study indicated that as women feel more symptoms of dyspnea attempting to perform activities of daily living, they also felt higher levels of depression. This score is represented lower with male patients and has a correlation index of 0.267, indicating that there is not much correlation. This aligned with previous results of other studies that found higher significance of depression among female patients with HF (Tam & Piña, 2019) (Hopper et al., 2016).

In contrast, there is a higher correlation between dyspnea when performing musculoskeletal strength with men than women. Men have a negative correlation score of -0.216, indicating that male patients may feel lower strength as they have higher levels of dyspnea. With women, there is a much smaller correlation between dyspnea and muscle strength, with a score of only -.075. No articles and studies directly addressed difference in the relationship between dyspnea and muscular strength amongst both genders with HF.

When observing the patients' dyspnea and disability, female patients have a higher correlation coefficient than men, having a r = 0.59. Male patients have a score of 0.39, indicating a smaller relationship between two variables. These numbers conclude that women perceive greater disability as they have higher levels dyspnea in comparison to men. Another study suggested that female HF patients that faced dyspnea experienced greater burden, aligning with the positive correlation to higher disability (Jering et al., 2021). However, the results did not show a correlation between dyspnea and muscular weakness, which may not completely align with the previous study. It was surprising to see male patients having a negative correlation of dyspnea with muscle strength, but it is possible that lack of physical therapy could result in poorer outcomes of dyspnea.

Although the CCI did not show significant differences between men and women, there was a notable difference in the frequency of certain comorbidities. The male patient group had a higher frequency of history of myocardial infarction (MI) and/or hyperlipidemia with a frequency of 53 with MI and a frequency of 70 with hyperlipidemia. Women instead had a frequency of 19 with MI and 46 with hyperlipidemia. There were few studies that discussed the frequency of hyperlipidemia and MI between both genders in HF patients, but there were sources that noticed a severity of diabetes in female patients and a higher rate of anemia in women (Hopper et al., 2016). The population in this study also showed female patients with diabetes, aligning with previous studies, yet showed a higher group of male patients with anemia contradicting past literature.

5.1 Significance

Understanding the differences that are noted with both men and women in HF allows for potential changes to treatment plans and interventions. By knowing the specific symptoms affected by dyspnea and knowing what dyspnea targets in each gender, future treatments can be implemented to target those precise symptoms. One study states that the lack of trials with women have caused a lack of treatment plans specific to gender (Tam & Piña, 2019). Thus, the results found in the correlation may assist in alleviating that barrier. With the stronger correlation of depression and disability with dyspnea, healthcare providers can be more aware of what interventions are needed to improve their quality of life, such as antidepressants, occupational therapy, or psychiatric therapy. Understanding the negative correlation with dyspnea and muscles strength in men may help contribute more muscle strengthening programs for male patients. This is supported by research that found a collaborative care program improved both mental and physical symptoms in patients with cardiovascular disease which led to improvements in health outcomes for the patients (Celano et al., 2018).

Acknowledging the different frequencies in comorbidities may also help with identifying the proper treatments and prevention plans for patients; however, there may be studies that refute treating hyperlipidemia with statins in hopes to decrease heart failure. Some data suggests that while statins (lipid lowering drugs) may assist in lowering CAD which helps with HF, statins alone are not indicated in a patient who already has severe HF and could even progress HF by intensifying hypertrophy of the heart (Lee et al., 2019). It may not be recommended to give extra statin drugs in an attempt to lower lipid levels in HF patients who are elderly due to the risk of polypharmacy and the low benefit (Lee,

2019). Thus, future studies that observe effects of lipid-lowering treatments on HF patients based on severity may be more appropriate. It is possible to continue focusing treatment on MI to prevent HF as supported by research that saw benefits in minimizing HF when properly treating a patient post-MI or giving neurohormonal blockades for a chronic HF patient with a history of MI (Minicucci et al., 2011). However, it is important to note that the study may not be up to date.

5.2 Limitation of Findings

The present study is a cross-sectional study design and as such, causal relationships cannot be established. Second, convenience sampling leads to selection bias and limits the generalizability of study, because subjects received care from heart failure specialists whose medical managements may have been better than other generalists. Additionally, current subjects may not represent the general population with HF.

5.3 Conclusion

The purpose of conducting this study was to conduct a secondary analysis of a population of HF adult patients to determine differences in gender in terms of dyspnea and its relation to muscle weakness, functional status, disability in activities of daily living, and depression. Previous studies have shown an underrepresentation of women in HF studies, making it difficult to obtain information about the patient population and its variability in symptom perception and treatment. To perform this study, the population collected from Dr. Seo's HF study was separated into its respective genders and the results of each test performed was placed in a correlation matrix to allow for observation of possible correlations and differences between each gender. The results showed that women had a positive correlation of higher dyspnea related to higher levels of depression and disability,

while men had a negative correlation of dyspnea with less muscle strength. These results may help with improving current day treatments and interventions to be more specific to their respective genders. This study helped highlight the potential differences seen with male and female patients in hopes of encouraging further research on the effects of HF on the female population. There are hopes to possibly expand into answering additional questions such as determining the effectiveness of certain HF treatments between men and women or evaluating the differences in female patients with HF with respect to individual ethnic groups.

APPENDIX A

DEMOGRAPHIC CHARACTERISTICS OF THE SUBJECTS

Demographic Characteristics of the Subjects (N=186)

Characteristics	Mean ± Standard Deviation	N	%
Age (Categorized by years)	58.92 ± 13.62		
26 – 49		49	26.3
50 – 64		75	40.4
≥ 65		61	33.3
Gender			
Female		85	45.7
Male		101	54.3
Marital Status			
Married		80	43.0
Single[a]		106	56.4
Living Conditions			
Alone		47	25.3
Living with others[b]		139	74.7
Race			
African-American		74	39.8
White		101	54.3
Hispanic		6	3.2
other		7	3.8
Education			
Less than High School		27	25.0
High School		75	40.8
Some College		41	22.3
College Graduate/ Postgraduate		22	12.0
Employed status			
Employed		44	23.7
Unemployed		142	76.3

Note: Single[a] include widowed, divorced or separated; Living with others[b] includes all responses (e.g., spouse, siblings, children, grandchildren, etc.)

REFERENCES

Azad, N., Kathiravelu, A., Minoosepeher, S., Hebert, P., & Fergusson, D. (2011, March). *Gender differences in the etiology of HEART FAILURE: A systematic review*. Journal of geriatric cardiology: JGC. Retrieved October 21, 2021, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3390064/.

Beck, A. T., Steer, R. A., Brown, G. K. (1996). *Beck depression inventory* (2nd Ed). San Antonio: The Psychological Co.

Benjamin, E. J., Blaha, M. J., Chiuve, S. E., Cushman, M., Das, S. R., Deo, R., Ferranti, S. D. de, Floyd, J., Fornage, M., Gillespie, C., Isasi, C. R., Jiménez, M. C., Jordan, L. C., Judd, S. E., Lackland, D., Lichtman, J. H., Lisabeth, L., Liu, S., Longenecker, C. T., … Muntner, P. (2017, January 25). Heart disease and stroke statistics-2017 update: A report from the American Heart Association. *Circulation.* Retrieved October 21, 2021, from https://www.ahajournals.org/doi/full/10.1161/cir.0000000000000485?keytype2=tf_ipsecsha&ijkey=375a411b8b19eef946fa3177ec44cab662de3585.

Celano, C. M., Villegas, A. C., Albanese, A. M., Gaggin, H. K., & Huffman, J. C. (2018). Depression and anxiety in heart failure: A Review. *Harvard Review of Psychiatry, 26*(4), 175–184. https://doi.org/10.1097/hrp.0000000000000162

Charlson, M. E., Popei, P., Ales, K. L., & MacKenzie, C. R. (1986). *A new method of classifying prognostic comorbidity in longitudinal studies: Development and validation. Journal of Chronic Disease, 40*, 373-383. doi: 10.1016/0021-9681(87)90171-8.

De Bellis, A., De Angelis, G., Fabris, E., Cannatà, A., Merlo, M., & Sinagra, G. (2019). Gender-related differences in heart failure: Beyond the "one-size-fits-all" paradigm. *Heart Failure Reviews, 25*(2), 245–255. https://doi.org/10.1007/s10741-019-09824-y

Duke University Center for the study of Aging and Human Development. (1978). *Multidimension Functional Assessment: The OARS methodology*. Durham, NC: Duke University.

Eisenberg, E., Palo, K. E. D., & Piña, I. L. (2018, February 27). *Sex differences in heart failure*. Wiley Online Library. Retrieved October 21, 2021, from https://onlinelibrary.wiley.com/doi/10.1002/clc.22917.

Keller-Ross, M. L., Larson, M., & Johnson, B. D. (2019). Skeletal muscle fatigability in heart failure. *Frontiers in Physiology*, *10*. https://doi.org/10.3389/fphys.2019.00129

Kupper, N., Bonhoff, C., Westerhuis, B., Widdershoven, J., & Denollet, J. (2016). Determinants of dyspnea in chronic heart failure. *Journal of Cardiac Failure, 22*(3), 201-209. doi:10.1016/j.carddail.2015.09.016

Guyatt, G. H., Sullivan, M. J., Thompson, P. J., Pugsley, S. O., Taylor, D. W., Berman, L. B. (1985). *The 6-minute walk: A new measure of exercise capacity in patients with chronic heart failure. Canadian Medical Association Journal, 132*, 919-923.

Haley, S. M., Jette, A. M., Coster, W. J., Kooyoomjian, J. T., Levenson, T. H., Heeren, T., & Ashba, J. (2002). Late life function and disability instrument: II. Development and evaluation of the function component. *Journal of Gerontology: Medical Sciences, 57*(A), M217-M222.

Heo, S., Moser, D. K., Lennie, T. A., Grudnowski, S., Kim, J. S., & Turrise, S. (2019). Patients' beliefs about causes and consequences of heart failure symptoms. *Western Journal of Nursing Research, 41*(11), 1623–1641. https://doi.org/10.1177/0193945918823786

Hopper, I., Kotecha, D., Chin, K. L., Mentz, R. J., & von Lueder, T. G. (2016, February 1). *Comorbidities in heart failure: Are there gender differences?* Current Heart Failure Reports. Retrieved October 21, 2021, from https://link.springer.com/article/10.1007/s11897-016-0280-1.

Jering, K., Claggett, B., Redfield, M. M., Shah, S. J., Anand, I. S., Martinez, F., Sabarwal, S. V., Seferović, P. M., Kerr Saraiva, J. F., Katova, T., Lefkowitz, M. P., Pfeffer, M. A., McMurray, J. J. V., & Solomon, S. D. (2021). Burden of heart failure signs and symptoms, prognosis, and response to therapy. *JACC: Heart Failure, 9*(5), 386–397. https://doi.org/10.1016/j.jchf.2021.01.011

Kemp, C. D., & Conte, J. V. (2012). The pathophysiology of heart failure. *Cardiovascular Pathology, 21*, 365-371. doi:10.1016/j.carpath.2011.11.007

Lee, M. M., Sattar, N., McMurray, J. J., & Packard, C. J. (2019). Statins in the prevention and treatment of heart failure: A review of the evidence. *Current Atherosclerosis Reports, 21*(10). https://doi.org/10.1007/s11883-019-0800-z

Lelli, D., Tolone, S., Pulignano, G., Tinti, M. D., Del Sindaco, D., Dipasquale Mazzilli, G., Antonelli Incalzi, R., & Pedone, C. (2020). Nutritional status is associated with physical function and disability in older adults with chronic heart failure. *European Journal of Internal Medicine*, *74*, 73–78. https://doi.org/10.1016/j.ejim.2019.12.007

Mario, M., Nicholas, J. A., Gleim, G. M., Rosenthal, P., & Nicholas, S. J. (1982). The efficacy of manual assessment of muscle strength. *Journal of Sports Medicine, 10*, 360-364. doi: 10.1177/036354658201000608. PMID: 7180955

Marra, A. M., Salzano, A., Arcopinto, M., Piccioli, L., & Raparelli, V. (2018). The impact of gender in Cardiovascular Medicine: Lessons from the gender/sex-issue in heart failure. *Monaldi Archives for Chest Disease, 88(*3). https://doi.org/10.4081/monaldi.2018.988

McSweeney J, Pettey C, Lefler LL, Heo S. (2012). Disparities in heart failure and other cardiovascular diseases among women. *Womens Health (Lond), 8*(4), 473-485

Minicucci, M. F., Azevedo, P. S., Polegato, B. F., Paiva, S. A. R., & Zornoff, L. A. (2011). Heart failure after myocardial infarction: Clinical implications and treatment. *Clinical Cardiology, 34*(7), 410–414. https://doi.org/10.1002/clc.20922

Pressler, S. J. (n.d.). *Women with heart failure are disproportionately studied as compared with prevalence: A review of published studies from 2013*. The Journal of cardiovascular nursing. Retrieved November 8, 2021, from https://pubmed.ncbi.nlm.nih.gov/25419948/.

Roberts, B. L. (1999). Activities of daily living: *Factors related to independence*. In A. S. Hinshaw (Ed.), Handbook on Clinical Nursing Research (pp. 563-577). Newbury Park: Sage.

Seo, Y., Roberts, B. L., LaFramboise, L., Yates, B. C., & Yurkovich, J. M. (2011). Predictors of modifications in instrumental activities of daily living in persons with heart failure. *Journal of Cardiovascular Nursing, 26*, 89-97. doi: 10.1097/JCN.0b013e3181ec1352

Seo, Y., Yates, B., LaFramboise, L., Dizona, P., & Norman, J. (2014). Predictors of cognitive/affective and somatic depression in heart failure patients. *Clinical Nursing Research, 23*, 259-280. https://doi.org/10.1177/1054773812473476

Tam, E., & Piña, I. L. (2019). Sex differences in heart failure—female representation in heart failure studies. *Current Cardiovascular Risk Reports, 13*(7). https://doi.org/10.1007/s12170-019-0613-1

Virani, S. S., Alonso, A., Aparicio, H. J., Benjamin, E. J., Bittencourt, M. S., Callaway, C. W., Carson, A. P., Chamberlain, A. M., Cheng, S., Delling, F. N., Elkind, M. S. V., Evenson, K. R., Ferguson, J. F., Gupta, D. K., Khan, S. S., Kissela, B. M., Knutson, K. L., Lee, C. D., Lewis, T. T., … Tsao, C. W. (2021). Heart disease and stroke statistics—2021 update. *Circulation, 143*(8). https://doi.org/10.1161/cir.0000000000000950

Walthall, H., & Floegel, T. A. (2019). The lived experience of breathlessness for people diagnosed with heart failure: A qualitative synthesis of the literature. *Current Opinion in Supportive and Palliative Care, 13*(1), 18-23. doi:10.1097/SPC.0000000000000405

BIOGRAPHICAL INFORMATION

Michelle Tran is nursing student who aspires to grow her career in research and the critical care subsection of healthcare. During her time at the University of Texas at Arlington, Michelle has written research papers for several classes, as well as given presentations that helped expand her knowledge in the field of nursing. Michelle also has also worked in her third year as an office assistant for the campus apartments and then as a patient care technician at a local hospital the following summer.

Starting her last semester of college, Michelle has started a job at a bakery and a research job as a research assistant for her mentor's personal study on post-COVID patients. Michelle plans to use her experience to graduation with the Maverick Advantage Distinction. Michelle also plans to graduate *Magna Cum Laude*.

Michelle plans to work in a critical care unit at a Trauma-1 teaching hospital to expand her knowledge on complex health conditions and use that knowledge to pursue some graduate routes, such as CRNA, NP, or education. She plans to continue her working relationship with Dr. Yaewon Seo at the University of Texas at Arlington as a research assistant to get more experience in the research industry, as well as get outpatient experience.