



CASE REPORT

# Case Report: Severe hyponatremia from psychogenic adipsia [version 1; referees: 2 approved]

Sarah Manning, Rehan Shaffie, Shitij Arora

Division of Internal Medicine, Montefiore Medical Center, Albert Einstein College of Medicine, Bronx, USA

**v1** First published: 11 Jan 2017, 6:34 (doi: [10.12688/f1000research.9181.1](https://doi.org/10.12688/f1000research.9181.1))  
 Latest published: 11 Jan 2017, 6:34 (doi: [10.12688/f1000research.9181.1](https://doi.org/10.12688/f1000research.9181.1))

**Abstract**

Hyponatremia is a common emergency room presentation and carries high mortality. We describe a case of a 56-year-old male patient with who presents with refusal to drink water for several weeks leading to the admission. He was diagnosed with psychogenic adipsia and was treated successfully with fluids, mirtazapine and clonazepam.

**Open Peer Review**

Referee Status:

	Invited Referees	
	1	2
<b>version 1</b> published 11 Jan 2017	 report	 report
<b>1</b> <b>Amapali Brar</b> , SUNY Downstate Medical Center USA		
<b>2</b> <b>Bijin Thajudeen</b> , University of Arizona USA		

**Discuss this article**

Comments (0)

**Corresponding author:** Shitij Arora ([drshitij@yahoo.com](mailto:drshitij@yahoo.com))

**How to cite this article:** Manning S, Shaffie R and Arora S. **Case Report: Severe hyponatremia from psychogenic adipsia [version 1; referees: 2 approved]** *F1000Research* 2017, 6:34 (doi: [10.12688/f1000research.9181.1](https://doi.org/10.12688/f1000research.9181.1))

**Copyright:** © 2017 Manning S *et al.* This is an open access article distributed under the terms of the [Creative Commons Attribution Licence](#), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

**Grant information:** The author(s) declared that no grants were involved in supporting this work.

**Competing interests:** No competing interests were disclosed.

**First published:** 11 Jan 2017, 6:34 (doi: [10.12688/f1000research.9181.1](https://doi.org/10.12688/f1000research.9181.1))

## Introduction

Hypernatremia is a common electrolyte abnormality seen in the emergency department and can carry an estimated mortality of 40–60% depending on the degree of severity<sup>1</sup>. Psychogenic adipsia is a rare cause of hypernatremia and represents a subgroup where chronic long term management is critical as these patients are likely to relapse. There has been a reported case where hypernatremia has been corrected with hemodialysis using a high sodium dialysate to prevent osmotic demyelination syndrome<sup>2,3</sup>. One of the mechanisms involved in psychogenic adipsia is the destruction or improper functioning of osmoreceptors in the hypothalamus that controls the thirst mechanism; this may be a result of a congenital malformation or acquired as in the case of stroke, trauma, or infection<sup>4,5</sup>.

We report a case of hypernatremia with serum sodium as high as 181meq/l and no neurologic manifestations, after patient refused to drink water in the nursing home.

## Case presentation

The patient being described is a 56 year old male with cognitive developmental delay and anxiety who is sent from his assisted living facility with hypernatremia on routine labs and documented refusal to drink water. There were no other complaints. He was afebrile and recorded a blood pressure of 99/97mmHg. Physical exam showed a cachectic male with dry mucous membranes. A complete medication list provided by the patient's assisted living facility included famotidine 40 mg daily, docusate 100 mg daily, and a daily multivitamin.

Laboratory analysis showed a plasma sodium concentration of 181 mEq/L, plasma chloride concentration of 138 mEq/L, and plasma potassium concentration of 4.6 mEq/L. Serum osmolality was revealed to be 359 mOsm/kg. The urine sodium level was less than 20 mEq/L and the urine chloride level was also less than 20 mEq/L. Urine osmolality was 1080 mEq/L. The patient was immediately rehydrated with D5 1/2 normal saline solution not to exceed a correction rate of 6–8 mEq/L of sodium per day. The patient continued to refuse most oral intake and denied thirst. A CT scan was obtained without contrast and showed mild microvascular ischemic disease without evidence of intraparenchymal hemorrhage, acute infarct, or hydrocephalus. No hypothalamic infarct or other mass lesion or focal mass effect were seen. Later in the course of his admission he admitted to severe stress from a recent emotional break up. He was started on mirtazapine 7.5 mg daily and clonazepam 0.25 mg twice daily to address his anxiety and that led to an improvement in appetite and regained thirst mechanism. He was stable when discharged back to his assisted living facility. His sodium remained stable within the normal range when discharged back to his assisted living facility and was normal at 6 months post discharge follow up.

## Discussion

The above case describes a patient with profound hypernatremia devoid of thirst and remarkably asymptomatic on neurologic exam. There are at least two very interesting phenomenon that can be discussed through this case. One is the presence of an intense emotional response and its effect on the thirst mechanism. Thirst is a very powerful mechanism meant to protect against hypernatremia. Functional MRI studies have demonstrated anterior cingulate gyrus as the core are associated with the consciousness of thirst<sup>6</sup>. The same area is also implicated in a number of psychiatric disorders like schizophrenia depression and autism<sup>7</sup>. While osmoreceptors sense the plasma sodium levels, the consciousness of thirst involves a very different and complex limbic system involvement. A patient with a plasma sodium concentration of 150 mEq/L or more who is alert but not thirsty has, by definition, a hypothalamic lesion affecting the thirst center<sup>8</sup>. Psychiatric illness affecting osmoreceptors of the hypothalamus appears to be very rare and very few cases have been reported; one of them involved a 17-year-old boy with psychosis who displayed an impaired thirst mechanism similar to the patient described above. When the psychosis was treated and began to resolve, the thirst mechanism returned<sup>9</sup>. A detailed psychiatric history should be very useful in preventing recurrences and identifying cases with psychogenic adipsia.

The case also highlights the cerebral adaptation to chronic hypernatremia that results in absent neurologic sequelae. The latter response involves an initial uptake of sodium and potassium, followed by the later accumulation of osmolytes; mainly myo-inositol and the amino acid glutamine. The delayed efflux of these osmolytes as seen when the sodium is corrected too rapidly, is what results in cerebral edema, seizures and coma<sup>10</sup>.

In conclusion, psychogenic adipsia represents a rare cause of severe hypernatremia and this case highlights the importance of psychiatric history in patients who present with severe chronic or recurrent hypernatremia.

## Consent

Written informed consent for publication of the patient's details was obtained from the patient.

---

## Author contributions

SM wrote the manuscript, performed the literature search. RS and SA conceptualized and were involved in patient care.

## Competing interests

No competing interests were disclosed.

## Grant information

The author(s) declared that no grants were involved in supporting this work.

## References

---

1. Mount DB: **Fluid and Electrolyte Disturbances**. In: Kasper D, Fauci A, Hauser S, Longo D, Jameson J, Loscalzo J. eds. *Harrison's Principles of Internal Medicine*, 19e. New York, NY: McGraw-Hill; 2015.  
[Reference Source](#)
2. Han MJ, Kim DH, Kim YH, *et al.*: **A Case of Osmotic Demyelination Presenting with Severe Hyponatremia**. *Electrolyte Blood Press*. 2015; **13**(1): 30–6.  
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
3. Sabatine MS: **Pocket Medicine**. Philadelphia: Wolters Kluwer Health/Lippincott Williams & Wilkins; 2011.  
[Reference Source](#)
4. Robertson GL: **Disorders of the Neurohypophysis**. In: Kasper D, Fauci A, Hauser S, Longo D, Jameson J, Loscalzo J. eds. *Harrison's Principles of Internal Medicine*. 19e. New York, NY: McGraw-Hill; 2015.  
[Reference Source](#)
5. Farley PC, Lau KY, Suba S: **Severe hyponatremia in a patient with psychiatric illness**. *Arch Intern Med*. 1986; **146**(6): 1214–1215.  
[PubMed Abstract](#) | [Publisher Full Text](#)
6. Yücel M, Yücel SJ, Fornito A, *et al.*: **Anterior cingulate dysfunction: implications for psychiatric disorders?** *J Psychiatry Neurosci*. 2003; **28**(5): 350–4.  
[PubMed Abstract](#) | [Free Full Text](#)
7. Egan G, Silk T, Zamarripa F, *et al.*: **Neural correlates of the emergence of consciousness of thirst**. *Proc Natl Acad Sci U S A*. 2003; **100**(25): 15241–6.  
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
8. Alpern RJ, Giebisch GH, Hebert SC, *et al.*: **Seldin And Giebisch's the Kidney: Physiology and Pathophysiology**. Amsterdam: Elsevier Acad. Press; 2008.  
[Reference Source](#)
9. Hossain HA, Al Aseri ZA, Suriya OM: **Behavioural induced severe hyponatremia without neurological manifestations**. *Saudi J Kidney Dis Transpl*. 2010; **21**(1): 113–117.  
[PubMed Abstract](#)
10. Heilig CW, Stromski ME, Blumenfeld JD, *et al.*: **Characterization of the major brain osmolytes that accumulate in salt-loaded rats**. *Am J Physiol*. 1989; **257**(6 Pt 2): F1108–16.  
[PubMed Abstract](#)

# Open Peer Review

Current Referee Status:  

Version 1

Referee Report 20 January 2017

doi:10.5256/f1000research.9879.r19222



## Bijin Thajudeen

Division of Nephrology, Banner - University Medical Center Tucson (BUMCT), University of Arizona , Tucson, AZ, USA

Interesting case. It would be more interesting if authors can comment of the role played by mirtazapine in curing the adipsia. One of the side effects of mirtazapine is increased thirst. Mirtazapine increases dopaminergic neurotransmission and dopamine has role in the modulation of thirst. On reviewing some of the case reports which deals with adipsia and psychiatric disorders (depression, schizophrenia), the treatments or intervention (electroconvulsive therapy) used have one thing in common. They all increase dopaminergic activity, supporting the hypothesis that deficiency of dopamine or lack of dopaminergic activity may be playing role in the pathogenesis of adipsia.

Adipsic hyponatremia is uncommon in patients with psychiatric disorders. Hence secondary causes like tumour, histiocytosis, sarcoidosis involving the hypothalamus should be ruled out. An MRI of the brain with or without contrast would be the most appropriate investigation of choice rather than a CT head without contrast.

Patients with adipsic hyponatremias associated with psychiatric disorders will have a normal ADH response and an appropriate increase in urine osmolality.

## References

1. Mittleman G, Rosner AL, Schaub CL: Polydipsia and dopamine: behavioral effects of dopamine D1 and D2 receptor agonists and antagonists. *J Pharmacol Exp Ther.* 1994; **271** (2): 638-50 [PubMed Abstract](#)
2. Nakayama K, Sakurai T, Katsu H: Mirtazapine increases dopamine release in prefrontal cortex by 5-HT1A receptor activation. *Brain Res Bull.* 2004; **63** (3): 237-41 [PubMed Abstract](#) | [Publisher Full Text](#)
3. Saker P, Farrell MJ, Adib FR, Egan GF, McKinley MJ, Denton DA: Regional brain responses associated with drinking water during thirst and after its satiation. *Proc Natl Acad Sci U S A.* 2014; **111** (14): 5379-84 [PubMed Abstract](#) | [Publisher Full Text](#)
4. Phillips MG, Gabow PA: Psychogenic adipsia in a patient with psychotic depression. *Am J Kidney Dis.* 1990; **15** (6): 592-4 [PubMed Abstract](#)
5. Landau AM, Chakravarty MM, Clark CM, Zis AP, Doudet DJ: Electroconvulsive therapy alters dopamine signaling in the striatum of non-human primates. *Neuropsychopharmacology.* 2011; **36** (2): 511-8 [PubMed Abstract](#) | [Publisher Full Text](#)
6. Farley PC, Lau KY, Suba S: Severe hypernatremia in a patient with psychiatric illness. *Arch Intern Med.* 1986; **146** (6): 1214-5 [PubMed Abstract](#)

**I have read this submission. I believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.**

**Competing Interests:** No competing interests were disclosed.

Referee Report 20 January 2017

doi:[10.5256/f1000research.9879.r19526](https://doi.org/10.5256/f1000research.9879.r19526)



**Amarpali Brar**

Department of Medicine, SUNY Downstate Medical Center, Brooklyn, NY, USA

Sarah Manning and co-authors present a case of psychogenic adipsia and hypernatremia. Overall the case report is well written. Although previously described as cited by authors and also additionally reported by others as listed below<sup>1,2</sup>, this is a known clinical presentation.

This case report will add to literature on this rare clinical presentation.

Urine osmolality units should be changed to mOsm/kg.

Add other published reports about this presentation in discussion.

#### References

1. Phillips MG, Gabow PA: Psychogenic adipsia in a patient with psychotic depression. *Am J Kidney Dis.* 1990; **15** (6): 592-4 [PubMed Abstract](#)
2. Choi JH, Lee HS, Kim SM, Kim HY, Kwon SK: Paranoid Adipsia-induced Severe Hypernatremia and Uremia treated with Hemodialysis. *Electrolyte Blood Press.* 2013; **11** (1): 29-32 [PubMed Abstract](#) | [Publisher Full Text](#)

**I have read this submission. I believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.**

**Competing Interests:** No competing interests were disclosed.

---