Available online at www.sciencedirect.com

ScienceDirect

Journal of the Chinese Medical Association 79 (2016) 614–617

www.jcma-online.com

Original Article

Comparison between maternal and neonatal serum vitamin D levels in term jaundiced and nonjaundiced cases

Seyyed Mohammad Hassan Aletayeb [a], Masoud Dehdashtiyan [b,*], Majid Aminzadeh [a], Arash Malekyan [b], Somayeh Jafrasteh [b]

[a] *Department of Pediatrics, Faculty of Medicine, Abu zar Children's Hospital, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran*
[b] *Department of the Pediatrics, Imam Khomeini Hospital, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran*

Received August 9, 2015; accepted May 2, 2016

Abstract

Background: Neonatal jaundice is the result of an imbalance between the production and conjugation of bilirubin. Considering the multiple roles of vitamin D, lower levels of vitamin D in these cases may be associated with neonatal jaundice. The present study was undertaken for the purpose of comparing serum vitamin D levels in healthy term jaundiced and nonjaundiced newborns and their mothers.
Methods: This case–control study was conducted in 60 term newborns and their mothers from a teaching and referral children's hospital in the southwestern region of Iran, from December 22, 2013 through March 22, 2014. Neonatal and maternal blood samples were obtained and sent to the laboratory.
Results: The mean serum 25-hydroxy vitamin D levels of newborns and their mothers in both the case and the control groups were not significantly associated with their serum bilirubin levels. The mean of laboratory indices (calcium, phosphorus, alkaline phosphates, parathyroid hormone, and 25-hydroxy vitamin D) in mothers and newborns of the case group were nonsignificantly higher than that of the control group, but the mean vitamin D level was significantly lower among newborn cases compared with the controls ($p < 0.05$).
Conclusion: Newborn vitamin D levels were significantly lower in jaundiced cases compared with those in the nonjaundiced healthy groups, which may reveal an association between indirect hyperbilirubinemia and serum vitamin D levels. We suggest that more studies should be conducted including follow-up after 15 days of age, when jaundice has typically been resolved, and before starting vitamin D supplementation.

Keywords: hyperbilirubinemia; jaundice; mothers; newborns; vitamin D

1. Introduction

In neonates, jaundice generally results from an imbalance between the production and conjugation of bilirubin.[1,2] Overall, up to 60% of term newborns have clinical jaundice in the 1st week of life.[3] Although some factors such as blood groups and/or Rh incompatibility and sequestration had been reported as reasons of neonatal jaundice, the majority of reasons for this condition have not yet been clearly defined. Liver tissue is involved in vitamin D synthesis and plays an important role in indirect to direct bilirubin conversion and hyperbilirubinemia pathophysiology.

Vitamin D deficiency was accompanied by cardiovascular problems, neoplastic diseases, diabetes, obesity, metabolic syndrome, and colorectal and breast cancers. Vitamin D deficiency has also been reported to have a relationship with the maternal, fetal, and placental health.[4] However, it was reported that more than 80% of Iranian pregnant women had low levels of vitamin D, and the mean 25-hydroxy vitamin D test results in most of their neonates were immeasurably low.[5]

Conflicts of interest: The authors declare that they have no conflicts of interest related to the subject matter or materials discussed in this article.

* Corresponding author. Dr. Masoud Dehdashtiyan, Department of the Pediatrics, Imam Khomeini Hospital, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran.
E-mail address: dehdashtian@ajums.ac.ir (M. Dehdashtiyan).

http://dx.doi.org/10.1016/j.jcma.2016.05.008

Although several studies had been performed on the treatment of hyperbilirubinemia among newborns using phototherapy and/or blood exchange and medications, only a few studies have investigated the role of vitamin D in neonatal jaundice. High economic expenditure and social problems of hospitalization of neonatal jaundice discourage investigators from finding a new therapeutic method.

There are several generally recognized causes of neonatal jaundice; however, despite numerous studies, the cause remains unknown in 10–50% of infants hospitalized with jaundice. However, considering the multiple roles of vitamin D, lower levels of vitamin D may be associated with neonatal jaundice in these cases.[3,4]

The present study was performed to compare the serum vitamin D levels in healthy term jaundiced and nonjaundiced newborns and their mothers.

2. Methods

2.1. Study participants

This case–control study was conducted in 60 term newborns (38–42 gestational weeks) and their mothers from a teaching and referral children's hospital in the southwest of Iran, between December 22, 2013 and March 22, 2014. This study was approved by the Ahvaz Jundishapur University of Medical Sciences Ethical Committee, and all parents signed the informed consent prior to enrollment.

2.2. Inclusion criteria

Jaundiced healthy term newborns (newborns with indirect hyperbilirubinemia) ranging in age from 2 days to 10 days, with birth weights between 2.5 kg and 4 kg, and their mothers were included as the case group. Nonjaundiced healthy term newborns with similar age and birth weight ranges and their mothers were considered as the control group. The case group consisted of newborns with a bilirubin level of >15 mg/dL, and the control group included newborns with nonvisible jaundice.

2.3. Exclusion criteria

Newborns with pathological causes for their hyperbilirubinemia such as blood group mismatch, infection, polycythemia, glucose-6-phosphate dehydrogenase deficiency, and cephalic hematoma; a history of asphyxia; or congenital anomalies were excluded. Additionally, newborns whose mothers had a history of chronic hepatic or renal disorders, gestational diabetes, or hypertension and used anticonvulsant drugs were excluded.

2.4. Study measurements

Blood samples were taken from the newborns and their mothers, and thereafter sent to the laboratory. After measurement of serum bilirubin levels, the blood samples were centrifuged using SELECTA devices at 4000 *g* and the extracted serum was maintained at −20°C. Then, samples were transferred on a weekly basis to the university reference laboratory and were stored at −70°C. Moreover, 25-hydroxy vitamin D, parathyroid hormone (PTH), calcium, phosphorus, and alkaline phosphates (ALPs) were measured. In our study, 25-hydroxy vitamin D and PTH were measured using the enzyme-linked immunosorbent assay method and ILB kit (Germany). Other tests such as calcium, phosphor, and alkaline phosphatase were carried out using Pars Azmoon kits (Pars Azmoon, Tehran, IR Iran). According to the reference level of those kits that were used in this study, individuals with serum vitamin D levels of <30 nmol/L were reported as vitamin D deficient, 30–75 nmol/L as vitamin D insufficient, and >75 nmol/L as those with a normal value of vitamin D.

2.5. Statistical analysis

The study data were collected and analyzed using the SPSS, version 19.0. To compare two quantitative and qualitative variables with normal distribution, independent sample *t* test and chi-square tests were used. Additionally, the Mann–Whitney *U* test was used for variables without normal distribution. All p values < 0.05 were considered significant.

Table 1
Maternal and neonatal demographic characteristics of the study cases and controls.

Variables		Case group ($n = 30$)	Control group ($n = 30$)	p
Maternal age (y), mean ± SD		27.00 ± 5.21	27.07 ± 3.55	0.954
Delivery type, *n* (%)	C/S	22 (74)	16 (54)	0.11
	SVD	8 (16)	14 (46)	
Male/Female, *n* (%)		22/8	22/8	>0.99
History of consanguineous marriages	Yes	12	13	0.79
	No	18	17	
Maternal BMI (kg/m^2), mean ± SD		26.06 ± 5.22	23.70 ± 3.24	0.041
Residency	City	26	26	>0.99
	Urban	4	4	
Neonatal body weight (g), mean ± SD		3120 ± 495.36	3120 ± 353.58	0.993
Head circumference in newborn (cm), mean ± SD		34.53 ± 0.927	34.46 ± 0.955	0.78
Body length of newborn (cm), mean ± SD		50.32 ± 1.60	49.95 ± 1.74	0.40

BMI = body mass index; SD = standard deviation.