Journal of Pharmaceutical Research International

33(54B): 314-316, 2021; Article no.JPRI.76679
ISSN: 2456-9119
(Past name: British Journal of Pharmaceutical Research, Past ISSN: 2231-2919, NLM ID: 101631759)

Cross Sectional Study on Hyponatremia

S. Rashmi [a#] and Santhi Silamban [b*†]

[a] Department of Biochemistry, Chettinad Hospital and Research Institute,Chettinad Academy of Research and Education, Kelambakkam-603103, Tamil Nadu, India.
[b] Sri Ramachandra Institute of Higher Education & Research,Porur,Chennai-600116, Tamil Nadu, India.

Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JPRI/2021/v33i54B33793
Editor(s):
(1) Dr. Barkat Ali Khan, Gomal University, Pakistan.
Reviewers:
(1) Belisario Dominguez Mancera, Universidad Veracruzana, México.
(2) Nkiruka Ukibe, Nnamdi Azikiwe University, Nigeria.
Complete Peer review History, details of the editor(s), Reviewers and additional Reviewers are available here: https://www.sdiarticle5.com/review-history/76679

Short Research Article

Received 04 October 2021
Accepted 09 December 2021
Published 13 December 2021

ABSTRACT

Introduction: Sodium is the major extracellular cation, playing important role in maintaining homeostasis. Normal level of serum sodium is between 136-145 mmol/L. Hyponatremia (<136mmol/L) can present with nausea, vomiting, confusion, lethargy, disorientation.Severe hyponatremia (<125mmol/L) can present with seizures, coma or death.
Methods: Our study was a cross sectional, retrospective study including 100 subjects of hyponatremia.
Results: In our study, we analyzed the age-wise distribution, severity and various causes of hyponatremia in each grade of hyponatremia based on severity.
Conclusion: Drug-induced hyponatremia is a more prevalent and a preventable cause and can be avoided by proper monitoring of patients.

Keywords: Hyponatremia; homeostasis; risk factors.

1. INTRODUCTION

Hyponatremia is a pathophysiologic process with water imbalance .So the diagnosis and treatment of the disorder is very important [1]. Various factors affect hyponatremia. Aging is an important factor. Older people are more prone to this disorder because of reduced sodium

[#] Assistant Professor;
[†] Professor of Biochemistry;
**Corresponding author: E-mail: santhisilambanan@gmail.com;*

conserving capacity and total body water. Use of diuretics, cardiac and renal failure is also risk factors [2]. Syndrome of inappropriate anti diuretic hormone secretion is also an important cause for the situation in elderly. Studies have explored an increased chance of cognitive impairment and fracture risk in the elderly with hyponatremia [3]. Early diagnosis of the cases is very important for its treatment. The main aim of treatment is to increase serum sodium levels to a safe range, at the same time avoiding rapid correction of the dyselectrolytemia [4]. The hypo-osmolality and hypotonicity due to reduced serum sodium levels can cause movement of water from extracellular to intracellular space and induce brain swelling. The brain swelling due to hyponatremia can compress brain parenchyma over the skull and increase the mortality [5]. The etiology may be wide and classified as below.

The etiology of hyponatremia [6] may be due hypovolemic, euvolemic or hypervolemic factors. So identification of the underlying cause of the hyponatremic situation will aid in early detection of the cases and prevention of complications. Aim of the study is to analyze age-wise distribution of hyponatremia, grade the severity of hyponatremia and analyze the various causes of hyponatremia in each grade of severity of hyponatremia.

2. MATERIALS AND METHODS

A cross – sectional, retrospective study was conducted in 100 patients admitted at Sri Ramachandra Institute of Higher Education & Research over a period of 6 months. The subjects are allocated into 3 categories by using convenient sampling methods. Adults >20yrs of age admitted with evidence of hyponatremia were included in the study. Exclusion criteria included age group <20 years, pregnancy, pseudo -hyponatremia cases with hyperlipidemia & hyperproteinemia. Patient details including baseline details like age/sex, clinical history, diagnosis, relevant investigations and response to treatment were noted and analyzed.

3. RESULTS

In these baseline demographic details of participants were about 58% are from 60-80 years old and 25% are from 40-60 years, 8% from 20-40 years and 9% from above 80 years old. The sex ratio of the male: female participants are 63:37 respectively. About 51% are diabetic, 36% are hypertensive and remaining 64% are having both Hypertension and Diabetes mellitus. The subjects are grouped into 3 categories of hyponatremia and their mean and SD with the p value significance is analyzed.

The major etiologies under which hyponatremia cases were categorized was under Diabetes Mellitus (DM),Chronic Kidney Disease (CKD), Congestive Cardiac Failure (CCF), Chronic Liver Disease (CLD), Syndrome of Inappropriate Anti Diuretic Hormone production (SIADH),use of diuretics, Acute gastroenteritis (AGE), other causes of infection and miscellaneous causes of unknown aetiology categorised as others

4. DISCUSSION

Acute and chronic hyponatremia can cause increased chances of morbidity and mortality. Organic osmolytes are important in causing adaptive responses like extruding excessive water from the brain by reducing electrolytes and amino acids in the brain. Taurine, glutamine, glutamate, and aspartate are the main amino acid osmolytes which are involved in the adaptive response of the brain to hyponatremia. Encephalopathy, brain damage and death can occur as a complication in severe cases [7-9]. SIADH is a condition of excessive anti-diuretic hormone (ADH) release. This causes renal water reabsorption and ECF volume expansion. The patients have inappropriately concentrated urine, increased urinary sodium with normal or increased intravascular volume. It is one of the most common cause for hyponatremia [10-11].

In our study, hyponatremia was common in the age group of 40-60years. Severe hyponatremia (<125 mmol/l) cases were higher compared to other grades of hyponatremia. More common in individuals with more than 60 years of age with serum sodium levels less than 130mmol/L especially in male population.

Common etiologies in the hyponatremia cases were Chronic Kidney Disease, Infections, diuretic-induced hyponatremiaand acute gastroenteritis.Common etiologies according to severity of hyponatremia are categorized into mild due to CKD, Hypothyroidism, Post-Operative period, CCF and age. Moderate due to infections, use of diuretics, SIADH and severe due to age, CKD and use of diuretics. Rapid correction with hypertonic solutions can cause demyelination and necrotic lesions, so a quick diagnosis and appropriate treatment is important [7].When a differentiation between acute or chronic hyponatremia is not possible, rapid correction has to be done by administration of hypertonic or isotonic saline along with furosemide [11].

Table 1. Stages of Hyponatremia

Severity	Mild (130-135 mmol/L)	Moderate (125-129 mmol/L)	Severe (<125 mmol/L)	p value
No. of cases (n=100)	23	30	47	
Patient values (Mean± SD)	131.83±1.62	126.70±1.56	116.57±6.22	0.0001

5. CONCLUSION

Hyponatremia is common in patients with CKD, post operative period, drug induced, AGE and CCF comparatively. Hyponatremia is a common dyselectrolytemia of clinical importance. Regular monitoring of sodium levels is recommended which can reduce morbidity and mortality. Drug-induced hyponatremia is a more prevalent and a preventable cause and can be avoided by proper monitoring of patients.

CONSENT

As per international standard or university standard, patient's written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

Ethical Clearance for this study was got approved from the Institutional Human Ethical Committee.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Hoorn EJ, Zietse R. Diagnosis and treatment of hyponatremia: compilation of the guidelines. Journal of the American Society of Nephrology. 2017;28(5):1340-9.
2. Sailer CO, Winzeler B, Nigro N, Bernasconi L, Mueller B, Christ-Crain M. Influence of outdoor temperature and relative humidity on incidence and etiology of hyponatremia. The Journal of Clinical Endocrinology & Metabolism. 2019;104(4):1304-12.
3. Soiza RL, Cumming K, Clarke JM, Wood KM, Myint PK. Hyponatremia: special considerations in older patients. Journal of clinical medicine. 2014;3(3):944-58.
4. Nzerue CM, Baffoe-Bonnie H, You W, Falana B, Dai S. Predictors of outcome in hospitalized patients with severe hyponatremia. Journal of the National Medical Association. 2003;95(5): 335.
5. Decaux G. Hyponatremia and the Brain. Kidney International Reports. 2017 Sep 1;3(1):24-35.
6. Papadakis, Maxine A., Stephen J. McPhee, and Michael W. Rabow. Current Medical Diagnosis & Treatment. Fifty-sixth edition. New York: McGraw Hill Education; 2017.
7. Massieu L, Montiel T, Robles G, Quesada O. Brain amino acids during hyponatremia in vivo: clinical observations and experimental studies. Neurochemical research. 2004;29(1):73-81.
8. Madias NE. Horacio J. Adrogué, MD, Nicolaos E, Madias, MD.
9. Moses AM, Miller M. Drug-induced dilutionalhyponatremia. New England Journal of Medicine. 1974;291(23):1234-9.
10. Cluitmans FH, Meinders AE. Management of severe hyponatremia: rapid or slow correction?. The American journal of medicine. 1990;88(2):161-6.
11. Palmer BF. Hyponatremia in patients with central nervous system disease: SIADH versus CSW. Trends in Endocrinology & Metabolism. 2003;14(4):182-7.

Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle5.com/review-history/76679