



Sex-specific temporal trends in the incidence and prevalence of hospitalized patients with preserved versus reduced left ventricular ejection fraction heart failure: A Japanese community-wide study



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ABSTRACT

Background: Sex specific temporal trends in the incidence and prevalence of hospitalization for heart failure (HF), particularly in conjunction with reduced and preserved left ventricular ejection fraction (EF) remain unclear, especially in Asian general populations.

Methods: We conducted a community based HF registration study over a 10 year period in an aging cohort of the Japanese general population.

Results: A total of 2598 cases of hospitalized HF were registered during the survey period. Of these 1413 cases (55%) were initial admissions for HF (incident case). The study period was divided into five 2-year terms (T1, 2003–2004; T2, 2005–2006; T3, 2007–2008; T4, 2009–2010; T5, 2011–2012), and data were compared among the terms. Age adjusted incidence of HF (per 10⁵ person-year) remained stable in men, but decreased significantly by 25% in women (from 104 at T1 to 79 at T5; *p* for trend <0.05). Among incident cases who underwent echocardiography (≈90%), the proportion of HF with preserved EF increased in men (from 32% at T1 to 43% at T5; *p* for trend <0.05), and was relatively high and remained stable throughout the study period in women (from 52% at T1 to 58% at T5; *p* for trend; NS).

Conclusion: Although the incidence of HF has declined especially in women between 2003 and 2012 in the study population, the proportion of HF with preserved EF has increased over time. These trends suggest a future prevalence of HF with preserved EF rather than HF with reduced EF in aging Asian populations.

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1. Introduction

It has been recognized that heart failure (HF) is a growing public health problem in industrialized nations with aging populations [1–3]. Although many reports have described the incidence and hospitalization rates for HF in various districts and countries mainly in North America and Europe [4–9], population based studies about recent temporal trends in HF incidence in terms of subtypes with reduced ejection fraction (HF reduced-EF) or preserved ejection fraction (HF preserved-EF) are very limited, especially in Asian countries.

Among elderly population, the proportion of HF preserved-EF within overall HF is higher in women than in men [10–14], whereas HF

reduced-EF is more common in men than in women. There may be some differences between the genders in terms of the etiology and prevalence of structural heart disease underlying HF. In fact, the Framingham heart study has reported a significantly lower prevalence of coronary artery disease in women compared to men among patients with HF [12]. Moreover, other underlying risk factors for HF such as valvular heart disease, hypertension and diabetes are more common in women than in men [12]. It may therefore be important to elucidate sex specific differences in the incidence and prevalence of HF according to ejection fraction and how these differences may have changed over time.

However, few sex specific population based studies have examined temporal changes in the incidence (initial admission for HF) and prevalence (initial or recurrent admission for HF) of hospitalized HF in relation to subtypes of left ventricular dysfunction. Owan et al. have studied the number of admissions for HF in Mayo clinic hospitals from 1986 to 2002, and described an increase in the prevalence of HF

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preserved-EF relative to HF reduced-EF over this period [11]. However, this previous study did not indicate whether temporal trends were similar in both sexes or whether temporal trends in incidence paralleled those for prevalence. Steinberg et al. have reported that the percentage of HF preserved-EF among voluntary based patients with HF increased gradually by approximately 5% during a 5 year study period [15]. However, this study may have included an inherent selection bias for HF patients, and also did not attempt any sex specific analysis of temporal trends of HF according to left ventricular function subtypes.

We have therefore performed a prospective population based registration study for hospitalized HF with the specific aim of defining temporal trends in the incidence of HF in the northern part of Iwate, Japan, over a 10 year period. We also investigated whether changes in the incidence and prevalence of HF preserved-EF and HF reduced-EF differed between men and women.

2. Methods

2.1. Study population

The study area comprised the districts of Ninohe and Kuji, a rural area situated in the northern part of Iwate prefecture, Honshu, Japan (Fig. 1). The population of this region decreased gradually from 135,395 in 2003 to 119,597 in 2012. However, the proportion of elderly (aged ≥ 65 years) increased from 26% in 2003 to 31% in 2012. The number of elderly women was 1.5 times higher than that of men. This area

has a low migration rate with a relatively stable population (i.e. in 2010, 93 elderly persons moved into the area and 151 moved out).

2.2. Case registration

The study area had only six general hospitals (Ninohe, Ichinohe, Karumai, Ibonai, Hirono, and Kuji hospitals) and no other medical providers in the area had cardiology admission facilities. Patients with decompensated HF were mostly admitted to the two hospitals (Ninohe and Kuji) which had fulltime attending cardiologists. The other 4 branch hospitals were usually not equipped to perform specialized tests and provide intensive care for overt HF. For these hospitals, part-time cardiologists from the major two hospitals visited regularly to provide cardiac examination such as 2-dimensional transthoracic echocardiographic (TTE) and medical advice to attending internists. Other medical facilities including local general practitioners in the study area did not provide care for symptomatic patients with HF on a regular basis. Thus, the above 6 general hospitals were selected for prospective registration. In addition, the registration study was extended to include 5 teaching hospitals located in remote urban areas such as Morioka city and Hachinohe city to capture patients who may have directly visited medical centers located outside of the study area (Fig. 1). During the 10 year study period, the study team of cardiologists and trained research nurses regularly retrieved and reviewed medical charts and/or discharge summaries for nearly all patients admitted to the cardiology and internal medicine wards at each of these 11 hospitals. Patients



Fig. 1. Study area. Black zone indicates the northern part of Iwate prefecture.

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