

Supplemental Material

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Supplemental Table 1. The inclusion and exclusion criteria of C-STRIDE study

Criteria	Contents
Inclusion criteria	1. Aged between 18 and 74 years 2. Specified eGFR range according to different CKD etiologies. For patients with glomerulonephritis (GN), the eGFR should be $\geq 15\text{ml}\cdot\text{min}^{-1}\cdot 1.73\text{m}^{-2}$. For patients with diabetic nephropathy (DN), the defining eligibility was $15\text{ml}\cdot\text{min}^{-1}\cdot 1.73\text{m}^{-2} \leq \text{eGFR} < 60\text{ml}\cdot\text{min}^{-1}\cdot 1.73\text{m}^{-2}$ or $\text{eGFR} \geq 60\text{ml}\cdot\text{min}^{-1}\cdot 1.73\text{m}^{-2}$ with “nephrotic range” proteinuria, which is defined as 24-hour urinary protein $\geq 3.5\text{g}$ or urinary albumin creatinine ratio (ACR) $\geq 2000\text{mg/g}$ or corresponding values of urine dipstick test or urinary protein creatinine ratio (PCR). For non-GN and non-DN patients, $15\text{ml}\cdot\text{min}^{-1}\cdot 1.73\text{m}^{-2} \leq \text{eGFR} < 60\text{ml}\cdot\text{min}^{-1}\cdot 1.73\text{m}^{-2}$ is setting for enrollment.
Exclusion criteria	1. NYHA Class III or IV heart failure 2. CKD caused by systemic inflammatory illness or autoimmune disease, such as lupus erythematosus 3. Treated with immunosuppressive agents in the preceding 6 months to treat kidney or immune disease 4. Self-reported or known diagnosis of HIV infection and/or AIDS 5. Isolated hematuria 6. Self-reported or known diagnosis of cirrhosis 7. Pregnant or breast-feeding women 8. Malignancy treated with chemotherapy within last 2 years 9. Kidney or other transplantation 10. Hereditary kidney disease 11. Participation in intervention clinical trial.

Supplemental Table 2. Comparison of baseline characteristics between included and excluded participants in the current study

	Total (N=3700)	Excluded cases (N=1676)	Included cases (N=2024)
Age, years	50±14	51±15	49±14*
Male, N(%)	2154(58%)	990(59%)	1164(58%)
BMI, kg/m ²	24.6±3.6	24.5±3.4	24.6±3.7
Smoker, N(%)	1230(38%)	493(39%)	737(37%)
Diabetes, N(%)	772(24%)	346(24%)	426(25%)
History of cardiovascular disease, N(%)	345(9 %)	143(9%)	202(10%)
CKD stages, N(%)			
1	494(13%)	222(13%)	272(13%)
2	595(16%)	248(15%)	347(17%)
3	1491(40%)	674(40%)	817(40%)
4	1120(30%)	532(32%)	588(29%)
eGFR, mL/min/1.73 m ²	50±30	49±31	51±29
Proteinuria, g/day	1.0(0.4, 2.3)	1.0(0.4, 2.4)	0.9(0.4, 2.1)
Serum albumin, g/dL	3.9±0.7	3.9±0.7	3.9±0.7
Hemoglobin, g/dL	12.7±2.3	12.7±2.4	12.7±2.2
Triglyceride, mg/dL	159(108, 225)	159(109, 231)	159(108, 219)
Total cholesterol, mg/dL	183(152, 221)	186(155, 224)	181(150, 218)*
HDL cholesterol, mg/dL	41(35, 51)	41(34, 51)	41(35, 51)
LDL cholesterol, mg/dL	101(80, 127)	101(580, 128)	101(81, 126)
Clinic systolic BP, mm Hg	130±18	131±19	129±17*
Clinic diastolic BP, mm Hg	81±11	80±11	80±11

Abbreviation: BMI: Body mass index, HDL: high-density lipoprotein, LDL: low-density lipoprotein, eGFR: estimated glomerular filtration rate, BP: blood pressure

Missing counts: Smoker 445, BMI 807, serum albumin 490, hemoglobin 395, triglyceride 732, total cholesterol 730, HDL cholesterol 835, LDL cholesterol 833, proteinuria 493, diabetes 493, clinic systolic BP 558, clinic diastolic BP 558

* $P<0.05$ comparison with excluded cases

Supplemental Table 3. Baseline characteristics of the participants stratified by nighttime BP control status

	Total (n=2024)	nocturnal normotension (n=540)	nocturnal hypertension (n=1484)
Age, years	49±14	47±15	50±13
Male, N(%)	1164(58%)	265(49%)	899(61%)
BMI, kg/m ²	24.6±3.7	23.9±3.6	24.9±3.9
Smoker, N(%)	737(37%)	141(27%)	596(41%)
Diabetes, N(%)	426(25%)	71(16%)	355(28%)
History of cardiovascular disease, N(%)	202(10%)	34(6%)	168(11%)
CKD stages, N(%)			
1	272(13%)	125(23%)	147(10%)
2	347(17%)	122(23%)	225(15%)
3	817(40%)	190(35%)	627(42%)
4	588(29%)	103(19%)	485(33%)
eGFR, mL/min/1.73 m ²	51±29	62±32	47±27
Proteinuria, g/day	0.9(0.4, 2.1)	0.7(0.2, 1.3)	1.0(0.4, 2.4)
24-hour urine sodium, mmol/day	150±79	146±81	151±78
Serum albumin, g/dL	3.9±0.7	4.0±0.7	3.8±0.8
Hemoglobin, g/dL	12.7±2.2	12.9±2.0	12.6±2.3
Triglyceride, mg/dL	158(108, 219)	144(104, 199)	161(110, 226)
Total cholesterol, mg/dL	181(150, 218)	180(151, 217)	181(149, 219)
HDL cholesterol, mg/dL	41(35, 51)	43(37, 53)	41(34, 50)
LDL cholesterol, mg/dL	101(81, 126)	102(82, 122)	100(81, 127)
Creatinine, mg/dL	1.6(1.1, 2.3)	1.3(0.9, 1.9)	1.7(1.3, 2.4)
Causes of kidney disease, N(%)			
Glomerulonephritis	1194(60%)	378(72%)	816(56%)
Diabetic kidney disease	252(15%)	23(4%)	229(16%)
Others	549(28%)	126(24%)	423(29%)
BP			
Clinic systolic BP, mmHg	129±17	120±15	133±17
Clinic diastolic BP, mmHg	81±11	75±9	83±10
24-hour systolic BP, mmHg	129±17	113±9	134±16
24-hour diastolic BP, mmHg	79±11	69±6	83±10
24-hour mean arterial pressure, mmHg	96±12	84±7	100±10
24-hour pulse pressure, mmHg	50±12	44±7	51±13
Daytime systolic BP, mmHg	130±17	117±10	136±16
Daytime diastolic BP, mmHg	81±11	71±7	84±10
Daytime mean arterial pressure, mmHg	97±12	86±7	101±11
Daytime pulse pressure, mmHg	50±12	45±8	52±13

Nocturnal systolic BP, mmHg	124±19	105±8	131±17
Nocturnal diastolic BP, mmHg	75±12	62±5	80±10
Nocturnal mean arterial pressure, mmHg	91±13.3	77±5	97±11
Nocturnal pulse pressure, mmHg	49±13	43±7	51±14
Nondipper, N(%)	1517(75%)	297(55%)	1220(82%)
Renin-angiotensin system inhibitor, N(%)	1153(57%)	326(60%)	827(56%)

Abbreviation: BP: blood pressure, BMI: Body mass index, HDL: high-density lipoprotein, LDL: low-density lipoprotein, eGFR: estimated glomerular filtration rate

Missing data: Smoker 36, diabetes 285, history of cardiovascular 11, 24-hour urine sodium 152, triglyceride 374, total cholesterol 373, HDL cholesterol 416, LDL cholesterol 416, clinic systolic BP 310, clinic diastolic BP 307, BMI 194, serum albumin 298, hemoglobin 118, causes of kidney disease 29

Supplemental Table 4 Association of nocturnal hypertension entities with kidney failure and cardiovascular events after additional adjustment with antihypertensive and hypoglycemic treatment.

	Unadjusted model HR(95%CI)	Adjusted model HR(95%CI)
Kidney failure		
Nocturnal normotension (n=540)	1.00(ref)	1.00(ref)
Isolated nocturnal diastolic hypertension (n=390)	1.89(1.21, 2.94)	1.18(0.75, 1.85)
Isolated nocturnal systolic hypertension (n=120)	2.27(1.25, 4.12)	1.19(0.64, 2.21)
Nocturnal systolic-diastolic hypertension (n=974)	4.14(2.89, 5.94)	1.52(1.04, 2.22)
Cardiovascular events		
Nocturnal normotension (n=540)	1.00(ref)	1.00(ref)
Isolated nocturnal diastolic hypertension (n=390)	1.68(0.85, 3.33)	1.61(0.80, 3.22)
Isolated nocturnal systolic hypertension (n=120)	7.58(3.96, 14.54)	2.96(1.51, 5.84)
Nocturnal systolic-diastolic hypertension (n=974)	3.59(2.08, 6.20)	2.08(1.18, 3.67)

Adjusted for age, sex, smoker, body-mass index, diabetes mellitus, history of cardiovascular disease, anti-hypertension treatment, hypoglycemic treatment, dyslipidemia, albumin, anemia, 24-hour urine protein, 24-hour urine sodium and eGFR.

Supplemental Table 5. Association of nocturnal hypertension entities with kidney failure and cardiovascular events using multiple imputation to fill missing data of covariate.

	Unadjusted model HR(95%CI)	Adjusted model HR(95%CI)
Kidney failure		
Nocturnal normotension (n=540)	1.00(ref)	1.00(ref)
Isolated nocturnal diastolic hypertension (n=390)	1.89(1.21, 2.94)	1.29(0.84, 1.99)
Isolated nocturnal systolic hypertension (n=120)	2.27(1.25, 4.12)	1.71(0.99, 2.95)
Nocturnal systolic-diastolic hypertension (n=974)	4.14(2.89, 5.94)	1.80(1.26, 2.58)
Cardiovascular events		
Nocturnal normotension (n=540)	1.00(ref)	1.00(ref)
Isolated nocturnal diastolic hypertension (n=390)	1.68(0.85, 3.33)	1.65(0.89, 3.04)
Isolated nocturnal systolic hypertension (n=120)	7.58(3.96, 14.54)	2.65(1.42, 4.95)
Nocturnal systolic-diastolic hypertension (n=974)	3.59(2.08, 6.20)	2.23(1.35, 3.70)

Adjusted for age, sex, smoker, body-mass index, diabetes mellitus, history of cardiovascular disease, renin-angiotensin system inhibitor, dyslipidemia, albumin, anemia, 24-hour urine protein, 24-hour urine sodium and eGFR.

Supplemental Table 6 Association of nocturnal hypertension entities with kidney failure and cardiovascular events in patients with eGFR<60 ml/min/1.73 m² (n=1405).

	Unadjusted model HR(95%CI)	Adjusted model HR(95%CI)
Kidney failure		
Nocturnal normotension (n=293)	1.00(ref)	1.00(ref)
Isolated nocturnal diastolic hypertension (n=243)	1.76(1.12, 2.77)	1.33(0.84, 2.11)
Isolated nocturnal systolic hypertension (n=99)	1.59(0.87, 2.90)	1.29(0.69, 2.41)
Nocturnal systolic-diastolic hypertension (n=770)	2.93(2.02, 4.25)	1.64(1.11, 2.43)
Cardiovascular events		
Nocturnal normotension (n=293)	1.00(ref)	1.00(ref)
Isolated nocturnal diastolic hypertension (n=243)	1.77(0.82, 3.81)	1.85(0.85, 4.03)
Isolated nocturnal systolic hypertension (n=99)	6.57(3.19, 13.56)	3.88(1.83, 8.19)
Nocturnal systolic-diastolic hypertension (n=770)	3.01(1.60, 5.64)	2.36(1.23, 4.51)

Adjusted for age, sex, smoker, body-mass index, diabetes mellitus, history of cardiovascular disease, renin-angiotensin system inhibitor, dyslipidemia, albumin, anemia, 24-hour urine protein, 24-hour urine sodium and eGFR.

Supplemental Table 7 Association of nocturnal hypertension entities with components of the cardiovascular events

	Unadjusted model HR(95%CI)	Adjusted model HR(95%CI)
Cardiovascular events (excluded peripheral vascular diseases) n=146		
Nocturnal normotension	1.00(ref)	1.00(ref)
Isolated nocturnal diastolic hypertension	1.80(0.89, 3.61)	1.74(0.86, 3.53)
Isolated nocturnal systolic hypertension	7.75(3.97, 15.15)	3.24(1.62, 6.50)
Nocturnal systolic-diastolic hypertension	3.85(2.20, 6.76)	2.32(1.30, 4.16)
Stroke n=50		
Nocturnal normotension	1.00(ref)	1.00(ref)
Isolated nocturnal diastolic hypertension	2.78(0.69, 11.09)	2.90(0.72, 11.66)
Isolated nocturnal systolic hypertension	12.66(3.36, 47.74)	5.68(1.44, 22.35)
Nocturnal systolic-diastolic hypertension	6.29(1.93, 20.51)	4.53(1.35, 15.18)
Heart failure n=60		
Nocturnal normotension	1.00(ref)	1.00(ref)
Isolated nocturnal diastolic hypertension	0.69(0.17, 2.76)	0.51(0.12, 2.10)
Isolated nocturnal systolic hypertension	4.66(1.50, 14.45)	1.87(0.58, 6.04)
Nocturnal systolic-diastolic hypertension	4.30(1.83, 10.07)	1.67(0.68, 4.10)
Myocardial infarction/angina n=35		
Nocturnal normotension	1.00(ref)	1.00(ref)
Isolated nocturnal diastolic hypertension	1.95(0.62, 6.14)	3.16(0.98, 10.25)
Isolated nocturnal systolic hypertension	8.70(2.92, 25.97)	3.25(1.05, 10.12)
Nocturnal systolic-diastolic hypertension	1.59(0.57, 4.42)	1.63(0.57, 4.64)

Adjusted for age, sex, smoker, body-mass index, diabetes mellitus, history of cardiovascular disease, renin-angiotensin system inhibitor, dyslipidemia, albumin, anemia, 24-hour urine protein, 24-hour urine sodium and eGFR.