Epidemiological, Clinical e Therapeutic Profile of Heart Failure in a Tertiary Hospital

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Abstract

Background: Heart failure is a complex syndrome with multiple risk factors involved in its genesis, making its prevention and management difficult to achieve.

Objective: To identify the main etiologies and risk factors in heart failure; to compare clinical and demographic characteristics of patients according to the etiology; analyze whether the treatment is according to that recommended by the Brazilian guidelines.

Methods: Retrospective, descriptive and observational study, carried out at Hospital das Clínicas of Universidade Federal de Goiás. The patients were divided in four groups, according to the etiology, for comparison: chagasic cardiomyopathy, hypertensive cardiomyopathy, dilated cardiomyopathy and others, ischemic cardiomyopathy. The Chi-square and Fisher's Exact tests, ANOVA and Kruskal-Wallis tests were used in the analysis of the groups and types of treatment.

Results: A total of 144 patients' files were analyzed; the patients' mean age was 61 ± 15 years and 54.2% of them were males. Chagasic cardiomyopathy was the main etiology (41%). Arterial hypertension (48.6%), anemia (22.9%), coronary disease (19.4%), dyslipidemia (17.3%) and diabetes (16.6%) were the main risk factors. There was a higher prevalence of female individuals among the hypertensive patients (p=0.044) as well as a higher frequency of pulmonary rales (p<0.01). Heart rate was lower among chagasic patients (p<0.001). The most often prescribed medications were diuretics (81.2%), angiotensin-converting enzyme inhibitors or angiotensin-receptor blockers (77.7%), beta-blockers (45.8%), spironolactone (35.4%), digitalis (30.5%) and vasodilators (8.3%).

Conclusion: Chagasic cardiomyopathy was the main cause of heart failure. No significant clinical differences were observed among patients from the four etiologic groups. (Arq Bras Cardiol 2010; 95(3): 392-398)

Key words: Heart failure/epidemiology/therapy; health profile; hospitalization.

Introduction

Heart failure (HF) can be defined as a complex syndrome, characterized by the failure of the heart and its incapacity to provide an adequate blood supply to cater to the metabolic needs of tissues in the presence of normal filling pressures or being capable of doing it only at high filling pressures[1-5]. It comprises the final common pathway of several diseases, such as systemic arterial hypertension (SAH), diabetes and coronary artery diseases (CAD)[1,6].

Prevalence studies have estimated that 23 million people have HF worldwide and two million new cases are diagnosed each year. The increase in the incidence of HF is related to the therapeutic advances in the treatment of acute myocardial infarction, arterial hypertension and even of HF, which results in longer survival and, consequently, an increase in HF prevalence and hospitalizations due to this syndrome, generating high costs for countries of which elderly population is on the rise. Thus, HF is currently acknowledged as an important public health problem[1,6,7].

According to data from the Brazilian Public Health System Database (DATASUS), there are currently around two million patients with HF in Brazil, with 240,000 new cases being diagnosed each year. Projections indicate that in 2025, Brazil will have the sixth largest elderly population, with approximately 30 million elderly individuals (15% of the total population)[8]. That will result in the increase of HF cases and of the costs related to this syndrome[9].

Multiple risk factors are simultaneously present and precede the onset of HF, which makes it difficult to select the basic cause of the disease and define specific health-planning actions in order to reduce its incidence[7,10]. In spite of the increasing recognition on the importance of HF in our country, epidemiological, clinical and therapeutic data on the disease are still lacking, which makes it difficult to define priorities in order to establish preventive strategies.

The objectives of the present study were to identify the etiology and the most frequent risk factors associated with HF

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Manuscript received November 10, 2009; revised manuscript received February 12, 2010; accepted October 27, 2010.

among patients treated at a reference outpatient clinic in the state of Goiás, Brazil; compare the clinical and demographic characteristics of patients according to the main etiologic groups identified in the sample; to analyze whether the treatment is according to that established by the guidelines for HF management in Brazil.

Methods

Type of study and study setting

The present was a retrospective, descriptive and observational study of patients with HF, treated from January to December 2008 at the Congestive Heart Failure (CHF) Outpatient Clinic of *Hospital das Clínicas of Universidade Federal de Goiás* (UFG). The *Hospital das Clínicas* is regulated by the Brazilian Public Health System (SUS), integrates the public health service system of the state of Goiás and is a tertiary hospital, treating HF patients from all over the state and adjacent areas.

Inclusion and exclusion criteria

The inclusion criteria were: diagnosis of HF with an functional class; patients of both sexes and at any age; patients who had at least one consultation at the Cardiology Outpatient Clinic in 2008. The exclusion criteria were defined as: incomplete medical files, with more than three missing data; files of patients who died in 2008; files of patients with unresolved diagnosis; patients from other states rather than Goiás.

Procedures and data collection

The selection of files was carried out according to the patients' scheduled visits to the HF outpatient clinic and, initially, 215 medical files, from patients treated in the year 2008, were included in the sample. Afterward, the files were requested at the Medical File and Health Information Service (SAMIS). Of the initial sample of 215 files, 71 were excluded due to several reasons (Figure 1) and the final sample consisted of 144 files selected by convenience.

Data collection was carried out through a file that contained information on: patient's age, origin, main diagnosis, associated risk factors, subjective evaluation of dyspnea and functional class, physical examination data (heart rate, systolic blood pressure, diastolic blood pressure, presence or not of pulmonary rales, 3rd sound, edema, jugular swelling), complementary examinations (blood count and echocardiogram) and prescribed medications.

The HF etiologies were grouped in four large groups for the analysis: 1) chagasic cardiomyopathy, 2) hypertensive cardiomyopathy, 3) dilated cardiomyopathy and others, and 4) ischemic cardiomyopathy. The following diagnoses were included in the dilated cardiomyopathy category: congenital cardiopathy, peripartum dilated cardiomyopathy, alcoholic cardiomyopathy, idiopathic dilated cardiomyopathy, hypertrophic cardiomyopathy, restrictive cardiomyopathy and rheumatic cardiomyopathy.

Regarding the therapeutic methods employed for the treatment of HF, the administration of angiotensin-converting enzyme inhibitors (ACEI) or angiotensin-receptor blockers (ARB), digitalis, diuretics, spironolactone, beta-blockers and vasodilators was evaluated.

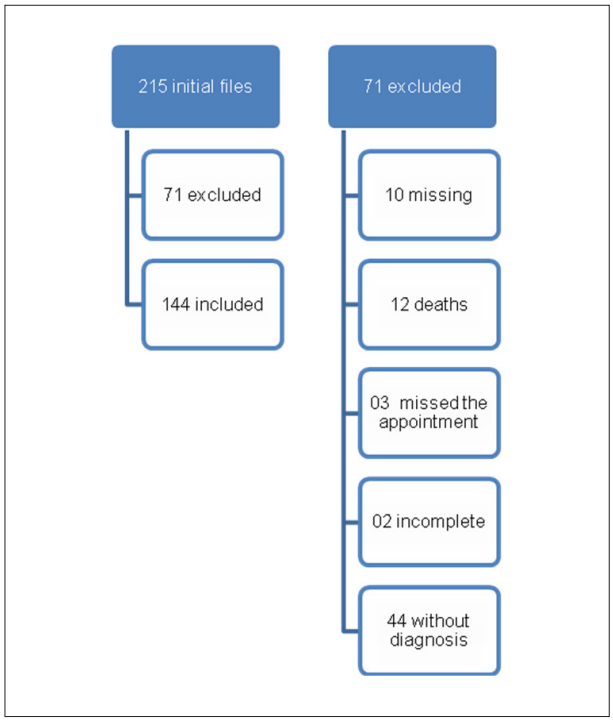

Figure 1 - File selection flowchart.

Statistical analysis

The descriptive statistical analysis of data was carried out using the SPSS (Statistical Package for Social Sciences) software for Windows, release 16.0, with a level of significance set at 5% ($\alpha = 0.05$). A bivariate analysis was carried out to compare the demographic and clinical characteristics of the patients and the types of treatment according to the main HF etiology. The Chi-square test (χ^2) and Fisher's Exact test were used to compare the proportions, according to the number of cases. One-way ANOVA was used for the quantitative variables, followed by Tukey's post-test and Kruskal-Wallis Test, then followed by Dunn's post-test, considering the normality of distribution of data verified through the Kolmogorov-Smirnov test.

Files with up to three missing data that were maintained in the study were not considered at the bivariate analysis, which involved questions of which answers were missing. When dividing the patients in the four categories, according to the main HF etiology, it was verified that the missing data were distributed among these categories and did not present differences at the bivariate analysis that could justify the exclusion of the files from the final sample.

Ethical aspects

The project was approved by the Ethics Committee in Human and Animal Research of *Hospital das Clínicas* of UFG, protocol #039/2009 and the study had no external sources of financial support.

Results

The mean age of the sample was 61 ± 15 years, ranging from 13 to 87 years and 54.2% of the individuals were males. The most frequent etiology was the chagasic cardiomyopathy, which corresponded to 59 cases (41%), followed by idiopathic dilated cardiomyopathy and others (36 cases - 25%), hypertensive cardiomyopathy (32 cases - 22.2%) and ischemic cardiomyopathy (17 cases - 11.8%).

The most frequent risk factors associated to the onset of HF were systemic arterial hypertension (48.6%), anemia (22.9%), coronary artery disease (19.4%), dyslipidemias (17.3%) and diabetes mellitus (16.6%) (Table 1).

Table 2 shows the demographic and clinical characteristics of patients according to the main HF etiology. When these characteristics are compared, no differences are observed, on average, regarding the ejection fraction, functional class (NYHA), diastolic blood pressure, 3rd sound, edema, jugular swelling and anemia. The patients with dilated cardiomyopathy and others had a younger mean age (50.5 ± 18.3) than that of the other categories ($p<0.001$). The female sex presented a higher prevalence of HF due to hypertensive cardiomyopathy ($p=0.044$), whereas a higher prevalence of the male sex was observed in the other three categories. The systolic blood pressure presented higher levels in hypertensive cardiomyopathy ($p=0.001$) and the presence of pulmonary rales was more frequent in the latter etiology ($p=0.01$).

Regarding the therapeutic methods, the most often prescribed medications were: diuretics (81.2%), but spironolactone was indicated for 35.4% of the patients; ACEI or ARB (77.7%) and beta-blockers (45.8%). Digitalis and vasodilators were prescribed to 30.5% and 8.3% of the patients, respectively. Table 3 describes the types of treatment used in HF management, considering the global sample (n=144).

The analysis of the distribution of the treatment types according to the main HF etiology detected differences only in the indication of vasodilators ($p<0.001$), whereas differences were not observed concerning the other classes of medications (diuretics, ACEI or ARB, beta-blockers and digitalis) (Table 4).

Table 1 - General characteristics of patients with heart failure (n = 144)

	n (%)
Age, (mean ± SD)	61.0 ± 15.0
≥ 60 years, n (%)	85 (59.0)
Male sex	78 (54.2)
Etiology	
Chagasic cardiomyopathy	59.0 (41.0)
Dilated cardiomyopathy and others	36 (25.0)
Hypertensive cardiomyopathy	32 (22.2)
Ischemic cardiomyopathy	17 (11.8)
Risk factors	
SAH	70 (48.6)
Anemia	33 (22.9)
CAD	28 (19.4)
Dyslipidemia	25 (17.3)
DM	24 (16.6)
Atrial fibrillation	21 (14.5)
Chronic nephropathy	13 (9.0)
Valvulopathy	12 (8.3)

SAH - systemic arterial hypertension; CAD - coronary artery disease; DM - diabetes mellitus.

Discussion

The incidence of HF and the number of hospital admissions in SUS due to decompensation of this syndrome have increased in recent years and currently, this incidence is considered an important public health problem in Brazil.

Studies on the epidemiological, clinical and therapeutic profiles of patients with HF are scarce in the state of Goiás, which makes it difficult to establish prevention, control and management policies for this syndrome. Its social and economic impact has resulted in the necessity to have further information on these patients' profiles.

According to Framingham[11], the most susceptible age for the onset of HF is > 60 years. In the present study, the mean age of the sample was 61 ± 15 years, ranging from 13 to 87 years, which coincides with Framingham's findings. Regarding the distribution by sex, it was observed that 54.2% of the patients were males, which is in accordance with the data in the study by Rassi et al[12] and Barretto et al[7,13].

The most frequent etiology was chagasic cardiomyopathy (41%), which can be explained by the fact that the Midwest region is considered one of the endemic areas of the disease in Brazil[10,14]. Although the World Health Organization (WHO) has certified the eradication of the vectorial transmission in our country, small endemic foci can still be found in Brazilian territory, resulting from an intense migratory process from rural to urban areas in the last decades. Similar results were obtained by Braga et al[14] in a study that sought to describe the clinical and therapeutic characteristics of HF due to Chagas' disease.

Ischemic cardiomyopathy was the least frequent etiology (17 cases - 11.8%), in contrast with other studies[7,12,14,15] that identified it as the main cause of HF among the patients. The study by Rassi et al[12], which evaluated survival and prognostic factors in systolic HF and was carried out in the state of Goiás, observed a higher frequency of ischemic cardiomyopathy, followed by chagasic cardiomyopathy. This finding might be explained by the fact that these two studies were carried out in different populations. The present study analyzed patients with a non-recent diagnosis of HF, whereas the study by Rassi et al[12] evaluated patients with systolic HF with recent symptom onset.

The analysis of the risk factors demonstrated a significant prevalence of systemic arterial hypertension (48.6%), anemia (22.9%), coronary artery disease (19.4%), dyslipidemias (17.3%) and diabetes mellitus (16.6%), results that corroborate the findings by Lessa[10], Firmida and Mesquita[16], whose conclusion is the presence of a variety of combinations of

Table 2 - Demographic and clinical characteristics of patients according to the main etiology of heart failure

	Chagasic cardiomyopathy	Hypertensive cardiomyopathy	Ischemic cardiomyopathy	Dilated cardiomyopathy and others	p-value
	n (%)	n (%)	n (%)	n (%)	
Number of patients	59 (41.0)	32 (22.2)	17 (11.8)	36 (25.0)	-
Age in years, (mean ± SD)	61.5 ± 11.6[A]	69.7 ± 11.5[A]	65.6 ± 10.2[A]	50.5 ± 18.3[B]	< 0.001*
≥ 60 years	37 (62.7)	25 (78.1)	11 (64.7)	12 (33.3)	0.002**
Male sex	32 (54.2)	11 (34.4)	24 (66.7)	11 (64.7)	0.044**
Ejection fraction in % (mean ± SD)[1]	46.4 ± 14.6	50.5 ± 16.8	39.3 ± 13.8	45.1 ± 15.6	0.121*
< 45%	28 (47.5)	13 (40.6)	11 (64.7)	17 (47.2)	0.563**
≥ 45%	27 (45.8)	17 (53.1)	6 (35.3)	18 (50.0)	
NYHA functional class					
I - II	46 (78.0)	26 (81.3)	33 (94.3)	13 (76.5)	0.350**
III - IV	13 (22.0)	6 (18.8)	2 (5.7)	4 (23.5)	
Systolic BP, mmHg (mean ± SD)	112.6 ± 20.0[A]	127.7 ± 21.5[B]	111.8 ± 22.2[A]	110.0 ± 18.3[A]	0.001***
Diastolic BP, mmHg (mean ± SD)	71.6 ± 9.9	76.0 ± 9.8	70.0 ± 12.2	71.4 ± 9.6	0.073.***
Heart rate, bpm (mean ± SD)	66.5 ± 14.1[A]	74.5 ± 11.7[B]	71.9 ± 11.8[AB]	76.1 ± 15.1[B]	< 0.001***
Pulmonary rales	1 (1.7)	5 (15.6)	0	1 (5.9)	0.01**
3rd sound	2 (3.4)	1 (3.1)	0	0	0.617**
Edema	12 (20.3)[2]	7 (21.9)[2]	5 (13.9)[1]	1 (5.9)[2]	0.469**
Jugular turgency	7 (11.9)[4]	3 (9.4)[5]	6 (16.7)[6]	2 (11.8)[7]	0.922**
Anemia	13 (23.6)[3]	12 (41.4)[2]	5 (15.2)	3 (17.6)[3]	0.091**

*NYHA - New York Heart Association; BP - blood pressure; mmHg - millimeters of mercury; bpm - beats per minute. *ANOVA and Tukey's post-test; ** Chi-square Test and Fisher's Exact Test; ***Kruskal-Wallis Test and Dunn's post-test. [1] One missing data; [2] Two missing data; [3] Four missing data; [4] 20 missing data; [5] 14 missing data; [6] Six missing data; [7] 11 missing data. [A, B, AB] Same letters indicate no significance between the groups.*

Table 3 - Frequency of types of treatment used in heart failure patients (n = 144)

Treatments	n (%)
Diuretics	117 (81.2)
ACEI or ARB	112 (77.7)
Beta-blockers	66 (45.8)
Spironolactone	51 (35.4)
Digitalis	44 (30.5)
Vasodilators	12 (8.3)

ACEI - angiotensin-converting enzyme inhibitor; ARB - angiotensin-receptor blocker.

ischemic disease and hypertension or other concomitant alterations in patients with HF.

Data from the Framingham's study had already shown that SAH and CAD are the main risk factors for the development of HF. In spite of the high prevalence of SAH (48.6%) and CAD (19.4%) in our sample, Chagas' disease was still shown as the main cause of HF.

The impact of the prevalence of anemia (22.9%) on prognosis in the HF patient was a relevant finding found in our series. The studies by Rassi et al[12] and Bacal and Freitas Júnior[17] identified anemia as a long-term predictor for poor prognosis in patients with severe HF, who would then need special attention, as the correction of anemia is associated with clinical and hemodynamic improvement in these patients.

Regarding the dyslipidemia, Bochi et al[18] pointed it out as a risk factor for the onset of HF; therefore, it must be controlled in order to prevent the increase in the incidence of the disease.

The study by Latado et al[15] demonstrated a prevalence of 37.5% of diabetes mellitus (DM) in patients with HF, as well as a positive association with the ischemic etiology. When analyzing this study, it can be observed that the prevalence of DM (16.6%) was less significant, which can explain the lower occurrence of ischemic cardiomyopathy[19].

Atrial fibrillation (14.5%), chronic nephropathy (9.0%) and valvulopathies (8.3%) have also been pointed out as risk factors for HF in the present study, although at lower levels. Regarding the atrial fibrillation (11.96%) and kidney failure (9.08%), similar results were observed by Barreto et al[7], who observed that such conditions contributed to a higher need for hospitalization and increase in mortality among elderly patients with HF[20,21].

The existence of valvulopathy in only 8.3% of the sample might be explained by its early identification, which allows its surgical correction and consequent non-progression of the disease.

Table 4 - Distribution of types of treatment according to the main etiology of heart failure

	Chagasic cardiomyopathy (n = 59)	Hypertensive cardiomyopathy (n = 32)	Ischemic cardiomyopathy (n = 17)	Dilated cardiomyopathy and others (n = 36)	p-value*
	n (%)	n (%)	n (%)	n (%)	
Diuretics	48 (81.4)	27 (84.4)	13 (76.5)	29 (80.5)	0.925
ACEI or ARB	45 (76.3)	27 (84.4)	14 (72.2)	26 (82.4)	0.630
Beta-blockers	33 (55.9)	11 (34.4)	9 (52.9)	13 (36.1)	0.120
Spironolactone	23 (39.0)	11 (34.4)	2 (11.8)	15 (41.7)	0.164
Digitalis	13 (22.0)	10 (31.2)	4 (23.5)	17 (42.5)	0.068
Vasodilators	2 (3.4)	3 (9.4)	6 (35.3)	1 (2.8)	<0.001

*ACEI - angiotensin-converting enzyme inhibitor; ARB - angiotensin-receptor blocker * Chi-square Test and Fisher Exact Test.*

The analysis of the demographic and clinical characteristics of the patients according to the main HF etiology demonstrated an age difference between the groups (p<0.001), with a younger mean age being observed in the dilated cardiomyopathy group, considering that the causes of this type of HF more often affects individuals at the intermediate age range of 20 to 60 years[7]. As for the chagasic, hypertensive and ischemic cardiomyopathy, they tend to appear with the progression of the underlying disease, which occurs at more advanced ages. This fact is also due to the improvement in the treatment of these diseases that has taken place in the last decades.

In the present study, the prevalence of HF was higher in the male sex for the chagasic, ischemic and dilated etiologies, differing only in the hypertensive etiology. This finding is in agreement with those by Levy et al[22] who, when investigating the association between HF and hypertension, concluded that the latter was more prevalent in the female sex and is associated with a two-fold higher risk and a three-fold higher risk for the development of HF in the male and female groups, respectively.

The predominance of HF with age increase in women has been demonstrated by several studies[23-25] and is probably related to the loss of the protective cardiovascular effect after menopause.

In the hypertensive cardiomyopathy group, the levels of systolic blood pressure were higher than those in the other groups (p=0.001) due to the inherent physiopathology of this etiology. When comparing the heart rate (HR), it was observed that chagasic patients presented lower HR than those in the hypertensive and dilated etiology groups (p<0.001), probably due to the sinus dysfunction, which is more common in the group of chagasic patients. The patients with ischemic cardiomyopathy showed no differences when compared to the other three groups.

The analysis of the groups showed differences regarding the presence of pulmonary rales at auscultation (p<0.01); however, in the group with hypertensive etiology, pulmonary congestion was more frequent (15.6%) than among patients with dilated cardiomyopathy (5.9%), chagasic (1.7%) and ischemic etiologies, probably due to worse diastolic dysfunction.

Regarding the presence of edema and jugular swelling, it is worth mentioning that these data were missing from 4.9% and 35.4% of the analyzed files, respectively. A study carried out by Rassi et al[12] demonstrated that the jugular swelling was associated to an increase in cardiovascular mortality and thus, should not be disregarded at the physical examination.

There were no recent blood count results in 6.9% of the files that could inform on the presence of anemia, which can be explained by the lack of personal or the family's initiative to provide it, due to the long interval between consultations.

The main guidelines for the management of HF[1,8,19,26] recommend, as the classic treatment, the sue of diuretics, ACEI or ARB and beta-blockers, but the etiology of HF and its intensity seem to influence the prescription of these drugs[13].

In the present study, the most often prescribed medications were: diuretics (81.2%), but spironolactone was indicated for 35.4% of the patients, ACEI or ARB (77.7%) and beta-blockers (45.8%), whereas digitalis and vasodilators were prescribed to 30.5% and 8.3% of the patients, respectively. These findings are in agreement with the results of several studies[13,14,27] and with the recommendations of the guidelines[1,8,18] for the treatment of HF in Brazil.

The increasing use of beta-blockers in clinical practice can be explained by the beneficial results on the morbimortality in patients with mild to moderate symptomatic stable HF, as verified by several studies (MERIT-HF, CIBIS-II, COPERNICUS)[28].

The prescription of digitalis at a lower proportion was an interesting finding of this study, considering that the ischemic etiology was the least frequent in our sample. According to the studies by Barretto et al[13] and Benerjee and Campbell[29], digitalis is less indicated for patients with this type of cardiomyopathy due to evidence that these medications might not be beneficial in patients with myocardial ischemia.

The analysis of the treatment of the patients by HF etiology did not detect any significant differences regarding the indication of diuretics (among them, spironolactone), ACEI or ARB, beta-blockers and digitalis.

In spite of the lack of significance, the use of beta-blockers was indicated in 55.9% of the chagasic patients, which is different from the study by Braga et al[14], in which these medications were used less frequently, mainly at moderate to high doses, due to the lower levels of systolic blood pressure and heart rate observed in patients with chagasic cardiomyopathy.

The analysis of the doses in the present sample showed that beta-blockers were prescribed at moderate to high doses only to 10.2% of the patients. A randomized study with carvedilol in chagasic patients (2004) verified good tolerability, functional improvement and significant gain in ejection fraction. The aforementioned medication was then recommended for this group at optimized doses[30].

ACEI and diuretics (among them spironolactone) were prescribed at higher frequencies to all etiologies, in accordance with the evidence that the associated administration of these medications reduces mortality and the need for hospitalization in patients with HF, in addition to providing significant relief of the peripheral and systemic congestive symptoms. The ARB were indicated for 20.8% of the patients in cases of intolerance to ACEI, with coughing being the main complaint.

The finding of higher-frequency ACEI prescription coincides with the study by Barretto et al[14], in which most of the patients with ventricular dysfunction of different etiologies (ischemic, dilated cardiomyopathy, Chagas' disease and hypertensive cardiomyopathy) were treated with this type of medication (87%).

The vasodilators, when analyzed in general, were the least frequently prescribed drugs (8.3%). Of the randomized studies carried out on HF and the effectiveness of vasodilators (*V*-HeFTI, *V*-HeFTII, FIRST, PROFILE)[28], only the *V*-HeFTI study demonstrated a decrease in mortality; thus, its indication in HF does not bring great benefits.

However, the analysis per etiology of the present study showed that the only class of medication that presented significance among the groups ($p<0.001$) was the vasodilators. Such medications were employed more frequently in patients with ischemic (35.3%) and hypertensive (9.4%) cardiomyopathy, due to the benefits described by studies (angina symptom reduction and blood pressure control)[28].

We conclude that chagasic cardiomyopathy is the main cause of HF in patients treated at a tertiary hospital in Goiania, state of Goiás, Brazil; the most common risk factors were SAH, anemia, CAD, dyslipidemias and diabetes mellitus.

The patients' mean age was younger in the group of patients with dilated cardiomyopathy. The male sex was more prevalent in almost all groups, except in the hypertensive cardiomyopathy group.

At the physical examination, no significant differences were observed among patients with different causes of HF, except the chagasic patients, who presented lower heart rate and the hypertensive patients, who presented higher systolic blood pressure levels. As for the types of treatment, diuretics, ACEI or ARB and beta-blockers were the most often prescribed types of medication, followed by digitalis and vasodilators.

The results of the present study can help in the creation of policies directed at HF prevention, aiming at reducing its incidence and the management of the diagnosed cases, allowing better treatment and care of higher-risk groups, such as hypertensive and ischemic cardiopathy patients, with the objective of decreasing the number of hospitalizations, surgeries, mortality rate and, in general, costs related to this syndrome.

Further studies are necessary to confirm the prevalence findings obtained in the present study, as well as randomized clinical trials to test whether the therapeutic options used in HF, as a whole, apply to patients with hypertensive and chagasic cardiomyopathy.

Potential Conflict of Interest

No potential conflict of interest relevant to this article was reported.

Sources of Funding

There were no external funding sources for this study.

Study Association

This article is part of the thesis of master submitted by Patrícia Resende Nogueira, from *Universidade Federal de Goiás*.

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