

PREVALENCE AND DETERMINANTS OF HYPERKALEMIA IN PATIENTS WITH STAGE 3-4 CKD: A PROSPECTIVE OBSERVATIONAL STUDY

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Introduction: Among patients with chronic kidney disease (CKD), hyperkalemia is a commonly occurring electrolyte disorder and is directly associated with increased risk of arrhythmogenic death and all-cause mortality risk [1-5]. The aim of this study is to investigate the prevalence and factors associated with hyperkalemia in a prospective cohort of outpatients with stage 3-4 CKD.

Material and Methods: Over a prospective period of 4 months, 223 consecutive patients with stable CKD stage 3-4 attending the Outpatient Nephrology clinic of our Department were enrolled in this study. We collected data on serum potassium levels and other relevant laboratory parameters, comorbidities and medications. The factors determining a serum potassium ≥ 5.5 mEq/L were analyzed in univariate and multivariate logistic regression models.

Results: Serum potassium elevation ≥ 5.1 mEq/L occurred in 30.5% of study participants and hyperkalemia (defined as serum potassium ≥ 5.5 mEq/L) was evident in 11.2% of study participants. As shown in (Figure 1), the prevalence of hyperkalemia rose in parallel with the staging of CKD (stage 3a: 10.2%, stage 3b: 9.9%, stage 4: 14.8%). In univariate comparisons, hyperkalemic patients were older in age, were more commonly diabetics, had significantly higher serum urea and lower estimated-glomerular-filtration-rate (eGFR) (Table 1). In multivariate logistic regression analysis, higher age [Odds Ratio (OR): 1.031; 95% Confidence Interval (CI): 1.030-1.060] and the presence of diabetes were associated with higher odds of hyperkalemia, whereas higher eGFR was associated with lower odds of hyperkalemia (OR: 0.971; 95% CI: 0.945-0.990). The use of agents blocking the renin-angiotensin-aldosterone-system was not determinant of hyperkalemia (OR: 1.314; 95% CI: 0.694-2.488) (Table 2).

Conclusion: Hyperkalemia affects up to 11% of patients with stage 3-4 CKD. Older age, the diabetic status and decrease in eGFR appear to be the major determinants of hyperkalemia occurrence in this population.

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Table 1: Demographic, clinical and laboratory parameters of study participants with and without elevated serum potassium.

Parameter	Serum K <5.1 mEq/L	Serum K ≥ 5.1 mEq/L	P Value
N	155	68	
Age (years)	68.3 \pm 12.7	71.1 \pm 9.9	0.10
Male gender (%)	44.5%	48.2%	0.45
eGFR (ml/min/1.73m ²)	43.5 \pm 13.2	37.1 \pm 13.7	<0.05
Serum glucose (mg/dl)	113.2 \pm 33.2	111.0 \pm 31.7	0.65
Serum urea (mg/dl)	74.6 \pm 36.9	86.1 \pm 36.8	<0.05
Serum creatinine (mg/dl)	1.9 \pm 1.0	2.1 \pm 1.0	0.07
Serum potassium (mEq/L)	4.5 \pm 0.4	5.4 \pm 0.5	<0.001
Serum sodium (mEq/L)	140.7 \pm 13.3	140.3 \pm 13.0	0.42
Serum calcium (mg/dl)	9.3 \pm 0.7	9.3 \pm 0.5	0.83
Serum phosphate (mg/dl)	3.6 \pm 0.7	3.7 \pm 0.7	0.20
Serum albumin (mg/dl)	4.3 \pm 0.5	4.3 \pm 0.4	0.84
Hemoglobin (g/dL)	12.6 \pm 1.7	12.9 \pm 1.7	0.25
Presence of diabetes (%)	35.8%	62.4%	<0.05
History of CHD (%)	25.3%	19.4%	0.33
History of CHF (%)	8.4%	6.0%	0.52
ACEI/ARB use (%)	39.4%	32.4%	0.32
Loop diuretic use (%)	39.4%	33.8%	0.43

Table 2: Multivariate logistic regression analysis of factors associated with serum K elevation ≥ 5.5 mEq/L.

Parameter	Odds Ratio	95% Confidence Interval	P Value
Age (per year increase)	1.031	1.003 – 1.060	<0.05
Gender (male vs female)	0.964	0.503 – 1.851	0.91
eGFR (per 1-ml/min/1.73m ² increase)	0.971	0.945 – 0.990	<0.05
Presence of diabetes (yes vs no)	1.834	1.141 – 3.463	<0.05
History of CHD (yes vs no)	1.279	0.592 – 2.765	0.53
History of CHF (yes vs no)	1.263	0.366 – 4.362	0.71
ACEI/ARB use (yes vs no)	1.314	0.694 – 2.488	0.40
Loop diuretic use (yes vs no)	0.931	0.473 – 1.832	0.83

Figure 1: Prevalence of hyperkalemia among patients with CKD stage 3-4

