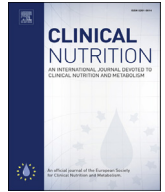




Contents lists available at ScienceDirect

Clinical Nutrition

journal homepage: <http://www.elsevier.com/locate/clnu>

Letter to the Editor

Charlotte Bronte, Re-feeding Syndrome and a case for checking a life or death electrolyte

Dear Editor,

We read with enthusiasm the article of Charlotte Bronte and Refeeding Syndrome by Alison and Lobo and concur this death was likely unavoidable without electrolyte evaluation and appropriate medical nutrition therapy [1]. But even today when a woman presents with hyperemesis gravidarum an important electrolyte is absent in the opening salvo of care: phosphorus. The current basic metabolic panel includes calcium, sodium, potassium, chloride, carbon dioxide, BUN, creatine and glucose.

Phosphorus, the 5th most abundant mineral in the body, is a critical component of the life-sustaining ATP molecule (adenosine tri-phosphate), required by all cells of body and brain for energy metabolism. Research indicates 2–3% of hospitalized patients admit with hypophosphatemia, increasing to 28% in critical care units with profound consequences [2,3] (see Table 1).

Complications arise when malnourished persons are aggressively re-fed and experience “Refeeding Syndrome” or “Nutritional Recovery Syndrome”, first reported in prisoners and Holocaust survivors after WWII [4]. During starvation, insulin secretion decreases in response to reduced carbohydrate supply. The resultant fat and protein metabolism deplete intracellular electrolytes; in particular, phosphorus. With re-nourishment, the sudden shift to (renewed) carbohydrate metabolism stimulates insulin secretion, resulting in cellular uptake of electrolytes into new cells with a corresponding fall in serum electrolytes, including phosphorus, with lethal consequences [5]. Complications occur because phosphorus cannot be incorporated into the ATP molecule at a rate new tissues demand [3].

Evaluating serum phosphorus on admission and on-going monitoring of at-risk patients, particularly those receiving dextrose as part of rehydration fluids and appropriate nutritional intervention, may reduce metabolic complications, mortality and health care costs.

Table 1

Effects of phosphorus depletion.

Severity	Serum phosphorus	Symptoms
Moderate	1.5–2.2 mg/dL	Respiratory muscle weakness, difficulty swallowing, confusion
Severe	<1.5 mg/dL	Seizures, coma, cardiac failure, sudden death

Conflict of interest

None declared.

References

- [1] Alison SP, Lobo DN. The death of Charlotte Bronte from hyperemesis gravidarum and refeeding syndrome: a new perspective. *Clin Nutr* 2019 Feb 10. <https://doi.org/10.1016/j.clnu.2019.01.027>.
- [2] Padelli M, Leven C, Sakka M, Plee-Gautier E, Carre JL. Causes, consequences and treatment of hypophosphatemia: a systematic review. *Presse Med* 2017 Nov;46(11):987–99 (in French).
- [3] Canada TW, Lord LM. Chapter 7: fluid, electrolytes, and acid-base disorders. In: Mueller CM, editor. *The A.S.P.E.N. Adult nutrition support core curriculum*. 3rd ed. 2017. p. 113–37. Silver Springs, MD.
- [4] Gomez F, Galvan RR, Munoz GC. Nutritional recovery syndrome: preliminary report. *Pediatrics* 1952;10(5):513–26.
- [5] Majumdar S, Dada B. Refeeding syndrome: a serious and potentially life-threatening complication of severe hyperemesis gravidarum. *J Obstet Gynaecol* 2010 May;30(4):416–7.

Miriam Erick
Brigham and Women's Hospital, Department of Nutrition, Boston, MA,
02115, USA
E-mail address: miriamerick@comcast.net.

28 May 2019