



Research articles

Comparative study on prevalence and assessment of altered sensorium among sodium abnormality patients at a tertiary care teaching hospital

G.N Sharma¹, P.A Sreeja*¹, B Shrivastava¹, C.I Sajeeth²¹Jaipur National University, Jaipur, India.²Grace College of Pharmacy, Palakkad, India**ABSTRACT**

Altered sensorium or altered level of consciousness is a common complaint among electrolyte abnormality patients and has several synonyms like altered behaviour, generalised weakness, lethargy, agitation, psychosis, disorientation, inappropriate behaviour, inattention, confusion, hallucination. The aim of the study was to evaluate the prevalence and to assess the level of consciousness dysnatremic patients at a tertiary care hospital. A prospective observational study, serum sodium level and other clinical profiles were recorded in a data collection form. GCS was used to analyse the level of consciousness among the enrolled patients. SPSS 22.0 statistical software was used for data analysis. During the study period, a total of 482 patients were enrolled in the study. Based on the serum sodium, they were categorized into Hyponatraemic (410) and Hyponatraemic (72) patients. Our study found a greater number of patients in the age group above 60 years and found that sodium imbalance increases generally in males with increasing age. Our study found that altered sensorium (60%) was predominant more in hyponatremia patients. Chi square test was performed to find statistically significant difference in level of consciousness between hypo and Hyponatraemic patients and was found to be significant p value (≤ 0.05). Abnormalities of plasma sodium are probably the most common electrolyte disorders and they are associated with serious morbidity including a poorer long-term neurologic outcome.

Keywords: Sodium abnormalities, Hyponatremia, Hypernatremia, Glasgow coma scale, Altered sensorium.

Received – 25/07/2021, Reviewed -23/08/2021, Revised/ Accepted- 02/11/2021

Correspondence: P A Sreeja* ✉ sreejavinod318@gmail.com

School of Pharmaceutical Sciences, Jaipur National University, Jaipur, India

INTRODUCTION

Altered sensorium or altered level of consciousness is commonly seen among dysnatremic or sodium abnormalities patients. Dysnatremic is defined as an abnormal level of serum sodium than its normal. The normal serum sodium level is 135 to 145mEq/L and less than 135mEq/l is defined as hyponatremia and more than 145mEq/L is hypernatremia. Sodium abnormalities are found to be associated with increased morbidity and mortality due to the severity of the associated underlying conditions.^[1] Various 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 ^[2] whereas renal deficiencies, fluid loss, increasing age, febrile diseases, burns etc. are contributing to hypernatremia. ^{[3][4][5][6]} Thus, it is more important to recognise, monitor and manage correctly to decrease the severity, morbidity and mortality of such patients.^[7] Abnormalities in electrolyte balances is mathematically measurable

by biochemical parameters in the blood stream determines the clinical indications of interactions between various metabolic events such as sepsis, hormones, vascular events, medications, hydration deficiencies and renal physiology.^{[8][9]} Glasgow Coma Scale is a neurological tool used for assessing the degree of consciousness.^[10]

The aim of our study is to evaluate the prevalence of sodium abnormalities and to compare the degree of altered level of consciousness among hypo and hypernatremic patients using GCS.

MATERIAL AND METHOD

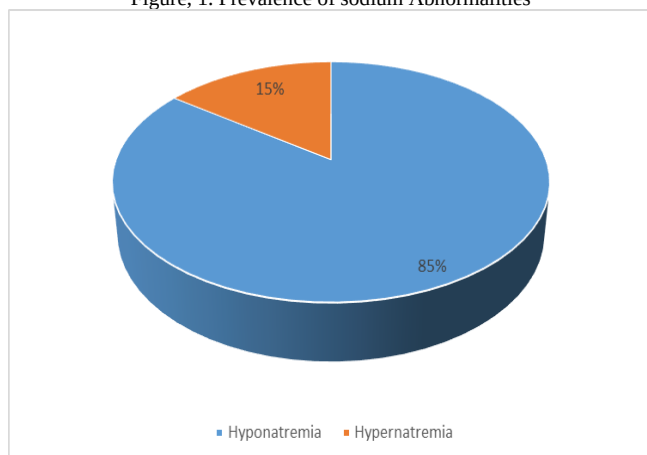
A prospective observational study was conducted for a period of 18 months at a tertiary care teaching hospital, after getting ethical committee clearance. Inpatients of both sex and age above 18years having serum sodium level less than 135mEq/L or more than 145mEq/L were included in our study, and those 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, clinical conditions and treatment chart review of patients. The severity of hyponatremia and hypernatremia were then categorized into mild, moderate and severe based on the serum sodium level. 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. The collected data was entered in MS Excel 2007 for calculating the percentage of various parameters. Continuous variables were expressed in mean $\pm$ standard deviation (mean $\pm$ SD). Comparison of GCS response of hypo and hypernatremia were then performed by Chi square test.

RESULT AND DISCUSSION

A total of 482 patients were enrolled under which 410 patients were hyponatremic and 72 were hypernatremic. George *et al.*,^[10] and Sajadieh *et al.*,^[11] in their study also concluded that hyponatremia was the main cause of electrolyte imbalance which was mostly seen in patients.

Figure, 1. Prevalence of sodium Abnormalities



According to gender wise distribution, in both hypo and hypernatremia, males predominate over female with a percentage of 58% and 42% in hyponatremia and 60% and 40% in hypernatremia. The mean age of enrolled subjects in the study was found to be 46.76 ± 14.44 years and 51.94 ± 12.21 years in hyponatraemic and hypernatremic patients respectively (Range: 18 yrs. and above).

According to the serum sodium level of hyponatraemic patients, they were categorized into mild 63(15.4%), moderate 148(36.1%) and severe 199(48.5%) with a mean $\pm$ 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 hyponatraemic patients was found to be 123.71 ± 5.61 mEq/L. In hypernatremic patients, a serum sodium level of 146-150mEq/L was categorized as mild, 151-155mEq/L as moderate, and more than 155 as severe with a percentage of 12.5, 34.7 and 52.8 respectively. The mean serum sodium level among the hypernatremic patients was

found to be 153.76 ± 3.274 mEq/L. Babalichi *et al.*,^[12] and had also conducted similar studies related to the severity of electrolyte abnormalities.

The various risk factors found in hyponatraemic patients 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%) while hyponatraemic management (34%), excessive salt intake (25%), drug-induced (22%) and patients without any risk factors (19%) were seen in hypernatremic patients. Generally, for patients with hyponatremia were treated with 3% sodium chloride, which causes an overload of sodium if not properly monitored which leads to an increase in sodium level leading the patient to hypernatremia.

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%)], hyperlipidaemia [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%)], haematology [13(3.2%)], dermatological [13(3.2%)], endocrine disorders [10(2.4%)] and patients reported with hyponatremia alone [15(3.7%)]. Among the 72 hypernatremic patients, we found a greater number of patients with renal impairment were having hypernatremia (43%), followed by diabetes mellitus (29%) and a least with hypertension (23%). A similar study was conducted by Ahmad *et al.*, [13] and Sriram *et al.*,^[14] which reveals the association between electrolyte abnormalities and comorbid conditions.

On assessment of symptoms among the enrolled population, under hyponatremia the common symptoms observed 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%), respiratory symptoms 37 (9.0%) while 27 (6.6%) were asymptomatic and among hypernatremic patients the symptoms were thirst (26%) followed by breathlessness (24%), fatigue (18%), seizure and confusion (14%).

Glasgow 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). We compared the statistical differences between GCS scores of altered sensorium among hypo and hypernatremic patients using Chi square test and was found to be significant p value <0.05 .

CONCLUSION

Altered sensorium is a condition that has several symptoms like altered consciousness, confusion, sleep disturbances, lethargy and so on. Altered sensorium is most commonly found among electrolyte abnormality patients. Electrolyte abnormalities are seen as common in most disease conditions, medications and their prevalence increase with age and occur more in males. Electrolyte abnormalities result in increased morbidity and mortality. Glasgow coma scale is found to be a good predictor for assessing altered sensorium and by using more understandable questions can help in detecting it and can lead to better treatment outcomes in such patient.

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.

ACKNOWLEDGEMENT

We thank the management of Karuna Medical College and Hospital, Vilayodi, Chittour 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 (PharmD. Intern) for their constant support and guidance.

REFERENCE

1. Patel M, Paliwal SK, Javed S, 2021. A study of dysnatremia in patients admitted in medical intensive care unit of a tertiary care teaching hospital. *Int J Adv Med*, 8,220-3.
2. Ganesh N Sharma, Sreeja.P.A, B Shrivastava, C.I.Sajeeth, 2020. Prevalence and assessment of level of consciousness and functional outcome among hyponatremia patients at a tertiary care teaching hospital: A prospective study. *IJSR*. 9(10):44-46.
3. Yano T,Uchimura S,Nagahama M,Yonaha T,Taniguchi M,Tsuneyoshi I, 2019.Continuous hemodiafiltration for hyponatremia and a simple formula for stepwise regulation of the sodium concentration in a dialysate. *Journal of clinical anesthesia*. [PubMed PMID: 30660092]
4. Iraqi B,Abilkassem R,Dini N, Agadr A, 2018.A three-year-old boy with hyponatremic hyponatremia syndrome. *The Pan African medical journal*. [PubMed PMID: 30627311]
5. Das MK,Ali MA,Latif T,Islam MN,Hossain MA,Moniruzzaman MM,Oliullah M,Haq SA,Gosh AK, 2018. Comparison of Serum Electrolytes Abnormality and Renal Function Status in Asphyxiated and

Normal Baby in a Tertiary Level Hospital. *Mymensingh medical journal* : MMJ. [PubMed PMID: 30487486]

6. Imai N, Shibagaki Y, 2019. The prevalence of dysnatremia in the elderly patients without CKD. *The American journal of emergency medicine*. [PubMed PMID: 30595426]
7. SD. Subba Rao, Biju Thomas, 2000. Electrolyte abnormalities in children admitted to Paediatric intensive care unit, *Indian Pediatrics*, 37, 1348-135.
8. Arif Kadri Balct, Ozlem Koksai, Ataman Kose, Erol Armagan, Fatma Ozdemir, Taylan Inal, Nuran Oner, 2013. General characteristics of patients with electrolyte imbalance admitted to emergency department *World J Emerg Med*, 4,12-19.
9. Sonal Upadhyay, Nilima Bhalerao, Shilpa A. Pratinidhi, 2017. Study of level of consciousness and electrolyte abnormalities in patients admitted to intensive care unit (ICU). *International Journal of Contemporary Medical Research*, 4(8), 1739-1742
10. Sternbach GL, 2000. The Glassgow Coma Scale *Journal of Emergency Medicine*. ;19(1):67-71.PMID:10863122
11. George Liamis, Eline M Rodeburg, 2013. Electrolyte disorders in community subjects: prevalence and risk factors. *American journal of medicine*.;26:1822-1828
12. Sajadieh A, Binici Z, Mouridsen MR, Nielson OW, 2009. Mild hyponatremia carries a poor prognosis in community subjects. *American journal of medicine*; 122: 679-686.
13. Babaliche P, Madnani S, Kamat S, 2017. Clinical profile of patients admitted with hyponatremia in the medical intensive care unit. *Journal of Critical Care Medicine*.; 21: 819-24
14. Ahmed A ,Zannad F, Love TE, 2007. A prospective matched study of the association of low serum potassium levels and mortality in chronic heart failure. *Eur Heart* 28(11),1334-43
15. Sriram S, Asokan K, Suruthi Priya J.M, Tharani C, Arthy L, Clelyiya N.A., 2020. Study on Electrolyte Abnormality and Quality Outcomes in the Management of Stroke. *International Journal of Scientific Research*. 9(7):152-157

How to cite this article

G N Sharma, P A Sreeja, B Shrivastava, C I Sajeeth, 2021. Sodium abnormalities, Hyponatremia, Hyponatremia, Glasgow coma scale, Altered sensorium. *Jour. of Med. P'cutical & Allied. Sci.* V 10 - I 6, 1565, P- 3837 - 3839. doi: 10.22270/jmpas.V10I6.1565