

Dehydration in Newborns Admitted to Intensive Care for Ehs Nouar Fadela

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ABSTRACT

Introduction: Dehydration (DSH) in newborns can have potentially fatal consequences such as cerebral oedema, intracranial haemorrhage, subdural haematoma, hydrocephalus and gangrene. In light of the increasing number of newborns with dehydration, there is a strong need to increase awareness and raise suspicion in the diagnosis of this potentially fatal condition.

Objective: To describe dehydration in the newborn, its complications and the method of appropriate management.

Patients and method: Retrospective descriptive and analytical study, from January 1, 2019 to May 31, 2021.

Study population: We included all newborns and infants aged 0 to 30 days, hospitalized during the period with clinical and biological signs of dehydration. Hyponatremia was defined by a natremia ≥ 150 mmol/L. Data were collected in Excel and analysed using R 3.5.0 software.

Conclusion: Neonatal dehydration is not as rare as is commonly believed. Feeding difficulties in newborns may result in inadequate secretion of sodium into the breast milk. Monitoring the mother and newborn in the first week of life for successful establishment of breastfeeding is essential. In an otherwise healthy newborn, poor feeding and weight loss may be a reason to suspect hyponatremia. Neonatal hyponatremia due to breast milk hyponatremia is now a well-established entity and should be sought in all newborns with hyponatremia. There is no reason to stop breastfeeding even if the sodium level in the breast milk is high as it decreases over time. Breastfeeding is still extremely beneficial for the baby and should be strongly recommended.

Keywords: Dehydration, hyponatremia, intensive care, newborns.

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I. INTRODUCTION

Neonatal dehydration is a common cause of admission and mortality in neonatal intensive care units, particularly in developing countries, and its frequency appears to be increasing [1], [5]. It is a serious clinical situation, associated with high morbidity and mortality due to complications [6]-[8]. The main reason for its occurrence is the decline of breastfeeding. The objective was to evaluate the frequency of DHS, to assess the frequency and circumstances of occurrence, to describe the clinical symptomatology, to determine the etiologies or risk factors, to assess the management and the functional and vital prognosis.

A. Patients and Method

Retrospective descriptive and analytical study, from January 1, 2019 to May 31, 2021.

B. Study Population

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II. DATA COLLECTION AND ANALYSIS

Data were collected from the hospital records and recorded on a data collection form established for this purpose. We collected sociodemographic data (age, sex of the newborn, family address, mother's level of education and socio-economic level); maternal and obstetrical data (maternal age, gesture, parity, pregnancy follow-up, obstetrical pathologies); delivery data (place, term, route, neonatal adaptation, notion of resuscitation), postnatal data (trophicity, mode and time of feeding, possible feeding difficulties) and data on hyponatremic dehydration (age of onset, aetiological factors, clinical symptomatology, percentage of weight loss, natraemia, associated biological signs, management modalities, kinetics of natraemia evolution, short- and medium-term prognosis).

Weight loss (relative to birth) was calculated using the following formula: weight loss = (birth weight - admission weight/birth weight $\times 100$).

The data collected was entered into an Excel program. The results were expressed as numbers and percentages, represented in tabular or graphical form.

Statistical analysis was carried out using R 3.5.0 software, with a descriptive step for positional parameters (means, medians, frequencies) and dispersion parameters (standard deviation, extremes) and an analytical step using the Chi2 and Fisher tests according to their applicability conditions. The difference was considered statistically significant when the P was less than 0.05.

III. RESULTS

This work shows that neonatal dehydration (NDH) is a relatively frequent and serious complication in our context and that it is associated with high morbidity and mortality, thus representing a real public health problem. NCD and associated nutritional problems are thought to be a common cause of neonatal death in developing countries [1].

TABLE I: FACTORS THAT AGGRAVATE DEHYDRATION

	Death (%)	p-value of
Renal insufficiency	55.0	<0.001
Respiratory distress	38.3	0.019
Apnoea	88.9	<0.001
Disturbance of consciousness	57.1	<0.001
Convulsions	40	0.056
Hypovolaemic shock	88.5	<0.001
Natremia > 150 mmol/L	62.5	<0.001

TABLE II: NEONATAL CHARACTERISTICS

Characteristics neonatal	Percentage
Route of delivery	
Low birth canal	21.8%
Term	
Preterm	8%
Full term	92%
Resuscitation	
Yes	3.9%
Weight	3200±442 gr
Feeding mode	
Exclusive breastfeeding	64.7%
Mixed	3.9%
Artificial	27.5%

TABLE III: FACTORS THAT AGGRAVATE DEHYDRATION ASSOCIATED WITH DEHYDRATION

Factors that aggravate dehydration	Death (%)	p-value
Renal insufficiency	55.0	<0.001
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IV. DISCUSSION

Our hospital incidence of 9.3% of admissions therefore appears particularly high compared to population-based surveys in England, which have estimated it at between 0.07 and 0.25 per 1000 live births [2], [12]. The incidence therefore appears to be lower in Western countries. In developing countries, such as Jamaica, a higher incidence has

been observed, between 0.4 and 1.3% [13]. In Turkey, a hospital study found a higher incidence at 4% of admissions to the neonatal intensive care unit [14]. For the characteristics of the newborns: the mean age was 38 SA and 4 days and a sex ratio of 1.2 64.7% of the newborns were exclusively breastfed. Clinical symptoms were dominated by fever (32%) and neurological signs (19.6%). The main complications were respiratory distress (5.9%), hypovolaemic shock (3.9%), convulsions (2%). Hyponatremia was present in 19.9% of cases. Associated biological abnormalities were renal failure (11.8%), breastfeeding failure represented 86.3% of the etiological circumstances. Lethality was 2%.

Fever and refusal to suckle are the most consistent signs [12], [24], [29], [30]. Jaundice is also a frequent sign and may occur in up to half of the cases in some series [11], [14], [17]. We noted it in 25.5% of cases. Neurological signs such as disorders of consciousness, tone or convulsions are very frequent, linked to plasma hyperosmolarity leading to cerebral suffering by neuronal cell dehydration [7], [8], [31]. In some series, these neurological signs were absent or very little observed [2], [13], [24]. Renal failure was noted in 11.8% of our neonates.

This rate was 19% in the series of Trotman in Jamaica [13] and only 5% in the series of Unver Korgali in Turkey [24]. Concerning biology, the average of the maximum values of natremia was quite high in our series 180 mg/L. The mean natremia was also around 160 mg/L in the series by Oddie in Great Britain and Trotman in Jamaica [2], [13]. A lower mean natremia around 152 mmol/L was reported by [24]. In [8] only 3.7% had a natraemia above 160 mmol/L. A natraemia above 160 mmol/L is recognized as a risk factor for complications and death [8], [34]. Other metabolic complications such as dyskalaemia and dysglycaemia were common in our population and are associated morbidity and mortality factors. They were observed at a lower frequency in other series [19], [22], [34].

V. CONCLUSION

Dehydration is associated with high morbidity and mortality and should be prevented by measures to promote breastfeeding and weight monitoring in the first days of life.

CONFLICT OF INTEREST

Authors declare that they do not have any conflict of interest.

VI. REFERENCES

- [1] Escobar GJ, Gonzales VM, Armstrong MA, Folck BF, Xiong B, Newman TB. Rehospitalization for neonatal dehydration: a nested case-control study. *Arch Pediatr Adolesc Med.* 2002; 156: 155-61.
- [2] Oddie SJ, Craven V, Deakin K, Westman J, Scally A. Severe neo-natal hypernatremia: a population-based study. *Arch Dis Child Fetal Neonatal.* 2013; 98(5): F384-7.
- [3] Reilev M, Borch K, Pryds OA. Neonatal hypernatraemic dehydration-why increasing incidence. *Ugeskr Laeger.* 2007; 169(13): 1227-31.
- [4] Laing IA, Wong CM. Hyponatremia in the first few days: is the incidence rising. *Arch Dis Child Fetal Neonatal Ed.* 2002; 87(3): F158-62.
- [5] Ballot DE, Davies VA, Cooper PA, Chirwa T, Argent A, Mer M. Retrospective cross-sectional review of survival rates in critically ill

- children admitted to a combined paediatric/neonatal intensive care unit in Johannesburg, South Africa, 2013—2015. *BMJ Open*. 2016; 36(6): e010850.
- [6] Ergenekon E, Unal S, Cucuyener K, Soysal SE, Koc E, Okumus N, et al. Hypernatremic dehydration in the newborn period and long-term follow up. *Pediatr Int*. 2007; 49(1): 19-23.
- [7] Finberg L. Neonatal neurologic damage after dehydration. *J Pediatr*. 2007; 151(2): 110-1.
- [8] Bolat F, Ofiaz M, Guven AS, Ozdemir, Alaygut D, Dogan MT, et al. What is the safe approach for neonatal hypernatremic deshy- dration? A retrospective study from a neonatal intensive care unit. *Pediatr Emerg Care*. 2013; 29(7): 808-13.
- [9] Dewey KG, Nommsen-Rivers LA, Heinig MJ, Cohen RJ. Risk factors for suboptimal infant breastfeeding behavior, delayed onset of lactation, and excess neonatal weight loss. *Pediatrics*. 2003; 112(3): 607-19.
- [10] Ng PC, Chan HB, Fok TF, Lee CH, Chan KM, Wong W, et al. Early onset of hypernatraemic dehydration and fever in exclusively breastfed infants. *J Paediatr Child Health*. 1999; 35(6): 585-7.
- [11] Boskabadi MG, Ebrahimi M, Ghayour-Mobarham M, Esmacily H, Sahebkar A, et al. Neonatal hypernatremia and dehydration in infants receiving inadequate breastfeeding. *Asia Pac J Clin Nutr*. 2010; 19(3): 301-7.
- [12] Oddie S, Richmond S, Coulthard M. Hypernatraemic dehydration and breast feeding: a population study. *Arch Dis Child*. 2001; 85(4): 318-20.
- [13] Trotman H, Lord C, Barton M, Antoine M. Hypernatraemic dehydration in Jamaican breastfed neonates: a 12-year review in a baby-friendly hospital. *Ann Trop Paediatr*. 2004; 24: 295-300.
- [14] Unal S, Arhan E, Kara N, Uncu N, Aliefendioglu D. Breastfeeding-associated hypernatremia: retrospective analysis of 169 term newborns. *Pediatr Int*. 2008; 50: 29-34.
- [15] Agence nationale de la statistique et de la démographie (ANSD) (Sénégal), ICF. Sénégal : enquête démographique et de santé continue (EDS-Continue 2017). Rockville, Maryland, USA: ANSD et ICF; 2018. French.
- [16] Aufrant C, Bompard Y. Dénutrition déshydratation et allaitement maternel. *J Pediatr Pueric*. 1999; 12: 4-9. French.
- [17] Moritz ML, Manole MD, Bogen DL, Ayus DL. Breastfeeding associated hypernatremia: are we missing the diagnosis? *Pediatrics*. 2005; 116: 343-7.
- [18] Manganaro R, Mami C, Marrone T, Marseglia L, Gemelli M. Incidence of dehydration and hypernatremia in exclusively breast-fed infants. *J Pediatr* 2001; 139: 673-5.
- [19] Konetzny G, Bucher HU, Arlettaz R. Prevention of hypernatraemic dehydration in breastfed newborn infants by daily weighing. *Eur J Pediatr*. 2009; 168(7): 815-8.
- [20] Lavagno C, Camozzi P, Renzi S, Lava SA, Simonetti GD, Bianchetti MG. Breastfeeding-associated hypernatremia: a systematic review of the literature. *J Hum Lact*. 2016; 32(1): 67-74.
- [21] Abu-Salah O. High breast milk sodium concentration resulting in neonatal hypernatraemic deshydration. *East Mediterr Health J*. 2001; 7: 841-3.
- [22] Peker E, Kirimi E, Tuncer O, Ceylan A. Severe hypernatremia in newborns due to salting. *Eur J Pediatr*. 2010; 169(7): 829-32.
- [23] Livingstone VH, Willis CE, Abdel-Wareth LO, Thiessen P, Lockitch G. Neonatal hypernatremic dehydration associated with breastfeeding malnutrition: a retrospective survey. *CMAJ*. 2000; 162: 647-52.
- [24] Unver Korgali E, Cihan MK, Oguzalp T, Sahinbas A, Ekici M. Hypernatremic dehydration in breastfed term infants: retrospective evaluation of 159 cases. *Breastfeed Med*. 2017; 12: 5-11.
- [25] Hall RT, Simon S, Smith MT. Readmission of breastfed infants in the first 2 weeks of life. *J Perinatol*. 2000; 20(7): 432-7.
- [26] Bhat SR, Lewis P, David A, Liza SM. Dehydration and hypernatremia in breast-fed term healthy neonates. *Indian J Pediatr*. 2006; 73(1): 39-41.
- [27] Boussoffara R. Déshydratation aiguë du nourrisson: étude comparative de 444 cas sur trois périodes en Tunisie. *Arch Pediatr*. 2008; 15: 942. French.
- [28] Zachariassen G, Juvonen P. Neonatal dehydration (dehydration fever) in newborn infants. *Ugeskr Laeger*. 2002; 164: 4930-4.
- [29] Erdemir A, Kahramaner Z, Cosar H, Turkoglu E, Kanik A, Sutcuoglu S, et al. Comparison of oral and intravenous fluid therapy in newborns with hypernatremic dehydration. *J Matern Fetal Neonatal Med*. 2014; 27: 491-4.
- [30] Bülbül A, Can E, Uslu S, Asiye N. Hypernatremic dehydration in term infants. *Turk Arch Ped*. 2009; 44: 84-8.
- [31] Boskabadi H, Anvarifar F, Nourizadeh N. Could neonatal hypernatremia deshydration influence hearing status. *Iran J Otorhinolaryngol*. 2014; 26(74): 13-8.
- [32] Boskabadi H, Akhondian J, Afarideh M, Maamouri G, Bagheri S, Parizadeh SM, et al. Long-term neurodevelopmental outcome of neonates with hypernatremic dehydration. *Breastfeed Med*. 2017; 12: 163-8.
- [33] Korkmaz A, Yigit S, Firat M, Oran O. Cranial MRI in neonatal hypernatraemic dehydration. *Pediatr Radiol*. 2000; 30: 323-5.
- [34] Boumanhil B, Pharaly S, Randrianaly H, Robillard PY, Renouil M. Déshydratation hypernatrémique et allaitement maternel. *Arch Pediatr*. 2001; 8: 731-3. French.