ORIGINAL RESEARCH PAPER
Volume - 9 | Issue - 10 | October - 2020 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

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

Pharmacy

Dr.Ganesh N Sharma — School of Pharmaceutical Sciences, Jaipur National University, Jaipur

Ms. Sreeja. P. A* — Department of Pharmacy Practice, Grace college of Pharmacy, Palakkad.* Corresponding Author

Dr. B Shrivastava — School of Pharmaceutical Sciences, Jaipur National University, Jaipur

Dr. CI Sajeeth — Department of Pharmacy Practice, Grace college of Pharmacy, Palakkad

ABSTRACT

Objective: To study the prevalence, to assess the degree of consciousness and the functional outcome in hyponatremic patients using Glasgow Coma Scale and Glasgow Outcome Scale respectively. Method: A prospective observational study, serum sodium 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 hyponatremic patients. One sample t test was performed to find the statistical difference between mild, moderate and severe hyponatremia. 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, 410 patients with hyponatremia were enrolled with various causes and symptoms, among which 63.2% patients shown altered level of consciousness with multiple comorbidities 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 hyponatremia 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, Hyponatremia, Altered level of consciousness, GCS, GOS.

INTRODUCTION

Altered sensorium or altered level of consciousness is mostly observed in patients' with electrolyte abnormality.[1] An electrolyte abnormality is defined as a decreased level of serum electrolytes than its normal and is usually denoted as “hypo”. Hyponatremia is defined as a serum sodium concentration <135mEq/L and occurs up to 30% of the hospitalised patients in its mild form with a serum [Na^+]130-135mEq/L. [2]

Hyponatremia is usually an untreated condition in clinical practice and can lead to a wide spectrum of clinical symptom. Multiple etiologic factors like increasing age, comorbidities like diabetes, hypertension, falls, fractures etc and some drugs like thiazide and loop diuretics, antidepressants, anticonvulsants, non-steroidal anti-inflammatories, and proton pump inhibitors will contribute to hyponatremia.[3,4] Complications of mild, moderate and severe hyponatremia differs from non neurologic to neurologic symptom. The non neurologic symptoms varies from fatigue, thirst, vomiting, bloating to neurologic symptoms like headache, lethargy, disorientation, seizures, coma, brain damage and death.[5,6] In moderate to severe hyponatremia, the degree of consciousness will be altered and can usually see in critically ill patients.[1,7] Glassgow Coma Scale is a neurological tool used for assessing the degree of consciousness and Glassgow Outcome Scale is used for assessing the functional outcome of the patients.[8,9]

Our study aimed to evaluate the prevalence and to assess the level of consciousness among the hyponatremic patients at a tertiary care hospital.

2. METHODS

A prospective observational study was conducted for a period of 18 months at a tertiary care teaching hospital, after getting ethical committee clearance. Inpatients of both sex and age above 18years having serum sodium level than <135 were included in the study and those who were not willing to participate were excluded.

A specially designed data collection form was used to collect necessary information's like demographic details (age, gender), past medical and medication history, serum sodium levels, fluid status, clinical conditions and treatment chart review of patients.

The severity of hyponatremia was then categorized into mild, moderate and severe based on the serum sodium level. On the basis of fluid status, the hyponatremic patients were classified into hypovolemic, euvolemic and hypervolemic.

The underlying risk factors along with comorbidities of the enrolled subjects were analysed. The symptoms of the study subjects presented with altered sensorium were then analysed and based on their GCS they were categorized into mild, moderate and severe. GCS were recorded at the time of admission, after 24hours and 48 hours.

The various management strategies were analysed. Based on volume status of the patients, the differences in the prescribing patterns were recorded. Functional outcome were then assessed using GOS at the time of 24hours, after 48hours and at the time of discharge and were categorized into 1,2,3,4,5.

The GCS and GOS of the patients were then compared to assess the improvement in functional outcome after the initiation of therapy. Informed consent was signed by the patients prior to the study.

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). Bivariate correlation coefficient analysis was used to find the association between severity, fluid status and altered sensorium among the hyponatremic patients. 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.

3. RESULTS

A total of 410 patients who were below 135mEq/L were enrolled in the study. According to gender wise distribution, males (58%) predominate over female (42%). The mean age of hyponatremic patients enrolled in the study was found to be 46.76 ± 14.44 years.(Range: 18 yrs and above).

According to the serum sodium level of hyponatremic patients, they were categorized into mild 63(15.4%), moderate 148(36.1%) and severe 199(48.5%) with a mean ± SD of 132.2 ±1.26 mEq/L, 126.68 ± 1.27 mEq/L and 118.14 ± 3.09 mEq/L respectively. The mean serum sodium level among the study population was found to be 123.71 ± 5.61 mEq/L.

On the basis of fluid status of the enrolled patients, it was classified into euvolemia 41(10%), hypovolemia 222(54.1%) and hypervolemia 147(35.9%).

The various risk factors found in our study were diarrhoea 92 (22.4%), vomiting 113 (27.6%), low salt intake 52(12.7%), excessive sweating 38(9.3%), drug induced 55(13.4%),and those without risk factors 60 (14.6%).[Figure 1]

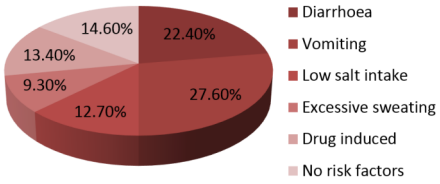

Figure 1: Risk Factors

We found single and multiple clinical conditions associated with hyponatremia in our study. The clinical conditions associated with hyponatremia were diabetes mellitus with respiratory diseases 98 (23.9%), diabetes mellitus with hypertension 77 (18.8%), hyperlipidemia 50(12.2%), CVS disorders 35 (8.5%),CNS disorders 32 (7.8%), gastrointestinal disorders 23 (5.6%), hepatic 24 (5.9%), hypertension 20 (4.9%), hematology 13(3.2%), dermatological 13 (3.2%), endocrine disorders 10(2.4%) and patients reported with hyponatremia alone 15 (3.7%).[Table 1]

Among 410 hyponatremic patients, the various symptoms found were memory loss 74 (18.0%), confusion 111 (27.1%), fatigue 72 (17.6%), loss of consciousness 47 (10.2%), sleep disturbance 42 (10.2%), repiratory symptoms 37 (9.0%) while 27 (6.6%) were asymptomatic.

Table 1: Clinical conditions associated with hyponatremia

Clinical conditions	No of patients (n=410)	Percentage (%)
Hyperlipidemia	50	12.2%
CVS disorders	35	8.5
CNS disorders	32	7.5
Gastrointestinal disorders	23	5.6
Hepatic	24	5.9
Hypertension	20	4.9
Hematological disorder	13	3.2
Dermatological disorder	13	3.2
Endocrine disorders	10	2.4
DM with respiratory disease	98	23.9
DM with hypertension	77	18.8
Hyponatremia alone	15	3.7

Our study assessed the prevalence of altered level of consciousness among hyponatremic patients. Most of the patients with hyponatremia were found to have altered level of consciousness 259(63.2%) and those without were 151(36.8%) was assessed using GCS scale. We analysed the statistical significance of GCS by comparing it at the time of admission, 24hrs and GCS at time of admission and 48hrs by using one way anova and found to be significant (p value <0.05). [Figure 2a, 2b]

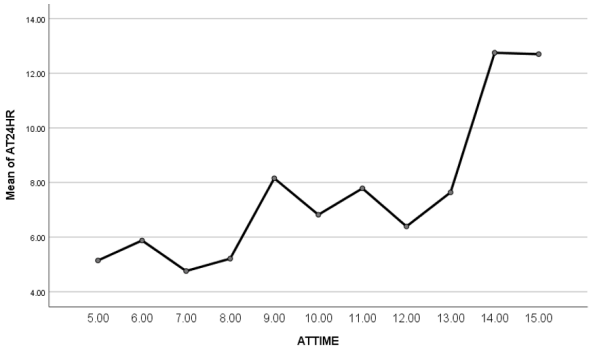

Figure 2a. Comparison of GCS score at the time of admission and 24 hrs .

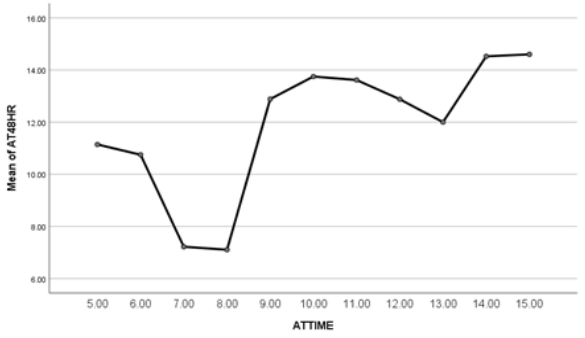

Figure 2b. Comparison of GCS score at the time of admission and 48 hrs.

The various treatment strategies given for management of hyponatremia were 3% sodium chloride infusion and tablet tolvaptan 246(60%) and 164(40%) respectively. The functional outcome were then assessed using GOS and were categorized into good recovery (1), moderate disability (2), severe disability (3), vegetative state (4) and death (5).The statistical differences between GOS score at 24 hrs, 48 hrs and at the time of discharge were analysed by using one way anova and were found to be having significant difference. (p<.05) [Figure 3a,3b.].

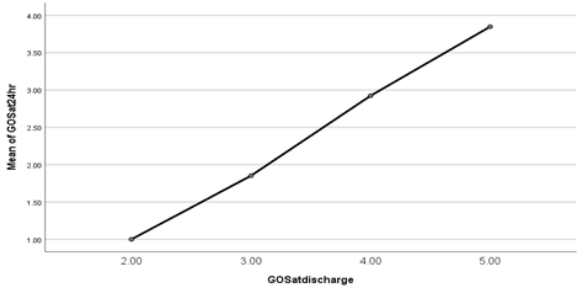

Figure 3a. Comparison of GOS score at 24 hrs and at the time of discharge

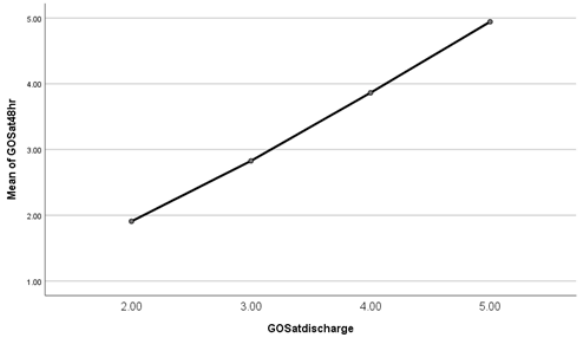

Figure 3b. Comparison of GOS score at 48 hrs and at the time of discharge

We found the association of GCS at 48 hrs and GOS at the time of discharge by Chi square test and found a statistical significant association between them, (p value = 0.05). [Figure 4]

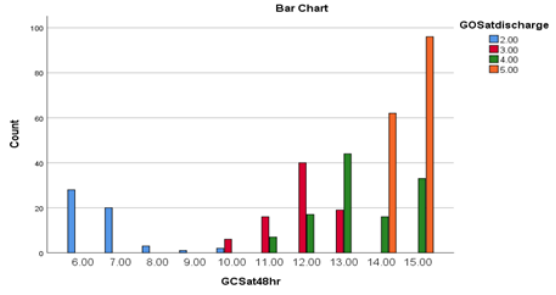

Figure 4: Association of GCS at 48 hrs and GOS at the time of discharge

4. DISCUSSION

Hyponatremia is found to be the most common electrolyte abnormality and is associated with increased morbidity and mortality. Altered sensorium was the most common general symptom in the patients with hyponatremia and was associated with altered behaviour, generalised weakness, lethargy, agitation, psychosis, disorientation, inappropriate behaviour, inattention, confusion, hallucination and so on.

The present study was to evaluate the prevalence of altered sensorium in hyponatremic patients in a tertiary care teaching hospital. The patients who were having a serum sodium less than <135mEq/L were included in our study and found a mean serum sodium level of 123.71 ± 5.61 mEq/L. Similar studies were conducted by Rao *et al.,* [10] and Chatterjee *et al.,*[11] and both the studies reported the mean sodium level as 113.89 and 126.34 mEq/l respectively. Our study included patients of age above 18 years and the maximum number of patients were in age group 50-59(32. It has been reported in several studies that as age increases the possibility of having electrolyte abnormalities also increase as there will be a decline in their renal physiology. Sood, *et al.,*[2] in his study also discussed about the age related factors in elderly. Our study found male (58%) predominance over females (42) with a ratio of 1.4:1 (male:female). Babaliche *et al*.,[12] reported male predominance (59%) in the incidence of hyponatremia. A similar gender distribution pattern was reported by Rahil *et al*.,[13] with more males (62.3%) patients than females (37.7%) presented with hyponatremia.

Out of 410 hyponatremic patients, majority of the patients were found with severe 48.5% followed by moderate hyponatremia 36.1% and in studies conducted by Senthamarai, *et al.,* [5] and Sood, *et al*.,[2] also found similar results.

The commonest type of hyponatremia according to the fluid status noted in our study was hypovolemic hyponatremia (54.1%), followed by hypervolemic hyponatremia (35.9%). In certain studies conducted by Rai *et al*.,[3] Chatterjee *et al.,*[11] and Rao *et al.,*[10] it was found that the common findings among hyponatremia was euvolemia but in contrast to their studies our study found more hypovolemic and hypervolemic patients than euvolemic hyponatremic patients. This may be due to the various comorbidities like diabetes mellitus and hypertension associated with hyponatremia. The predominant comorbidity found in our study was hypertension with diabetes mellitus 77(18.8%). Sood, *et al.,*[2] in their study found hypertension (23.58%) was the most common associated co-morbidity in the patients followed by diabetes (11.32%).

Glassgow Coma Scale (GCS) is a neurological tool having 15 point objective clinical scoring system for assessing changes in patient's conscious level. It depends on the patient's behaviour (eye opening, verbal response and motor response) and their responses towards it. The scores were categorized into mild (13-15), moderate (9-12) and severe (1-8). In our study, we assessed GCS of the patient at the time of admission, at 24hrs and 48hrs and revealed a statistical significant difference between them, like a similar study conducted by Upadhyay, *et al*.,[1] A low GCS score reflects an impaired level of consciousness with a decline in serum sodium level, which is directly having a relation with the sensorium.

We studied the various treatment strategies given for the management of hyponatremia and found that for the correction of hypovolemic hyponatremia 3%NaCl infusion and tablet Natrise (Tolvaptan) given for managing hypervolemic and euvolemic hyponatremia. A study conducted by Tosh *et al*., [15] compared the efficacy of 3%NaCl and tablet Tolvaptan and reported that for managing symptomatic hyponatremia 3%NaCl is used.

The functional outcome of the patient was analysed using Glassgow Outcome Scale (GOS) at 24hrs, 48hrs and at the time of discharge and found statistical significant differences between the groups. We evaluated the association of GCS at 48hrs with GOS at the time of discharge and found a significant association between them. Our study analyse the significant association of functional outcome using GOS in electrolyte abnormality patients with mild, moderate and severe of GCS scale and found that there was a statistically significant association between both which was found to be similar to the study conducted by *Udekwu P et al.,*[16] which concluded that there is a relation between both and mortality falls steeply between a low GCS score**.** *Zafonte RD et al.,*[17] also conducted a study to identify the correlation between GCS and functional outcome and concluded that GCS as a single variable may have limited value as a predictor of functional outcome.

5. CONCLUSION

Electrolyte abnormalities are found to be more frequent in hospitalised patients, among which hyponatremia the most common one that contributes to increased morbidity and mortality is. It was found that increasing age, comorbidities like hypertension, diabetes mellitus and certain drugs are the common etiologic factors associated with hyponatremia.

Decreased sodium levels in elderly patients are related with altered level of consciousness and our study observed a positive correlation of severity and various symptoms associated with hyponatremia. Glassgow coma scale and Glassgow outcome scale are found to be a good predictor for assessing altered sensorium and the functional outcome respectively in hyponatremia and patient with low GCS scale is found to have poor functional outcome.

Early detection and correct assessment of altered sensorium in hyponatremic patients are of great importance for reducing the mortality and morbidity. Timely management including calculation of the rate of correction with suitable interventions may improve the outcome and shortens the length of hospital stay.

6. DECLARATIONS

Conflict of Interest

The Author(s) declare(s) that they have no conflicts of interest to disclose.

Funding

This research received no specific grant from any funding agency in the public, commercial or not.for.profit sectors.

7. Acknowledgement

We thank the management of Karuna Medical College and Hospital, Vilayodi, Chittur and Grace College of Pharmacy, Kodunthirappully, Palakkad for their cooperation during the study period. We also thank the clinical pharmacists of Aster medicity, Kochi and Ms.Amala.T.A (Pharm.D Intern) for their constant support and guidance.

REFERENCES

1. Sonal Upadhyay, Nilima Bhalerao, Shilpa A. Pratinidhi. Study of level of consciousness and electrolyte abnormalities in patients admitted to intensive care unit (ICU). International Journal of Contemporary Medical Research 2017;4(8):1739-1742.
2. Nikhil Sood, Kailash Nath Sharma, Pratibha Himral, Tarun Sharma,Dhiraj Kapoor Clinical profile of patients with hyponatremia in a tertiary care hospital in the Sub-Himalayan region Journal of Family Medicine and Primary Care 2020;9:834-838.
3. Rai NK, Meena LP, Chakravarty J, Rai M, Sundar S. A study to assess the etiology and clinical profile of patients with hyponatremia at a tertiary care hospital. National Journal of Physiology, Pharmacy and Pharmacology 2018;8:497-500.
4. Soiza RL, Hoyle GE, Chua MP. Electrolyte and salt disturbances in older people: Causes, management and implications. Review of Clinical Gerontology 2008;18:143-58.
5. Senthamarai A, Ilango C, Susan AM, Shridharan P, Anandan H. Clinical Profile of Euvolemic Hyponatremia in Elderly Hospitalized Patients in a Tertiary Care Hospital in India. International Journal of Scientific Study 2017;5(6):164-167.
6. Filippatos TD, Liamis G, Christopoulou F, Elisaf MS. Ten common pitfalls in the evaluation of patients with hyponatremia. European Journal of Internal Medicine 2016;29:22-5
7. Badurudeen Mahmood Buhary, Saleh M Alrajhi, Muhammad Abukhater, A.S. Mohamed Kyadudyn, Ahamed Faiz Ali S.M, A. Khalilur Rahman and Abdul Muthalib Hussain, Acid Base Electrolyte Imbalance and Survival Outcome of Low Glasgow Coma Scale (GCS) patients in the Medical Intensive Care Unit, Annals of Medical and Health Sciences Research, 2017, Vol 7; 231-238.
8. Sternbach GL.The Glassgow Coma Scale Journal of Emergency Medicine. 2000 Jul;19(1):67-71.PMID:10863122
9. Jared Knopman, Roger Härtl, Early Prognostic Indicators of Severe Traumatic Brain Injury in International Encyclopedia of Public Health (Second Edition), 2017
10. Rao MY, Sudhir U, Anil Kumar T, Saravanan S, Mahesh E, Punith K. Hospital-based descriptive study of symptomatic hyponatremia in elderly patients. Journal of Association of Physicians of India 2010; 58:667-9.
11. Chatterjee N, Sengupta N, Das C, Chowdhuri AR, Basu AK, Pal SK. A descriptive study of hyponatremia in a tertiary care hospital of Eastern India. Indian Journal of Endocrinology and Metabolism 2012;16:288-91
12. Babaliche P, Madnani S, Kamat S. Clinical profile of patients admitted with hyponatremia in the medical intensive care unit. Journal of Critical Care Medicine. 2017; 21: 819-24.
13. Rahil A, Khan F, Al Badri M. Clinical profile of hyponatraemia in adult patients admitted to Hamad General Hospital, Qatar: Experience with 53 cases. Journal of Clinical Diagnosis and Research. 2009; 3: 1419-25
14. Krishnamurthy H, Srinivas K. "The Hyponatremia." A real masquerader in emergency medicine. International Journal of Contemporary Medicine and Research 2015;4:515-9.
15. Tosh P, Sunil Rajan, Dilesh Kadapamannil, Nandhini Joseph, Lakshmi Kumar Efficacy of Tolvaptan Vs3%hypertonic saline for hyponatremia in post-operative patients Indian J Anaesth 2017;61:996-1001