Brief Report

The Prevalence of Stages of Heart Failure in Primary Care: A Population-Based Study

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ABSTRACT

Background: Planning strategies to prevent heart failure (HF) in developing countries require epidemiologic data in primary care. The purpose of this study was to estimate the prevalence of HF stages and their phenotypes, HF with preserved ejection fraction (HFPEF), and HF with reduced EF (HFREF) and to determine B-type natriuretic peptide (BNP) levels to identify HF in the adult population.

Methods and Results: This is a cross-sectional study including 633 individuals, aged ≥45 years, who were randomly selected and registered in a primary care program of a medium-sized city in Brazil. All participants were underwent clinical evaluations, BNP measurements, electrocardiograms, and tissue Doppler echocardiography in a single day. The participants were classified as stage 0 (healthy, 11.7%), stage A (risk factors, 36.6%), stage B (structural abnormalities, 42.7%), or stage C (symptomatic HF, 9.3%). Among patients with HF, 59% presented with HFPEF and 41% presented with HFREF. The mean BNP levels were 20 pg/mL^{-1} in stage 0, 20 pg/mL^{-1} in stage A, 24 pg/mL^{-1} in stage B, 93 pg/mL^{-1} in HFPEF, and 266 pg/mL^{-1} in HFREF. The cutoff BNP level with optimal sensitivity (92%) and specificity (91%) to identify HF was 42 pg/mL^{-1}.

Conclusion: The present study demonstrated a high prevalence of individuals at risk for HF and the predominance of HFPEF in a primary care setting. The clinical examination, along with BNP and tissue Doppler echocardiography, may facilitate early detection of stages A and B HF and allow implementation of interventions aimed at preventing progression to symptomatic HF. (*J Cardiac Fail 2016;22:153–157*)

Key Words: Epidemiology, Prevalence, Heart failure, Echocardiography, Natriuretic peptides.

The Latin American population has heterogeneous risk factors for heart failure (HF). Compared with citizens of developed countries, Latin Americans present with a lower risk of diabetes, obesity, smoking, and aging, whereas they have higher rates of hypertension, rheumatic fever, and Chagas disease. Inefficient public policies are responsible for aggravating this scenario.[1] HF is considered to be epidemic and has great impacts on the costs associated with hospitalization and early retirement.[2]

The strategies for the diagnosis and prevention of HF in primary care settings are from data obtained in secondary care settings and tertiary hospitals.[3] Neither the prevalence of patients at risk of developing HF stage A or B nor that of patients at risk of developing the symptomatic forms (stages C and D) is known at the community level in Brazil and Latin America. This knowledge is fundamental for planning prevention strategies for the health care system.[1]

This study aimed to estimate the prevalence of HF, its different stages and forms—HF with preserved ejection fraction (HFPEF) and reduced EF (HFREF). We also aimed to estimate the best B-type natriuretic peptide (BNP) cutoff point to identify HF in adults aged ≥45 years receiving primary care in Brazil.

Methods

This cross-sectional study included 633 individuals, randomly selected, aged 45–99 years, registered in the Primary Care Program of Niteroi city, an urban medium-sized town

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with 487,562 inhabitants in Rio de Janeiro State, Brazil. The data were collected from July 2011 to December 2012. Details are described in a previous paper.[4]

Participants underwent a single-day evaluation consisted of: (1) anamnesis and clinical examinations; (2) laboratory tests, including BNP; (3) 12-lead electrocardiogram; and (4) tissue Doppler echocardiography (TDE). The physicians were blinded from the clinical status and examination results. The examinations were performed according to the recommendations of the quantification of chambers from the American Society of Echocardiography and the European Association of Echocardiography.[5] The systolic function was assessed by measuring the left ventricular EF (LVEF) by Simpson's method.

The HF stage (A, B, C, and D) definitions were based on the guidelines of the American College of Cardiology Foundation/American Heart Association[6]; and stage 0 consisted of asymptomatic subjects without major risk factors for HF (obesity, hypertension, diabetes, and coronary atherosclerotic disease) and without cardiac structural or functional abnormalities.

Diagnosis of HFREF was confirmed in individuals with a history of HF or the presence of signs or symptoms of HF and LVEF < 50%.[7] HFPEF diagnosis was confirmed in individuals with a history of HF or signs or symptoms of HF with LVEF ≥ 50% and an end-diastolic volume index EDV-I < 97 mL/m^{-2} in the presence of diastolic dysfunction of the left ventricle.

Statistical analysis was performed with SPSS software version 21.0 (Chicago, Illinois). Continuous variables are expressed as mean ± standard deviation and between-group differences were compared using Student's *t* test. Categorical variables were summarized as percentages and analyzed using the chi-square test (Pearson, Fisher's exact test, or linear-by-linear association test if necessary). The receiver operating characteristic curve was used for identifying the best BNP cutoff point for the diagnosis of HF. The level of statistical significance was 5%.

The study protocol was approved by the Ethics Committee of the institution. All subjects signed the consent form.

Results

The study included 633 individuals (59.6 ± 10.4 years; 62% female) that completed clinical and laboratory evaluations. Stage 0 included 11.7% of the study population. They were younger than individuals in other stages. Stage A represented 36.3% of participants, and hypertension was the most prevalent risk factor. Stage B was the most prevalent stage. In stage B, the main structural and functional abnormalities were as follows: left ventricular hypertrophy (TDE); diastolic dysfunction; and left ventricular hypertrophy by electrocardiogram (Table 1).

The HFPEF prevalence was higher than the HFREF prevalence (59% vs 41%). Regarding gender, HFPEF was more frequent in females (6.6% vs 3.7%) and HFREF was more frequent in males (5.7% vs 2.5%) ($P = .012$). Patients with HFPEF were older, more obese, and had a higher proportion of hypertension and diabetes than those with HFREF (Table 2).

BNP levels were not different between the asymptomatic stages ($P = .09$), but there was a significant difference in stage C ($P < .0001$). The area under the receiver operating characteristic curve (Fig. 1) for BNP detection of symptomatic HF was 0.95 (95% confidence interval, 0.925–0.983; $P < .0001$). A cutoff value of BNP = 42 pg/mL^{-1} had a sensitivity of 92%, specificity 91%, accuracy 91%, positive predictive value 50%, negative predictive value 99%, and a likelihood ratio for a positive test identifying HF of 9.91.

Discussion

The present study is the first in Brazil and Latin America in a primary care setting. Our results show a high prevalence (79%) of individuals ≥45 years of age at risk for HF (stages A and B). Among the 9.3% of cases with symptomatic HF, there was a predominance of the HFPEF phenotype (59%).

The results disclose that the high rate of major risk factors for HF in the study population, which are associated with accelerated aging processes in developing countries, could indicate an epidemic growth of new HF cases in the near future. The paucity of data on the prevalence of HF in the general population impairs a precise evaluation of the real impact of HF in similar populations and in public health systems.[6] This study found an exponential increase in the prevalence of HF in people older than 60 years of age, with a higher prevalence of the HFPEF phenotype. The same pattern was observed in other studies performed in primary care settings of developed countries.[8–10]

Compared with the study by Ammar et al[9] in the community of Olmsted County including people ≥45 years of age, our data presented some interesting differences. We found a lower prevalence of stage 0 (11.7% vs 31.5%) and a higher prevalence of people at risk for HF stages A and B (79% vs 56.5%). We also observed fewer cases of HF stage C (9.3% vs 12%). In our study, major risk factors had a higher prevalence when compared with the Ammar study, such as hypertension (58% vs 29%), diabetes (25% vs 8%), coronary heart disease (17% vs 9%), and obesity (33% vs 30%). These differences could be explained by the multiethnicity and socioeconomic aspects of the studied population. For example, in the Ammar study, 81% of the study population was white, compared with 37% in our study.

Some studies showed that LV hypertrophy and cardiac dysfunction (stage B) play an important role in the progression and prognosis of HF.[9,11] The Multi-Ethnic Study of Atherosclerosis[12] found that people with LV dilation and normal LVEF have a high risk for HF and that people with LV dilation and reduced LVEF had a worse prognosis when compared with people with normal LV and LVEF. These results reinforce the importance of the identification of stage B. The present study showed that individuals in stage B