SUPPLEMENTAL MATERIALS

Supplemental Methods

Echocardiographic exams

Echocardiography was performed according to contemporary guidelines (1), with current echocardiography machines. Briefly, from the standard parasternal view, left ventricular (LV) internal diameters and wall thickness were measured, and LV mass was calculated using the American Society of Echocardiography method (2). Simpson's biplane method was used to calculate LV ejection fraction (LV-EF). Early and late mitral inflow velocities were acquired at the tip level of the mitral valve from the apical 4-chamber view. Tissue Doppler velocities were obtained at the medial side of the mitral annulus. Relative wall thickness (RWT) of the LV was calculated by the equation as follows: (2 × posterior wall thickness)/LV end-diastole diameter. LV hypertrophy (LVH) was defined as LV mass indexed to body surface area greater than 115 g/m² in men, and 95 g/m² in women, and was further categorized as concentric LVH if RWT >0.42 and eccentric LVH if RWT ≤0.42 (1).

References

1.   Lang RM, Badano LP, Mor-Avi V, et al. Recommendations for cardiac chamber quantification by echocardiography in adults: an update from the American Society of Echocardiography and the European Association of Cardiovascular Imaging. J Am Soc Echocardiogr 2015;28:1-39.

2.   Seo HY, Lee SP, Park JB, et al. Discrepancies in Left Ventricular Mass Calculation Based on Echocardiography and Cardiovascular Magnetic Resonance Measurements in Patients with Left Ventricular Hypertrophy. J Am Soc Echocardiogr 2015;28:1194-1203.

Supplemental Tables

Table S1. Baseline characteristics of the study participants according to sex.

	Men (N=2,218)	Women (N=1,962)	P-value
Age, year	71.0 (60.0-78.0)	76.0 (68.0-82.0)	<0.001
BMI, kg/m²	23.2 (20.9-25.6)	22.8 (20.2-25.7)	0.005
SBP, mmHg	123 (109-142)	127 (110-145)	0.003
DBP, mmHg	72.0 (62.0-83.0)	71.0 (62.0-82.0)	0.819
Heart rate, bpm	85 (71-102)	86 (70-103)	0.609
NYHA class, n (%)			0.647
I/II	132 (8.7)	102 (6.6)	
III	824 (54.8)	729 (54.4)	
IV	549 (36.5)	510 (38.0)	
Past medical history, n (%)			
Diabetes mellitus	792 (35.7)	639 (32.6)	0.036
Hypertension	1200 (54.1)	1195 (60.9)	<0.001
IHD	805 (36.3)	549 (28.0)	<0.001
Atrial fibrillation	631 (28.4)	599 (30.5)	0.187
Laboratory findings			
TC, mg/dL	146 (120-175)	154 (128-187)	<0.001
Hemoglobin, g/L	13.0 (11.0-14.4)	11.6 (10.2-13.0)	<0.001
Sodium, mmol/L	138 (134-140)	138 (134-140)	0.546
Potassium, mmol/L	4.2 (3.8-4.6)	4.1 (3.7-4.6)	0.003
Troponin I, ng/mL	0.1 (0.0-1.9)	0.1 (0.0-0.8)	<0.001

AST, IU/L	27.0 (19.0-43.0)	26.0 (19.0-40.0)	0.006
ALT, IU/L	22.0 (13.0-38.0)	18.0 (11.0-30.0)	<0.001
BUN, mg/dL	22.0 (16.0-32.0)	20.0 (15.0-30.0)	<0.001
Creatinine, mg/dL	1.2 (0.9-1.7)	0.9 (0.7-1.4)	<0.001
GFR, mL/min/1.73m^2	62.2 (39.9-83.3)	59.6 (37.1-81.9)	0.032
HbA1c, %*	6.2 (5.7-7.1)	6.1 (5.7-7.0)	0.333
Presentation glucose level, mg/dL	127 (103-172)	129 (104-172)	0.645
NT-proBNP, pg/mL	4339 (1702-10416)	4970 (1825-12396)	0.020
Medication, n (%)			
Beta blockers	1349 (60.8)	1202 (61.3)	0.992
RAS blockers	1543 (69.6)	1314 (67.0)	0.028
Spironolactone	978 (44.1)	899 (45.8)	0.394
Diuretics	1568 (70.7)	1475 (75.2)	0.006
Statin	1211 (54.6)	1024 (52.2)	0.034
Echocardiographic parameters			
LVEDD, mm	55.5 (50.0-62.0)	50.0 (44.8-55.6)	<0.001
LVESD, mm	44.0 (36.0-52.0)	36.0 (29.0-44.0)	<0.001
LVEDV, mL	130 (96-175)	88 (63-121)	<0.001
LVESV, mL	85 (52-126)	48 (28-82)	<0.001
LV-EF, %	34.2 (25.0-48.8)	44.7 (31.0-57.4)	<0.001
HFpEF, n (%)	514 (23.2)	783 (39.9)	<0.001
LA diameter, mm	45.0 (39.3-51.5)	43.3 (38.0-49.5)	<0.001
LA volume, mL	84 (62-115)	82 (59-113)	0.064
LAVI, mL/m^2	48.9 (36.4-67.0)	54.8 (39.4-74.6)	<0.001

E wave, m/s	0.8 (0.6-1.1)	0.9 (0.6-1.1)	<0.001
A wave, m/s	0.7 (0.5-0.9)	0.8 (0.6-1.0)	<0.001
Deceleration time, s	158 (125-205)	169 (135-227)	<0.001
E/e' ratio	15.7 (11.0-22.4)	17.3 (12.5-24.0)	<0.001
Septum, mm	10.2 (9.0-12.0)	10.0 (9.0-11.2)	<0.001
Posterior wall, mm	10.0 (9.0-11.5)	10.0 (9.0-11.0)	<0.001
LVMI, g/m²	133 (107-162)	123 (100-150)	<0.001
RWT	0.4 (0.3-0.4)	0.4 (0.3-0.5)	<0.001
LVH, n (%)	1308 (59.0)	1379 (70.3)	<0.001
LVH type, n(%)			<0.001
Concentric LVH	390 (29.8)	562 (40.8)	
Eccentric LVH	918 (70.2)	817 (59.2)	
LV-GLS, %	9.6 (6.5-13.3)	10.9 (7.7-14.9)	<0.001
RV FAC, %	37.0 (25.0-47.4)	39.2 (28.0-50.0)	<0.001

Values given as number (percentage), or median (interquartile range) unless otherwise indicated.

*HbA1c data was available in 42.3% patients.

ALT=alanine aminotransferase; AST=aspartate aminotransferase; BMI=body mass index; BUN=blood urea nitrogen; DBP=diastolic blood pressure; DM=diabetes mellitus; GFR=glomerular filtration rate; HbA1c=glycated hemoglobin; HFpEF, heart failure with preserved ejection fraction; IHD=ischemic heart disease; LA, left atrium; LAVI, LA volume index; LV, left ventricle; LVEDD, LV end-diastolic diameter; LVEDV, LV end-diastolic volume; LV-EF, LV ejection fraction; LVESD, LV end-systolic diameter; LVESV, LV end-systolic volume; LV-GLS, LV global longitudinal strain; LVH, LV hypertrophy; LVMI, LV

mass index; NT-proBNP=N-terminal pro-brain natriuretic peptide; NYHA=New York Heart Association; RAS=renin-angiotensin system; RV-FAC, right ventricle fractional area change; RWT, relative wall thickness; SBP=systolic blood pressure; TC=total cholesterol.

Table S2. The statistical fit of structural equation models in the current study.

	SEM in men	SEM in women	Standard criteria
CFI	1.000	0.986	>0.90
RMSEA	0.000	0.033	<0.08
SRMSR	0.003	0.013	<0.06

CFI, comparative fit index; RMSEA, root mean square error of approximation; SEM, structural equation modeling; SRMSR, standardized root mean square residual.

Supplemental Figures Legends

Figure S1. Path diagrams of relationship between presentation glucose level, left ventricular global longitudinal strain or ischemic heart disease, and mortality according to sex

Diagrams of the structural equation model in men (A) and in women (B). Standardized path coefficients are shown indicated on each path as effect estimate. Solid lines denote significant paths and dashed lines denote non-significant paths. The 5-year mortality data were used in this model.

IHD=ischemic heart disease; LV-GLS=left ventricular global longitudinal strain

*P-value <0.05, **P-value <0.001

Figure S2. Correlation between presentation glucose level and HbA1c level.

Scatter plots of presentation glucose level and HbA1c value in men (A) and women (B). Each dot indicates an individual patient's data. Linear regression line (solid line) and 95% confidence interval (shade area) is depicted. Presentation glucose level had moderate correlation with HbA1c value in both sexes. (Pearson's correlation coefficient (r)=0.55, p<0.001 for men; r=0.45, p<0.001 for women)
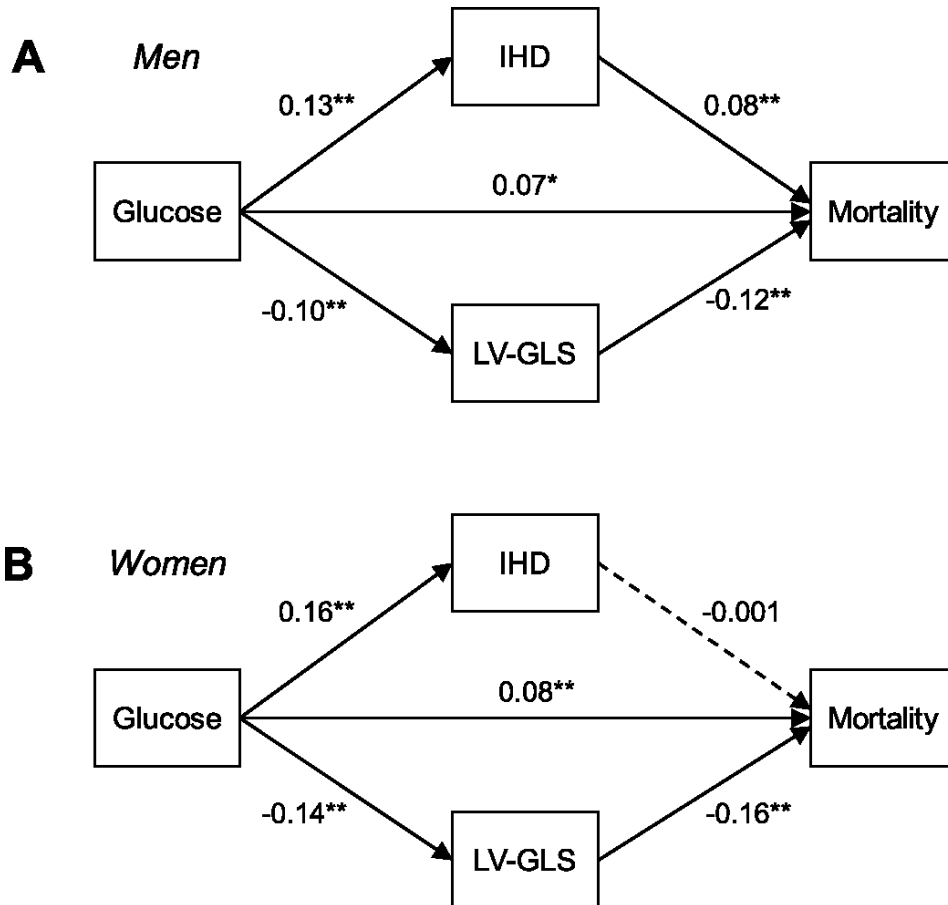
Supplemental Figures

Figure S1

Figure S2