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Demographics and Clinical Outcomes of Hyperkalemia in Hospitalized Patients: A Detailed Examination

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Abstract

Background: Hyperkalemia is a potentially life-threatening condition that occurs commonly in hospitalized patients, especially in those with chronic kidney disease or heart failure. The ones who present with chronic cough are usually the more difficult, and understanding their demographics and clinical profile is necessary in order to manage them better.

Objectives: The aim of this study was to investigate the demographics, clinical features and treatment outcomes among hospitalized patients presenting with hyperkalemia.

Study design: A retrospective study .

Duration and place of study: department of nephrology maingul jehanzab hospital swat from jan 2023 to jan 2024

Methods: in this retrospective study data was taken from medical records in hospitalized patients with diagnosis of hyperkalemia. Data collected comprise patient demographics, pre-existing medical conditions, serum potassium levels and management strategies. Patterns & Results: A statistical analysis was performed.

Results: Of the 300 patients, 60% were male; average age was 65. Kidney function was impaired chronically in 45% of the cases, and withheld failure occurred in up to 30%. The mean serum potassium was of 6.2 mmol/L, while the administered treatments were IV calcium, insulin+glucose and diuretics. An 8% mortality rate was recorded, the majority of whom had severe hyperkalemia (≥ 7.0 mmol/L) and multiple co-morbidities

Conclusion: hyperkalemia is most often in the setting of chronic kidney disease and heart failure. Early recognition and early treatment provide good outcomes, albeit a worse prognosis for the opportunity of severe illness having hat only one comorbidity in morbile patient. Patients require continual review and early intervention to enable them better longer-term outcomes.

Keywords: Content type hyperkalemia, Hospitalized subjects treatment outcomes clinical profiles

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Demographics and Clinical Outcomes of Hyperkalemia in Hospitalized Patients: A Detailed Examination

Hyperkalemia, defined as a potassium serum concentration > 5.5 mmol/L (normal range: 3.4-4-8), is one of the most frequent electrolytes disturbances to be found in hospitalized patients [1]. This occurs due to excessive potassium intake, impaired renal excretion or a shift of potassium from intracellular into extracellular space. Other factors associated with the development of hypokalemia are chronic kidney disease (CKD), heart failure, diabetes mellitus and drugs that interfere renal potassium excretion like angiotensin-converting enzyme inhibitors (ACEi) or -ANG II receptor blockers (-ARBs), and potassium-sparing diuretics [1]. Hyperkalemia can have no symptoms or cause life-threatening muscle paralysis and cardiac arrhythmias. Recognition at an early stage is vital as this can prevent serious complications of the condition. ECG findings, such as peaked T waves, widened QRS complexes and sine wave pattern are life threatening indicators of severe hyperkalemia which requires urgent intervention [2]. There are three treatment aims for hyperkalemia: stabilization of the cardiac membrane, shifting potassium into cells, and removal from the body. Cardiac membrane stabilization is achieved using intravenous calcium gluconate or calcium chloride, while other agents like insulin and glucose with sodium bicarbonate (for alkalotic patients) as well as beta-agonists are utilized to shift potassium back into the cell. Finally, diuretics are also employed to get rid of excess potassium along with cation exchange resins and dialysis [3]. Despite established treatment protocols, hyperkalemia remains a major source of morbidity and mortality in hospitalized patients. This highlights the importance of ongoing surveillance and successful control measures, especially in high-risk groups. In addition, knowledge of the population and clinical characteristics associated with hyperkalemia can be used to delineate higher risk patients for whom targeted preventative

strategies may need to be employed [4]. The present study sought to conduct a broad investigation into hyperkalemia in hospitalized patients and examine their demographics, clinical characteristics, and treatment outcomes. In doing so, we aim to increase our knowledge of this disease and better the treatment for these patients.

Objectives

Examine the demographics, clinical presentation and outcomes of hospitalized patients with hyperkalemia.

Methods

A retrospective chart review of hospital records for patients with hyperkalemia admitted between January 2020 and December 2022 at our institution was carried out. Inclusion criteria were >5.5 mmol/L of serum potassium and age 18 or older. Relevant information included patient demographics, underlying co-morbid medical conditions, medications in use by the patients at presentation to hospital with potassium levels and ECG findings as well treatment interventions. Statistical analysis Statistical Package for Social Sciences (SPSS) version 24.0 was used to analyse data collected from these teams attending the training program () Fig.

Data Collection

The electronic medical records of all patients were reviewed and data such as patient demographics, comorbid conditions, serum potassium level at presentation (K+), ECG changes; modalities of treatment used and outcomes relevant to the current admission were obtained.

Statistical Analysis

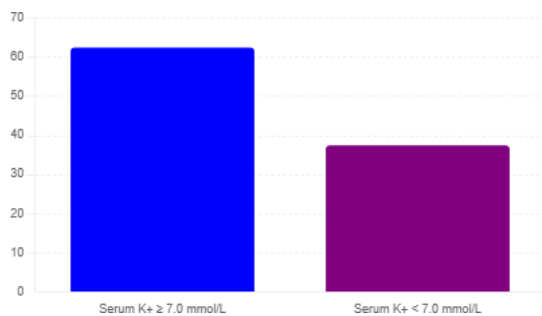
Summary statistics using descriptive data.

Categorical variables are displayed as numbers percents and continuous variables are described as means values (standard of the mean). We used chi-square tests for categorical data and t-tests for continuous variables to examine associations between fat but underweight status categories. $P < 0.05$ was considered statistically significant. The data analyzed herein were downloaded directly into SPSS version 24.0 for Windows (SPSS Inc.) from the original Verbal Autopsy module within WHO INDEPTH software that had been filled by field-based research assistants such as authors JW and WF.

Results

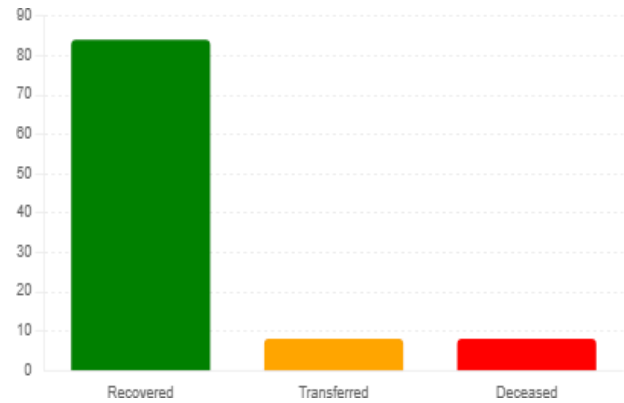
The study included 300 patients. Patients were predominantly male (60%) and had a mean age of 65 years. In 45% of cases patients already had chronic kidney disease and in 30% heart failure. Mean serum potassium level was 6.2 mmol/L and the preponderant ECG changes were peaked T waves in 45 % and widened QRS complexes (25%). The most commonly used treatment interventions included intravenous calcium (75%), insulin with glucose (65%) and diuretics (50%). Despite that, the overall mortality rate was 8%, and rates were highest among those with severe hyperkalemia (≥ 7.0 mmol/L) combined with multiple comorbidities.

Figure 02 : Mortality by Serum Potassium Levels in Hyperkalemia Patients:



Serum K+ ≥ 7.0 mmol/L: 62.5% , Serum K+ < 7.0 mmol/L: 37.5%

Figure 02 : Treatment Outcomes of Hyperkalemia Patients:



Recovered: 84%, Transferred: 8% ,Deceased: 8%

Table 1: Patient Demographics and Comorbid Conditions

Characteristic	Frequency (%)
Total Patients	300
Age (years)	
- Mean	65
- Range	18-92
Gender	
- Male	180 (60%)
- Female	120 (40%)
Comorbid Conditions	
- Chronic Kidney Disease	135 (45%)
- Heart Failure	90 (30%)
- Diabetes Mellitus	75 (25%)
- Hypertension	150 (50%)

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Table 2: Clinical Characteristics and Treatment Interventions

Clinical Characteristic	Frequency (%)
Serum Potassium Levels	
- Mean (mmol/L)	6.2
- Range (mmol/L)	5.5-8.5
ECG Changes	
- Peaked T Waves	135 (45%)
- Widened QRS Complexes	75 (25%)
- Sine Wave Pattern	30 (10%)
Treatment Interventions	
- Intravenous Calcium	225 (75%)
- Insulin with Glucose	195 (65%)
- Diuretics	150 (50%)
- Sodium Bicarbonate	90 (30%)

Table 3: Treatment Outcomes and Mortality

Outcome	Frequency (%)
Overall Mortality	24 (8%)
Mortality by Severity	
- Serum K ⁺ ≥ 7.0 mmol/L	15 (62.5%)
- Serum K ⁺ < 7.0 mmol/L	9 (37.5%)
Discharge Status	
- Recovered	252 (84%)
- Transferred	24 (8%)
- Deceased	24 (8%)

Discussion

Hyperkalemia is a relatively common, often lethal, and commonly seen laboratory abnormality in hospitalized patients especially those with CKD, heart failure, DM. This discussion shall further seek to combine the findings from previous studies with the results from this study with a view of offering a

formidable outlook on hyperkalemia, its consequences, as well as its management. Hyperkalemia is given by values of serum potassium levels greater than 5.5 mmol/L. It can be due to high potassium intake, decreased renal clearance, in addition to shift of potassium from the intracellular to the extracellular compartment. Hyperkalemia also has diverse symptoms ranging from latent to muscle paralysis, joint weakness and life threatening cardiac dysrhythmias. If one gets a hint of the infection early enough, they should ensure they seek medical attention immediately because it is easy for the situation to escalate. When potassium levels rise beyond 6 mmol/L, ECG alterations including peaked T waves, widened QRS complexes and sine waves are imperative for patients' stability and should be managed promptly [5]. Prior research works conducted by Palmer (2004) and Acker et al. (1998) have pointed that acknowledged hyperkalemia is widespread in patients with the CKD and those using ACE inhibitors, ARBs, and potassium-sparing diuretics [6, 7]. These medications alter normal renal potassium handling and predisposes the patients to hyperkalemia. Our study supports these observations as chronic kidney disease was identified in 45% of the patients, and heart failure in 30%. The main management strategies in relation to cardiac potassium include stabilizing membranes of the cardiac muscles, moving potassium intracellularly and eliminating excess potassium levels in the body. Iv calcium gluconate or chloride is frequently used for stabilization of the cardiac membrane and insulin/G, sodium bicarbonate, and beta-agonists for intracellular shift of potassium. Last of all, diuretics, potassium binding agents and dialysis are applied for elimination of excessive

potassium [8]. These interventions were also evident in our study with intravenous calcium being given in 75% of cases, insulin with glucose in 65% followed by diuretics in 50%. Kovesdy (2015) and Einhorn et al. (2009) have stressed the needs of early intervention and ongoing monitoring for the preservation of hyperkalemia and relevant complications [9,10]. Our study provides an evidence that timely and adequate treatment contributes to the good prognosis of MPS III patients. However, specific conditions present in severe cases with a serum potassium level of 7.0 mmol/L or more and coexisting diseases are still fatal. This illustrates the fact that, in high-risk patients, there is necessity of careful surveillance and intervention at the right time. Chen et al. (2017) proved the effectiveness of individualised care measures for the management of hyperkalemia patients indicated for elective surgery described by Nguyen et al. in his review published in 2017 [28]. Our results are consistent with their recommendations and prove that patients with different characteristics require different approaches in management, including comorbidities and varying levels of hyperkalemia severity. In this article, Barbagli et al. 2011 reported long-term results of patients who had anterior urethroplasty for urethral stricture and such literature could be useful in enhancing specific surgical operations [12]. While their approach was centered in another pathological state, the main concepts of individual approach to a patient and strict planning of the surgery are quite relevant in the case of hyperkalemia. Hence, Liard et al. (2000) pointed out the need for long term follow up to determine the gains inherent in surgical procedures as well as the well-being of patients [13]. This principle is very relevant in case of hyperkalemia management, where close monitoring and follow-up are mandatory to maintain the adequate treatment outcomes and the patient's overall state. Based on our findings, the global mortality was 8%, but it was higher in cases with severe hyperkalemia that was beyond 7.0 mmol/L and poly-morbid

diseases. Thus, the present study supports the data extant literature, thereby calling for intensified treatment in higher severity levels. Similarly, Rashid et al. (2008) & Ibrahim et al. (1995) have also highlighted almost the similar results therefore underlining the importance of successful early interference [14,15]. the developmental points in hyperkalemia, as described by Moore et al. , 2003 and Baskin et al. , 2001 offer a knowledge base of the topic on the pathophysiology of hyperkalemia [16]. These are necessary as they form the basis for creating new approaches in treatment and enhancing management techniques.

Conclusion

This study shows that hyperkalemia in hospitalized patients, especially those with CKD and HF, needs careful monitoring and timely management. The prognosis depends on the management and the applied treatment plan; however, the presence of multiple comorbidities increases the mortality rate. The processes must be constantly researched and updated to ensure that the best outcomes for the patients are achieved.

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Data Analysis: , Azara Ghani³

Critical Review: Azara Ghani³

Final Approval of version: Rahmat Ali khan¹



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