Risk factors associated with rapid decline of renal function in patients with advance Chronic Kidney Disease

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Background

- Time from advance renal failure to end stage renal disease (ESRD) is different in patients with chronic renal disease (CKD).

Aim

- Identify risk factors associated with decrease of renal function more than 25% annually in patients with advance Chronic Renal Failure (CKD 4)

Methods

- 304 patients with CKD mean GFR 22.1 ± 5 ml/min/1,73m² (age 73 ± 10 years, 58% men 30% with diabetes) with completed data were followed for up to two years.
- Kidney function was measured by 51Cr EDTA or Iohexol.
- The patients on dialysis treatment or kidney transplantation were excluded.
- The relationships between risk factors and decrease of GFR>25%/yearly as outcome was examined by univariate and multiple logistic regression model.
- Odds ratio (OR) with 95% confidence interval (CI) was estimated for each independent variable and significance was assessed with the Wald X2 value, with the P-value given.

Results

- In study period (two years) 107 patients (35%) had decrease of GFR >25% /year or more.
- **Risk factors showed as statistically significant**:
- **Univariate logistic regression :**
  - Systolic blood pressure (SBP) (OR=1.02, 95% CI 1.005-1.029)
  - Acute kidney injury (AKI) on (CKD) (OR: 3.67, 95% CI: 2.18-6.17)
  - History of cardiovascular disease (CVD) (OR:2.87, 95% CI: 1.76-4.70)
  - Haemoglobin <100 gr/l (OR: 2.82, 95% CI: 1.35-5.89)
  - Proteinuria> 1gr/daily (OR: 5.20, 95% CI:3.10-8.73)

Multiple logistic regression model:

  - SBT (OR=1.02; 95%CI 1.006-1.040)
  - Cholesterol (OR=1.38; 95% CI 1.02-1.88)
  - History of CVD (OR=2.83; 95% CI 1.36-5.89)
  - Proteinuria> 1gr/daily (OR=4.50; 95% CI 2.20-9.20)
  - Ongoing treatment with Renin Angiotensin Aldosterone system blocker(RAAS-blocker) (OR=0.50; 95% CI 0.26-0.96).

Table 1. Clinical and biochemical characteristics of patients with Chronic kidney disease (304)

Age(years)	73 ± 10
Male(%)	58
GFR ml/min/1.73m²)[a]	22.1 ± 5 ml/min/1,73m2
SBP(mmHg)	133 ± 21
DBP (mmHg)	73 ± 13
BMI (kg/m2)	28 ± 6
Haemoglobin (g/L)	117 ± 15
Cholesterol (mmol/L)	4.3 ± 1.2
Triglycerides (mmol/L)	1.8 ± 1
Diabetes (%)	30
History of CVD (%)	35
History of heart failure (CHF) (%)	15
Severe proteinuria (%)[b]	33
Ongoing treatment with RAAS blocker (%)[c]	58
AKI on CKD (%)[d]	29

[a] GFR <60 ml/min/1.73m2 was measurd by 51Cr EDTA or Iohexol. . b Severe proteinuria. U-albumin excretion >300 mg/daily or albumin/creatinin (ARC)> 30 mg/mmol. c renin-angiotensin-aldosterone system blocker d Acute Kindney Injury (AKI) Increase in serum creatinine of 0.3 mg/dL developing over 48 hours or >50% developing over 7 days

Table 2. Univariate and multiple logistic regression analyses with odds ratios (95% CI) for baseline variables as predictors and risk ofrapid decline of renal function(n=304).

	Univariate model Odds ratio (95% CI)	Multiple model Odds ratio(95% CI)
Age (years)	1.05 (0.95-0.99	0.96 (0.93-0.99)
Female Gender	1.04(0.64-1.67)	1.05 (0.53-2.06)
SBP (mmHg)	1.02(1.00-1.03)	1.02 (1.00-1.04)
DBP (mmHg)	1.02 (0.99-1.03)	-
BMI (kg/m²)	0.99 (0.96-1.04)	0.97 (0.92-1.03)
Haemoglobin (g/L)	**0.97 (0.95-0.98)**	**0.96 (0.94-0.98)**
Cholesterol (mmol/L)	1.23 (0.99-1.53)	1.38 (1.02-1.88)
AKI on CKD	3.67 (2.18-6.17)	1.93 (0.93-3.99)
Diabetes	1.23 (0.75-1.99)	0.58 (0.28-1.24)
Haemoglobin <100gr/l	2.82 (1.35-5.89)	-
Severe proteinuria	**5.20(3.10-8.73)**	**4.50(2.20-9.20)**
History of CVD	**2.87(1.76-4.70)**	**2.83(1.36-5.89)**
Ongoing treatment with RAAS blocker	**0.76 (0.47-1.22)**	**0.50 (0.26-0.96)**

The odds ratio (OR) for each variable was adjusted for all other variables. Continues variables were increase per 1 unit.

Conclusions

- **Proteinuria >1gr/daily is the strongest risk factor associated with rapid reducing of renal function.**
- **History of cardiovascular disease, anemia and acute on chronic kidney disease are other important risk factors**
- **Ongoing treatment with Renin angiotensin aldosterone system blocker (RAAS-blocker) associated with lower risk of rapid decline of renal function and this effect is still significant after adjusted for proteinuria, blood pressure and presence of heart failure.**
- **Diabetes without albuminuria did not significantly increase the risk of rapid decline of renal function.**

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