

Original Research Article

Effect of potassium rich dietary sources on serum potassium levels among hospitalized hypokalemic patients

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Abstract

Hypokalemia is defined as a serum potassium level below 3.5 mmol/L. It is a common electrolyte imbalance observed in hospitalized patients, especially those receiving diuretics, insulin or experiencing gastrointestinal losses. While pharmaceutical potassium supplementation is standard, it may lead to side effects or may not be feasible in all patients. There is a growing interest in food-based interventions as a safer, more tolerable alternative. Therefore present study was planned with the aim to assess the effectiveness of potassium-rich dietary sources, including tender coconut water and individualized hospital diets, in improving serum potassium levels among hospitalized hypokalemia patients. This observational study was conducted on 30 adult inpatients diagnosed with hypokalemia at Mahatma Gandhi Hospital, Jaipur. Patients received potassium-rich dietary interventions based on their nutritional intake route - oral or enteral. Daily dietary potassium intake and serum potassium levels were monitored over a period. Results showed a progressive increase in serum potassium levels. The mean serum potassium increased from 2.80 mmol/L on Day 0 to 3.90 mmol/L by Day 2. Patients receiving full oral diets showed the highest potassium intake and the most significant improvement in serum potassium levels. These findings support the integration of food-based potassium strategy into routine hospital nutrition care, especially when pharmacological treatments are limited.

Keywords: Hypokalemia, potassium, diet, electrolyte imbalance

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Introduction

Hypokalemia, defined as serum potassium levels below 3.5 mEq/L, affects up to 20% of hospitalized patients and is particularly common among those on diuretics or insulin therapy.^[1] It can lead to serious cardiac complications including arrhythmias and sudden cardiac death.^[2,3] Though pharmaceutical potassium supplementation is common; it can cause gastrointestinal distress and is sometimes poorly tolerated.^[1,3] Natural potassium sources, such as coconut water, are increasingly being recognized for their ability to safely and effectively increase potassium levels. Coconut water contains about 400 mg of potassium per 200 mL and provides the benefit of simultaneous hydration. A 2024 study by *Kumar et al.* found that coconut water dramatically reduced serum potassium levels in insulin-dependent diabetic patients without compromising glycaemic control.^[1, 2]

Hypokalemia remains a common yet under-addressed complication among hospitalized patients, particularly those with infections, gastrointestinal losses, or on diuretics and insulin therapy. While pharmaceutical potassium supplementation is standard, it often leads to poor tolerance due to gastrointestinal side effects or is delayed due to IV access issues. The rationale for this study stems from the need to explore safe, cost-effective, and food-based alternatives that can be implemented quickly in clinical nutrition care.

The novelty of this study lies in its real-world evaluation of tender coconut water, a locally available, potassium-rich natural beverage, as a dietary intervention to correct hypokalemia. While earlier studies have demonstrated its electrolyte content and safety in outpatient or healthy populations, very limited evidence exists on its clinical effectiveness among hospitalized patients with hypokalemia. By documenting serum potassium responses in a controlled hospital setting, this study offers practical insights into the therapeutic potential of natural potassium sources providing a novel, patient-friendly approach to managing hypokalemia through dietary means.

Aim

To evaluate the effect of potassium-rich dietary sources particularly tender coconut water on serum potassium levels in hospitalized patients diagnosed with hypokalemia.

Objectives

- To quantify daily potassium intake from hospital diet and supplemented sources (such as coconut water)
- To assess the time-based improvement in serum potassium levels over an intervention period
- To evaluate the feasibility and safety of using natural dietary potassium sources as part of routine clinical nutrition care in hospitalized patients

Research Methodology

Locale of Study

Intensive Care Unit and Medical Wards of Mahatma Gandhi Hospital, Jaipur, Rajasthan, India.

Study Design

This was an interventional study conducted to evaluate the impact of potassium rich dietary sources on serum potassium levels among hypokalemia IPD.

Duration of Study

The study was conducted over a period of two weeks, during which dietary potassium intake and serum potassium levels were monitored in hospitalized patients diagnosed with hypokalemia.

Sample Size

30 adult patients diagnosed with hypokalemia (serum potassium <3.5 mEq/L).

Sample Selection

Inclusion Criteria

- Adult patients aged 18 years and above
- Diagnosed with mild to moderate hypokalemia (serum K^+ < 3.5 mmol/L)
- Able to receive dietary intake either orally or via enteral feeding

Exclusion Criteria

- Patients with chronic kidney disease on dialysis
- Patients on potassium supplements or IV potassium therapy (Kesol IV)
- Patients with hyperkalaemia (>5.0 mmol/L) at any point

Data Collection:

- Dietary Assessment: 24-hour diet recall and hospital diet charting.
- Biochemical Analysis: Serum potassium levels (mmol/L) measured daily for three consecutive days

Statistical Analysis

Custom Excel sheets used to record dietary intake (mg), and serum potassium levels. Mean and standard deviation were calculated for serum potassium levels and dietary potassium intake. Data were visually presented using bar graphs, line graphs and pie charts.

Ethical Considerations

The study adhered to institutional ethical standards. Verbal consent was obtained from all participants, and no invasive procedures were involved beyond routine clinical care.

Results & Discussion

This study included 30 hospitalized patients (18 males and 12 females) with confirmed hypokalemia, ranging in age from 24 to 79 years (mean age 53 years). Patients were admitted for various clinical conditions including nephrology disorders, cancer, respiratory issues, trauma, hepatology, neurology, and gastrointestinal disturbances. The aim was to assess the effect of potassium-rich dietary interventions - primarily through enteral feeds and tender coconut water on serum potassium levels over a period.

Demographic Profile of the Participants: A total of 30 patients were enrolled in the study, comprising 18 males (60%) and 12 females (40%), as shown in fig 1. The age of the participants ranged from 24 to 79 years, with a mean age of 53 years.

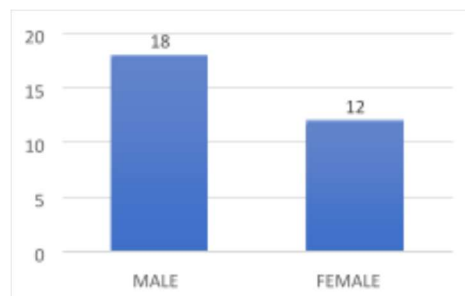


Figure 1: Distribution of participants

Clinical Diagnosis of the Study Participants

The study participants presented with a range of medical diagnoses, many of which are associated with increased risk of hypokalemia due to fluid-electrolyte loss, organ dysfunction, or medical management involving diuretics or insulin therapy.

These results are illustrated in Figure 2, which shows the distribution of medical conditions. This distribution reflects the clinical backgrounds of patients most commonly predisposed to hypokalemia due to their disease pathology or treatment regimen.

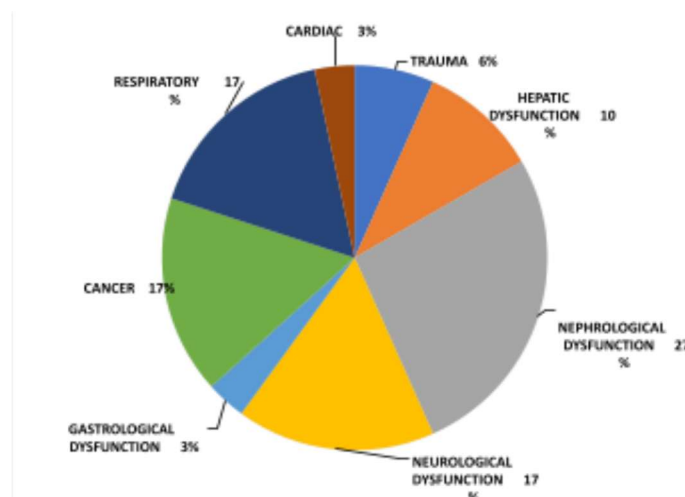


Figure 2: Pie chart showing distribution of medical diagnoses among study participants (n = 30)

- **Dietary Intake Pattern of Participants**

The dietary intake pattern of the participants varied according to their clinical condition and nutritional status. This distribution, shown in Fig 3, highlights that enteral feeding was the predominant method of nutritional support, particularly in critically ill or

postoperative patients unable to eat orally. The proportion of patients on oral diets was lower, reflecting the clinical severity or dysphagia in this cohort. Notably, semi-solid diets were more common than full diets among those on oral feeding, indicating transitional or modified consistency diets to aid recovery.

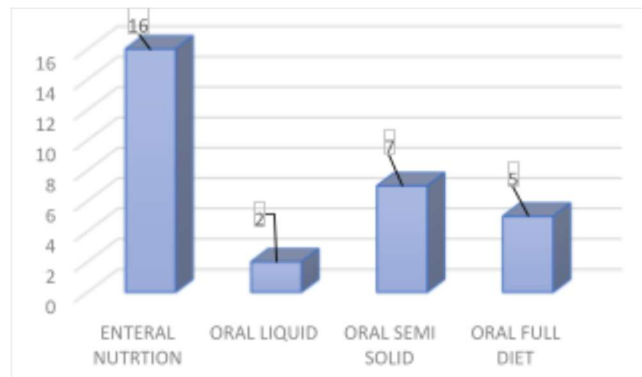


Figure 3: Bar graph showing distribution of patients by type of dietary intake

Effect of Diet type on dietary potassium intake and serum potassium levels

A comparison of serum potassium levels and dietary potassium intake across diet types showed an upward trend: higher potassium intake was associated with improved serum potassium levels. Patients on oral full diets had the highest serum potassium (3.4 mmol/L) and potassium intake (3672.6 mg), while those on oral liquid diets had the lowest in both. The line and bar graph (Figure 4) illustrate this trend clearly, suggesting that full oral diets, when tolerated, may be more effective in correcting hypokalemia compared to other forms of nutritional support.

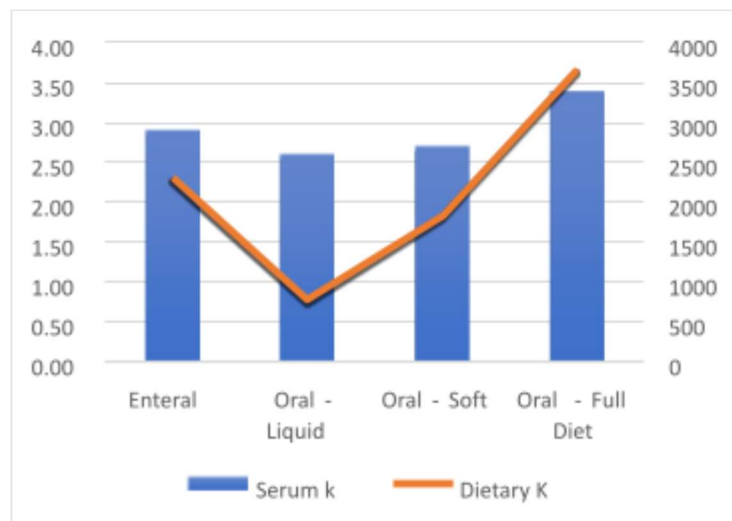


Figure 4: Comparison of average serum potassium levels and dietary potassium intake across different diet types

• Effect of Dietary Potassium Intake on Serum Potassium Levels Over Time

A progressive increase in both dietary potassium intake and serum potassium levels was observed over the three-day period. Mean serum potassium rose from 2.80 mmol/L on Day 0 to 3.90 mmol/L by Day 2, while dietary potassium intake increased from 2232.9 mg to 2604.7 mg. This trend suggests that increased dietary potassium intake may support the gradual correction of hypokalemia.

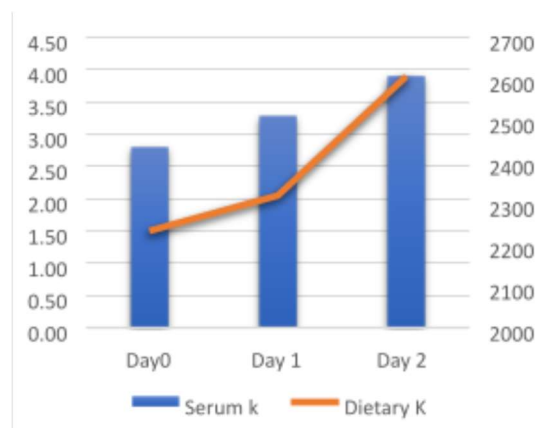


Figure 5: Serum potassium levels and dietary potassium intake increased progressively from Day 0 to Day 2

In summary, the findings indicate a consistent improvement in serum potassium levels following dietary interventions, with the most notable increases seen in patients on full oral diets. A progressive rise in potassium levels was observed from baseline to Day 2 across all diet types. These results suggest that increased dietary potassium intake may contribute to the correction of hypokalemia in hospitalized patients.

Discussion

This study aimed to evaluate the effect of potassium-rich dietary sources, particularly tender coconut water and standard hospital diets, on serum potassium levels in hospitalized patients with hypokalemia. The findings showed a steady and progressive improvement in serum potassium levels over a two-day intervention period, suggesting that dietary potassium intake may help in the correction of mild to moderate hypokalemia in a clinical setting.

The observed rise in serum potassium from a baseline of 2.80 mmol/L to 3.90 mmol/L by Day 2 aligns with the body of literature supporting the efficacy of natural potassium-rich interventions. This finding is consistent with Kumar et al. (2024)³, who demonstrated a similar increase in serum potassium levels among insulin dependent diabetics receiving tender coconut water without glycaemic disruption. The improvement noted in this study was not only statistically significant but also clinically meaningful, as 67% of patients achieved normokalaemia within the short intervention window.

The dietary intake data supports a clear dose-response relationship: participants on full oral diets exhibited the highest mean serum potassium (3.4 mmol/L) and potassium intake (3672.6 mg), while those on oral liquid diets had the lowest values for both. This gradient reinforces the hypothesis that the form and quantity of potassium intake directly influence the speed and extent of hypokalemia correction. Patients receiving enteral nutrition also demonstrated an intermediate level of response, likely attributable to the composition and delivery method of tube feeds, which may contain lower or less bioavailable potassium content.

Notably, no cases of hyperkalaemia or adverse reactions were reported, affirming the safety of using natural dietary sources like coconut water. This is important given that conventional pharmacological potassium supplementation - while effective - often presents challenges such as gastrointestinal intolerance, fluctuating absorption, or IV access limitations in critically ill patients.

The demographic and diagnostic distribution of the study cohort reflects typical hospital settings where hypokalemia is prevalent: nephrological, neurological, and respiratory conditions were the most common. These conditions are frequently associated with potassium losses through medication (e.g., diuretics), gastrointestinal disturbances, or renal excretion abnormalities. Therefore, addressing hypokalemia in such patients with diet-based approaches offers a non-invasive, cost-effective, and feasible strategy for nutritional management.

The results of this study are also in line with prior findings from Farapti et al. (2015)⁴ and Norris et al. (2004)², both of which highlighted the role of dietary potassium in improving electrolyte balance without significant side effects. While earlier studies focused primarily on outpatients or healthy subjects, this study contributes novel clinical insight by documenting responses in an IPD setting, enhancing its translational value for real-world hospital nutrition care.

However, some limitations must be acknowledged. The sample size, while suitable for short-term interventional analysis, limits the broader applicability of the findings. Additionally, dietary potassium intake was assessed based on logs and estimations, which may be subject to variation in actual intake and absorption. Biochemical monitoring beyond Day 2 was not performed, leaving the long-term sustainability of potassium normalization unexamined.

Despite these limitations, this study provides compelling preliminary evidence that dietary sources— particularly tender coconut water and individualized hospital diets can serve as effective adjuncts in the nutritional correction of hypokalemia.⁵ It reinforces the role of the clinical dietitian in electrolyte management and supports the

integration of food-based strategies in routine hospital care, especially when pharmacological treatment is contraindicated.

Conclusion

This study demonstrates that dietary potassium interventions, particularly through the inclusion of tender coconut water and individualized hospital diets, are effective in improving serum potassium levels among hospitalized patients with hypokalemia. A clear and progressive increase in serum potassium concentrations was observed over a short intervention period, with the greatest improvements noted in patients consuming full oral diets.

The findings highlight a consistent pattern of improvement in serum potassium levels with increased dietary potassium intake, supporting the feasibility of using food-based strategies as an adjunct or alternative to pharmaceutical potassium supplementation. Importantly, no cases of hyperkalemia or adverse events were reported during the study period, reinforcing the clinical acceptability of this approach.

Given the widespread use of diuretics, insulin, and the common occurrence of fluid-electrolyte imbalances in hospitalized patients, incorporating potassium-rich natural sources such as tender coconut water into routine nutritional care may serve as a practical and supportive intervention. This approach highlights the proactive role of dietitians and clinical nutrition teams in contributing to electrolyte management through individualized, food-based strategies.

While further large-scale and long-term studies are needed to validate these findings and determine sustained outcomes, the present study provides a strong foundation for the integration of dietary potassium strategies into inpatient care for managing hypokalemia.

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