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Changing trends in heart failure patient's hospitalization and treatment in 2010-2014

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Abstract

Introduction/Aim: The aim of this study was to look for trends in demography and treatment of patients with both heart failure (HF) with preserved and reduced ejection fraction (EF) and to establish the extent of adherence to ESC guidelines for heart failure treatment.

Materials and Methods: This is a retrospective study involving 535 heart failure patients hospitalized for the period from January 2010 to December 2014. It involves age, gender, left ventricular EF, drug treatment prohibiting comorbidities and medical treatment with renin-angiotensin system blockers, beta- blockers and mineralocorticoid receptor antagonists.

Results: Patients in general tended to become older, and females and HFrEF to be prevalent over time in the investigated period. Patients with HF with preserved EF (HFpEF) were older than those with reduced EF. Male gender prevailed in the group of patients with HF with reduced EF (HFrEF) and female – among those with HFpEF. When estimating the annual percentage of non-adherence to therapy recommendations for heart failure, taking into account contraindications as well, a trend to better adherence to treatment recommendations over time was found. Still, there was a high percentage of non-adherence to heart failure therapy recommendations for both HFpEF and HFrEF.

Conclusion: There was increasing predominance of HFpEF, older age and female gender in heart failure hospitalizations over time with a tendency to improve adherence to ESC recommended treatments for heart failure in 2010-2014.

Keywords: heart failure, research, RAS blockers, beta-blockers, mineralocorticoid receptor antagonists, calcium antagonists

Introduction

Heart failure (HF) is characterized by high morbidity and mortality rates. It is often a consequence of other disorders of the cardiovascular system, including coronary artery disease, hypertension or valve disease. HF has usually being considered as insufficiency of contractile function of the left ventricle and left ventricular ejection fraction (EF) is used to define cardiac pump function. In the last two decades, it has been established that HF can also occur with normal or borderline EF – named HF with preserved EF (HFpEF) or heart failure with mid-range EF (HFmrEF), which now characterizes the majority of the HF cases [1-5]. The differences between the patients with HF with reduced EF (HFrEF) and those with HFpEF are numerous. The latter group are older and more frequently women. There are comorbidities that often accompany heart failure like diabetes, chronic kidney disease, anemia, iron deficiency, chronic obstructive pulmonary disease and obesity [6]. Compared to patients with HFrEF, hospitalizations and poor prognosis in patients with HFpEF are more frequently related to non-cardiovascular causes [6]. For HFrEF there are approved therapies that improve survival, if there are no contraindications or intolerance, while for HFpEF there are still controversies in treatment approaches [6] These approved therapies include ACE inhibitors (ACEi) and angiotensin receptor blockers (ARB), aldosterone antagonists (MRA), and beta-blockers (BB). They are frequently used in combination with diuretics, prescribed for relief of symptoms and signs of congestion.

Materials and Methods

In this retrospective study, 535 patients hospitalized as from January 2010 to December 2014 with a diagnosis of chronic decompensated heart failure are included. The patients were diagnosed upon admission with HF based on signs and symptoms typical for heart failure and were classified in NYHA III / IV functional class. Ejection fraction was determined by echocardiography and those with HF symptoms and signs and ejection fraction ≥ 50% were considered HFpEF patients. HFrEF patients were defined as having symptoms and signs of heart failure and EF<50%. Demographic, clinical and laboratory data including gender, age, echocardiographic left ventricular ejection fraction, blood pressure, heart rate, creatinine and eGFR, potassium and presence of COPD. Medication at hospital discharge was also collected collected from medical files.

Statistics

Descriptive analysis was used for the interpretation of the main characteristics of the sample and of the indicators included in the study. The basis of the analysis is composed of nonparametric tests, such as cross tabulation and chi-square (Chi) when searching for significant differences in the frequency representation of category values. The statistical significance in nonparametric tests was considered when $p \leq 0.05$.

Correlation analysis was used to analyse dependences between the variables. The estimation of the degree of dependence

between the variables was based on the results from the Pearson coefficient (r). It calculated the correlation based on monotonous interrelations. The degree of association between the variables was defined as significant when r>0.5 and high when >0.7 with p≤0.05.

Results & Discussion

When analyzing the mean age of the patients from 2010 until 2014, there was a trend of age increase. For the five years of the study, the mean age was as follows: 70 years (SD 9.9); 70.2 years (SD 11.4); 73 years (SD 9.8); 70.9 years (SD 11.7), and 71.9 years (SD 10.5) (Fig.1). Patients with HFpEF were older than those with reduced EF by 1 year on the average. A predominance of female gender was established among the ones hospitalized for decompensated chronic HF through the years (Fig.2). For the studied period, women comprised 53.6% of all patients. Male gender prevailed among the HFrEF patients and female – among those with HFpEF. On the other hand, the percentage of patients with HFpEF was significantly higher in both genders (Fig. 3). Among men, 52% were with HFpEF and 48% - with HFrEF (t=4.16; p=0.0001). Among women 72% were with HFpEF and 28% - with HFrEF (t=13.24; p=0.0001). The data from the analysis are summarized in Table 1, 2 and 3. The observed tendencies approximate those from current European studies in the field [6, 8].

Table 1: Demographic data of hospitalized patients with heart failure for the period 2010-2014.

Parameters	All
Number	535
Gender (Females)	287 (53.6%)
Mean age	71.2±11
HFpEF	336 (63.2%)
Males with HFpEF	52%
Females with HFpEF	72%
eGFR<30 ml/min/m^2	66 (12.3%)
Chronic kidney disease	138 (25.8%)
Systolic blood pressure (SBP)<100 mm Hg	32 (6%)
Potassium>5.5 mmol/l	17 (3.2%)
Heart rate <60 bpm	15 (2.8%)
COPD	77 (14.4%)
ACEi/ARB %	68.6
BB %	81.5
MRA %	43

Table 2: Medications data of hospitalized patients with heart failure for the period 2010-2014.

Medication	HFpEF	HFrEF
ACEi/ARB %	72.9	61.3
BB %	82.7	79.4
MRA %	37.2	52.8

Table 3. Demographic data of hospitalized patients with heart failure by year 2010-2014.

Year	2010	2011	2012	2013	2014	Total
All pts (n)	100	118	113	103	101	***535***
Age (yrs)	70	70.2	73	70.9	71.9	***71.2***
Females (%)	56	65.3	41.6	53.4	54.5	***53.6***
HFpEF (%)	66	61	61.9	65	62.4	***63.2***

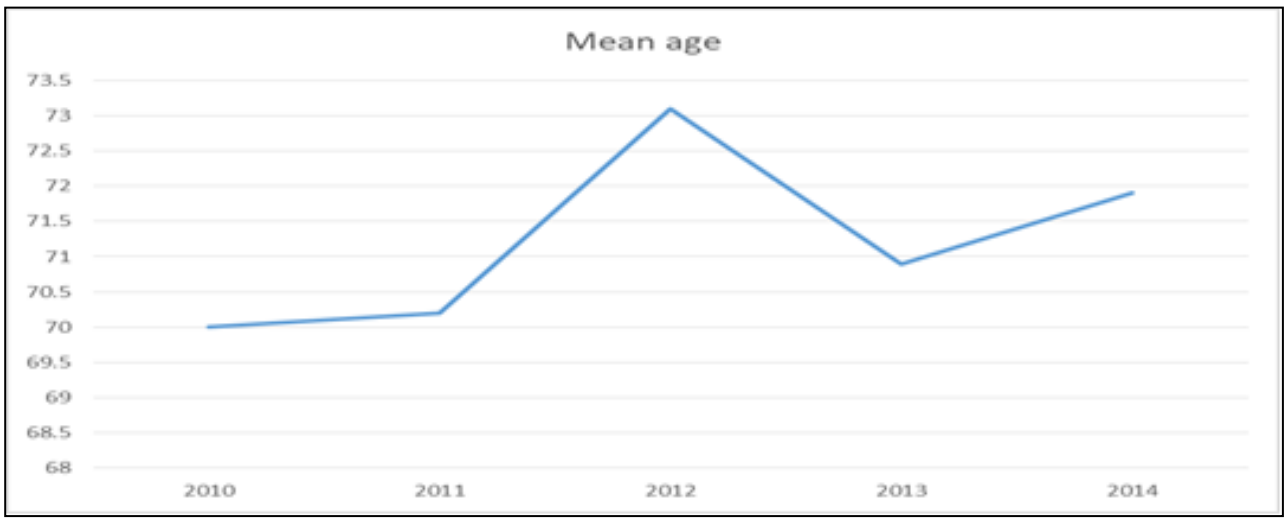

Fig 1: Mean age of hospitalized patients with heart failure 2010-2014

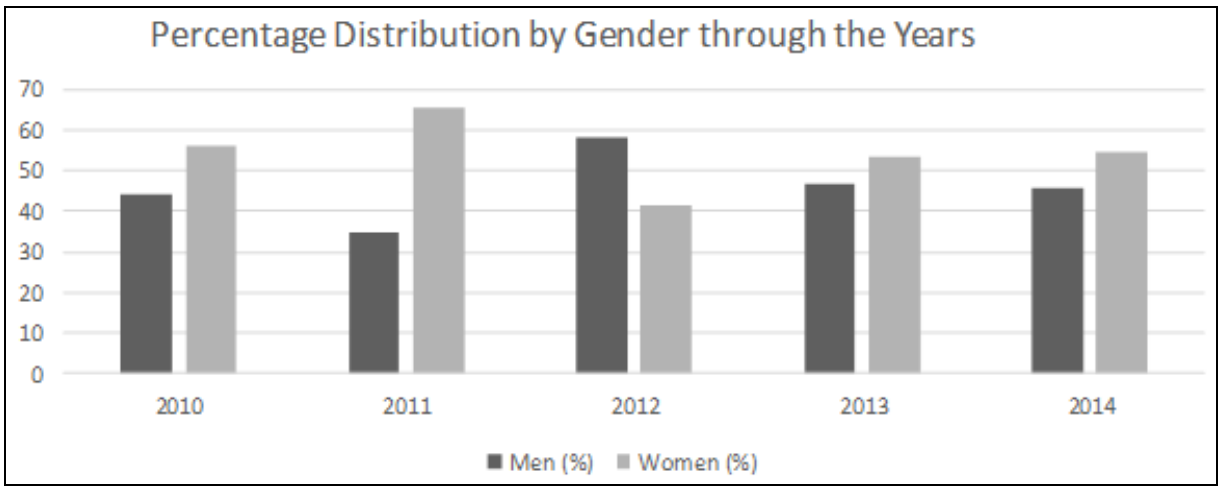

Fig 2: Percentage distribution by gender of hospitalized heart failure patients 2010-2014.

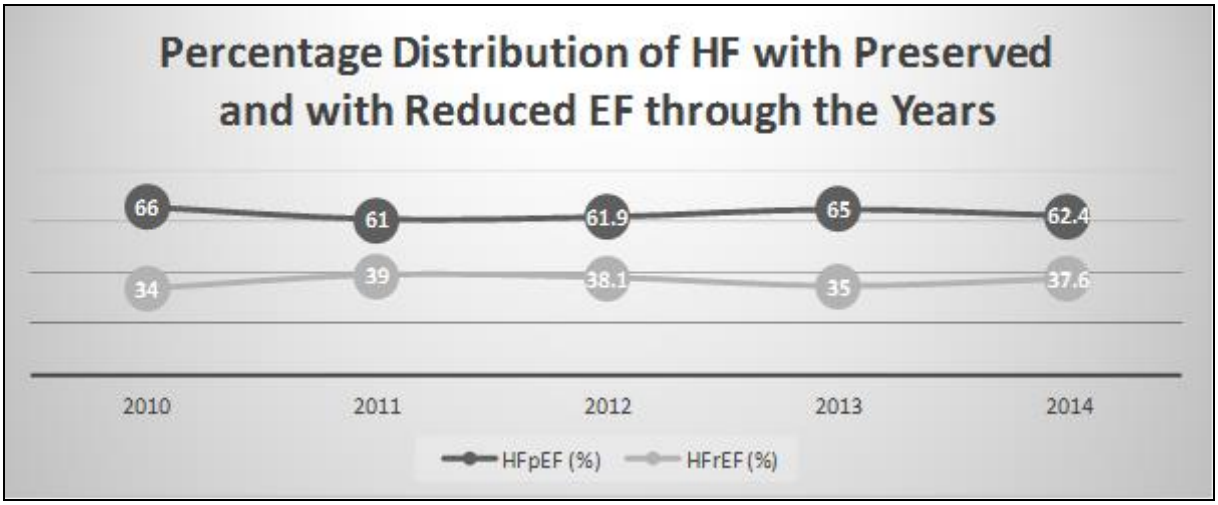

Fig 3: Percentage distribution of hospitalized heart failure patients by ejection fraction 2010-2014.

To establish the adherence to European Society of Cardiology Guidelines for treatment of heart failure patients data for the entire study period were summarized after which the percentage of non-prescription was analyzed year by year and recalculated taking into account contraindications for specific drug prescription.

The total percentage of prescribed RAAS blockers, beta-blockers and mineralocorticoid receptor antagonists for the period 2010-2014 was in 68.6%, 81.5% and 43% of the cases, respectively. Since this therapy is recommended by the guidelines only for HFrEF patients, there the level of prescription of ACEi/ARB, beta-blockers and MRA was 60%, 78.6%, and 52.2%, respectively (i.e. they were not prescribed for the given period in 40%, 21.4%, and 47.8% of the cases, respectively).

The percentage distribution by years of patients who have not received the recommended therapy is summarized in Table 4.

Table 4: Percentage of discharged heart failure patient who have not received the recommended therapy

Year	2010	2011	2012	2013	2014
ACEi/ARB %	52.9	36.2	34.9	36.1	35.9
BB %	32.4	14.9	20.9	16.7	15.4
MRA %	55.9	48.9	39.5	52.8	35.9

Data for potential contraindications of the medications was summarized according to ESC Guidelines for HF and the ACEi/ARB contraindications included severe kidney dysfunction and GFR<30 ml/min/m2, symptomatic systemic hypotension (systolic blood pressure under 100 mmHg) and hyperkalemia (serum potassium over 5.5 mmol/l). Beta-blocker contraindications included bronchial asthma/COPD, bradycardia (heart rate under 60 bpm), symptomatic hypotension (systolic blood pressure under 100 mmHg). The MRA contraindications included hyperkalemia (serum potassium over 5.5 mmol/l, renal dysfunction with GFR<30 ml/min/m2 (Table 5).

Table 5: Contraindications for prescription of medication of discharged heart failure patients 2010-2014.

Medications	Contraindications
ACEi/ARB	Severe renal dysfunction eGFR<30 ml/min/m^2, symptomatic hypotension (systolic blood pressure < 100 mm Hg), hyperkalemia (serum potassium over 5.5 mmol/l)
BB	Asthma/COPD, bradycardia (heart rate <60 bpm), symptomatic hypotension (systolic pressure < 100 mm Hg)
ARB	Hyperkalemia (serum potassium > 5.5 mmol/l), renal dysfunction eGFR<30 ml/min/m2

In some cases, the reasons for non-prescription were exactly these contraindications but in others, reflecting real non-adherence, the reason was non-prescription of the medications without any contraindications. Based on this, the percentages of non-prescription were recalculated taking into account contraindications. The results showed that in the majority of cases, non-prescription was not due to a specific contraindication but to non-adherence to ESC guidelines.

The recalculated percentages providing information about the actual non-adherence to the recommendations according the presence of contraindications (Table 6).

Table 6: Recalculated percentages of non-adherence to the recommendations of the guidelines according presence of contraindications

Year	2010	2011	2012	2013	2014
ACEi/ARB %	47.1	23.4	23.3	16.7	25.6
BB %	23.5	10.6	16.3	16.7	12.8
MRA %	38.2	25.5	20.9	16.7	17.9

The obtained data about the real percentage of non-adherence to ESC guidelines for the main medications in HFrEF (ACEi/ARB, beta-blockers and MRA) for the period 2010-2014 have surpassed data about non-adherence from the European registries [9]. However, when tracking the results by year, a decreasing tendency of non-adherence was observed. A better adherence to treatment recommendations was established with a reverse correlation of the indicators but without reaching a statistically significant level (r=-0.053; p=0.46) (Fig.4).

In the final year 2014, significant adherence to the recommendations of the European Society of Cardiology (ESC) for treatment of heart failure, was achieved - 74.4% for ACEi/ARB, 87.2% for beta-blockers and 82.1% for mineral corticoid receptor antagonists.

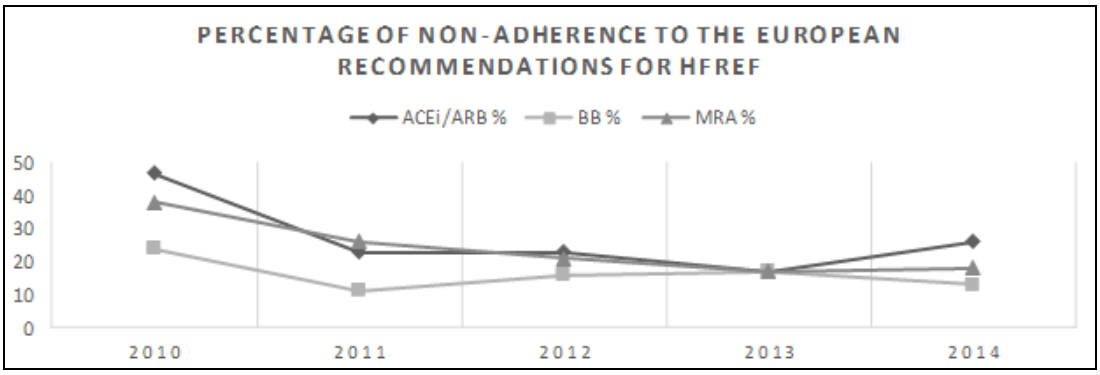

Fig 4: Percentage of non-adherence of the recommendations for HFrEF treatment

Conclusions

Analysis of data from European studies has established that there is a better prognosis for HFrEF even for the last ten years (8). Prior to the 1990s, i.e. before the contemporary treatment period, more than 50% of the patients died within 5 years of establishing the diagnosis and hospitalizations and rehospitalizations were common and lead to an epidemic of HF in many countries (10-12). Efficient treatment has improved both results in Europe with a relative reduction of 30-50% of the number of hospitalizations in the recent years and not as successful, but still significant, reduction of the mortality rate (10-12).

In this study, we have found a trend towards increasing age at hospitalization, increase of female gender and increase of number of patients with HFpEF. There was a considerable gender differences in both hospitalizations of HFrEF and HFrEF. There was a considerable number of patients with contraindications for specific drug categories and at the same time there a tendency towards improvement of adherence to over the years to the recommendations for treatment of heart failure. Data obtained show that the percentage of non-adherence to guidelines is still high compared to that of some European studies.

Of considerable importance for this progress are numerous studies in the field and the adherence to the contemporary guidelines where the current treatment with neurohormonal inhibitors (ACEi/ARB, BB and MRA) plays a key role. The adherence to the guidelines is of utmost importance for the achieved progress and to improve prognosis in heart failure.

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