

Clinical Spectrum and Outcome of Dehydration Fever in Term healthy Neonates – A Teaching Hospital Based Prospective Study

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Abstract

Background: Exclusive breast feeding during first six months of life is the recommended method of feeding in infant. However, inadequate feeding (either due to maternal problems or breast related problems), high ambient temperature (summer) can lead to dehydration fever which has serious complications like hypernatremic dehydration and, hence needs to be identified early and promptly treated.

Aim: To study the clinical profile, risk factors, complications and outcome of dehydration fever in healthy breastfed term neonates.

Methods: This is a prospective study including all breast fed babies with evidence of dehydration and weight loss ($>10\%$) admitted to NICU of referral hospital from March 2015 to June 2015.

Results: Total of 368 babies were admitted in NICU during the study period. 49 neonates were having dehydration fever and hence, included in this study. Incidence of dehydration fever was 13.31% in hospitalized neonates. Age ranged from 2-23 days with mean age of 4.31 days. Male: female ratio was 1.2:1. Feeding was inadequate in 75% babies. Fever was the commonest complaint (71.42%) followed by jaundice, not feeding well and reduced urine output. Hypernatremia and AKI were noted in 83.67% and 18.36% cases respectively.

Conclusion: Exclusive breast feeding is the norm of infant feeding in first 6 months of life Breastfeeding is universally considered to be the best and the safest way to feed neonates. In breastfed infants, dehydration is a serious complication because of improper feeding. Early detection of serious weight loss, decreased frequency of urination may help for early diagnosis of dehydration related to breastfeeding failure. Advice to mothers regarding keeping babies 'just warm' and recognising signs of fever and warning signs of dehydration fever are the need of the hour.

Key words: Dehydration Fever, Breastfeeding, Hypernatremia, Acute kidney injury.

Introduction

Exclusive breastfeeding is the accepted mode of infant feeding in the first 6 months of life. It can alone meet the energy requirements, both the micro and macronutrient and the water requirements of the baby in these 6 months. As per BFHI (baby friendly hospital initiative), the institutions adopting the policies of BFHI have to reinforce exclusive breastfeeding for the first 6 months of life^[1].

In cases of inadequate feeding, either due to maternal problems or breast related problems, baby can

become dehydrated and develop hyperthermia, hypernatremia and acute renal failure with disastrous consequences, if not attended on time. Inadequacy of feeding can become exaggerated in summers due to increased insensible loses.

Lack of confidence in primigravida mothers and attendants, caesarean delivery and improper treatment of dehydration fever with antipyretics and/or antibiotics can make the situation worse.

Early recognition of dehydration fever by serial monitoring of weight to detect inappropriate weight

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loss and early correction of dehydration fever can prevent disastrous complications in the baby.

The aim of the present study was to evaluate the clinical profile, risk factors and outcome of dehydration fever in healthy, breastfed babies.

Materials and Methods

This is a prospective study conducted in neonatal intensive care unit (NICU) of referral hospital. The study period was in summer months from March 2015 to June 2015.

All term breastfed babies with evidence of dehydration and weight loss more than 10% were included in the study.

Babies with gross congenital anomalies, structural renal diseases, babies born preterm and babies with significant problems at birth requiring admission to NICU were excluded from this study.

Detailed history to identify risk factors for dehydration was taken and detailed examination of baby was done using standard pre-structured and pre-designed proforma. Necessary investigations like temperature, complete blood counts (CBC), hematocrit, serum electrolytes, urea, and creatinine were done.

Neonatal ARF is defined as plasma creatinine more than 1.5 mg/dL for at least 24 to 48 hrs if mother's renal function is normal; or Serum creatinine raised more than 0.3 mg/dL over 48 hours; or Serum creatinine fails to fall below maternal plasma creatinine within 5-7 days^[2].

Hypernatremia was defined as serum sodium greater than 145mEq/L^[3].

Babies were managed as per standard protocol with continued feeding and correction of dehydration using half strength normal saline with 5% dextrose as per assessment^[2].

Results

A total of 368 babies were admitted in NICU during study period from March 2015 to June 2015, out of which 49 were diagnosed with dehydration fever and hence were included in the study. The incidence of NICU admission for dehydration fever was 13.31% in this study.

27 (54.10%) were males and 22 (45.89%) were females. The age ranged from 2- 23 days with the mean being 4.31 ± 3.2 days. 11(22.44%) of these were low birth weight. Antenatal history was uneventful in 43(87.75%) of babies. Out of 49 babies 27(55.1%) were born by vaginal route and 22(45.8%) were born by caesarean

section. 45(91.83%) were born at term and remaining 4(8.16%) were post term. 37(75.5%) of the babies were first born, 10(20.40%) were second born and the rest were of higher birth order.

Majority i.e. 40(81.63%) of mothers initiated breast feeding within 4 hours of birth while only 9(18.36%) initiated breast feeding after 4 hours. Only 2 (4%) of the babies received prelacteal feeds. Feeding was inadequate in 37(75%) of babies as assessed by markers of adequacy of feeding. 8(16.67%) of mothers having a history of inadequate feeding had breast or nipple related problems while 2 (4%) had significant medical problems (Table 1).

Fever was the most common presenting complaint seen in 35(71.42%) of babies followed by excessive cry in 27(55.1%), jaundice in 18(36.73%), not feeding well in 19(38.77%) and reduced urine output in 21(42.81%) of the babies (Figure 1).

Elevated serum urea level, which is a marker of dehydration was seen in 39(79.5%) of the cases. Raised hematocrit above 55% was seen in 4(8.16%) of the babies.

Hypernatremia was observed in 41(83.67%) of the babies with dehydration fever. Elevated creatinine was noted in 37(75.51%), AKI was observed in 9(18.36%) in which one child needed peritoneal dialysis.

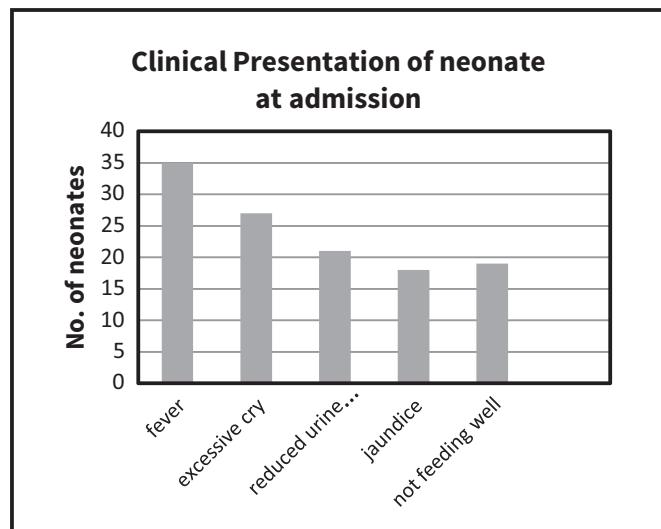
Table 1. Profile of neonates with Dehydration Fever

Variables	Neonates	n=49
Birth order	Born to Primigravida	37
	Born to second gravida	10
	Born to higher birth order	2
Gender	Male	27
	Female	22
Birth weight	Appropriate for gestational age	38
	Small for gestational age	11
Mode of delivery	Born of normal vaginal	27
	Born of LSCS	22
Initiation of Breastfeeding	<4hrs	40
	>4hrs	9
Feeding problems	Due to breast problems	8
	Due to medical problems	2
	Due to inadequate breast milk	37
	No problem	2

10(20.4%) babies developed complications, one baby had hypoglycaemia and other one baby needed peritoneal dialysis and other neonates who had AKI was treated with i.v fluids and supportive management and recovered.

Babies were discharged after regaining of birth weight with steady daily weight gain and establishment of optimal lactation.

Figure 1. Clinical presentation of neonate at admission



Discussion

Exclusive breast feeding is the accepted method of feeding for neonates. However, despite adequate measures to ensure proper lactation, problems can occur.

Many centres have reported hypernatremic dehydration due to faulty feeding practices in exclusively breast fed neonates^[1,4,5].

It has been noted that insufficient breast milk production is the most important factor in the induction of hypernatremic dehydration^[1]. It is a potentially lethal condition as it can induce cerebral edema, intracranial haemorrhage, seizures, disseminated intravascular coagulation and ultimately death^[6,7].

The incidence of admission for dehydration fever in this study was 13.31%, which is concordant with studies done by Bhat et al.^[1]. around 16 % was observed by Hassan et al.^[8]. 5.6% was observed by Nurdan Uras et al.^[9]. These studies were done for long periods, this study was done during summer months when the incidence is high.

Male to female ratio was 1.2:1 in this study. the similar ratio was observed by Basil et al.^[10]. In this study

dehydration fever was more commonly observed in neonates born to primigravida mothers i.e 75.5%. which was concordant to study of Basil et al. 82%^[10]. and not concordant with 54.3% by Hassan et al.^[8].

In this study the age at admission ranged from 2- 23 days with Mean being 4.31 ± 3.2 days, is concordant with Yaseen et al. 4.9 days Basil et al. 1-14 days and 3.9 days ± 1.9 by Maayan et al.^[10-12].

Fever was the most common presentation at admission observed in 71.42%. Similar results were observed by Maayan et al. and Hassan et al. i.e., 50% and 52.5% respectively^[8,11]. Followed by irritability, decreased urine output, not feeding well, and jaundice with 55.1%, 42.8%, 38.77% and 36.73% respectively. Similar results on irritability 45.3%, and hyperbilirubinemia 39.6% was documented by Hassan et al.^[8].

Hypernatremia was observed in 83.67% in this study which is concordant with study Yaseen et al. who had 27 of 29 cases which was very significant, and non concordant with Hassan et al. 31.8%^[8,12].

In this study we observed that 37 neonates had raised serum creatinine levels and 9 of them had AKI. Studies done by Bhat et al. and Boskabadi et al. did not mention about the presence or absence of AKI in their respective prospective series of exclusively breast fed babies with hypernatremia ($\text{Na} > 150 \text{ mEq/L}$) and excessive weight loss (>10%)(1,8). Case studies by Bhat et al. in 2001 reported a single case with hypernatremic dehydration^[13]. And one case report with peritoneal dialysis for AKI in hypernatremic dehydration by Zika et al.^[14], Shroff et al.^[4] reported 5 cases with AKI in hypernatremic dehydration, out of them one needed peritoneal dialysis.

In this study 9 out of 49 neonates developed AKI and one underwent peritoneal dialysis and one neonate had hypoglycaemia all of them were improved and discharged with zero mortality.

Hot humid climates of this area during the study period and regional practices to keep baby and mother in a closed and poorly aerated rooms had significant predisposition to dehydration fever and its complications.

Limitations of the study:

Needs bigger sample size, longer duration of study period and multicentric trial for corroboration of our findings.

Conclusions:

Optimal antenatal lactational counselling and early initiation of exclusive breast feeding will help to reduce

incidence of dehydration fever and its complications. Early detection of serious weight loss (more than 10%), decreased frequency of urination and stools may help for early diagnosis of dehydration fever related to lactational failure.

Low knowledge about lactation especially in primigravida is a detrimental factor for dehydration fever.

Always suspect dehydration fever as a cause of fever in first few days of life in apparently healthy exclusively breast fed newborns.

References

- Bhat SR, Lewis P, David A, Liza SM. Dehydration and hypernatremia in breast-fed term healthy neonates. Vol. 73, Indian Journal of Pediatrics 2006;73: 39-41.
- Agarwal R, Deorari A, Paul VK. AIIMS Protocols in Neonatology. New Delhi: CBS Publishers and Distributors Pvt. Ltd; 2015. p. 281-96.
- Kleigmann RM. Nelson Textbook of Pediatrics. New Delhi: Reed Elsevier India Pvt. Ltd.; 2016. p.350-7.
- Shroff R, Hignett R, Pierce C, Marks S, van't Hoff W. Life-threatening hypernatraemic dehydration in breastfed babies. Arch Dis Child [Internet]. 2006;91(12):1025-6. Available at: <http://www.pubmedcentral.nih.gov/article/abstract?artid=2083010&tool=pmcentrez&rendertype=abstract> Cited 2017 Apr 6.
- Manganaro R, Mami C, Marrone T, Marseglia L, Gemelli M, Rowland T, et al. Incidence of dehydration and hypernatremia in exclusively breast-fed infants. J Pediatr [Internet]. 2001 Nov [cited 2016 Sep 13];139(5):673-5. Available from: <http://linkinghub.elsevier.com/retrieve/pii/S0022347601126107>
- Iyer NP, Srinivasan R, Evans K, Ward L, Cheung W-Y, Matthes JWA. Impact of an early weighing policy on neonatal hypernatraemic dehydration and breast feeding. Arch Dis Child [Internet]. 2008 Apr 1 [cited 2016 Sep 14];93(4):297-9. Available from: <http://adc.bmjjournals.org/cgi/doi/10.1136/adc.2006.108415>
- Laing I. Hypernatraemic dehydration in newborn infants. Acta Pharmacol Sin [Internet]. 2002;48-51. Available from: [http://web4.uwindsor.ca/users/b/boulous/main.nsf/9d019077a3c4f6768525698a00593654/703453ccb701463685256ea50004a158/\\$file/sodium.pdf](http://web4.uwindsor.ca/users/b/boulous/main.nsf/9d019077a3c4f6768525698a00593654/703453ccb701463685256ea50004a158/$file/sodium.pdf)
- Boskabadi H, Maamouri G, Ebrahimi M, Ghayour-Mobarhan M, Esmaeily H, Sahebkar A, et al. Neonatal hypernatremia and dehydration in infants receiving inadequate breastfeeding. Asia Pac J Clin Nutr. 2010;19(3):301-7.
- Uras N, Karadag A, Dogan G, Tonbul A, Tatli MM. Moderate hypernatremic dehydration in newborn infants: retrospective evaluation of 64 cases. J Matern Fetal Neonatal Med [Internet]. 2007;20(6):449-52. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/17674254>
- Hanoudi BM. Factors Contributing to Dehydration Fever in Neonate, A Teaching Hospital Study. Iraqi J Comm Med Oct. 2012 (4):293-7.
- Maayan-Metzger A, Mazkereth R, Kuint J. Fever in healthy asymptomatic newborns during the first days of life. Arch Dis Child Fetal Neonatal Ed. 2003;88:F312-4.
- Yaseen H, Salem M, Darwich M. Clinical presentation of hypernatremic dehydration in exclusively breast fed neonates. Indian J Pediatr 2004 Dec;71(12):1059-62.
- Bhat SR, Lewis P, Dinakar C. Hypernatremic dehydration in a neonate. Indian Pediatr. 2001; 38(10):1174-7.
- Zaki SA, Mondkar J, Shanbag P, Verma R. Hypernatremic dehydration due to lactation failure in an exclusively breastfed neonate. Saudi J Kidney Dis Transpl. 2012;23:125-8.

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