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Increased comorbidities in heart failure patients ≥85 years but declined from >90 years: Data from the Swedish Heart Failure Registry

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ABSTRACT

Objectives: Epidemiological studies of elderly heart failure (HF) patients (≥85 years) are limited with inconsistent findings. Our objective is to confirm and extend epidemiological study in elderly (≥85 years) patients using the Swedish Heart Failure Registry database.

Methods: This retrospective study included 8,347 HF patients aged ≤65 years and 15,889 HF patients aged ≥85 years. Elderly population was further divided into two subgroups: 11,412 patients were 85–90 years and 4,477 patients were >90 years.

Results: The ≥85 year group was characterized by more women, higher systolic blood pressure (SBP), lower body-mass index (BMI), more than twice as many HF with normal left ventricular ejection fraction (HFNEF), higher incidence of cardiovascular and non-cardiovascular comorbidities and less use of proven therapeutics compared with the ≤65 year group. Compared with the 85–90 year subgroup, the >90 year subgroup had a decline in cardiovascular and non-cardiovascular comorbidities except renal insufficiency and anaemia which continued to increase with ageing ($p<0.01$). Tendency was the same regardless of gender but slightly different between systolic HF (SHF) and HFNEF. In the group with HFNEF, there were more women, higher SBP, lower N-terminal pro-B-type natriuretic peptide levels, less ischaemic heart disease, more hypertension and left bundle branch block regardless of age. Atrial fibrillation was more frequent in patients with HFNEF than with SHF in the elderly group ($p<0.01$). Patients with HFNEF in the >90 year subgroup had increasing incidence of ischaemic heart disease compared to 85–90 year group ($p<0.01$).

Conclusions: HF patients ≥85 years had increased cardiovascular and non-cardiovascular comorbidities but with a decline from >90 years.

1. Introduction

Heart failure (HF) is still one of the leading causes of death, and it increases with age in line with comorbidity and mortality [1–12]. Previous landmark randomized clinical trials have mostly been conducted in younger systolic HF (SHF) patients with an average age of <63 years and a left ventricular ejection fraction (LVEF) of <40%. Available HF studies on the so-called "elderly" have generally focused on a population aged around 65–75 years, and patients ≥85 years are rarely studied [1–12,19]. As a consequence, HF in patients aged ≥85 years remains poorly understood. Findings from the few studies that have been performed in this age group have not been consistent, particularly with regard to both cardiovascular and non-cardiovascular comorbidities [6,8,9,13–18]. For instance, the incidence of hypertension has been reported to be both lower [14,17,18] and higher [6,7,15] and the incidence of ischaemic heart disease has been shown to be similar [17], higher [15] and lower in elderly patients [14,18]. These differences may be due to small sample sizes in previous studies, a limitation because of the highly heterogeneous nature of the elderly HF patient population. Moreover, HF with normal left ventricular ejection fraction (HFNEF) was reported to be more frequent in the elderly. Differences in comorbidity between SHF and HFNEF in those ≥85 years remain largely unknown.

The need for in-depth characterization and understanding of HF in elderly populations is important, particularly for those aged ≥85 years, because the number of people with HF in this age group is increasing rapidly as the aged population increases worldwide. In addition, because

Abbreviations: ACEi, ACE inhibitors; BNP, B-type natriuretic peptide; BB, Beta blockers; eGFR, Estimated glomerular filtration rate; HF, Heart failure; HFNEF, Heart failure with normal left ventricular ejection fraction; LVEF, Left ventricular ejection fraction; NT-proBNP, N-terminal pro B-type natriuretic peptide; S-HFR, Swedish National Heart Failure Registry; SHF, Systolic heart failure.

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advanced medical technology allows us to offer a wider range of therapies, further information to help us make the correct choice becomes more important.

The internet-based Swedish Heart Failure Registry commenced in 2003 [20]. It is an important source of information about the epidemiology and characteristics of HF in elderly patients. In the present study, our main objective is not only to confirm previous epidemiological finding in the ≥85 year group but also to extend the study by dividing this group further into two subgroups: 85–90 year and >90 year, and moreover making comparisons between SHF and HFNEF in this elderly population.

2. Methods

2.1. Swedish Heart Failure Registry

The Swedish Heart Failure Registry has been described previously in the introduction [20]. This internet-based registry was created in 2003 and allows participating units to register their HF patients online after diagnosis by a clinician (www.rikssvikt.se). During an initiation visit, staff receive training from a registry coordinator on how to register patients and how to use the registry. More than 70 variables, including demographics, concomitant diseases, diagnostic procedures, hemodynamics, laboratory data, and medication, are recorded at discharge from hospital (within 1 month) or after visits to outpatient clinics. Sixty of these variables in the registry are obligatory and the other 10 are optional. The registry recommends that patients be re-registered after each hospitalization due to HF. All patients are informed that their hospital or primary care centre is participating in the registry and patients who do not wish to participate are assured that all registered data related to them will be deleted. Patients are consecutively entered. The registry and analysis of the database were approved by the regional ethical review board.

2.2. Subgroups and definitions

The ≥85 year group was further subdivided into two groups: 85–90 year and >90 year. Additionally a younger population (≤65 years) was included for comparison. Patients aged 66–84 years were not included in this study because of two reasons: 1) to not include the transient age group to show the greatest contrast as possible between the much younger and much elderly and 2) to make the focus of current study on the ≥85 year group. HF was diagnosed individually by physicians from participating registration sites where the current guidelines for the diagnosis and treatment of acute and chronic HF is strongly recommended [21,22]. Cut-off for LVEF is defined as <50% in SHF, and ≥50% for HFNEF. Tachycardia is defined as heart rate >100 beats/min, whereas bradycardia is <60 beats/min. In the registry, the estimated glomerular filtration rate (eGFR) was calculated using the Cockroft–Gaults formula.

2.3. Statistics

The results are presented as percentage and mean ± standard deviation (SD), or as median and interquartile range (IQR) when values were not distributed normally. In the case of continuous variables, statistical analysis was performed using Student's unpaired *t*-test or the Mann–Whitney *U*-test for abnormally distributed variables. For discrete variables, the chi-square test was used. The PASW Statistics 18 (USA) statistical package was used for all the data analyses. $p<0.05$ was regarded as statistically significant.

3. Results

Up until 31 December 2009, 8,348 younger (≤65 years) and 15,889 elderly (≥85 years) HF patients were registered. In the ≥85 year HF patient group, 11,412 patients were 85–90 years and 4,477 were >90 years. Patients aged 66–84 years were not included in this study. Natriuretic peptide testing was performed in 2,938 patients (35%) in the ≤65 year group, 2,890 (25%) in the 85–90 year group and 723 (16%) in the >90 year group. Among comorbidity, only 5% of the data set was completely filled for both depression and malignancy. The majority of HF patients had been registered by hospital clinicians. Only 2.1% of the ≤65 year group, 4.5% of the 85–90 year group, and 1.2% of the >90 year group were registered by primary care clinicians.

3.1. Differences in demographic and clinical characteristics among the age groups

As shown in Table 1, both the 85–90 year group and the >90 year group had characteristics that differed from those of the younger population ≤65 years. In general, compared with the ≤65 year group, the ≥85 year group was characterized by more women, lower BMI, higher systolic blood pressure (SBP), lower diastolic blood pressure (DBP), more left bundle brunch block (LBBB), more than twice as many patients with HFNEF, more cardiovascular comorbidities (ischaemic heart disease, hypertension and atrial fibrillation), more non-cardiovascular comorbidities (anaemia, pulmonary disease, stroke and renal insufficiency) except diabetes which decreased with ageing ($p<0.01$ for each of these variables). Compared to the 85–90 year group, the >90 year group had a decline in cardiovascular and non-cardiovascular comorbidities except renal insufficiency and anaemia which continued to increase with ageing (Table 1). As shown in Table 1, moderate renal insufficiency in terms of GFR <60 mL/min kept increasing from 10.9% in patients ≤65 years to 89.8% in patients 85–90 years and continued increasing to 97.2% in patients >90 years. An even more dramatic increase was observed in severe renal insufficiency in terms of GFR <30 mL/min from 1.8% in patients ≤65 years to 28.0% in patients 85–90 years and continued increasing to 53.1% in those >90 years. Likewise, the incidence of anaemia increased from 22.4% in patients ≤65 years to 44.3% in patients 85–90 years and furthermore to 47.2% in those >90 years.

HFNEF occurred more than twice as often in the 85–90 and >90 year groups compared with the ≤65 year group. The incidences of HFNEF were different depending on how they were calculated. In cases where the sample size was only the number of those with available echocardiography, HFNEF was present in 27.3% and 33.0% of the patients in the 85–90 and >90 year subgroups, respectively, compared with 12.3% in the ≤65 year group. However, in cases where the sample size was the total number of patients including those without available echocardiography, HFNEF was present in 22.2% and 20.4% of the patients in the 85–90 and >90 year subgroups, respectively. Moreover, both B-type natriuretic peptide (BNP) and N-terminal pro B-type natriuretic peptide (NT-pro BNP) levels were twice as high for the 85–90 and >90 year subgroups compared to the ≤65 year group (Fig. 1).

3.2. SHF and HFNEF profile differences among the age groups

As shown in Table 2, the SHF and HFNEF patient profiles varied not only between the ≤65 and ≥85 year groups, but also between the 85–90 and >90 year subgroups. In general, patients with HFNEF were more likely to be women and had higher SBP, narrower QRS width, lower P-creatinine (Cr) levels, lower NT-proBNP levels (Fig. 1), less ischaemic heart disease and more hypertension compared with those with SHF ($p<0.01$ for each of these variables). However, there were several differences between SHF and HFNEF. In the ≥85 year group, HFNEF patients had significantly higher frequency of atrial fibrillation compared to those with SHF; this was not the case for HFNEF patients in the ≤65 year group (Fig. 2). In the ≥90 year group, ischaemic heart diseases continued to increase in HFNEF but decreased in SHF. However, diabetes incidence and BMI decreased with age regardless of SHF or HFNEF.

3.3. Hemodynamic disorders

As compared to the ≤65 year group, the incidences of tachycardia did not increase until >90 years. By contrast the incidence of bradycardia decreased from ≥85 years and continued decreasing despite >90 years. Similarly, the incidence of hypertension with SBP >140 mm Hg was higher and hypotension was lower in the 85–90 and >90 year subgroups compared to the ≤65 year group (data not shown).

3.4. Distinct treatment profiles among the different age groups

At the time of discharge from hospital, prescriptions of beta receptor blockers (BB), ACE inhibitors (ACEi), angiotensin receptor blockers (ARB) and aldosterone antagonists were less common whereas diuretics were more common for ≥85 year patients than for ≤65 year group. Even less BB, ACEi, ARB and aldosterone antagonists were