



HYPERNATREMIC DEHYDRATION IN TERM NEONATES IN NEONATAL PERIOD

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(ABSTRACT) **Background:** Hypernatremic dehydration in neonates is a potentially devastating condition which adversely affects central nervous system and may have neurodevelopmental sequelae. Recent reports have identified inadequate breast feeding as a key factor in its pathophysiology.

Material & Methods: The study was conducted on Term previously healthy neonates less than 28 days of age who were admitted to NICU of CAIMS, Karimnagar, to identify, and classify possible causes and clinical presentation of hypernatremic dehydration.

Results: Seventeen cases of hypernatremic dehydration were identified. Newborn Infant weight loss ranged from 6.5% to 34% of birth weight, and serum sodium levels ranged from 146 mmol/L to 211 mmol/L. In each case, maternal or infant factors, (e.g poor breast-feeding technique, lactation failure following postpartum complications and infant suckling disorders associated with cleft palate), climate conditions resulting in hypernatremic dehydration are identified.

Conclusion: Hypernatremic dehydration is relatively common among exclusively breast fed neonates. Regular weight monitoring, adequate breast feeding and providing thermoneutral environment should be encouraged for preventing hypernatremic dehydration.

KEYWORDS : hypernatremia, dehydration, term neonate, exclusive breastfeeding

INTRODUCTION:

Hypernatremic dehydration is a potentially devastating condition. The number of case reports of hypernatremic dehydration in neonates in the last few years has increased¹⁻³ Recent studies have identified inadequate breast-feeding as a key factor.

Early postpartum hospital discharge may leave mothers poorly prepared for breast-feeding and may contribute to increased neonatal morbidity⁴. Some breastfeeding mothers perceive their milk supply is inadequate or recognize their baby is failing to thrive and rapidly resort to bottle feeding⁵. In contrast, other mothers are aware of the unique characteristics of breast milk and persist with exclusive breastfeeding, reluctant to give additional formula despite excessive neonatal weight loss. These babies are at risk of developing hypernatremic dehydration, with the potential for seizures and permanent neurological and vascular damage if their condition is not recognized and treated early⁶. The low sodium content of breast milk can protect the neonates from hypernatremia. Therefore, the most common cause of hypernatremia in newborns is hypernatremic dehydration due to increased insensible water loss associated with high environmental temperature and/or inadequate breast milk ingestion⁷. It is normal over the first week of life for the neonate to lose as much as 7% of its birth weight through normal diuresis. Neonates should start to gain weight within a few days and regain their birth weight by the tenth day of life. Either rapid weight loss or loss greater than 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 in urine, combined with weight loss.

Neonates with hypernatremic dehydration have better preservation of intravascular volume and therefore, they are protected against hypotension and oliguria; in this case, the neonates are initially less symptomatic and therefore medical diagnosis might be delayed⁷.

The purpose of this study was to identify and classify possible underlying causes of neonatal hypernatremic dehydration and to encourage paediatricians to perform careful breast-feeding assessments, counselling about temperature management, so that neonates at risk for dehydration can be identified.

MATERIALS & METHODS:

This is an observational study conducted over a period of three years.

Term healthy neonates who were less than 28 days of age, exclusively breastfed admitted in NICU of CAIMS (a tertiary care center in Bommakal, Karimnagar) with serum sodium concentrations exceeding 145 mmol/L were identified. Significant weight loss was defined as more than 10% cumulative weight loss within first 7 days of life. Detailed medical history was obtained from maternal medical records and from direct questionnaire to mothers.

Data were obtained from the standard clinical breast-feeding assessment, routinely performed on mothers. This assessment included a detailed maternal and infant history and examination, an observation of breast-feeding, a standard test feed (i.e., measurement of infant's weight before and after a feed) and the volume of residual pumped breast milk. Total of 17 cases were identified with hypernatremic dehydration and evaluated. The study was approved by institutional local ethical committee, and the informed consent were obtained from parents.

RESULTS:

Seventeen cases of hypernatremic dehydration in breast-fed neonates were identified (Table 1); Infant age at presentation ranged from 2 days to 27 days. Presenting complaints included weight loss, failure to gain weight, lethargy, poor feeding, dull activity, decreased urine output and vomitings. one neonate had documented seizures. 14 neonates were exclusively breast-fed and 3 had been supplemented with approximately 30 mL of expressed milk every 2-4 hours for the 48 hours prior to admission.

Infant birth weight ranged from 2250 g to 3100 g, and weight loss ranged from 6.5% to 34% (mean 20.2%) of birth weight. On initial examination signs of dehydration (i.e., dry mucous membranes, sunken fontanelle, poor skin turgor) were noted in only 7 cases. No other underlying pathological conditions were detected. Infant serum sodium on initial testing ranged from 146 mmol/L to 211 mmol/L (mean 178 mmol/L).

14(82.3%) neonates presented in first week of life. There is no significance with gender. 14(82.3%) mothers were primigravida and 16(95%) had caesarean sections. 8(47.2%) babies presented in summer months. 12(70%) neonates presented with dull activity and refusal of feeds, 2(11.6%) with vomitings, 1(5.8%) with hyperbilirubinemia, 1(5.8%) with decreased urine output, 1(5.8%)

with seizures. The baby presented with seizures died during treatment with acute renal failure.

Table 1 : Age of presentation

Age	No of cases	percentage
1-7 days	14	82.3
8-14 days	02	11.7
15-21 days	00	00.0
22-28 days	01	05.8

Table 2 : Demographic profile

	No of cases	Percentage
Male	10	58
Female	07	42
Primi	14	82
Multi	03	18
LSCS	16	94.2
NVD	01	05.8

Table 3 : Season of presentation

Season	No of cases	percentage
Summer	08	47.2
Winter	07	41.1
Rainy	02	11.7

Table 4 : Clinical presentation

Age	No of cases	percentage
Lethargy, not accepting feeding	12	70
Vomitings	02	11.6
Jaundice	01	05.8
Seizures	01	05.8
Decreased urine output	01	05.8

Table 5: Investigations

Serum sodium (mmol/lit)		
146-159	11	64.7%
160-179	05	29.4%
180-211	01	05.8
Renal function tests		
Normal	16	95
Abnormal	01	05

Discussion:

In each of our cases there was a correlation between inadequate breast-feeding due to primiparity, LSCS and neonatal hypernatremic dehydration.

Maternal or infant factors that preexisted could have affected different phases of lactation or breastfeeding and resulted in inadequate breast-feeding; prenatal or early postpartum screening could have identified all of these factors.

Fourteen of the mothers were primiparous, and this may represent a compounding factor because the mothers lacked experience and failed to recognize the severity of their infant's illness. sixteen cases were LSCS which might be the reason for delayed initiation of breast feeding. Despite severe dehydration, 10 neonates did not exhibit characteristic signs of dehydration, such as sunken fontanelles and lack of skin turgor. This may mislead clinicians to underestimate the degree of dehydration and thus degree of hypernatremia .

According to our findings, a significant weight loss is observed in neonates with hypernatremia, so prevention and early detection of hypernatremic dehydration can be achieved by routine monitoring of weight of neonates.

Conclusion:

The present study indicates that hypernatremic dehydration is common in primiparous, LSCS deliveries and temperate climates. The prevention of hypernatremia in breast-fed neonates begins with prenatal and early postpartum screening to identify possible maternal and infant factors that could interfere with successful lactation and breast-feeding, as well as with anticipatory guidance regarding basic breast-feeding techniques^{8,12}.

The Baby Friendly Hospital Initiative encourages health professionals to teach all mothers, the skills of breast-feeding and stresses the importance of early routine postpartum follow-up, which should

include frequent monitoring of infant growth. If a neonate loses more than 7% of its birth weight, if weight continues to fall after the first week, or if the birth weight has not been regained within 10 days, a clinical lactation and breast-feeding assessment is warranted. This will aid in the early detection of insufficient breast milk intake and failure to thrive and in the prevention of hypernatremic dehydration.

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