

**Table 1: Baseline characteristics in the controls and patients with chronic heart failure who did and did not experience the primary outcome within 1 year after study inclusion**

	CONTROLS	ALL CHF	<i>p</i> or $\chi^2$	CHF, death or acute HF or emergent heart transplant or assist device within 1 year		<i>p</i> or $\chi^2$ value
				Yes	No	
	n=39	n=104		n=29	n=68	
<b>Clinical characteristics</b>						
Age, (years)	50±15	57±11	0.06	62±11	56±11	0.11
Male, n (%)	21(54)	83(80)	0.005	36(82)	47(78)	0.66
Body Mass Index (kg·m <sup>-2</sup> )	25±5	26±5	0.88	26±6	26±4	0.7
History of hypertension	-	37(36)		9(21)	28(47)	0.006
Diabetes, n (%)	-	22(21)		9(21)	13(22)	0.88
Hypercholesterolaemia, n (%)	-	56(54)		22(50)	34(57)	0.72
Systolic blood pressure, (mmHg)	137±16	104±22	0.0001	108±23	107±21	0.98
Diastolic blood pressure, (mmHg)	74±10	63±14	0.09	66±4	64±15	0.82
Heart rate, (beats·min <sup>-1</sup> )	68±11	74±14	0.14	77±12	71±15	0.13
NYHA 3-4 vs. 1-2, n (%)	0	85(82)	0.0001	39(89)	46(77)	0.12
Ischemic heart disease, n (%)	0	45(43)	0.0001	20(46)	25(42)	0.7
<b>Laboratory tests</b>						
Haemoglobin, (g/dL)	13.4±0.6	13.6±1.7	0.99	13.4±2.0	13.9±1.7	0.67
Creatinine, (micromol/L)	82±22	118±51	0.0001	128±27	110±61	0.08
BNP, (pg·ml <sup>-1</sup> )	18±14	373±539	0.0001	660±662	213±412	<0.0001
<b>Treatment</b>						
Beta-blockers, n (%)	-	95(91)		39(89)	56(93)	0.4
ACE inhibitors, n (%)	-	87(84)		38(86)	49(82)	0.52
AR inhibitors, n (%)	-	20(19)		8(12)	12(20)	0.82
Diuretics, n (%)	-	90(87)		41(93)	49(82)	0.21
Aldosterone antagonist, n (%)	-	64(62)		27(61)	37(62)	0.98

CHF: chronic heart failure; NYHA: New York Heart Association; BNP: brain natriuretic peptide; VO<sub>2</sub>max: maximal oxygen uptake; VE/VCO<sub>2</sub>: lowest minute ventilation (VE) and carbon dioxide production (VCO<sub>2</sub>); ACE: angiotensin-converting enzyme; AR inhibitors: angiotensin receptor inhibitors.

**Table 2: Baseline echocardiographic features in the controls and patients with chronic heart failure who did and did not experience the primary outcome within 1 year after study inclusion**

	CONTROLS	ALL CHF	<i>p</i>	CHF, death or acute HF or emergent heart transplant or assist device within 1 year		<i>p</i> value
				Yes	No	
	n=39	n=104		29	68	
<b>LV variables</b>						
LVEF (%)	59±9	28±8	0.0001	23±8	30±7	<0.001
Em (cm·s <sup>-1</sup> )	70±16	85±32	0.14	95±26	72±34	0.001
Am (cm·s <sup>-1</sup> )	75±21	55±28	0.002	35±36	57±25	0.146
Em/Am	1.0±0.3	1.3±1.5	0.010	2.8±1.5	1.1±1.4	0.021
LVEDD <sub>ind</sub> (mm·m <sup>2</sup> )	25±4	37±6	0.0001	38±6	37±6	0.44
E wave deceleration time (ms)	228±39	144±79	0.001	117±57	158±85	0.008
Lateral S <sub>a</sub> (cm·s <sup>-1</sup> )	10.8±2.4	5.0±1.9	0.0001	4.6±1.6	5.3±2.0	0.063
Lateral E <sub>a</sub> (cm·s <sup>-1</sup> )	10.6±3.9	5.7±2.8	0.0001	6.0±3.4	5.5±2.5	0.349
Lateral A <sub>a</sub> (cm·s <sup>-1</sup> )	11.4±1.3	5.1±2.6	0.0001	5.5±3.5	5.0±2.1	0.018
Septal S <sub>a</sub> (cm·s <sup>-1</sup> )	8.7±1.0	4.0±1.9	0.0001	3.7±1.3	4.4±1.9	0.049
Septal E <sub>a</sub> (cm·s <sup>-1</sup> )	7.5±2.4	4.2±2.2	0.0001	5.0±2.5	4.3±2.2	0.863
Septal A <sub>a</sub> (cm·s <sup>-1</sup> )	10.8±1.7	5.1±2.5	0.0001	3.6±2.5	5.8±2.4	0.004
S <sub>a</sub> mean (cm·s <sup>-1</sup> )	9.1±1.5	4.4±1.6	0.0001	4.1±1.2	5.0±1.7	0.019
Em/Ea	7±5	14±10	0.0001	18±11	13±9	0.05
<b>RV variables</b>						
TAPSE (mm)	25±4	15±5	0.0001	13±4	17±5	0.001
S <sub>a<sub>t</sub></sub> (cm·s <sup>-1</sup> )	14.0±1.9	9.0±2.8	0.0001	7.5±2.2	10.0±2.8	0.0001
E <sub>a<sub>t</sub></sub> (cm·s <sup>-1</sup> )	12.0±3.0	7.0±3.5	0.0001	7.7±3.7	6.9±3.4	0.75
A <sub>a<sub>t</sub></sub> (cm·s <sup>-1</sup> )	14.0±3.2	9.7±4.0	0.0001	8.5±4.6	10.1±3.5	0.08
E <sub>a<sub>t</sub></sub> /A <sub>a<sub>t</sub></sub>	0.8±0.3	0.7±0.8	0.17	0.9±0.8	0.7±0.8	0.10

The data are median±standard deviation.

CHF: chronic heart failure; LVEF: left ventricular ejection fraction; Em, Am: early and late transmitral diastolic peak flow velocity, respectively; Sa, Ea, Aa: peak acceleration of annular velocity of S, E, and A wave, respectively, in lateral or septal position; LVEDD<sub>ind</sub>: left ventricular end diastolic diameter index to body surface area; TAPSE: tricuspid annular plane systolic excursion; Sa<sub>t</sub>, Ea<sub>t</sub>, Aa<sub>t</sub>: tricuspid annular peak velocity.

**Table 3: Comparison of baseline segmental systolic strain and strain rate in the controls and patients with chronic heart failure who did and did not experience the primary endpoint within 1 year after study inclusion**

	CONTROL	ALL CHF	<i>p</i>	CHF, death or acute HF or emergent heart transplant or assist device within 1 year		<i>p</i> value
				Yes	No	
<b>N</b>	<b>39</b>	<b>104</b>		<b>29</b>	<b>68</b>	
<b>LV 2D-strain , (%)</b>						
<b>Lateral wall segments</b>						
Basal	-20.2±6.9	-8.5±6.2	0.0001	-8.2±5.9	-8.3±6.3	0.204
Middle	-17.4±5.7	-5.8±4.7	0.0001	-4.8±4.8	-7.3±4.7	0.086
Apical	-19.4±7.3	-9.3±5.7	0.0001	-10.2±4.0	-9.5±6.3	0.824
<b>Mean</b>	<b>-20.3±5.1</b>	<b>-7.3±4.3</b>	0.0001	<b>-6.6±3.6</b>	<b>-8.0±4.5</b>	<b>0.044</b>
<b>Septal wall segments</b>						
Basal	-16.9±3.3	-8.8±4.8	0.0001	-7.5±4.0	-9.8±5.0	0.071
Middle	-19.8±3.5	-10.2±5.4	0.0001	-8.7±6.1	-10.8±5.0	0.159
Apical	-24.4±3.6	-10.2±8.0	0.0001	-9.9±6.2	-11.0±8.7	0.427
<b>Mean</b>	<b>-20.5±2.3</b>	<b>-10.0±4.8</b>	0.0001	<b>-8.6±4.9</b>	<b>-10.9±4.6</b>	<b>0.039</b>
<b>Mean 4C Strain</b>	<b>-19.8±2.8</b>	<b>-8.7±3.7</b>	0.0001	<b>-8.4±3.2</b>	<b>-9.5±3.7</b>	<b>0.04</b>
<b>LV 2D-strain rate, per 0.1 s<sup>-1</sup></b>						
<b>Lateral wall segments</b>						
Basal	-1.6±0.6	-0.9±0.5	0.0001	-0.8±0.4	-1.0±0.5	0.336
Middle	-1.1±0.4	-0.5±0.3	0.0001	-0.5±0.3	-0.6±0.3	0.223
Apical	-1.3±0.5	-0.7±0.4	0.0001	-0.7±0.2	-0.8±0.4	0.172
<b>Mean</b>	<b>-1.36±0.39</b>	<b>-0.77±0.30</b>	<b>0.0001</b>	<b>-0.7±0.2</b>	<b>-0.9±0.3</b>	<b>0.087</b>
<b>Septal wall segments</b>						
Basal	-1.0±0.3	-0.8±0.4	0.0001	-0.7±0.4	-0.8±0.3	0.925
Middle	-1.1±0.2	-0.7±0.3	0.0001	-0.6±0.3	-0.7±0.3	0.153
Apical	-1.4±0.3	-0.8±0.4	0.0001	-0.7±0.3	-0.9±0.4	0.097
<b>Mean</b>	<b>-1.23±0.23</b>	<b>-0.73±0.27</b>	0.0001	<b>-0.7±0.3</b>	<b>-0.8±0.2</b>	<b>0.044</b>
<b>Mean 4C Strain</b>	<b>-1.35±0.24</b>	<b>-0.72±0.23</b>	0.0001	<b>-0.7±0.2</b>	<b>-0.8±0.2</b>	<b>0.024</b>
<b>RV 2D-strain, (%)</b>						
<b>Lateral wall segments</b>						
Basal	-33.4±8.5	-23.5±8.7	0.0001	-18.5±7.5	-24.3±9.0	0.01
Middle	-31.0±7.1	-21.1±8.2	0.0001	-16.7±7.0	-22.9±8.4	0.003
Apical	-26.3±8.3	-15.3±9.3	0.0001	-12.8±8.3	-18.8±8.7	0.004
<b>Mean</b>	<b>-29.5±5.5</b>	<b>-19.1±7.7</b>	0.0001	<b>-15.7±6.3</b>	<b>-21.3±7.9</b>	<b>0.01</b>
<b>RV 2D-strain rate, per 0.1 s<sup>-1</sup></b>						
<b>Lateral wall segments</b>						
Basal	-2.79±0.75	-1.72±0.66	0.0001	-1.6±0.7	-1.8±0.7	0.40
Middle	-2.12±0.45	-1.42±0.51	0.0001	-1.4±0.5	-1.5±0.5	0.077
Apical	-1.67±0.5	-1.21±0.51	0.0001	-1.1±0.4	-1.3±0.5	0.095
<b>Mean</b>	<b>-2.11±0.4</b>	<b>-1.44±0.44</b>	0.0001	<b>-1.4±0.4</b>	<b>-1.5±0.4</b>	<b>0.18</b>

Data are median±standard deviation. CHF: chronic heart failure; HF, heart failure; 4C, four-chamber

**Table 4. Univariate analysis of variables associated with the primary outcome in the group of patients with chronic heart failure**

Variables	Wald $\chi$ -squared	<i>p</i>	Hazard Ratio	95%CI
History of hypertension	6.81	0.009	2.48	1.25-4.91
Log BNP, (pg·ml <sup>-1</sup> )	23.5	0.0001	6.08	2.93-12.6
LVEF (%)	19.8	0.0001	0.91	0.88-0.95
LV mean 4C strain, (%)	6.52	0.011	1.14	1.03-1.25
LV mean 4C strain rate, (%)	4.04	0.044	6.72	1.05-43.1
Sa mean, (cm·s <sup>-1</sup> )	12.3	0.0001	0.64	0.49-0.82
Em, (cm·s <sup>-1</sup> )	14.2	0.0001	1.01	1.00-1.02
Am, (cm·s <sup>-1</sup> )	3.98	0.046	0.99	0.98-1.00
Em/Am	11.2	0.001	1.38	1.14-1.66
Em/Ea	9.81	0.002	1.04	1.01-1.06
LVEDD <sub>ind</sub> , (mm·m <sup>-2</sup> )	4.09	0.043	1.05	1.00-1.11
E wave deceleration time (ms)	12.9	0.0001	0.99	0.98-0.96
TAPSE (mm)	4.46	0.035	0.93	0.87-1.00
Sa <sub>t</sub> (cm·s <sup>-1</sup> )	7.69	0.006	0.85	0.76-0.95
RV 2D-strain (%)	11.4	0.001	1.07	1.03-1.12
RV 2D-strain rate, per 0.1 s <sup>-1</sup>	4.1	0.043	2.14	1.03-4.47

95%CI: 95% confidence interval; BNP: brain natriuretic peptide; LVEF: left ventricular ejection fraction; Em, Am: early and late transmitral diastolic peak flow velocity, respectively; Sa, Ea, Aa: peak acceleration of annular velocity of S, E, and A wave, respectively, in lateral or septal position; LVEDD<sub>ind</sub>: left ventricular end diastolic diameter index to body surface area; TAPSE: tricuspid annular plane systolic excursion; Sa<sub>t</sub>: peak systolic velocity of the tricuspid annular; RV, right ventricle; 2D: two-dimensional;

**Table 5. Independent prognostic variables by multivariate analysis in the CHF cohort with different models.**

<b>Model</b>	<b>Wald <math>\chi</math>-squared</b>	<b><i>p</i></b>	<b>Hazard Ratio</b>	<b>95%CI</b>
<b>Model 1- RV systolic function variables (RV strain, RV strain rate, TAPSE, S).</b>				
<b>RV 2D-strain</b>	11.2	0.001	1.08	1.03-1.13
<b>Model 2 - Echocardiographic variables</b>				
<b>RV 2D-strain</b>	6.54	0.011	1.08	1.02-1.15
<b>LVEDD<sub>ind</sub></b>	4.51	0.034	1.076	1.05-1.13
<b>E wave deceleration time</b>	3.65	0.06	0.99	0.98-0.99
<b>Model 3 – clinical, laboratory, and echocardiographic variables</b>				
<b>Log BNP</b>	16.85	0.0001	5.04	2.33-10.92
<b>RV 2D-strain</b>	4.93	0.045	1.05	1.00-1.10

95%CI: 95% confidence interval; RV, right ventricle; 2D: two-dimensional; LVEDD<sub>ind</sub>: left ventricular end diastolic diameter index to body surface area; BNP: brain natriuretic peptide