

Clinical and Demographic Profile and Quality Indicators for Heart Failure in a Rural Area

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Abstract

Background: data on heart failure (HF) in Brazil are ensued from tertiary centers. This information can not be extended to the rural population, for it reflects distinct social, economic and cultural characteristics.

Objective: To establish the clinical and demographic profile and quality indicators for HF in rural areas.

Methods: Transversal cohort study that included 166 patients from the rural area of Valença, Rio de Janeiro, Brazil. After the evaluation of clinical, laboratorial and echocardiograph data, chi-square and Fisher's exact tests were used for analysis of proportion, as well as the Student's t-test for numeric variables, in order to establish the population's characteristics.

Results: Mean age was 61 ± 14 years old, as 85 of them (51%) were men, 88 (53%) were afro-Brazilian and 85 (51%) had heart failure with reduced ejection fraction (HFREF). Systemic arterial hypertension (151 patients, 91%) and metabolic syndrome (103 patients, 62%) were prevalent comorbidities. The most common etiologies were: hypertensive (77 patients, 46%) and ischemic (62 patients, 37%). Quality indicators in HF were: 43 patients (26%) with previous echocardiogram, 102 patients (62%) were in use of beta-blockers, 147 patients (88%) received angiotensin converter enzyme inhibitor (ACEI) or angiotensin receptor blockers (ARB), and 22% of the patients with atrial fibrillation (AF) were under treatment with oral anticoagulation. For heart failure with normal ejection fraction (HFNEF), females ($p=0.001$; OD: 0.32; CI=0.17-0.60), metabolic syndrome ($p=0.004$; OD: 0.28; CI=1.31-4.78) and hypertensive etiology ($p<0.0001$; OD: 6.83; CI=3.45-13.5) were predominant. For HFREF, males ($p=0.001$; OD: 0.32; CI=0.170-0.605) and ischemic etiology ($p<0.0001$; OD: 0.16; CI=0.079-0.330) were predominant.

Conclusion: In rural areas, HF shows similarity with regard to sex, ethnicity and classification. Hypertensive etiology was the most commonly present. HFNEF was prevalent among women and in the presence of metabolic syndrome, while HFREF was associated with males and ischemic etiology. (Arq Bras Cardiol 2009; 93(6):637-642)

Key Words: Heart failure; health profile; quality indicators, health care; rural population.

Introduction

The first publication on cardiac insufficiency in Brazilian rural areas dates from 1909, when Dr. Carlos Ribeiro Justiniano das Chagas (also known as Carlos Chagas) published his discovery¹, later on called Chagas' Disease. Before the centenary of this valuable publication, many articles on heart failure (HF) in rural areas continue to be published only about Chagas' cardiopathy²⁻⁴.

Studies on heart failure (HF) have been directed by intra-hospital assessments in cases of decompensate heart failure (HF), through Datasus database, and in specialty

ambulatories of institutions of great Brazilian metropolises^{5,6}. These data can not be extended to the rural areas, for populations have very distinct demographic characteristics, food and cultural habits, type of occupations and access to medical assistance.

International studies carried out at hospitals of rural areas demonstrated a poor access of the population to medical assistance, bad hospital and therapeutics quality, as well as a poor access to basic exams for HF, such as echocardiogram⁷⁻⁹. In addition, these studies have shown that, according to hospitalization index, patients presented not only bad life quality, but also low life expectancy in comparison to those of the urban area. It may be partially explained by the isolation, the lack of means of transportation, the distance and even by other comorbidities⁹.

In a two-year follow-up cohort from Brazil, Campos Lopes et al¹⁰ have shown that, in this group of patients, precarious

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Manuscript received October 30, 2008; revised manuscript received
December 5, 2008; accepted on May 6, 2009.

socioeconomic conditions, a common characteristic in rural areas, were the major mortality predictor.

Valença borough is located in the South region of Rio de Janeiro State, a non-endemic zone for Chagas' disease. The biggest part of its territory is rural and presents an estimated population (2006 data) in 70,375 inhabitants. It comprises a great territorial area (1,305 km²), considered as the second biggest city in expansion of the State, with low demographic density (53.9 inhab/km²).

In 2006, cattle raising represented approximately 4.2% of the borough's internal raw material, while in the capital of the State, this activity did not reach 1%. In 2001, the average monthly income of Valença's population was estimated in R\$ 500.25, while in Rio de Janeiro city this value reached R\$ 1,083.88¹¹.

By assessing data of Health Ministry¹² concerning the period that comprises 2000 to 2006, Balheiro et al. shown that hospitalization and mortality due to HF rates in Valença was proportionally higher than the rate found in national territory¹³.

This paper aims at describing clinical and demographic characteristics as well as studying the quality indicators of patients with HF from the rural area of Valença.

Methods

A transversal study was carried out on 166 patients that were prospectively and consecutively included, after being referred to the ambulatory of HF in the period from October 2006 to May 2008. Inclusion criteria were: age >18 years old, Boston criteria with values >7 for HF diagnosis, and residence in the rural area.

According to the Brazilian Institute for Geography and Statistics (IBGE, acronym in Portuguese), rural area is defined as the area that is external to the urban perimeter (as urban area, on the other hand, is characterized by buildings, streets and intense human habitation). Patients who lived in rural agglomerates of urban extension, that is, localized at least 1 km distant from and in contiguity with the area of a city or village which is officially urbanized, were also considered as inhabitants of rural areas. Such areas consist of simple extension of the effectively urbanized area with inhabited lots, agglomerates of habitations considered subnormal or groups developed around industrial, commercial or service establishments¹¹.

The group was assessed in the moment of admittance to the HF ambulatory. All patients went through medical consultation, fulfilled a clinical questionnaire of assessment and were submitted to blood exams (complete hemogram, glucose, urea, creatinine, uric acid, sodium, potassium, and lipid profile), urine, electrocardiogram, thoracic radiograph and bidimensional transthoracic echocardiography with color Doppler. Patients who presented dilated ventricle in the echocardiography, showed no evidence for ischemia and were from endemic areas for Chagas disease, or had been to endemic locations, were submitted to serology for Chagas' disease diagnosis.

The following variables were considered: sex, self-declared ethnicity, etiology of heart failure, history of coronary artery disease (CAD), atrial fibrillation (AF), systemic arterial hypertension (SAH), diabetes mellitus (DM), smoking, functional class of New York Heart Association (NYHA), chronic renal insufficiency (CRI), heart failure with normal ejection fraction (HFNEF) and heart failure with reduced ejection fraction (HFREF).

Patients who presented previous invasive coronary intervention, history of infarction with electrocardiograph alterations, any positive test for ischemia or cineangiography with lesion superior to 50% of obstruction in any artery were considered patients with CAD. Systolic blood pressure ≥ 140 mmHg, diastolic blood pressure ≥ 110 mmHg, or patients normal systolic and diastolic blood pressure under treatment with antihypertensive medicines were considered patients with SAH. DM was defined as the fast glucose result higher than 126 mg/dl. Patients under substitutive dialysis and those who presented serum creatinine ≥ 1.5 mg/dl were considered patients with CRI.

To determine CINEF and CIREF, the minimum percentage for the ejection fraction of the left ventricle was 50%¹⁴.

The study protocol was approved by the Ethics Committee of the institution and all patients signed the informed consent.

In the statistical analysis, chi-square and Fisher's exact tests were used for analysis of proportion, and Student's t-test for numeric variables. Values of $p < 0.05$ were considered significant. The statistical software SPSS 11.0 was employed.

Results

From October 2006 to May 2008, 166 patients were included in the study after being referred to HF ambulatory. General characteristics of population are described in Table 1. Mean age was 61 ± 14 years old and there were 85 (51%) male patients. There were 78 (47%) non-afro-Brazilian self-declared patients, and HFREF was found in 81 (49%) patients.

Among risk factors, SAH was predominant in 151 (91%) patients, and metabolic syndrome in 103 (62%) patients.

Hypertensive etiology was detected in 77 (46%) patients, a superior rate in relation to ischemic etiology, detected in 62 (37%) patients, followed by rheumatic valvulopathy in 14 (8%) patients, idiopathic dilated cardiomyopathy in 10 (6%) patients, alcoholic in 2 (1%) and hypertrophic in 1 patient (1%).

Overweight and obesity were present in 103 (62%) patients, but there was a low rate for malnutrition, present in only 3 (2%) patients.

Quality indicators for HF at patients' admittance in the ambulatory are presented in Table 2. Only 43 patients (26%) had previous transthoracic echocardiogram with color Doppler (1 year before entry). The biggest part of the patients (101, 61%) referred to the ambulatory had already been hospitalized in the past last year for decompensation of cardiac insufficiency. Beta-blocker was being administered in 102 (62%) patients, and only 22% of the patients with atrial

Table 1 – General characteristics of the studied population (n=166)

Demographic data	
Age (years)	61±14
Sex – n (%)	
Male	85 (51%)
Female	81 (49%)
Color – n (%)	
Other ethnicities	78 (47%)
Afro-Brazilians	88 (53%)
Heart failure classification – n (%)	
HFNEF	81 (49%)
HFREF	85 (51%)
Risk factors – n (%)	
Smoking	70 (42%)
Diabetes mellitus	51 (31%)
Previous CAD	68 (41%)
SAH	150 (91%)
Metabolic syndrome	103 (62%)
Atrial fibrillation	37 (22%)
CRI	22 (13%)
NYHA – n (%)	
I	58 (35%)
II	56 (34%)
III	48 (29%)
IV	4 (2%)
Etiology – n (%)	
Hypertensive	77 (46%)
Ischemic	62 (37%)
Rheumatic valvulopathy	14 (8%)
Idiopathic	10 (6%)
Others	3 (2%)
Clinical characteristics	
B3	31 (19%)
B4	39 (23%)
MMII edema	50 (30%)
Jugular turgency	25 (15%)
PND	48 (29%)
BMI kg/m ² – n (%)	
<18	3 (2%)
18 – 25	60 (36%)
25 – 30	58 (35%)
>30	45 (27%)

HFNEF - heart failure with normal ejection fraction; HFREF - heart failure with reduced ejection fraction; CAD - coronary artery disease; SAH - systemic arterial hypertension; IRC - chronic renal insufficiency; BMI - body mass index; PND - paroxysmal nocturnal dyspnea; MMII edema - inferior members edema; NYHA - New York Heart Association.

fibrillation were under treatment with anticoagulation at the time of admittance.

Forty seven patients (28%) were under treatment with diagoxine, 83 (50%) with furosemide, 42 (25%) with tiazidic. On the other hand, 105 (63%) patients were under treatment with acetylsalicylic acid, 82 (49%) were using statins, 43 (26%) were using calcium channel blockers, and 3 patients were in use of nitrate associated with hydralazim.

When assessing complementary exams, the following characteristics were found: in the echocardiogram, mean and standard deviation of the left atrium diameter was 44.5±8 mm. Diastolic diameter of the left ventricle was 58±10 mm, while its systolic diameter was 43±12 mm. Ejection fraction of left ventricle resulted 49±17%, and the interventricular septum was 10,9±2 mm. In the conventional electrocardiogram, 37 patients (22%) presented atrial fibrillation, 28 (17%) had left bundle branch block with QRS higher than 120 ms, while there were 12 (7%) patients with right bundle branch block with QRS higher than 120 ms. Among studied patients, 113 (68%) presented some pattern of left ventricular hypertrophy. After studying the differences between CINEF and CIREF in this sample, we observed that the following variables did not present significant differences between groups: age, self-declared ethnicity, SAH, AF, CRI, DM, NYHA classification, MMII edema, paroxysmal nocturnal dyspnea (PND) and jugular turgency.

In HFNEF cases, the predominant characteristics were: females (p= 0.001; OD: 0.32; CI= 0.17-0.60); metabolic syndrome (p= 0.004; OD: 0.28; CI= 1.31-4.78), hypertensive etiology (p<0.0001; OD: 6.83; CI= 3.45-13.5) and obesity (p= 0.011; OD: 2.4; CI= 1.19-4.89) (Table 3).

In HFREF cases, the predominant characteristics were: males (p= 0.001; OD: 0.32; CI=0.170-0.605); CAD (p< 0.0001; OD: 0.28; CI= 0.147-0.545); ischemic etiology (p< 0.0001; OD: 0.16; CI= 0.079-0.330), and normal body mass index (BMI) (p< 0.0001; OD: 0.20, CI= 0.101-0.417) (Table 3).

When differences between males and females were analyzed, variables such as age, self-declared color, SAH, AF, CRI, DM, previous CAD, NYHA classification, MMII or B4 no significant differences were found.

Among males, smoking (p< 0.0001; OD: 3.45; CI= 1,815-6,670), ischemic etiology (p= 0.015; OD: 2.13; CI=

Table 2 – Indicadores de qualidade assistencial na cardiac insuficiency

First consultation	n (%)
LV function assessment rate	43 (26%)
ACEI usage rate	128 (77%)
ARB usage rate	19 (11%)
Beta blocker usage rate	102 (62%)
Oral anticoagulation usage in AF rate	22%

LV - left ventricle; ACEI - Angiotensin converter enzyme inhibitor; ARB - Angiotensin receptor blocker II; AF - atrial fibrillation

1,122-4,073), B3 ($p= 0.032$; OD: 2.33; CI= 1,021-4,073), jugular turgency ($p= 0.05$; OD: 2.28; CI= 0,925-5,627), paroxysmal nocturnal dyspnea (PND) ($p= 0.021$; OD: 2.16; CI=1,080-4,324) and obesity ($p= 0.011$; OD: 0.41; CI= 0,205-0,845) were common occurrences.

Among females, there was a higher prevalence of metabolic syndrome ($p= 0.004$; OD: 0.40; CI= 0,209-0,765); hypertensive etiology ($p= 0.007$; OD: 0,437; CI= 0,234-0,815) and relevant obesity according to BMI ($p= 0.011$; OD: 0.416; CI= 0,205-0,845).

Discussion

This pioneer study on clinical and demographic profile of patients with heart failure from rural areas identified similar prevalence for CINEF e CIREF, as well as an elevated occurrence of metabolic syndrome and SAH.

Mean age of the studied population was 61 years old, which is below that observed in Framingham Heart Study¹⁵ (65 years old) or by Jaarsma et al¹⁶ (71 years old). Roger et al¹⁷, studying patients from USA communities, found a mean age of 74 years old, a value that is similar to those found in some national studies, such as EPICA (Niterói, RJ, Brazil), in which mean age was 60 years old⁶.

The similar distribution among men and women with HF in the present study was also observed in EPICA study⁶ – Niteroi (Rio de Janeiro); however, the majority

of national and international studies show prevalence for males^{5,15,18}.

Males were predominantly carriers of HFREF, while HFNEF was prevalent in females. Ischemic etiology in a bigger proportion was also observed in HFREF cases, a result that corresponds to those found by Villacorta et al¹⁹.

When assessing patients' admittance data, a good usage of angiotensin converter enzyme inhibitor (ACEI) (77%) and angiotensin receptor blocker (ARB) (11%) was observed, as well as beta-blockers (62%) and oral anticoagulation (22%) usage rate under recommendations for patients with atrial fibrillation. Inferior medical therapeutics – with under-usage of angiotensin converter enzyme inhibitor and beta-blockers – were found by Ansari et al²⁰, who compared such medication in rural and urban areas.

As observed in international studies^{8,9} on HF in rural areas, a under-usage of echocardiogram in the admittance to the ambulatory was also found.

A great difference was found with regard to cardiac insufficiency etiology. National studies, such as those performed by Barreto et al⁵ and Bocchi et al²¹ showed a higher prevalence of ischemic etiology (33 and 34%, respectively), while hypertensive etiology was present in 7 and 13% of the patients, respectively. This study showed predominance for hypertensive etiology (46%) versus ischemic etiology (37%).

Table 3 – Differences between patients with CINEF and patients with CIREF

	CINEF n=81	CIREF n=85	p-value	OD	CI
Age (years)	59±15	62±12	0.16		
Males – n (%)	30 (37%)	55 (65%)	0.001	0.321	0.170 – 0.605
Smoking – n (%)	28 (35%)	42 (49%)	0.05	0.541	0.290 – 1.001
Previous CAD – n (%)	21 (26%)	47 (55%)	<0.0001	0.283	0.147 – 0.545
Metabolic syndrome – n (%)	59 (73%)	44 (52%)	0.004	2.499	1.306 – 4.780
Etiology – n (%)					
Hypertensive	56 (69%)	21 (25%)	<0.0001	6.827	3.451 – 13.503
Ischemic	14 (17%)	48 (56%)	<0.0001	0.161	0.079 – 0.330
Clinical characteristics					
B3	9 (11%)	24 (28%)	0.005	0.318	0.137 – 0.735
B4	25 (31%)	14 (16%)	0.022	2.264	1.078 – 4.755
BMI kg/m ² – n (%)					
18 -25	20 (24%)	40 (47%)	<0.0001	0.205	0.101 – 0.417
25 – 30	31 (38%)	27 (32%)	0.237	1.332	0.702 – 2.525
>30	29 (36%)	16 (19%)	0.011	2.405	1.184 – 4.885

CAD - coronary artery disease; BMI - body mass index; CINEF - cardiac insufficiency with normal ejection fraction; CIREF - cardiac insufficiency with reduced ejection fraction; OD - odds ratio, CI - confidence interval

The relation between metabolic syndrome and HF, found mainly among females in this study, is similar to the studies of Balieiro et al²², who analyzed cardiac insufficiency and metabolic syndrome in rural area, and to that found by Coelho et al²³, who studied cardiac insufficiency and metabolic syndrome in patients referred from primary medical care.

Discrepant data, such as the high prevalence of hypertensive etiology, low usage of beta-blockers and basic exams, such as echocardiogram, showed a necessity of further researches on this subject, in order to study HF in distinct areas. This is a duty of great importance for the creation of regional attention protocols and for the reduction of morbi-mortality and socioeconomic impacts caused by this disease.

Conclusion

In patients from rural areas, data homogeneity with regard to sex, ethnicity and HF syndrome for cardiac function was observed.

The most widely present etiology was the hypertensive, followed by ischemic and valvulopathy.

Among risk factors, hypertension and metabolic syndrome were predominant.

HFNEF was prevalent in females and in patients with metabolic syndrome. HFREF, on the other hand, was associated with smoking, CAD and males.

Among females there was a higher prevalence of metabolic syndrome and hypertensive etiology and, among males, the main etiology found was ischemic. Males also presented a higher rate for smoking.

In patients from rural areas, we observed a usage below that recommended for beta-blockers, as well as for anticoagulation substances in atrial fibrillation cases, and reference to echocardiogram.

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 Henrique Miller Balieiro, from Universidade Federal Fluminense e Faculdade de Medicina de Valença.

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