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ETIOLOGY OF POTASSIUM ABNORMALITIES AND THEIR OUTCOMES IN PATIENTS ADMITTED IN A RURAL MEDICAL COLLEGE

General Medicine

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KEYWORDS

INTRODUCTION :

Potassium — the most abundant intracellular cation — governs resting membrane potential, neuromuscular excitability, and cardiac conduction. Deviations as small as 0.5 mEq/L from the physiological range of 3.5–5.0 mEq/L can precipitate clinically significant arrhythmias, ascending muscle weakness, and haemodynamic compromise. Both hypokalemia and hyperkalemia are associated with a well-described U-shaped relationship with in-hospital mortality across general and critical care cohorts.

Published prevalence data estimate potassium abnormalities in 10–21% of all hospitalised adults, with rates exceeding 40% in intensive care populations. In low- and middle-income countries, this burden is amplified by delayed presentation, limited electrolyte surveillance, and a higher background prevalence of infectious diseases and chronic kidney disease — factors that likely produce etiological distributions quite distinct from Western cohorts. Region-specific data from rural Indian tertiary care settings remain scarce. Local prescribing habits, dietary patterns, and comorbidity profiles have not been systematically characterised in this context. We therefore undertook this study at KIMS, Narketpally — a rural teaching hospital in Telangana — to evaluate the etiological factors, clinical spectrum, electrocardiographic manifestations, and in-hospital outcomes of potassium abnormalities in consecutive hospitalised adults, aiming to inform context-specific monitoring and management protocols.

Methodology :

- Design: Prospective, observational study
- Setting: Dept. of General Medicine (ward + ICU), KIMS, Narketpally, Telangana
- Duration: 24 months — January 2024 to December 2025
- Sample size: n = 60 adult patients

Inclusion criteria:

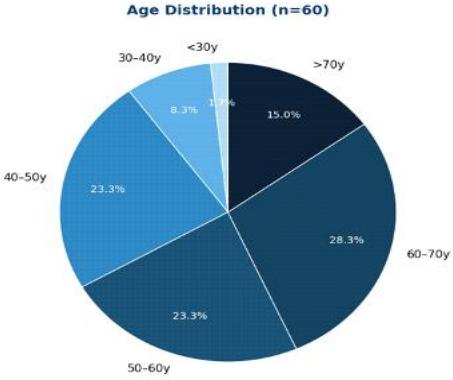
Age > 18 years; admitted to General Medicine ward or ICU
Serum K^+ < 3.5 mEq/L or > 5.0 mEq/L (admission or during stay)
Written informed consent obtained

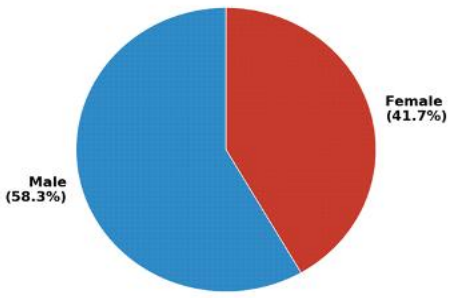
Exclusion criteria:

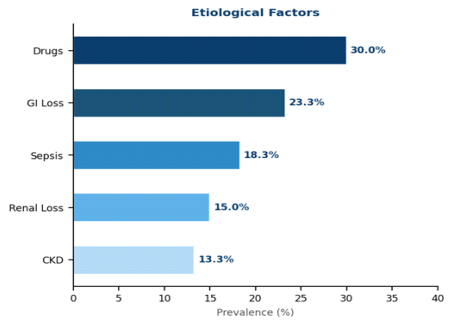
Incomplete clinical or laboratory data Refusal of consent
Parameters assessed:
Demographics · Clinical presentations · Etiological factors · Medication history · Comorbidities · Serial serum K^+ (admission → discharge) · 12-lead ECG · Treatment modality (oral / IV) · Complications · Outcome · Duration of stay
Statistical analysis:
SPSS v24 | Continuous variables: mean ± SD
Categorical variables: frequency and percentage
Ethics: IEC-approved protocol | Informed consent obtained from all participants

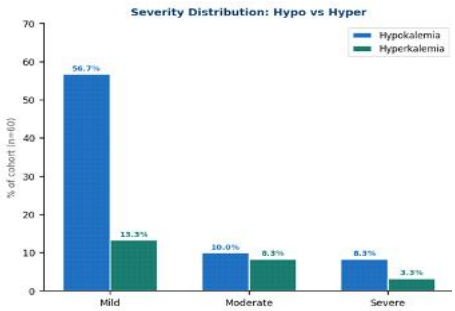
RESULTS :

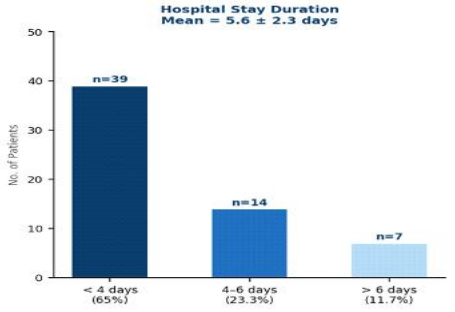
Parameter	Value
Sample size (n)	60
Hypokalemia	45 (75.0%)
Hyperkalemia	15 (25.0%)
Mild hypokalemia	34 (56.7%)
Top etiology	Drug-induced 18 (30%)
ICU admission	24 (40.0%)
ECG changes	17 (28.3%)
K^+ at admission	3.6 ± 1.3 mEq/L
K^+ at discharge	3.8 ± 0.7 mEq/L
Overall improvement	53 (88.3%)
In-hospital mortality	2 (3.3%)
Mean hospital stay	5.6 ± 2.3 days











DISCUSSION :

What is immediately apparent in our cohort is the concentration of cases among patients ≥40 years- nearly 90% of our 60-patient series. Advancing age progressively impairs renal tubular reserve, hormonal responsiveness, and homeostatic buffering. This pattern mirrors Eliacik et al. (2015), who documented a similar age skew across 9,045 hospitalised patients in Turkey, and Paice et al. (1986), who linked hypokalemia disproportionately to elderly inpatients in a large record-linkage study.

The predominance of drug-induced etiology (30%) is perhaps our most striking observation-exceeding even GI losses (23.3%). Diuretics accounted for the vast majority of drug associations (18.3%), a finding entirely consistent with Greenberg's (2000) extensive review of diuretic complications and with Morgan & Davidson's (1980) seminal analysis of diuretic-mediated hypokalaemia. Sympathomimetics (6.7%) and insulin (5.0%) contributed via transcellular shifts-mechanisms that interact synergistically with underlying systemic stress during acute illness. Sepsis as the third largest etiological category (18.3%) likely reflects catecholamine surges, renal hypoperfusion, and cytokine-mediated tubular dysfunction in our rural cohort.

Our ECG abnormality rate of 28.3% falls within the expected range. Weaver and Burchell (1960) established the ECG–potassium relationship decades ago, yet Montague et al. (2008) later demonstrated limited ECG sensitivity for hyperkalemia specifically-our 71.7% without ECG changes despite confirmed potassium disturbances reflects exactly this limitation. Arrhythmias in 10% of patients, with respiratory failure and cardiac arrest each in 1.7%, underscore that potassium disturbances carry real-world cardiac risk even in predominantly mild severity cohorts.

Outcome data are reassuring overall: 88.3% improved and mortality was 3.3%. Both oral (91.9% improvement) and intravenous (82.6%) correction modalities performed favourably-consistent with Kim & Han (2002), who argued oral replacement suffices for mild-moderate hypokalemia. Notably, all deaths (n=2) occurred in the hypokalemia group (4.3%) with zero mortality in hyperkalemia patients-a finding consistent with Krogager et al. (2017), who found hypokalemia independently associated with short-term mortality in hospitalised adults. Engelhardt et al. (2019), studying 53,248 ICU patients, demonstrated that potassium variability-not merely absolute level-predicts mortality; our improvement from 3.6 ± 1.3 mEq/L to 3.8 ± 0.7 mEq/L at discharge, with markedly reduced variability, reflects effective in-hospital stabilisation.

Study	n	Top Etiology	Improvement
Present study (2024–25)	60	Drug-induced (30%)	88.3%
Mayee KR et al., 2019	200	Disease-related causes	NR
Balaji T. et al., 2020	NR	AGE → diuretics	NR
Eliacik et al., 2015	1265	GI loss / RAAS-I	~50% at DC
Singer AJ et al., 2017	~50k	Multiple / mixed	Higher admit
Engelhardt LJ et al.,-2019	53,248	ICU-drug-related	Var. dependent

CONCLUSION :

1. Potassium abnormalities are common in this rural tertiary care cohort, predominantly affecting middle-aged and elderly patients; hypokalemia accounts for 75% of cases, with mild hypokalemia (56.7%) as the most frequent single subtype.

2. Drug-induced etiology leads all etiological categories (30%), followed by gastrointestinal losses (23.3%) and sepsis (18.3%) - underscoring the iatrogenic contribution to electrolyte disturbance in routine inpatient care.

3. Despite predominantly mild absolute potassium deviations, 40% of patients required ICU admission, highlighting that underlying systemic illness-not the electrolyte number alone-drives clinical severity.

4. Electrocardiographic changes were present in 28.3%; cardiac arrhythmias occurred in 10% of the cohort. Serial ECG monitoring should accompany all clinically significant potassium disturbances as a standard of care.

5. Overall improvement was achieved in 88.3% of patients; both oral and intravenous correction strategies were effective when appropriately matched to clinical severity.

6. In-hospital mortality was 3.3%, confined exclusively to the hypokalemia group (4.3% within hypokalemia cohort), with zero deaths among hyperkalemia patients-warranting heightened vigilance for severe or rapidly progressive hypokalaemic states.

7. Routine electrolyte surveillance, early etiological identification, and individualized correction pathways are essential pillars of safe inpatient electrolyte management in resource-limited rural settings.

REFERENCES :

1. Mount DB. Fluid and electrolyte disturbances. Harrison's Principles of Internal Medicine. 21st ed. McGraw-Hill; 2022.
2. Gennari FJ. Hypokalemia. N Engl J Med. 1998;339:451–58.
3. Palmer BF, Clegg DJ. Hyperkalemia. JAMA. 2015;314:2405–16.
4. Einhorn LM et al. Frequency of hyperkalemia in CKD. Arch Intern Med. 2009;169:1156–62.
5. Krogager ML et al. Short-term mortality and serum K^+. Am J Med. 2017;130:318–26.
6. Eliacik E et al. Potassium abnormalities in clinical practice. Med Princ Pract. 2015;24:271–5.
7. Singer AJ et al. ED potassium disturbances. Clin Exp Emerg Med. 2017;4:73–9.
8. Engelhardt LJ et al. Potassium and in-hospital mortality in ICU. Ann Intensive Care. 2019;9:100.
9. Balaji Tamilselvan. Serum K^+ abnormalities in tertiary care. IJAMSCR. 2020;6:17–21.
10. Mayee KR et al. Evaluation of potassium abnormalities. Int J Pharm Pharm Sci. 2019;11:104–7.
11. Greenberg A. Diuretic complications. Am J Med Sci. 2000;319:10–24.
12. Weaver WF, Burchell HB. Serum K^+ and ECG in hypokalemia. Circulation. 1960;21:505–21.
13. Montague BT et al. ECG changes in hyperkalemia. Clin J Am Soc Nephrol. 2008;3:324–30.
14. Schulman M, Narins RG. Hypokalemia and cardiovascular disease. Am J Cardiol. 1990;65:4E–9E.
15. Kim GH, Han JS. Therapeutic approach to hypokalemia. Nephron. 2002;92(suppl 1):28–32.