



Original Article

A COMPARISON OF DISEASE-SPECIFIC FUNCTIONAL LIMITATIONS BETWEEN
GERIATRIC AND NON-GERIATRIC PATIENTS WITH CONGESTIVE HEART FAILURE:
CROSS-SECTIONAL STUDY

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ABSTRACT

Purpose: Reports in patients with chronic heart failure (CHF) demonstrate that nearly 60% of patients experience difficulty in one or more activities of daily living (ADLs), and functional inability is related with a worse prognosis. The purpose of this retrospective study was to compare disease-specific functional limitations between geriatric and non-geriatric patients with CHF.

Method: Sixty-eight patients with CHF were divided into two groups as geriatric (age \geq 65 years, n=29, group I) and non-geriatric (age<65 years, n=39, group II). The level of difficulty during ADLs was assessed using the Performance Measurement-8 Questionnaire for Activities of Daily Living (PMADL-8) and the disease specific health status using the Chronic Heart Failure Questionnaire (CHQ).

Results: The PMADL-8 scores of patients with CHF in group I were significantly higher than those in group II (p=0.001). The CHQ dyspnea scores of patients in group I were lower than those in group II (p=0.024). The scores of the CHQ fatigue, emotional status, mastery subdimensions, and total scores were similar between groups (p>0.05).

Discussion: Geriatric patients with CHF have greater disease-specific functional limitations during daily life and poorer disease-related quality of life compared with their non-geriatric counterparts. Rehabilitation experts must pay special attention in the geriatric CHF group, with an emphasis on functional limitation during daily activities.

Keywords: Congestive heart failure; health-related quality of life; activities of daily living; health status.

ÖZET

Amaç: Kronik kalp yetmezliği (KKY) olan hastalardaki raporlar; hastaların neredeyse % 60'ının bir veya daha fazla günlük yaşam aktivitesinde (GYA) zorluk yaşadığını ve fonksiyonel yetersizliğin daha kötü prognoz ile ilişkili olduğunu göstermektedir. Bu retrospektif çalışmanın amacı; KKY olan geriatrik ve geriatrik olmayan hastalar arasındaki hastalığa özgü fonksiyonel limitasyonları karşılaştırmaktır.

Yöntem: KKY'li 68 hasta geriatrik (yaş \geq 65 yıl, n=29, grup I) ve geriatrik olmayan (yaş<65 yıl, n=39, grup 2) olarak iki gruba ayrıldı. Günlük Yaşam Aktiviteleri için Performans Ölçümü-8 Anketi (PMADL-8) ile GYA esnasındaki zorluk düzeyi ve Kronik Kalp Yetmezliği Anketi (CHQ) ile hastalığa spesifik sağlık statüsü değerlendirildi.

Sonuçlar: Grup I'deki KKY'li hastaların PMADL-8 skorları, grup II'ye göre anlamlı derecede yüksekti (p=0,001). Grup I'deki KKY'li hastaların CHQ dispne skorları grup II'den daha düşüktü (p=0,024). Gruplar arasında CHQ yorgunluk, emosyonel statü, yeterli alt boyutları ve total skorları benzerdi (p>0,05).

Tartışma: KKY olan geriatrik hastalar, geriatrik olmayan hastalara kıyasla günlük yaşamda daha yüksek hastalığa özgü fonksiyonel sınırlamalara ve daha kötü sağlıkla ilgili yaşam kalitesine sahiptir. Rehabilitasyon uzmanları, geriatrik KKY grubunda günlük aktiviteler sırasındaki fonksiyonel kısıtlamaya özellikle dikkat etmelidir.

Anahtar kelimeler: Konjestif kalp yetmezliği; sağlıkla ilgili yaşam kalitesi; günlük yaşam aktiviteleri; sağlık durumu.

INTRODUCTION

The pathogenesis of chronic heart failure (CHF) in elderly patients is usually based on coronary artery risk factors that adversely affect both the heart and vascular system and accelerate cardiovascular ageing (1). The CHF prevalence is strongly related to age, and according to recent data, the percentages of patients with CHF are 1.5% for men and 1.2% for women between the ages of 40 and 59 years, whereas the proportions increase to 10.6% for men and 13.5% for women aged ≥ 80 year (1,2).

Decreased pulmonary and cardiac reserves, skeletal muscle dysfunction, and additionally physiological factors, such as iron deficiency anemia, and vascular abnormalities, contribute to functional limitations in CHF (3). Symptoms such as dyspnea, fatigue, peripheral edema, and poor exercise capacity could lead to activity limitations in CHF (4). Patients with CHF also feel dissatisfied with their limitations in activities of daily living (ADLs) and poor overall life quality (4,5). These functional declines in daily life also increase the burden on caregivers and society (5).

Reports in patients with CHF demonstrate that nearly 60% of patients experience difficulty in one or more ADLs, and functional inability is related with a worse prognosis (6). Although there are findings regarding reduced ADLs performance in elderly patients with chronic obstructive pulmonary disease (COPD) compared with younger patients (7), there is no study in the literature that compares the level of functional limitations during daily life between geriatric and non-geriatric patients with CHF. Therefore, the study compared disease-specific functional limitations and quality of life between geriatric and younger patients with CHF.

METHODS

Data analysis was conducted between November 2020 and January 2021 in this cross-sectional retrospective study at the Ahi Evren Thoracic and Cardiovascular Surgery Training and Research Hospital Department of Cardiology. The required number of samples was determined based on our previous data using the performance-based ADLs simulation test in COPD (7). A power analysis program (G*Power, ver. 3.1; Universität Düsseldorf, Düsseldorf, Germany) was used to

calculate the sample size. For 80% power with 5% type I error, the required sample size was 30 for each group.

Participants

Individuals between the ages of 45 and 75 years, conscious, speaking Turkish, and the New York Heart Association (NYHA) classes I-IV were included in the study. These patients, who were referred for physiotherapy and rehabilitation, had the health status and functional limitation assessment records. Uncooperative and hospitalized with an acute condition were excluded from the study. Patients were divided into two groups: geriatric (age, ≥ 65 years, group I) and younger (age, < 65 years, group II) CHF. The Hacettepe University Non-Interventional Clinical Research Ethics Committee approved the study on May 31, 2022, registration number GO 22/524. Written informed consent was obtained from all participants. This study was conducted in accordance with the principles of the Declaration of Helsinki.

Assessments

Participants' physical characteristics, body mass index (BMI), smoking exposure (pack/year), marital status, and education level were recorded. The NYHA classification, comorbidities, and number of coronary artery disease risk factors (CADs) were recorded. Shortness of breath, fatigue, chest pain, and peripheral edema symptoms of the participants were recorded as present/absent. Patients' left ventricle ejection fraction (LVEF) values were recorded from echocardiography. The CHF phenotype was defined as heart failure with reduced ejection fraction (HFrEF), heart failure with mildly reduced ejection fraction (HFmrEF), and heart failure with preserved ejection fraction (HFpEF) (8).

The Performance Measure for Activities of Daily Living-8 (PMADL-8) questionnaire based on the International Classification of Functioning, Disability, and Health (ICF) model was used to assess functional impairments in patients with CHF. The PMADL questionnaire consists of eight items and a four-category response scale (1, very easy; 2, somewhat easy; 3, somewhat difficult, and 4, very difficult). High scores demonstrate severe functional limitations of daily life (9). The Turkish version of PMADL-8 was found to be reliable

and valid in patients with CHF in a previous trial by the authors (10).

Health-related quality of life was assessed using the Turkish version of the Chronic Heart Failure Questionnaire (CHQ). The CHQ includes four dimensions. Higher scores demonstrate better health status (11).

Statistical analysis

Statistical analyses were performed using SPSS for Windows (version 23.0; IBM Inc., Armonk, NY, USA). Data are expressed as mean±standard deviation and as percentages (%) for categorical variables. The variables were investigated using visual (histograms/probability plots) and *Shapiro–Wilk* tests to determine whether they were normally distributed. The *Mann–Whitney U* test for non-normally distributed parameters and the *Student-t* test for normally distributed parameters were used to compare parameters between groups. The *chi-square* test was used to analyze the categorical variables. The level of significance was set at $p<0.05$ (12). A post hoc power analysis was performed using the G*Power statistical program (G*Power 3.0.10 Software) according to the PMADL-8 scores. The post hoc power of the study was 99%.

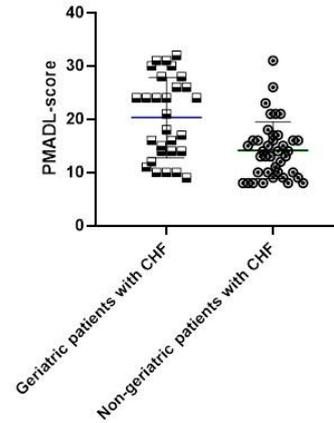
RESULTS

Sixty-eight patients with CHF (mean age, 62.40 ± 13.70 years; female/male, 53/15) participated in the study. The mean LVEF was $32.50\pm 9.70\%$. The physical characteristics, smoking status, symptoms, risk factors for CAD, comorbidities, and education levels of the groups are presented in Table 1. The groups were comparable in terms of physical and clinical status. The number of risk factors for CAD was higher in group I than group II ($p=0.016$, Table 1). The CHF phenotype was similar between groups ($p>0.05$, Table 1), and most patients had the HFrEF phenotype. In addition, the patients in group I had significantly more chest pain and peripheral edema complaints than those in group II ($p=0.033$, $p=0.018$; respectively, Table 1).

Functional impairment and quality of life results of the groups are presented in Table 2. The PMADL-8 scores of group I were significantly greater than those of group II ($p=0.001$; Table 2, Figure 1). The CHQ dyspnea scores were

significantly lower in group I than in group II ($p=0.024$; Table 2). Otherwise, the scores of the CHQ-fatigue, emotional status, mastery subdimensions, and total scores were similar between groups ($p>0.05$, Table 2).

Figure 1. The comparison of the PMADL-8 scores between geriatric and non-geriatric patients with CHF



DISCUSSION

According to our knowledge and literature search, this is the first study to compare functional limitations during daily life using a disease-specific outcome measure between geriatric and younger patients with CHF. This study demonstrated that geriatric patients with CHF have greater disease-specific ADL limitations and worse health-related quality of life than younger patients.

Geriatric patients with CHF usually have a different clinical presentation than younger patients with the same diagnosis. They generally have complex comorbidities, such as atrial fibrillation, and polypharmacy adversely affects their clinical and functional status (13). Patients with CHF who experienced moderate/severe difficulty during ADLs were associated with a greater risk of all-cause and non-cardiovascular hospitalization and poor prognosis (6). Shimizu et al. showed higher PMADL-8 scores in patients with CHF aged ≥ 60 years than in healthy controls and demonstrated the discriminative properties of the PMADL-8 for disease-specific functional limitations in this patient group (9).

Table 1. Characteristics of geriatric and non-geriatric patients with CHF.

Variables	Geriatric patients with CHF (n=29)	Non-geriatric patients with CHF (n=39)	p value
	Mean±SD	Mean±SD	
Age (years)	74.69±7.60	53.26±9.31	<0.001*
Sex (Male/Female) (n)	14/8	19/13	0.721
Height (cm)	170.07±9.13	171.13±9.12	0.223
Weight (kg)	77.62±16.83	83.95±14.64	0.294
BMI (kg/m ²)	27.00±6.57	28.66±4.56	0.333
Smoking (pack-years)	20.00±24.79	18.76±24.53	0.949
CAD risk factors (n)	3.38±1.05	2.69±1.15	0.016&
LVEF (%)	31.11±9.02	33.56±9.58	0.197
NYHA functional class, n (%)			
I	1 (3.4)	5 (12.8)	0.021 ^y
II	16 (55.2)	30 (76.9)	
III	8 (27.6)	3 (7.7)	
IV	4 (13.8)	1 (2.6)	
HF phenotype, n (%)			
	25 (92.6)	29 (80.6)	0.194
HFrEF			
HFmrEF	0 (0.0)	4 (11.1)	
HFpEF	2 (7.4)	3 (8.3)	
Comorbidities, n (%)			
Hypertension	25 (89.3)	36 (94.7)	0.643
DM	13 (46.4)	13 (35.1)	0.357
Hyperlipidemia	6 (21.4)	33 (89.2)	0.483
COPD	12 (42.9)	10 (27.0)	0.182
CAD	26 (92.9)	36 (97.3)	0.573
Chronic renal failure	6 (21.4)	4 (10.8)	0.306
Symptom perceptions, n (%)			
Dyspnea	29 (100)	39 (100)	N/A
Fatigue	29 (100)	39 (100)	N/A
Chest pain	29 (100)	31 (83.8)	0.033 ^y
Peripheral edema	23 (82.1)	20 (54.1)	0.018 ^y
Education level, n (%)			
Illiterate	1 (3.6)	1 (2.6)	0.008 ^y
Primary school	18 (64.3)	11 (28.2)	
Middle school	6 (21.4)	6 (15.4)	
High school	2 (7.1)	16 (41.0)	
University	1 (3.6)	5 (12.8)	
Marital status, n (%)			
Single	3 (10.3)	7 (17.9)	0.498
Married	26 (89.7)	32 (82.1)	

Abbreviations: CI: Confidence Interval; BMI: Body Mass Index; CAD: Coronary artery disease; NYHA: New York Heart Association; HFrEF: Heart failure with reduced ejection fraction, HFmrEF: Heart failure with mildly reduced ejection fraction, HFpEF: Heart failure with preserved ejection fraction; LVEF: Left ventricular ejection fraction; DM: Diabetes mellitus; COPD: Chronic obstructive pulmonary disease; N/A: Not applicable. *p<.05 Student t-test, &p<.05, Mann Whitney-U test, ^yp<.05, Chi-Square test.

Table 2. Functional limitations and disease-specific quality of life in geriatric and non-geriatric patients with CHF.

Variables	Geriatric patients with CHF (n=29)	Non-geriatric patients with CHF (n=39)	Median	95% CI for Mean		p value
	Mean±SD	Mean±SD		Lower bound	Upper bound	
<i>Functional limitations</i>						
PMADL-8 score	20.31±7.58	14.15±5.35	16.78	15.07	18.49	0.001 ^{&}
<i>Quality of life</i>						
CHQ dyspnea score	23.55±8.38	28.18±4.97	26.20	24.51	27.89	0.024 ^{&}
CHQ fatigue score	19.45±5.83	21.95±3.49	20.88	19.73	22.03	0.161
CHQ emotional status score	30.83±8.86	33.92±6.24	32.60	30.77	34.43	0.194
CHQ mastery score	18.28±5.46	20.77±4.77	19.70	18.45	20.96	0.063
CHQ total score	92.00±26.11	104.33±14.64	99.07	93.97	104.18	0.111
Abbreviations: CI: Confidence Interval; PMADL-8: The Performance Measure for Activities of Daily Living-8 for Patients with Congestive Heart Failure; CHQ: Chronic Heart Failure Questionnaire. ^{&} p<.05 Mann Whitney-U test.						

The most affected ADLs were “going up a flight of stairs without a handrail”, “closing a heavy door”, “walking at the same speed as their peers”, and “walking up a slight slope for 10 min” in CHF. Norberg et al. found in their study that increased age had a significant effect on ADL performance and most of the patients were independent during basic ADLs, whereas 75% of patients were dependent on one or more instrumental ADLs. In particular, NYHA stage-II–III patients showed increased effort during ADLs. Geriatric patients were more dependent on cooking, transportation, and cleaning (14). In our study, we demonstrated that geriatric patients with CHF had higher PMADL-8 scores than younger patients and mostly had difficulty climbing stairs/hills and

walking at the same speed as their peers, similar to the findings of Shimizu et al (9). Dyspnea (87%) and fatigue (88%) symptoms were common in daily life in elderly patients (15). The PMADL-8 score was also shown to be related to dyspnea, fatigue symptoms, and NYHA functional class in CHF (9). Although dyspnea and fatigue symptoms affect functional status in both the geriatric and non-geriatric groups, higher functional disability in pediatric patients could be a result of the aging process on systems, decreased endurance capacity, and muscular dysfunction.

Gott et al. demonstrated that older age was associated with worse general quality of life in their study with 542 people with heart failure aged >60 years and patients who were

female, in NYHA functional class III–IV, and with lower socioeconomic status and had depression or multiple comorbidities had lower quality of life (16). In a study with 257 patients with CHF (mean age, 74.70±10.01 years; 80% of patients were in NYHA classes I–II), 28% of the patients had a moderate disability level, and 16.7% had a severe disability level. The most problematic dimensions were ADLs, and the life quality of the patients was mildly affected. Female sex and NYHA classes III–IV worsen quality of life, whereas higher LVEF values were related to better physical dimension scores of the quality of life (17). The quality of life is more strongly associated with symptom perception and CHF severity with biomarkers or physiological measurements. Medical comorbidities, especially diabetes mellitus (DM), anemia, and COPD, adversely affect the quality of life in patients with CHF (13,16,18). Higher health literacy, social support levels, and proper medication usage positively affect all dimensions of health-related quality of life in chronic disorders (19). Our study confirmed previous findings that geriatric patients with CHF have a poorer quality of life, especially those related to dyspnea symptoms. The distribution of comorbidities was similar between the groups, whereas the number of risk factors for CAD and number of patients in NYHA classes III–IV were significantly higher in the geriatric group, and nearly half of the geriatric patients had COPD and DM comorbidities that were closely related to poor quality of life (16,18). At the same time, although the social support levels seemed similar between groups, the lower education level of geriatric patients with CHF could have led to poor health literacy and worse self-management of their chronic disorders.

Limitation

The limitation of the study was that we could not assess muscle function, physical or cognitive frailty, or maximal cardiorespiratory fitness level of patients with CHF owing to limited laboratory facilities. To be able to investigate the relationships between these parameters would have been useful for interpreting the findings.

CONCLUSION

In conclusion, our study demonstrated that geriatric patients with CHF have higher disease-specific functional limitations

during daily life and poorer health-related quality of life than non-geriatric patients. There is a need for special attention for the geriatric CHF population with focus on functional limitations during ADLs. Guideline-recommended interventions should be considered for CHF that include upper and lower extremity exercise training, energy conservation techniques, or self-management strategies that may help decrease ADL limitations and improve their quality of life during cardiac rehabilitation programs.

Author contributions

Idea/Concept – ECK, NE; Design – ECK, NE; Data Collection and/or Processing – NE, HEA, GU, MRS; Analysis and/or Interpretation – ECK, NE, GU, MRS, Literature Search – ECK, NE, HEA; Writing Manuscript– ECK, NE; Critical Review – ECK, NE, GU, HEA, MRS.

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Conflict of interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

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