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Research Article

PREVALENCE AND ASSESSMENT OF LEVEL OF CONSCIOUSNESS AND FUNCTIONAL OUTCOME AMONG HYPOKALEMIC PATIENTS AT A TERTIARY CARE TEACHING HOSPITAL: A PROSPECTIVE STUDY

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ABSTRACT

Objective: To study the prevalence, to assess the degree of consciousness and the functional outcome in hypokalemic patients using Glasgow Coma Scale and Glasgow Outcome Scale respectively. Method: A prospective observational study, serum potassium level and other clinical profiles were recorded in a data collection form. GCS and GOS were used to analyse the level of consciousness and the functional outcome of the hypokalemic patients. One sample t test was performed to find the statistical difference between mild, moderate and severe hypokalemia. Analysis of variance (ANOVA) was used for comparison involving more than two groups (GCS and GOS). The association significance between GCS and GOS was done by Chi square test. Data were analysed using SPSS 22.0 statistical software. Results: During the study period, 286 patients with hypokalemia were enrolled with various causes and symptoms, among which 67.8% patients shown altered level of consciousness with chronic kidney disease as major cause. Management strategies were also studied and the functional outcome were analysed. We couldn't found any statistical association among GCS and functional outcome of the hypokalemic patients. Conclusion: Prevalence of hypokalemia is more common in elderly and those admitted in ICU. A proper assessment of serum electrolyte levels and degree of consciousness will help reduce the morbidity and mortality among electrolyte imbalance patients.

Keywords: Electrolyte abnormality, Hypokalemia, Altered level of consciousness.

INTRODUCTION

Hypokalemia is defined as a serum potassium level less than 3.5mmol/L (normal range: 3.5–5.0 mmol/L). Hypokalemia is classified to as mild, moderate and severe with serum potassium levels between 3.0 to 3.5mmol/L,2.5 to 3.0mmol/L and <2.5 mmol/L respectively.[1,2] It is a life threatening electrolyte disturbance, especially in hospitalized patients, with various etiologies and sometimes requires urgent medical attention.[3]

The various causes of hypokalemia may be due to increased loss of potassium in urine, due the use of drugs like penicillin, diuretics (thiazides and loop diuretics), endocrine diseases, kidney disorders, and genetic diseases affecting kidney.[4,5] The other causes include gastrointestinal loss due to prolonged diarrhea or vomiting, chronic laxative abuse, intestinal obstruction or infections. An intracellular shift of the potassium can also lead to severe hypokalemia.[1] The severity of hypokalemia depends on the serum concentration of potassium and may vary from life threatening symptom like cardiac arrhythmias and respiratory paralysis to absence of symptoms in mild to moderate hypokalemia.[6,7]

Altered level of consciousness or altered sensorium can be seen in patients with hypokalemia and more often in patients admitted to ICU. It will be more difficult to explain and characterize the altered state of consciousness, as there are many terms to explain the conditions, like clouding of consciousness, confusional state, delirium, lethargy, obtundation, stupor, dementia, hypersomnia, vegetative state akinetic, mutism, locked-in syndrome, coma and brain death.[8,9]

Glasgow Coma Scale is a neurological tool used for assessing the degree of consciousness and Glasgow Outcome Scale is used for assessing the functional outcome of the patients. [10,11]. The present study aims to find the prevalence of hypokalemia and to assess the altered level of consciousness among them.

MATERIALS AND METHODS

Study Site

A hospital based prospective observational study was conducted at Karuna Medical College and Hospital, Vilayodi, Chittur which is a tertiary care teaching hospital with various departments.

Study Duration

The study was conducted for a period of 18 months (October 2019- March 2020).

Study Population

A total of 286 patients were enrolled in the study.

Study Criteria

Inclusion criteria: Inpatients of both sex and age above 18years with a serum potassium level less than 3.5mmol/L were included in the study.

Exclusion Criteria: Patients who were not willing to participate were excluded.

Study Procedure

A specially designed data collection form was used to collect necessary information's like demographic details (age, gender), serum potassium levels, causes, symptoms and treatment chart review of the patients. The severity of hypokalemia was then categorized into mild, moderate and severe based on the serum sodium level. The symptoms along with various causes of the enrolled subjects were analysed. The degree of altered level of was analysed using Glasgow Coma Scale (GCS) and were recorded at the time of admission, after 24hours and 48 hours.

The various management strategies were analysed. Functional outcome were then assessed using Glasgow Outcome Scale (GOS) at the time of 24hours, after 48hours and at the time of discharge. The association of GCS and GOS of the patients were then compared after the initiation of therapy.

Ethical Committee Approval

The study was approved by Institutional Human Ethics Committee (KMC/IHEC/10/2018) dated12.12.2018.

Statistical Analysis

The collected data was entered in MS Excel 2007 for calculating the percentage of various parameters. Continuous variables were expressed in mean ± standard deviation (mean± SD). One sample t test was performed to find the statistical difference between mild, moderate and severe hypokalemia. Analysis of variance (ANOVA) was used for comparison involving more than two groups (GCS and GOS). The association significance between GCS and GOS was done by Chi square test. Data were analysed using SPSS 22.0 statistical software.

RESULT

A total of 286 patients who had a serum potassium level below 3.5mmol/L were enrolled in the study.

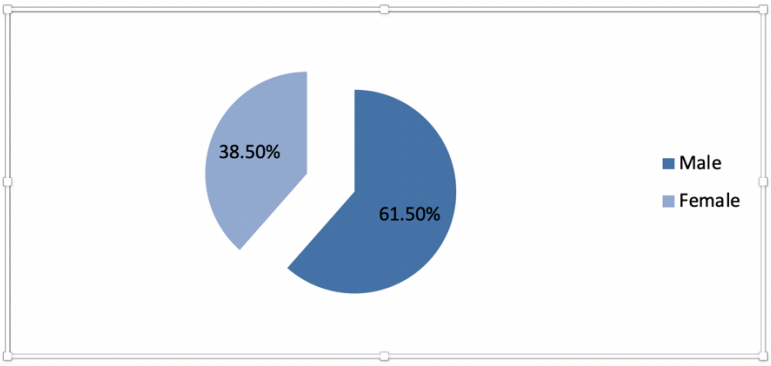

Figure 1: Gender wise distribution

Table 1: Age wise distribution among the enrolled population

S.No	Age group in years	No of patients (n=286)	Percentage (%)
1	18 – 28	28	9.79
2	29 – 39	33	11.54
3	40 – 49	34	11.89
4	50 – 59	66	23.08
5	>60	125	43.70

Table 2: One sample t test among mild, moderate and severe groups

S.No	Severity	No of patients (n=286)	Mean±SD	Sig (2 tailed)
1	Mild	43	3.20 ± 0.02	.000
2	Moderate	166	2.14 ± 0.01	.000
3	Severe	77	2.70 ± 0.01	.000

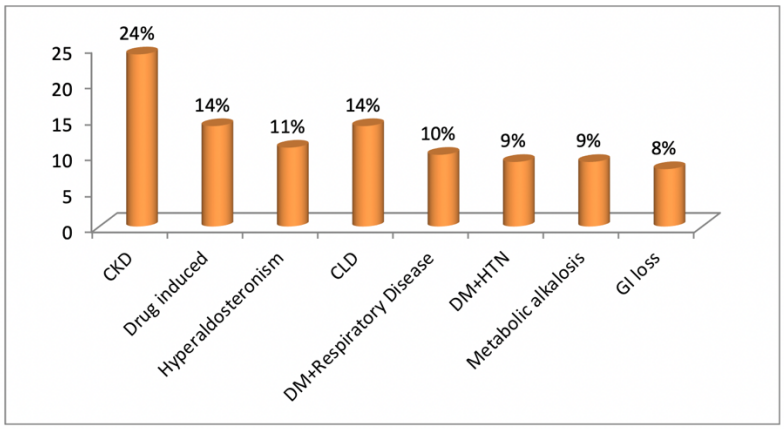

Figure 2: Causes wise distribution among hypokalemic patients.

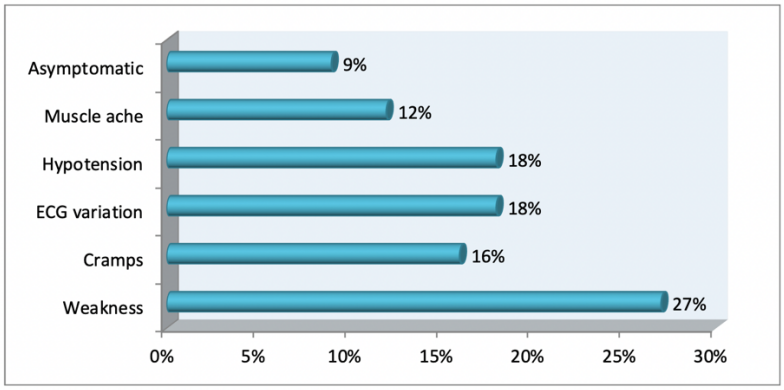

Figure 3: Symptom wise distribution

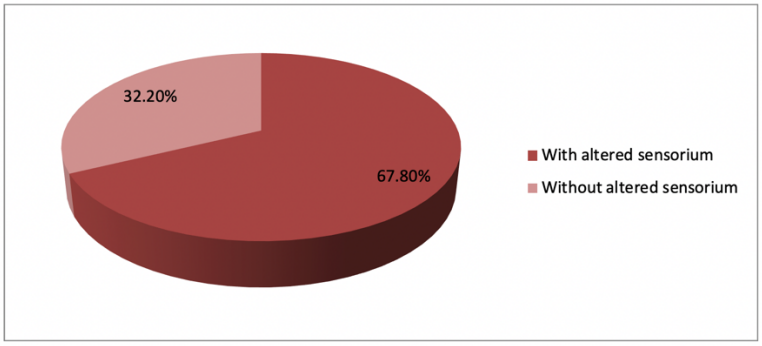

Figure 4: Prevalence of altered level of consciousness among hypokalemic patients

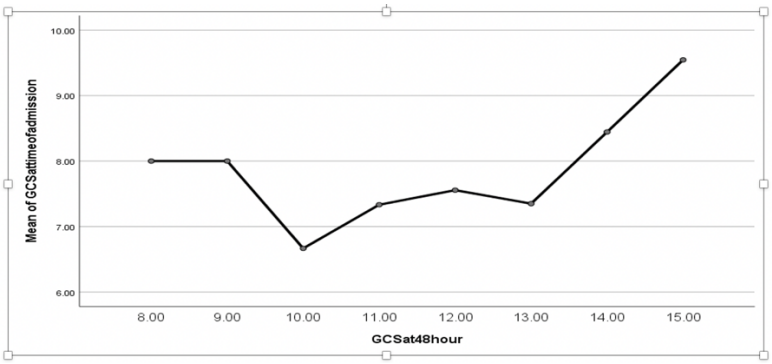

Figure 5a: Comparison of GCS scores at the time of admission and 48 hrs.

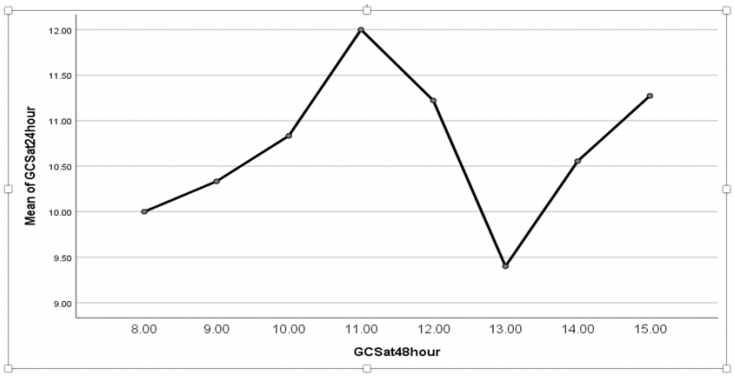

Figure 5b: Comparison of GCS scores at 24hrs and 48 hrs.

Table 3: The management of hypokalemia

S.No	DRUGS GIVEN	No Of Patients	PERCENTAGE(%)
1	Infusion KCl	179	63
2	Syrup KCl	86	30
3	IV Potassium Phosphate	21	7

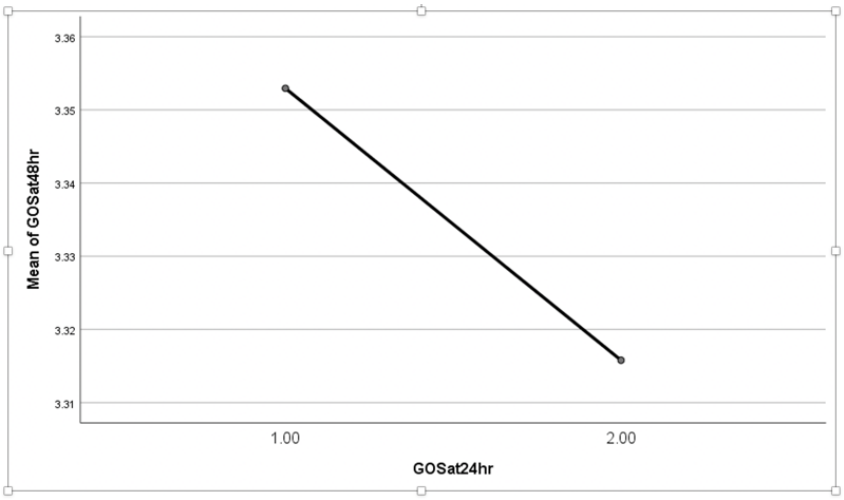

Figure 6a. Comparison of GOS score at 24 hrs and 48 hrs

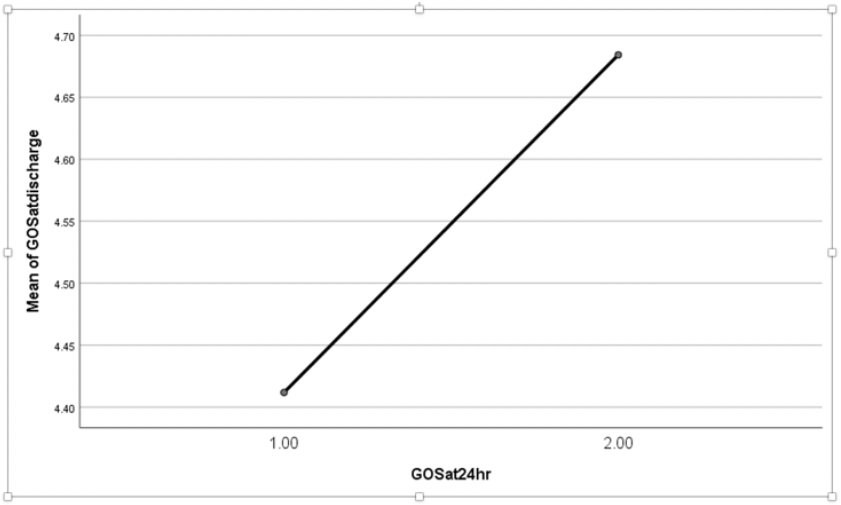

Figure 6b. Comparison of GOS score at 48 hrs and at the time of discharge

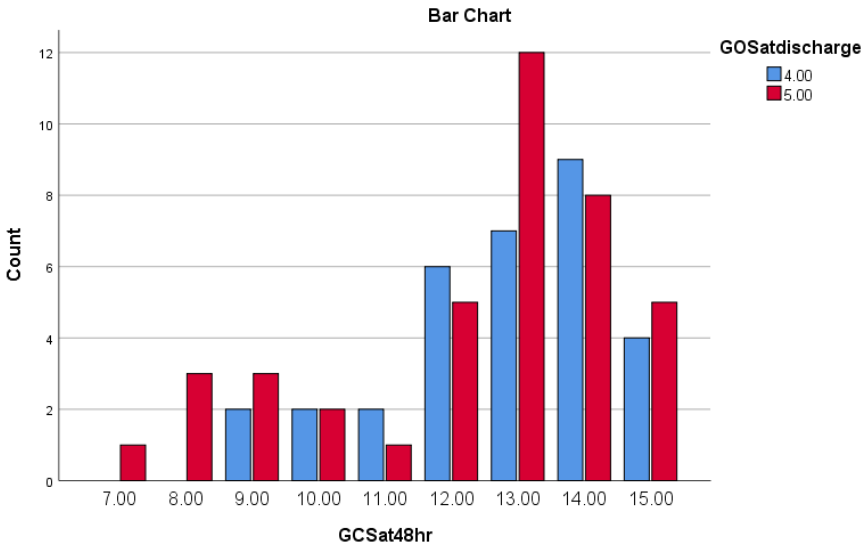

Figure 7: Association of GCS and GOS

DISCUSSION

Altered sensorium or altered level of consciousness is usually associated with electrolyte abnormalities generally in elderly people and patients in ICU.8 Potassium is an important electrolyte and increase or decrease in its level, leads to serious life threatening consequences. Serum Potassium level less than 3.5mmol/L is considered to as hypokalemic and more than 5.5mmol/L is referred as hyperkalemic (Normal serum potassium level: 3.5-5.5mmol/L). Hypokalemia leads to severe disorders in neuromuscular, gastrointestinal, respiratory and cardiovascular systems. Hypokalemia is generally occurs due to an increase in gastrointestinal and renal loss.[6,12] The objective of our study was to assess the various causes, symptoms and prevalence of altered sensorium along with the functional outcomes after the management among hypokalemic patients.

Figure.1 represents the gender wise distribution among enrolled population. In our study we found hypokalemia is more predominant in males (61.5%) than females (38.5%), with a male:female ratio 1.6:1.

Table.1 represents the age wise distribution. Among the age group, patients of age group more than 60yrs were more with a mean age of 59.05±20.61years which is supported by Dumra HS *et al.* in their study, age older than 60 years and above were more prone to have electrolyte abnormalities.[13] Study by Mauro Giordano *et al* had mean age of 52.3.[14]

Table.2 shows the severity of hypokalemia among the enrolled population. Based on the serum potassium levels, the patients were categorized into mild, moderate and severe. Out of the 286 patients most of them were severe (58%) followed by moderate (27%) with a mean serum potassium level of 2.48± 0.41mmol/L. We found a statistical significant difference between mild, moderate and severe hypokalemic groups (p value <0.05). Zhu *et al* in their study also categorized the patients into mild, moderate and severe on the basis of serum potassium level.[1] In contrast to their study our study reported more number of patients with hypokalemia.

Figure.2 shows the various causes associated with hypokalemia. The various causes found in our study were chronic kidney disease (24%), chronic liver disease (14%), drug induced (14%), hyperaldosteronism (11%), metabolic acidosis (10%), GI loss (9%) and DM with hypertension (10%) in which the chronic kidney disease was the most predominant one (24%). Dumra.H.S *et al*. in their study found hypertension as the major problem.[13] Dungdung A *et al.* studied the various drugs inducing hypokalemia.[6] Efstratios Kardalas *et al*. also explained the various causes leading to hypokalemia.[4]

Figure 3 shows various symptoms presented in the enrolled hypokalemic patients. The major symptom found among the hypokalemic patients in our study was weakness (27%), ECG variation (18%), hypotension (18%), cramps (16%), muscle ache (12%) followed by patients without showing any symptoms (asymptomatic) 9%. Dungdung A *et al.* in their study also found weakness as the major symptom.[6] Frey K *et al.* in their study also explained the various symptoms associated with hypokalemia.[7]

Figure 4 shows the prevalence of altered level of consciousness among hypokalemic patients. In our study, most of the patients with hypokalemia were found to be having altered level of consciousness (67.8%) and was assessed using GCS scale.

Figure.5a & 5b represents the GCS among the hypokalemic patients. We analysed the statistical significance of GCS by comparing it at the time of admission, 24hrs and GCS at 24hrs and 48hrs by using Anova and found to be significant (p value < 0.05). Upadhay et al. in their study also used GCS to find the degree of level of consciousness.[8] Dumra.H.S *et al*. also mentioned GCS as the tool for measuring the degree of consciousness.[13]

Table 3 depicts the various treatments given among the enrolled population. Infusion KCl (63%), syrup KCl (30%) and IV potassium phosphate (3%) are the drugs given for managing hypokalemia. Dungdung A *et al.* in their study also mentioned various treatment strategies to improve the serum potassium levels.[6]

Figure 6a & 6b represents GOS of the hypokalemic patients. The functional outcome of the patients were analysed by using GOS. Anova was performed to compare the significance of GOS at 24hrs and 48hrs and was found to be non-significant. But on comparing the GOS at 48hrs and at the time of discharge, it was found to be significant (*p* value < 0.05). We found a progressive

increase in serum potassium level and an improvement in their functional outcome after 48 hrs.

Figure.7 shows the association of GCS and GOS. The association between the altered level of consciousness (GCS) at 48hrs and the functional outcome of the enrolled patients were analysed using Chi square test and found no statistical significant association between them. This may be due to the underlying cause of the patient. Upadhyay, *et al. a*nd Sriram.S *et al*. in their studies also found that there were no association of GCS and functional outcome among hypokalemic patients.[8,15]

CONCLUSION

Our study concluded that moderate to severe hypokalemia is associated with varied degree of altered sensorium which can lead to a increase in morbidity and mortality. So, a well knowledge on these imbalances and its timely management is necessary to reduce their life threatening consequences. Thus our findings highlighted the prevalence of altered sensoriun, underlying causes, various symptoms and the functional outcomes among the hypokalemic patients.

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