Original Article

Determining the dehydration prevalence in the several-week-old neonates with jaundice hospitalized in Shahid Motahhary educational therapeutic center of Orumia County in 2014

Zahra Fakour[1*], Mohammad Karamyyar[2], Kamran Dehghan[1], Bahareh Vahid[3]

[1] Assistant Professor of Perinatology, Urmia University of Medical Sciences, Urmia, Iran,[2] Associate Professor of Pediatric Infectious Disease, Maternal and Childhood Obesity Research Center, Urmia University of Medical Sciences, Urmia, Iran,[3] Urmia University of Medical Sciences, Urmia, Iran.

Correspondence: Zahra Fakour, Assistant Professor of Perinatology, Urmia University of Medical Sciences, Urmia, Iran. Email: fakour.zahra@gmail.com.

ABSTRACT

Background and Objective: jaundice and hyperbilirubinemia are enumerated as common and most often benign problems of the neonates. One of the major risk factors of unconjugated hyperbilirubinemia of the neonates is being fed solely on mother's milk, especially in cases that breast-feeding is not carried out appropriately and the infant undergoes a large deal of weight loss. The objective of the present study is the determination of jaundice-induced dehydration frequency in the several-week-old neonates hospitalized in Shahid Motahhary's educational and treatment center of Orumia County in 2014. Materials and Methods: the present retrospective study investigated the files of all the infants who had been hospitalized with jaundice, kernicterus, sepsis and dehydration diagnosis since the beginning of 2014 to the end of the year and the data were analyzed in SPSS, version 22. Findings: in the 652 files investigated, 505 cases belonged to term infants (77.5%) 102 (20.2%) of whom had weight losses over 7% and dehydration; out of this number, 57 (55.9%) were boys and 45 (44.1%) were girls; 66 infants (64.7%) had been born through C-section and 36 infants (35.3%) had been born through NVD practices. Out of the 102 infants with weight loss, 52 (51%) had sodium levels below 145 for a prevalence rate of 7.1% and 66 (48.9%) had sodium levels above 145 for a prevalence rate equal to 13.06%. Out of the 505 term infants investigated, 154 (31.2%) had abnormal Na levels (over 145MEq/l) and no weight loss was evidenced in 88 infants (17.8%) and 66 infants (13.4%) had hypernatremia plus weight loss. Conclusion: the higher frequency of dehydration in Shahid Motahhary's educational treatment center of Orumia County as compared to the other Iranian studies performed in Tehran and the high prevalence of weight reduction for over 10% (49%) can be due to the insufficient information of mothers referring to this center regarding the importance and method of breastfeeding during the first week after birth and/or mother's refraining from consulting the milking problems like breast problems that need correct instruction, appropriate culture-building and follow-up visiting of the mother and the infant and the determination of the frequency of these problems is suggested as a future and further research.

Keywords: Term, dehydration, sodium level, serum, serum bilirubin level, weight loss.

Introduction

Neonatal jaundice is a common benign status experienced by 60% to 80% of the infants during the early weeks of their lives [1]. Some of the neonates might have acute jaundice exposing them to death risk resulting from bilirubin toxicity and long-term neurological disorders that need effective evaluation and treatment [2]. Jaundice might last longer than 14 days in breast-fed infants in which case it is called prolonged jaundice. Such a situation is seen in 20% to 30% of the infants up to about their first month of life and the disease is usually temporary and benign [3]. The relationship between jaundice and breast-feeding is usually divided into two sets and includes jaundice that occurs during the first week and is accompanied with weight losses more than the natural ranges determined for neonates and the jaundice that begins after the first week in neonates fed on mother's milk and the neonate usually has appropriate weight gains [4]. The studies have shown that there is a relationship between being fed on mother's milk and jaundice and the

Access this article online	
Website: www.japer.in	**E-ISSN:** 2249-3379

How to cite this article: Zahra Fakour, Mohammad Karamyyar, Kamran Dehghan, Bahareh Vahid. Determining the dehydration prevalence in the several-week-old neonates with jaundice hospitalized in Shahid Motahhary educational therapeutic center of Orumia county in 2014. J Adv Pharm Edu Res 2019;9(S2):47-50.
Source of Support: Nil, Conflict of Interest: None declared.

infants who are fed more on their mothers' milk experience more acute jaundice that might last even for several weeks and/or several months. It is also observed that the infants fed on their mother's milk a lot more than their counterparts experience more acute jaundice [5]. The researchers have shown in Turkey [6] and Taiwan [5] that about 20% to 28% of the infants exclusively fed on their mothers' milk for a period of four weeks had serum bilirubin levels (TSB) over 5mg/dL. Moreover, the insufficient use of mother's milk, particularly during the first week of life, can add to the intensity of the physiological jaundice. The phenomenon is termed "breast milk jaundice" or better said "jaundice resulting from lack of milking" [7]. Due to the maternal or neonatal factors, the mother's milk is insufficient for these infants who subsequently suffer weight losses exceeding physiological levels meaning that they lose over 7% of their weights during the first week of their lives [8, 9]. In the study conducted by Bertiny et al, jaundice and weight loss were lower in neonates who had received mother's milk for a sufficient amount and in a correct manner than those who had been forced to use supplements and dried milk due to the neonates' starvation [10]. On the other hand, it was made clear in the study conducted by Gartner that mother's milk contains some progesterone metabolites that neutralize bilirubin and exert counteracting effects on non-serum related bilirubin concentration and hyperbilirubinemia duration [11]. During the years before 1990s, kernicterus was reduced in the advanced countries with the appropriate prevention of Rh incompatibility and the popularization of phototherapy use in treating infants' jaundice but, during the recent decades, there is observed a recurrence of kernicterus in neonates over 35 weeks old worldwide due to the early dismissal, to wit earlier than the first 48 hours of their lives along with the promotion and increase in being fed on mother's milk. The issue has been pointed out in numerous articles issued by the academia of pediatrics [7, 9, 12, 13].

According to the high rate of children's hospitalization for jaundice during their first weeks of their lives and the scarcity of the researches countrywide, the present study aims at determining the prevalence rates of weight loss and dehydration in neonates hospitalized for jaundice to come up with solutions regarding the prevention of the issue.

Materials and Methods:

The present retrospective study investigated the files of all neonates hospitalized for jaundice since early 2014 till the end of the same year in terms of such variables as gender, hospitalization age, birth order, total and direct serum bilirubin levels, weight at birth and weight at hospitalization, delivery method, the existence of comorbid disease in mother and neonate, existence of hypernatremia following which the data were collected. In the meantime, the files of the infants diagnosed with kernicterus, blood group, Rh incompatibility, sepsis and dehydration were also examined. Despite the existence of dehydration, such other clinical scales like mucosal dryness, disrupted dermatological turgor, subsided fontanelle might be absent in these neonates, weight and its reduction seem to be the most precise method of diagnosing dehydration in the infants. Neonates with weight reductions for over 7% of their initial weight were entered the study as infants with dehydration and serum levels more than 145 mmol/L were considered as hypernatremia. Serum sodium levels above 145mmol/L was considered as an indicator of hypernatremia and weight reductions to over 7% were considered as the gold standard of dehydration. Specific urine weight was not utilized as a scale for dehydration evaluation because complete urinary experiments did not exist in the files of the entire infants. Neonates born after a less than 34-week pregnancy period, infants with major congenital defections, infants with hypernatremic dehydration due to other causes like gastroenteritis and dermal disorders, sepsis and adrenal failure and infants with cholestase, i.e. direct bilirubin over 1.5mg/dL were excluded from the study. The files of 652 neonates were investigated and the data were subjected to SPSS, version 22.

Results:

In the present retrospective study, records of 652 neonates diagnosed with jaundice and hospitalized for a period from early 2014 to late 2014 were investigated. Out of 652 files studied, 505 (77.5%) were term (over 35-week pregnancy period) neonates who were included by the study and 147 (22.5%) were preterm neonates who were excluded from the study. Out of 505 term infants, 102 (20.2%) had weight reductions over 7% and dehydration. Out of 102 neonates who had been diagnosed with jaundice, 57 (55.9%) were boys and 45 (44.1%) were girls. Out of 102 infants who had been diagnosed with dehydration, 66 (64.7%) had been born through C-section delivery and 36 (35.3%) had been born through NVD practices. Out of 102 infants who had been diagnosed with dehydration, 49 (48.3%) were first-born, 22 (21.5%) were second-born and 4 (3.9%) were third-born and 5 (4.9%) were fourth-born and 2 (1.9%) were sixth-born and no birth order had been recorded for 20 neonates (19.68%). Out of 102 infants who had been hospitalized for dehydration, 77 (75.5%) were found in their first five days of hospitalization and 23 (22.5%) were in their sixth to tenth days of hospitalization and 2 (2%) were in their hospitalization period of over 11 days. The average birth weight of the neonates with dehydration was 3156.76±501.25 grams. According to the experiments recorded in the neonates' files, the average admission bilirubin level and the average sodium level were 17.38±6.28 and 147.89±13.52, respectively, and the serum BUN to creatinine ratio was 30.56±15.68. Out of 102 neonates who had been diagnosed with weight reduction, 52 (51%) had 7% to 10% dehydration and 50 (49%) had weight reductions more than 10%. In the investigation of the diseases of neonates' mothers, the obtained results indicated that 77 mothers (75.5%) had no diseases and 25 mothers (24.5%) had background diseases. Out of the 25 mothers with background diseases, 24 had UTI and 1 had hyperthyroidism. Out of 102 neonates who had been diagnosed with dehydration, 36 (35.3%) had serum sodium levels below 145 and 66 (64.7%)

had serum sodium levels above 145 (table 1). In the 505 studied neonates' files, serum sodium levels below 145MEq/dl, equivalent to 7.1%, were found recorded for 36 neonates and serum sodium levels above 145MEq/dl, equivalent to 13.06%, were found recorded for 66 neonates. Serum sodium levels had not been recorded for 12 neonates. Out of 493 term infants with jaundice, 339 (68.8%) had normal Na level (below 145MEq/l) and 154 (31.2%) had abnormal Na level (above 145MEq/l). amongst 154 neonates with hypernatremia, 88 (17.8%) did not show weight loss and 66 (13.4%) had hypernatremia plus weight loss (table 2). A significant relationship was evidenced between sodium level and weight loss of the neonates with hypernatremia in chi-square test (P=0.000).

Table 1: weight variations in neonates hospitalized for jaundice during their early weeks of their lives in Motahhary Hospital in 2014 based on sodium level

Sodium level (MEq/dl)	Without weight loss	With weight loss	Total
		Over 7%	
Below 145	303 (61.5%)	36 (7.3%)	339 (68.8%)
Abnormal (above 145)	88 (17.8%)	66 (13.4%)	154 (31.2%)
Total	391 (79.3%)	102 (20.6%)	493 (100%)

Table 2: absolute and relative frequency distributions of the neonates in terms of dehydration and serum sodium level

Variable	Frequency	Percentage
Dehydrated neonates without hypernatremia	36	7.3
Dehydrated neonates with hypernatremia	66	13.38
Neonates with jaundice and hypernatremia and without dehydration	88	17.64
Neonates with jaundice and without dehydration and hypernatremia	303	61.46

Discussion:

Unconjugated hyperbilirubinemia is one of the major causes of neonates' hospitalization during their early weeks of their lives and it is found accompanied by considerable mortality rates and neurological symptoms in case of its being severe and pathologic [14]. Jaundice is the result of bilirubin accumulation in the blood that can stem from excessive production of bilirubin and/or body's inability in metabolizing bilirubin [15, 16]. The most common factor giving rise to prolonged neonatal jaundice is being fed on mother's milk during the first two to three weeks of life and it can last up to 12 weeks. To diagnose the mother's milk-induced jaundice, there is a need for screening for other pathological factors [17]. It has been shown in animal specimens that mother's milk can increase bilirubin take-up in the digestive system as a result of which there is bought about an increase in the hepatic-intestinal circulation of bilirubin [18]. The present study aimed at the determination of dehydration frequency in term newborns hospitalized for jaundice in Orumia's Motahhary Hospital during 2014. Based on the studies, a considerable number of the neonates hospitalized for jaundice (20.2%) also had notable weight losses and 13.38% had considerable weight loss along with hypernatremia. In the study that was conducted by Tarkan et al, 28 out of 86 neonates with jaundice (33%) showed severe weight losses and 10 neonates (12%) were found with concomitant severe weight loss and hypernatremia [19]. Hypernatremia was found more frequent in this study for such a reason as lower hypernatremia limit in our study, i.e. 145mmol/l; but, in the study by Tarkan et al a serum sodium level over 150mmol/l had been set [19]. Higher frequency of dehydration in this study in comparison to the other studies carried out in Iran and the higher prevalence rates of weight loss to over 10% (49% of the dehydrated neonates) can be due to the insufficient awareness of mother referring to our health center of the importance and method of their neonates' breastfeeding during the first week after birth and/or their refrainment of expressing their milking problems such as breast problems that need appropriate instruction and culture-building [10, 20]. In the present study, 64.7% of the neonates had been born through C-section delivery that is a factor restricting proper feeding of the neonate on the mother's milk. The hospitalization age of the majority of the neonates (75.5%) was in a range from the first to the fifth days after birth and 22.5% of the neonates were in their 6th to 10th day of their lives. Considering the early jaundice induced by mother milk deficiency during the first week, it is important to instruct the unexperienced primiparous mothers about jaundice contingency during the first week as related to improper nutrition and inappropriate milking and there is also a need for precise follow-up tests of the neonates during this period [13]. In the study by Fernanda et al in Brazil, as well, imperfect nutrition was found followed by weight loss on the third day after birth and emphases were made on instruction for proper milking, supervision of milking mothers and evaluation of neonates for the development of acute jaundice risk and taking measures in line with reducing the intensity, if any [7]. It is recommended in the studies performed in this regard that the neonates should be examined for jaundice during their first 2 to 3 days after dismissal [21, 22]. In the study conducted by Adoba et al, the majority of the neonates (54%) had experienced jaundice during one to three days after birth. Adoba et al reported that delivery period and neonate's weight are associated with jaundice and the neonates with lower body weights are more frequently found with jaundice at birth [23]. It seems that jaundice can be a warning sign of dehydration originating from nutritional problems during the first week of life. In this study, 154 (31.2%) out of all the patients with jaundice had hypernatremia and 88 neonates (17.8%) only had hypernatremia without considerable weight loss. Hypernatremic cases without weight loss can be attributed to the differences in the scales used for weighing the neonates, the differences in places wherein the neonates have been weighed, the differences in hospitalization place and duration and/or early referral before the occurrence of weight loss. The majority of the mothers uninformed of the harm that neonatal dehydration and jaundice can cause to the other parts of the body do not take neonatal jaundice so serious [23]. Therefore, it is recommended that the mothers should be provided with the required instructions regarding the dangers of neonatal jaundice so that they take quick measures like referring to pediatrician upon being confronted with such problems.

Conclusion:

Due to the higher prevalence rates of hypernatremic dehydration in neonates with jaundice as was documented in the present study in contrast to the other similar studies, it seems that milking and its problems have been taken less seriously.

Suggestions:

It is suggested that the future research should be undertaken on mother milk deficiency and its relationship with hypernatremic dehydration and the prevalence of mothers' milking problems.

References

1. Riordan SM, Gazzin S. Where do we stand in the field of neonatal jaundice? Commentary on the 2017 J. Donald Ostrow Trieste Yellow Retreat. Pediatr Res. 2018 May 2. doi: 10.1038/pr.2018.53.
2. Olusanya BO, Teeple S, Kassebaum NJ. The Contribution of Neonatal Jaundice to Global Child Mortality: Findings from the GBD 2016 Study. Pediatrics. 2018 Feb;141(2). pii: e20171471. doi: 10.1542/peds.2017-1471.
3. 3. Brian Gendelman, Ada Kendall, Sharon McManus, Mary Smyth. The Natural History of Jaundice in Predominantly Breastfed Infants. Pediatrics. 2014 Aug;134(2): e340-5. doi: 10.1542/peds.2013-4299.
4. Flaherman VJ, Maisels MJ, Academy of Breastfeeding Medicine. ABM Clinical Protocol #22: Guidelines for Management of Jaundice in the Breastfeeding Infant 35 Weeks or More of Gestation-Revised 2017. Breastfeed Med. 2017 Jun;12(5):250-257. doi: 10.1089/bfm.2017.29042.vjf. Epub 2017 Apr 10.
5. Chang PF, Lin YC, Liu K, Yeh SJ, Ni YH. Prolonged unconjugated hyperbiliriubinemia in breast-fed male infants with a mutation of uridine diphosphate-glucuronosyl transferase. J Pediatr. 2009 Dec;155(6):860-3. doi: 10.1016/j.jpeds.2009.05.034.
6. Tiker F, Gürakan B, Tarcan A. Serum bilirubin levels in 1-month-old, healthy, term infants from southern Turkey. Ann Trop Paediatr. 2002 Sep;22(3):225-8.
7. Femanda M. Neonatal juandice and breastfeeding. American academy of pediatrics. 2010; 282-8.
8. Macdonald PD. Neonatal Weight Loss in Breast and Formula Fed Infants. Arch Dis Child Fetal Neonatal Ed.2003; 88:472-6.
9. Huang A. Differential Risk for Early Breastfeeding Juandice in a multi-ethnic Asian cohort. Original article.2009;38(3):2018-24.
10. Bertini G, Dani C. Is Breastfeeding Really favoring Early Neonatal Jundice?. PEDIATRICS.2001;107(3):1-5.
11. Gartner LM. 50 Years Ago in The Journal of Pediatrics: Studies of Prolonged Neonatal Jaundice in the Breast-Fed Infant. J Pediatr. 2016 Jan; 168:211. doi: 10.1016/j.jpeds.2015.07.047.
12. Stanley ip. An evidence-based review of important issue concering neonatal hyperbillirubinemia. PEDIATRICS. 2004; 114(1): 130-53.
13. Ardakani SB. Prevalence of juandice caused by lack of breastfeeding. Iranian Journal of Pediatrics.2004;14(2):108-14.
14. Slusher TM, Zamora TG, Appiah D, Stanke JU, Strand MA, Lee BW, Richardson SB, Keating EM, Siddappa AM, Olusanya BO. Burden of severe neonatal jaundice: a systematic review and meta-analysis. BMJ Paediatr Open. 2017 Nov 25;1(1): e000105. doi: 10.1136/bmjpo-2017-000105.
15. Chee YY, Chung PH, Wong RM, Wong KK. Jaundice in infants and children: causes, diagnosis and management. Hong Kong Med J. 2018 May 21. doi: 10.12809/hkmj187245.
16. Amin SB, Wang H, Laroia N, Orlando M. Unbound Bilirubin and Auditory Neuropathy Spectrum Disorder in Late Preterm and Term Infants with Severe Jaundice. J Pediatr. 2016 Jun; 173:84-9. doi: 10.1016/j.jpeds.2016.02.024.
17. Maisels MJ, Clune S, Coleman K, et al. The natural history of jaundice in predominantly breastfed infants. Pediatrics 2014;134: e340-5.
18. Kumral A, Ozkan H, Duman N, Yesilirmak DC, Islekel H, Ozalp Y. Breast milk jaundice correlates with high levels of epidermal growth factor. Pediatr Res 2009; 66:218-21.
19. Tarcan A, Tiker F, Vatandas NS, Haberal A, Gurakan B. Weightloss and hypernatremia in breast-fed babies: frequency in neonates with non-hemolytic jaundice. J Pediatr Child Heath 2005;41(9-10):484-7.
20. Ruth A, Laurence R, Laurence M. Breastfeeding. th14, Elsevier Mosby, 2011; 489.
21. Dennery P. Neonatal Hyperbillirubinemia. N Engl.2001;344(8):581-9.
22. Pichon, Jean-Baptiste L.; Riordan, Sean M.; Watchko, Jon; Shapiro, Steven M. The Neurological Sequelae of Neonatal Hyperbilirubinemia: Definitions, Diagnosis and Treatment of the Kernicterus Spectrum Disorders (KSDs). Bentham Science Publishers Volume 13, Number 3, August 2017, pp. 199-209(11)
23. Adoba P, Ephraim RKD, Kontor KA, Bentsil JJ, Adu P, Anderson M, Sakyi SA, Nsiah P. Knowledge Level and Determinants of Neonatal Jaundice: A Cross-Sectional Study in the Effutu Municipality of Ghana. Int J Pediatr. 2018 Mar 1; 2018:3901505. doi: 10.1155/2018/3901505.