

Severe Hyponatremia in Exclusive Breast-Feeding Neonate: A Case Report

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Abstract Neonatal hyponatremia is a potentially lethal condition related with cerebral oedema, intracranial hemorrhage and convulsion. Hyponatremia was previously thought to be unusual in breastfed babies but the incidence of hyponatremia and hyponatremic dehydration is rising. This case report aimed to emphasize the importance of early recognition and timely intervention of neonatal breast milk hyponatremia significantly reduces the consequences. A 13 days old female neonate, weighing 2.1 kg was admitted to the Neonatal intensive care unit (NICU) with complaints of lethargy, unable to breast feed for 3 days before admission and the baby was not urinating adequately for 20 hours before admission. Mother was 31 years primigravida healthy, pregnancy was uneventful. Baby's birth weight was 3.3 kg on exclusive breast feeding. On examination the baby was sick, lethargic, markedly wasted and had clinical evidence of severe dehydration. On admission laboratory findings showed severe hyponatremia. The initial serum sodium was 175.9 mmol/L, serum creatinine 1.98mg/dl. Initially the patient was given bolus of isotonic saline 20 ml/kg. Then hyponatremia was managed by gradual and slow correction over 72 hours with baby saline. Mother's serum electrolytes were within normal limits. Breast milk electrolytes results showed sodium 95 mmol/L (normal; 13 mmol/L), potassium 7.1 mmol/L, and chloride 75 mmol/L. Under constant supervised management serum sodium and creatinine returned to normal at 4th day of admission. Initial twenty-four hours baby was nothing per oral then naso-gastric feeding started with expressed breast milk. Initially parents refused to give breast milk but assuring that this high breast milk sodium decreases as time progresses, and then they agreed to give breast milk. The baby was on exclusive breastfeeding at 4th day of admission and discharged at 6th day of admission. Discharged weight was 2.9 kg. Final diagnosis was severe hyponatremia with hyponatremic dehydration. The cause of hyponatremia was due to breast milk.

Keywords Neonate, Exclusive breast feeding, Hyponatremia, Hyponatremic dehydration

1. Introduction

The benefits of exclusive breast feeding of a baby are well-known [1]. It reduces the incidence of many acute infections and chronic diseases and improved neurodevelopmental outcomes of the baby [2]. Hyponatremia, a frequently encountered electrolytes disorder is defined as a serum sodium level greater than 145 mmol/L. Serum sodium of >160mmol/L is often regarded as severe hyponatremia. In neonate, hyponatremic dehydration may be suspected as a weight loss of more than 10% of birth weight at the end of the first week of life [3].

Hyponatremia was previously thought to be unusual in breastfed babies but recent reports suggested that the incidence of hyponatremia and hyponatremic dehydration is rising [4]. Failure to diagnose neonatal hyponatremia can have serious consequences including cerebral edema, seizures, intracerebral hemorrhage, vascular thrombosis and death [1,5]. In this case report, we describe a case of severe hyponatremia with hyponatremic dehydration in a neonate who is exclusively breastfed with a review of the literature.

2. Case Presentation

A 13 days old term female neonate, weighing 2.1 kg was admitted to the Neonatal Intensive Care Unit (NICU) of North East Medical College Hospital (NEMCH) due to complaints of baby being lethargic, unable to breast feed for 3 days before admission and baby was not urinating

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adequately for 20 hours before admission but no history of loose motion, vomiting, convulsion and jaundice. Baby was born by caesarean section due to mother's desire, because mother was concerned about cerebral palsy which she observed in a case of her relative's vaginal delivery. Mother was 31 years old primigravida healthy, had no history of PIH, GDM and pregnancy was uneventful. Baby's birth weight was 3.3 kg. After birth, the baby was seen by a paediatric consultant and parents were assured that the baby was well. The neonate was on exclusive breastfeeding. On examination the baby was sick, lethargic, markedly wasted and had clinical evidence of severe dehydration. Her vital signs were: respiratory rate 45 breaths/minute, heart rate 160 b/min, temperature 99°F. Oxygen saturation was 94% without oxygen. Skin was doughy, and the anterior fontanelle was depressed. Examination of heart, lungs were unremarkable and abdomen was scaphoid. Neurologically she was extremely lethargic, with a weak cry and marked hypotonia. Moro reflex was poor and sucking was intermittent. A provisional diagnosis of sepsis with severe dehydration was made. Baby's birth weight was 3.3 kg and the admission weight was 2.1 kg. Weight loss 36.3%.



Figure 1. During admission at NICU, NEMCH, Sylhet, Bangladesh

On admission laboratory findings showed severe hyponatremia. The initial serum sodium was 175.9mmol/L and potassium was 5.1mmol/L, serum creatinine 1.98mg/dl, random blood sugar was 5mmol/L, serum calcium 9.5mg/dl, and sepsis screen was negative. ABG at the time of admission showed metabolic acidosis. Hemoglobin 18g/dl, TLC- 4700/cumm and platelets count 250000/cumm. Blood was sent for culture and sensitivity. She (patient) was diagnosed as a case of severe hyponatremia with hyponatremic dehydration.

She was given a bolus of isotonic saline 20 ml/kg over 60 minutes, IV antibiotics started with intravenous injection ceftazidime and injection ampicillin. Then sodium excess was managed by gradual and slow correction over 72 hours with baby saline (composed of 0.225% NaCl and 5% dextrose). The baby required 200 ml /kg /day (1.3 times maintenance) of fluids from day 1 to day 3 to correct hydration status. Serum electrolytes were measured 12 hours intervals and serum creatinine daily.



Figure 2. During discharge from the NEMCH, Sylhet

As there was no apparent cause of hyponatremia found, further evaluation was started. At that time mother gave history of taking added salt with food. Then mother's breast milk was taken into consideration. As it is relatively a rare phenomenon, 2 samples of mother's breast milk were collected and sent to two different laboratories for breast milk electrolytes test. Mother's serum electrolytes were also done and results were within normal limits. Breast milk electrolytes results showed sodium 95 mmol/L (normal; 13 mmol/L), potassium 7.1 mmol/L, and chloride 75 mmol/L. Results from both laboratories were almost the same. So, it was quite evident that the breast milk is the source of hyponatremia of the baby.

Under constant supervised management with proper rehydration and maintaining intake output chart. Serum sodium levels and serum creatinine returned to normal at day 4 of admission. Baby's general condition dramatically improved, urine output became normal, and the baby became more active. Blood culture showed no growth, antibiotics stopped at day 5. Initial twenty-four hours baby was nothing per oral then naso-gastric feeding started with expressed breast milk. Initially parents refused to give breast milk but assuring that this high breast milk sodium decreases as time progresses then they agreed to give breast milk. The baby was on exclusive breastfeeding at 4th day of admission and discharged at 6th day of admission. The discharged weight was 2.9 kg. The final diagnosis was severe hyponatremia with hyponatremic dehydration. The cause of hyponatremia was due to breast milk.

3. Discussion

Breast milk hyponatremia in neonates was thought to be unusual until the late 1970s in the USA and western countries but was never in the discussion in countries like Bangladesh. Since 1990 there have been increased reported cases from countries like England, USA, Hong Kong, India [6,7,8]. In those cases, serious complications like seizures, disseminated intravascular coagulation, cerebrovascular accidents and even deaths were reported. It is normal over the 1st week of life for the neonate to lose as much as 7% of birth weight through normal diuresis. Neonates should start to gain weight thereafter and regain their birth weight by the

10th day of life. Rapid weight loss or weight loss >7% of birth weight is a cause for concern. The first signs of neonatal dehydration include the failure to have bowel movements or the presence of urate crystals, combined with weight loss [9]. Fortunately, in our case no serious complications were developed before or during treatment. We studied different cases from various journals and found that this baby was an ideal case of neonatal severe hyponatremia on exclusive breast feeding. Hyponatremic dehydration is notoriously difficult to diagnose on clinical examination alone, as skin turgor is preserved; the anterior fontanelle can retain its normal fullness, and urine output, although reduced, is maintained even in the face of severe dehydration [10]. The clinical features are a spectrum, from an alert and hungry child who appears relatively well to a child who is lethargic, irritable and even moribund. [11] Sodium content of breast milk at birth is high and declines rapidly over the subsequent days. In 1949, Macy established mean Na⁺ content of colostrum in first 5 days is 22 mmol/L and transitional milk from day 5 to day 10 is 13 mmol/L and of mature milk after 15 days is 7 mmol/l. [12,13] Hyponatremia may be associated with hyperglycemia and mild hypocalcemia, the mechanism of which is not known. [5] Hyperglycemia was noted in 13 out of 42 reported cases of breastfeeding associated hyponatremia by Van Amerongen *et al.* [14] In this case has no hyperglycemia or hypocalcemia observed. Hyponatremia in neonates is entirely preventable, If the right steps can be taken quickly and in a timely manner.

4. Conclusions

The study can be safely concluded that breast feeding associated neonatal hyponatremia is not as rare as it is commonly believed. Poor feeding and weight loss could be a reason to suspect neonatal hyponatremia in an otherwise healthy baby. In this particular case we suggest, close monitoring of weight and hydration status of exclusively breast-fed babies and earlier intervention if weight loss exceeds 10% of birth weight reduces the consequences of neonatal hyponatremia. This case had a happy ending if not detected early and intervention delayed outcome may have been entirely different.

REFERENCES

- [1] Suliman OSM. Dying for milk: A neonate with severe hyponatremia associated with breast feeding. *Sudan J Paediatr* 2015; 15(2): 55-62.
- [2] Moritz, M.L., Manole, MD., Bogen, DL and Ayus, JC. Breastfeeding-Associated Hyponatremia: Are We Missing the Diagnosis? *Pediatrics*, 2005; 116; e343, DOI: 10.1542/peds.2004-2647.
- [3] Jagadish C das. Hyponatremic Dehydration in Newborn Infants: A Review *Ulutas Med J.* 2015; 1(2): 22-25.
- [4] Majawar NS, Jaiswal AN. Hyponatremia in the Neonate: Neonatal hyponatremia and hyponatremic dehydration in neonates receiving exclusive breastfeeding. *Indian J. Critical Care Med*, 2017 Jan; 21(1): 30-33.
- [5] Greenbaum LA. Fluid and Electrolyte Disorders. In: Kliegman RM, ed. *Nelson Textbook of Pediatrics*. 21th edition. Philadelphia: Elsevier; 2020. pp392-398.
- [6] Cooper WO, Atherton HD, Kahana M, Kotagal UR. Increased incidence of severe breast-feeding malnutrition and hyponatremia in a metropolitan area. *Pediatrics* 1995; 96: 957-960.
- [7] Van der Heide PA, Toet MC, van Diemen-Steenvoorde JA, Renardel DL, De jonge GA. [Hypertonic dehydration in "silent" malnutrition of breast-fed infants]. *Ned Tijdschr Geneesk* 1998; 142: 993-5.
- [8] Oddie S, Richmond S, Coulthard M. Hyponatremic dehydration and breast-feeding: a population study. *Arch Dis Child* 2001; 85: 318-320.
- [9] Livingstone VH. Problem-solving formula for failure to thrive in breast-fed infants. *Can Fam Physician*. 1990; 36: 1541-1545.
- [10] Shivaprakash NC, Ahmed T. Hyponatremic dehydration in newborns. *Int J Contemp Pediatr* 2015; 2: 260-262.
- [11] Laing IA, Wong CM. Hyponatremia in the first few days: is the incidence rising? *Arch Dis Child Fetal Neonatal Ed.* 2002; 87: F158-162.
- [12] Koo WW, Gupta JM. Breast milk sodium. *Arch Dis Child.* 1982; 57: 500-502.
- [13] Laing IA. Hyponatremic dehydration in newborn infants. *Acta Pharmacol Sin.* 2002; 23: 48-51.
- [14] Van Amerongen RH, Moretta AC, Gaeta TJ. Severe hyponatremic dehydration and death in a breast fed infant. *Pediatr Emerg Care* 2001; 17: 175-180.