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HYPERNATREMIA IN EXCLUSIVELY BREASTFED NEONATES, CASE SERIES FROM NURSERY, TATA MAIN HOSPITAL, JAMSHEDPUR

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ABSTRACT

Hypernatremic dehydration occurs in neonates because of inadequate breastfeeding in an exclusively breast fed baby. Though hypernatremia due to insufficient breast feeding is an infrequent entity the incidence is on the rise. Hypernatremic dehydration should always be kept in the differential diagnosis of exclusively breastfed babies who present with more than expected weight loss, refusal to feed, lethargy, jaundice, seizures or decreased urine output. Here we present 3 term neonates, in the first three weeks of life, who presented with more than physiological weight loss and severe dehydration, whose initial serum sodium levels were above 170mEq/l. With institution of appropriate fluid protocol as per unit policy serum sodium levels gradually came down in next 72 hours. After complete work-up we came to the conclusion that breast milk was the source of high sodium load for the babies. Therefore, awareness and early recognition of this potentially fatal but treatable clinical condition is desirable for favorable outcomes in newborn babies.

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INTRODUCTION

Hypernatremia is defined as a serum sodium concentration > 145 mEq/l. Neonatal hypernatremic dehydration results from inadequate transfer of breast milk from mother to infant. It is a known fact that breast feeding is associated with decreased incidence of many acute infections and chronic diseases as well as improved neurodevelopmental outcomes [1]. However, inadequate breast feeding has got many serious complications, most important being hypernatremic dehydration [2]. Breast milk sodium levels usually fall to normal levels in first two weeks of life but can remain high if appropriate feeding pattern could not be established. Therefore hypernatremia, if not picked early and managed accordingly, can have disastrous complications like seizures, intracranial hemorrhages,[3] vascular thrombosis,[4] and death [5].

Patient 1- A 13 day old term male baby delivered vaginally with uneventful perinatal history, birth weight being 2.5kg, discharged on day 3 of life, came back with complaints of decreased feeding, fever, and not gaining weight, on day 13 of life. The baby was being breastfed exclusively. Admission weight was 1.8kg, baby was lethargic, severely dehydrated, cold extremities, capillary refill time was 3seconds, heart rate 180/min, respiratory rate 45/min, other systemic examination were normal. After giving initial fluid boluses, relevant investigations were sent and empirical antibiotics Cefoperazone-Sulbactam and Amikacin, as per unit policy, were started. Serum sodium was 172meq/l, CBC, CRP, serum

potassium, creatinine, CSF analysis were normal. Since no other cause of sodium excess for the baby at day13 of life could be attributed, a diagnosis of breastfeeding hypernatremia was made. Urine sodium and specific gravity was ordered and found to be high. Appropriate fluid correction (free water deficit, water deficit in excess of electrolytes calculated. Half deficit plus maintenance in first 24 hours, rest half deficit in next 24 hours) as per our NICU protocol was instituted for next 48 hours and breastfeeding was withheld. Breast milk sodium levels were analyzed by flame photometer IL943 and found to be 80 mEq/l (normal being 8±2 mEq/l)[6]. The serum level of Sodium gradually came down in the baby in next 50 hours without any further complications, breastfeeding was restarted and baby was observed for next 3days on exclusive breastfeeding. Serum sodium levels were monitored daily which did not show further rise. Baby was discharged on exclusive breastfeeding on day19 of life. Follow-up serum sodium done on 22nd day of life was within normal range.

Patient 2- Eight day old, breastfed male baby, delivered vaginally with birth weight of 3 kg, discharged on day 3 of life, presented with not gaining weight and lethargy. At admission, 25% weight loss was documented with severe dehydration. Initial serum sodium level was 175 mEq/l; breast milk sodium level was 65 mEq/l. Other relevant investigations are presented in table-1. Baby managed with same fluid protocol but discharged on formula feeds, since on reinstatement of breast feeds serum sodium was again rising as documented on day12 of life. The patient was followed on 14th

day and again on 18th day when repeat breast milk sodium was done which was within normal range and hence baby was switched over to exclusive breastfeeding. This could be because of the fact that breast milk sodium level usually comes to normal range between 2nd to 3rd weeks of life.

Patient 3- Seventeen day female baby born by LSCS, presented with decreased feeding and not gaining weight, weight loss of 30% of birth weight, while on breast feeds. Initial serum sodium was 178 mEq/l and breast milk sodium was 94 mEq/l. Signs of severe dehydration were present. The patient was treated with same fluid protocol as described for the first patient. Persistent hyperglycemia was observed in this baby (random blood sugar level 200-300 mg/dl) during fluid correction, getting normalized only when sodium levels came down, hence highlighting the fact that insulin use to be discouraged in such patients. The baby was discharged on exclusive breast feeding on day 21 of life. The baby was followed up on day 24 of life and normal serum sodium and glucose levels were observed. Hyperglycemia and hypocalcemia are associated with hypernatremia the cause of which is not known [7]. All relevant details of the cases are given in the below mentioned Table 1.

removal from the breast [10]. Hypernatremic dehydration needs to be corrected slowly over 48-72 hours after calculating free water deficit and level of dehydration, the rate of fall of sodium should be 0.5 mEq/kg/hour as rapid fall in sodium levels during therapy can precipitate seizures.

It is unclear why the incidence of breastfeeding associated hypernatremia may be increasing, but it does not seem to be attributable to early discharge from the hospital or to a higher incidence of breastfeeding. Studies indicated that early discharge was not associated with increased readmission rates. The history and clinical examination should be meticulous to observe signs of dehydration, as extracellular fluid volume remains preserved in early hypernatremia. However, weight loss and inadequate stooling are sensitive indicators of dehydration among breastfed infants and should be included in the history of all infants presenting for evaluation of jaundice, fever, weight loss and lethargy.

CONCLUSION

It is desirable to obtain breast milk and urinary sodium levels in babies who have been discharged on exclusive breast

Table 1

Clinical/lab features	Normal lab references	Patient 1	Patient 2	Patient 3
Parity, delivery mode, sex		Primi, NVD, male	Primi, NVD, male	Multipara, LSCS, female
Birth weight in grams		2500	3000	2800
Admission weight in grams		1800	2250	1960
Weight loss in %		28	25	30
Presentation		Fever, lethargy, decreased urine	Not gaining weight, lethargy	Not gaining weight, decreased feeding
Degree of dehydration		Severe	Severe	Severe
Septic screen, CSF		Normal	Normal	Normal
Urine sodium (mEq/L)	20-40	86	94	104
Urine specific gravity	1033	1025	1025	1030
Breast milk sodium (mEq/L)	8±2	80	65	94
Blood urea (mg/dL)	20-40	129	136	150
Serum sodium (mEq/L)	135-145	172	175	178
Serum creatinine (mg/dL)	0.5-1.5	1.2	1	1.3
Problems during fluid correction		Nil	Nil	Nil
Discharged on		Breast feeding	Formula feed	Breast feeding
Any other problems		Nil	Nil	Hyperglycemia
Follow-up		Uneventful	Uneventful	Uneventful

DISCUSSION

Though the incidence of breastmilk hypernatremia seems a rare entity, in a recent population based study of severe neonatal hypernatremia, Oddie *et al* [8] found an incidence of 7 per 100,000 over a one year period in the UK and the Republic of Ireland. There are many causes of high breast milk sodium in early neonatal period like mastitis, cystic fibrosis and adrenal insufficiency, but in our patients, high urinary sodium and specific gravity along with high breast milk sodium levels indicated that breast milk was the only source of excess sodium load for the babies. Sodium content of breast milk at birth is high and declines rapidly over the subsequent days usually between end of 2nd week and 3rd week. A study conducted by Morton [9] on the breast milk of 130 women as they began to breast feed showed women who failed to establish a good breast feeding habit did not show the normal decline in sodium content. Primary insufficient lactation is rare. Poor milk production is usually secondary to poor milk

feeding and came back to NICU with complaints of not gaining weight or have lost more than expected birth weight. High blood glucose value during fluid therapy is not to be confused with neonatal diabetes, thus avoiding unnecessary insulin therapy as glucose levels get corrected with lowering of sodium levels. Because severe hypernatremia can have disastrous consequences acutely and also long-term developmental disability [12], early diagnosis, appropriate management and routine follow-up are needed to manage these babies.

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