

## Original Research Article

# Clinical profile and outcome of neonates admitted during summer months with dehydration and hypernatremia in tertiary care hospital of central Gujarat, India

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### ABSTRACT

**Background:** Dehydration and hypernatremia amongst exclusively breast fed neonates due to inadequate breast feeding or due to less feeding is a potentially devastating condition, and its incidence rate increases during hot environment especially during summer months. We conducted this study to identify possible etiology behind dehydration and hypernatremia among healthy newborn.

**Methods:** Authors retrospectively studied from available records from our Extramural NICU for months of March, April, and May 2017. Inclusion criteria for study were 1) Neonates with signs and symptoms of dehydration, 2) exclusively breast fed newborn. Those with congenital malformations, very low birth weight and perinatal asphyxia were excluded from the study.

**Results:** Total NICU admissions were 434 during these months, and 28 patients we received with dehydration and 21 patients out of 28 had hypernatremia. Incidence rate of dehydration was 6.45%. Almost all the patients had altered renal functions at the time of admission, which became normal before discharge. 4 patients had culture proven sepsis. 2 patients died out of 28 patients. 26 patients out of 28 recovered completely and discharged.

**Conclusions:** Dehydration and hypernatremia is preventable and treatable condition. All the mothers needs to taught correct feeding method like proper position and attachment of feeding. Signs of dehydration must be explained to mother as well as close relatives. Follow up visits should be ensured and check for weight is must. Not to encourage mother to give any other feed apart from exclusive breast feeding for first 6 months and even during summer months.

**Keywords:** Dehydration, Exclusive breast feeding, Hypernatremia, Healthy newborn

### INTRODUCTION

“A new baby is like the beginning of all things-wonder hope, a dream of possibilities.”

Dehydration in exclusively breast fed baby needs to be identified and treated as early as possible, so that mothers are not discouraged from breastfeeding. Dehydration can be life threatening, it may cause severe renal impairment and sometimes causes acute kidney injury, which can

lead to morbidity and mortality. Hypernatremic dehydration is a lethal condition and is associated with cerebral edema, intracranial hemorrhage hydrocephalus. As extracellular water level decreases there is increase in serum sodium. Hypernatremia was thought to be unusual in breast fed babies.<sup>1</sup> Since 1990s, there has been an increase in the number of breastfed infants reported to have hypernatremia and hypernatremic dehydration. The condition carries an acute morbidity and mortality.<sup>2</sup> In 1949, Macy established mean (standard deviation [SD])

Na content of colostrums 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.<sup>3,4</sup> Inadequate milk production due to insufficient lactation may lead to dehydration. This condition gets aggravated during hot and humid atmosphere. During summer months baby losses more water due to large surface area, and these babies only receives breast milk, which may not be sufficient for baby's requirement may lead to dehydration and presents with fever, convulsions, prerenal-acute kidney injury. So, we conducted this study to identify possible etiology of dehydration in exclusively breast feed newborns during summer months.

**METHODS**

We retrospectively study from medical records (case history and investigations) of all patients admitted in our hospital NICU from month of March, April, and May, who were <28 days old, with gestational age of >36 weeks and weighing >2 kg. Out of 434 admissions during these months, 28 healthy newborns were presented with dehydration. Inclusion criteria for study were

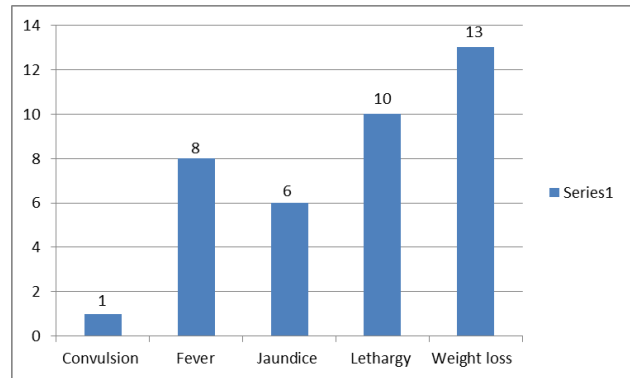
- Neonates with signs and symptoms of dehydration,
- exclusively breast fed newborn.

Those with congenital malformations, very low birth weight and perinatal asphyxia were excluded from the study. Complete blood count, blood culture, cerebro spinal fluid culture, serum bilirubin, blood urea, serum creatinine, sodium, potassium and blood sugar were measured. Weight, temperature, urine output, stool frequency, fluid requirement monitored daily among study patients. Rehydration achieved with 0.45% normal saline with 5% dextrose or 0.9% normal saline according to serum sodium level. In cases with sodium level >175 mmol/L treated with 3% normal saline. Breast feeding was ensured in all babies who were recovered from morbidity, correct position and attachment taught to mothers. Syringing taught to 4 mothers who had flat nipples. Counseling done to all mothers for advantages of breast milk for both baby and mother, as well as to increase frequency of feeding during summer.

**RESULTS**

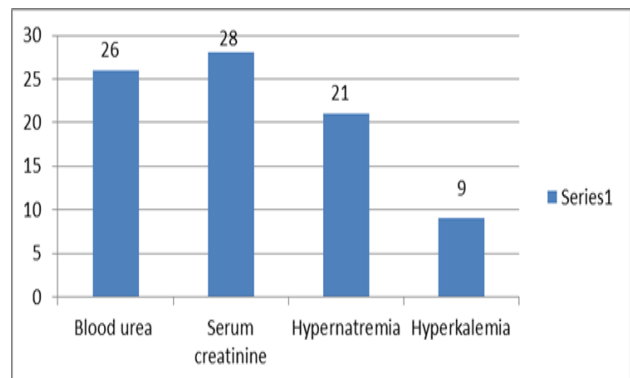
Out of 434 NICU admissions during months of March, April and May, 28 patients had dehydration. Incidence rate is 6.45%. In a study conducted by Wang AC et al, incidence of hypernatremic dehydration in breast fed newborn was 2.3 per 1000 live births<sup>5</sup>. Out of 28, 16 were male patients (57.14%) and 12 were female (42.8%). All these patients were full term, gestational age was >37 completed weeks. Patients were admitted in our out born (Extramural NICU) unit. Mean age on admission was 10.5 day of life. 7 patients were born out of LSCS delivery. Mean hospital stay is 8.5 days. 46.4% patients had >20% weight loss on admission, 35.7% had

lethargy, 21.4% had jaundice, 28.5% had fever, 3.5% had convulsion (Figure 1).



**Figure 1: Indications for admission.**

100% patient had altered renal functions. 75% patients had hypernatremia (Figure 2). In a study by Hassan et al, incidence of breast feeding associated hypernatremia among all hospitalized term neonates was 3.1 %, significantly higher than the reported incidence of hypernatremia attributable to all causes among hospitalized children, adults, and elderly subjects (1.1-1.9%).<sup>6</sup> 14.2% patients had culture proven sepsis. 14.2% cases presented with shock. Out of 28, 2 patients died, 1 due to renal failure and 1 due to septic shock. Mortality rate was 7.14%. 92.3% patients discharged.



**Figure 2: Altered renal profile of patients.**

**DISCUSSION**

In this study we have found that incidence of dehydration increases in summer months. In our study it is 6.45% whereas during cold season it is almost half. It indicates that neonates need to be properly checked for adequacy of breast milk during summer. Breast feeding is considered to be the best and safest way to feed neonates. Human milk is low in sodium, which mitigates against the possible development of hypernatremia in breast fed neonates.<sup>6</sup>

Compared with cow's milk mature human milk contains considerably less sodium, potassium and chloride. Higher

level of sodium in breast milk is associated with lactation failure, and a reduction in feeding frequency is associated with marked rise in milk sodium concentration.<sup>6</sup> This might be related to reduce breast milk production, which could in turn be secondary to maternal factors or neonatal factors. Insufficient milk production is the most important factor in the induction of hypernatremia. Low level of maternal knowledge in lactation, cesarean section and failure of early postnatal follow up was associated with the neonatal dehydration. Decreased urine and stool frequency might be considered as a warning for failure of lactation.<sup>7</sup>

Hypernatremia is lethal condition leads to cerebral edema, intracranial hemorrhage, seizures, disseminated intravascular coagulation and finally death. In our study 75% patients had hypernatremia could be due to insufficient feeding. Hassan Boskabadi et al demonstrated that mothers of neonates with hypernatremia had either technical difficulties (positioning and attachment), or breast problems like inverted nipples, cracked nipples, and mastitis. It is highly recommended that breast examination during pregnancy and after delivery should be considered as routine clinical practice to lower the risk of breast feeding problems. However clinical presentation of hypernatremic dehydration is usually around ten days with range from 3 to 21 days. Apart from cerebral edema, there may be jaundice, seizure and excessive weight loss. There may be fever, tachycardia with poor perfusion, hypotension and hypovolemia. Skin becomes thick, doughy and may even feel moist due to perspiration. Mucous membrane is dry, and baby has intense thirst. Major complications are central pontine myelinosis and hyperglycemia, hypocalcemia, renal tubular injury and renal vein thrombosis. hypernatremic dehydration in infancy is a medical emergency with high rates of mortality and morbidity.<sup>8</sup> Early diagnosis and prompt treatment is crucial for survival and better prognosis. Mother should be educated about signs and symptoms of dehydration before discharge after delivery. Breast feeding related hypernatremia has a strong association with primiparous mothers, which indicates the need for close observation of this population whose infants lose more than 10% of their birth weight.<sup>9</sup> Hypernatremic dehydration in exclusively breast fed neonates is preventable. Primipara should be given appropriate counseling and support for successful initiation of breastfeeding and maintenance of lactation.<sup>10</sup> The health care provider should be aware of this potentially serious complication of exclusive breastfeeding and recognize neonates at risk for this potentially lethal condition. In conclusion it is important to be aware that hypernatremic dehydration can occur in the neonatal period due to inadequate breastfeeding. It is therefore important to ensure adequate hydration in breastfed neonates.<sup>11</sup> The other causes of hypernatremia should be ruled out before attributing hypernatremia to inadequate breastfeeding.

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