Medical Journal of the
Islamic Republic of Iran

Volume 17
Number 1
Spring 1382
May 2003

FREQUENCY OF HYPOCALCEMIA IN LOW BIRTH WEIGHT INFANTS AT HOSPITALS IN KASHAN IN 1997

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ABSTRACT

Considering the fact that early hypocalcemia is the most common type of neonatal hypocalcemia which manifests during the first few days of life (72 hours) and that hypocalcemia in low birth weight neonates is very common, this descriptive study on hypocalcemia was conducted to determine the frequency of hypocalcemia in low birth weight neonates in the city of Kashan in the first 9 months of the year 1997. A total of 250 infants weighing less than 2.5 kg were included in this study. Variables such as gestational age, APGAR score, birth weight, pre-eclampsia of mother and age of pregnancy were recorded. All of the newborns were checked and laboratory tests for serum calcium level were performed on them. Any full-term infant with a serum calcium level less than 8 mg/dL or pre-term infants with serum calcium levels less than 7 mg/dL were identified as hypocalcemic infants. The results of the study showed that 22.4% of the infants were hypocalcemic, most of these being neonates below 1500g weight. The frequency of hypocalcemia in infants whose mothers were afflicted by pre-eclampsia was 30.8%. The frequency of hypocalcemia in infants with low APGAR score was 28.8% and for those neonates with a normal APGAR score, 21.2% (p value<0.01). The frequency rate of hypocalcemia in full-term and pre-term infants was 29.7 and 20.2% respectively (p-value<0.05).

Considering the high prevalence of hypocalcemia in low birth weight infants, it is recommended that all infants weighing less than 2.5 kg with or without clinical signs undergo screening tests and their level of calcium measured so that prompt treatment can be provided to prevent the serious consequences of this disorder.
MJIRI, Vol. 17, No. 1, 47-50, 2003.

Keywords: Hypocalcemia, low birth weight infant.

INTRODUCTION

Hypocalcemia is a relatively common disorder in infants that needs investigation and urgent treatment. Neonatal hypocalcemia has been clinically classified under two categories of early and late hypocalcemia. Early hypocalcemia often occurs within the first 72 hours of life while the late form occurs from the end of the first week to 6 weeks of life. Early hypocalcemia is more prevalent than the other type, especially in neonates weighing less than 2.5 kg,[1] or infants with low APGAR scores or infants of diabetic mothers.[2]

The prevalence of early hypocalcemia varies of birth weight and gestational age and is inversely related to the age of pregnancy and the weight of the neonate.[3] Clinical signs of the disease vary and depend on the serum calcium level. The most important signs are neuromuscular excitability and seizures that need immediate treatment. Nevertheless some cases have no signs or symptoms.[1] Considering the high prevalence of hypocalcemia

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in low birth weight infants (less than 2.5 kg) and that it may present itself without any sign, it is necessary to measure the serum calcium level of newborns that are at risk of developing hypocalcemia; therefore, this study was undertaken to examine all neonates with low birth weight for a duration of 9 months, and the calcium level of these neonates regardless of any clinical signs was measured.

MATERIAL AND METHODS

A prospective descriptive study was conducted at the neonatal ward of Beheshti General Hospital and Martyr Shabihkhani maternity hospital in Kashan in 1997.

Two-hundred and fifty neonates weighing less than 2.5 kg with or without clinical manifestations of hypocalcemia, were included in the study during the last nine months of 1997. Serum calcium level was measured in all of them and their demographic and corresponding data including gestational age, sex, APGAR score, birth weight and maternal history of pre-eclampsia were recorded on questionnaires.

Considering a precision of 5%, a coefficient of confidence of 95% and a possible frequency of 20%, a sample size of 250 was determined.

Serum calcium level was measured in all of these neonates by obtaining 2 milliliter blood samples. Hypocalcemia was defined as a serum calcium level lower than 8 mg/dL and 7 mg/dL in term and preterm neonates respectively.

Those with hypocalcemia were detected and the findings were statistically analyzed.

RESULTS

During the 9 months of the study, 3600 infants were born, 250 infants (7 percent) had low birth weight and 61 (24.4 percent) of these were identified as early hypocalcemic infants, among which 59% of them were asymptomatic and 41% were symptomatic. In this study, 122 boys and 128 girls with low birth weight were examined. The prevalence of hypocalcemia in girls and boys was 23.5 and 25.4 percent, respectively (p value= N.S.). The result of the study showed that 28.8 percent with low APGAR scores and 21.2 percent with normal APGAR scores were hypocalcemic (P.V. < 0.01). 29.7 percent of full-term and 20.2 percent of pre-term infants were also hypocalcemic (p value<0.05). About 30.8% of neonates born to mothers with pre-eclampsia developed hypocalcemia (Table I). Hypocalcemia was observed in 44% and 19.5% of newborns weighing less than 1500 g and those with 1500 to 2500 g respectively (p value< 0.01). In babies weighing less than 1500 g 81% of neonates with normal APGAR scores and 26.7% of them with low APGAR scores were hypocalcemic (p-value< 0.01), (Table II).

DISCUSSION

The results of this research showed that approximately 25% of low birth weight infants developed early hypocalcemia, and 20 percent of pre-term and 30 percent of full-term infants suffered from hypocalcemia. In a research that was conducted in the United States, the prevalence of hypocalcemia in full-term infants was 30 to 40 percent, that is comparable to the findings of this research;[1] our study shows a lower frequency rate (20%) of hypocalcemia in pre-term infants in comparison with a similar research in the U.S.[1] Our lower frequency rate may be explained by exclusion of winter in our study, while those in the U.S. included all the seasons in their research. In addition, this difference may be due to the lack of sufficient facilities for giving care to very low birth weight neonates.

Table I: Frequency of infants weighing less than 2500 g according to the prevalence of hypocalcemia, gestational age, birth weight and maternal pre-eclampsia.

Hypocalcemia	Pre-term				Full-term				Total
	1500-2500g		Less-than 1500g		1500-2500g		Less-than 1500g		
	Pre-eclampsia		Pre-eclampsia		Pre-eclampsia		Pre-eclampsia		
	-	+	-	+	-	+	-	+	
Positive	18 (20)	2 (15.4)	7 (22.6)	1 (20)	14 (17.5)	5 (29.41)	10 (100)	4 (100)	61 (24.4)
Negative	72 (80)	11 (84.6)	24 (77.4)	4 (80)	66 (82.5)	12 (70.59)	-	-	189 (75.6)
Total	90 (100)	13 (100)	31 (100)	5 (100)	80 (100)	17 (100)	10 (100)	4 (100)	250 (100)

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In another study that was conducted in 1995 in England,[12] it was reported that 47.5 percent of IUGR infants suffered from hypocalcemia while this figure for the present study was 30 percent. This difference may be partly explained by the fact that we excluded those SGA infants weighing more than 2500 g while Spinillo et al. also included those babies in their study.[12]

Our study showed that 25.4 percent of male and 23.5 percent of females were hypocalcemic, so there was no significant association between gender and the disorder. This finding is similar to what has been reported in scientific sources.[3] In this study when different parameters including APGAR score, gestational age, birth weight and pre-eclampsia of the mother were investigated, the effects of these factors in developing early hypocalcemia became more apparent. According to the results of the present study, the majority of the early hypocalcemic infants (59%) were without clinical signs and the rest (41%) were symptomatic. In reference text books, it is confirmed that the majority of hypocalcemic infants are asymptomatic but no figure has been presented in this respect.[4]

The present study showed that a significant number of low birth weight infants developed early hypocalcemia. The associated risk factors were prematurity, intra-uterine growth retardation, birth weight, pre-eclampsia of the mother and since the majority of afflicted infants were asymptomatic, the importance of routine measurement of serum calcium levels in this group of infants becomes clear. On the other hand, with better care during pregnancy and prior to delivery, it is possible to prevent problems such as pre-eclampsia, prematurity, IUGR, and birth asphyxia and consequent hypocalcemia of infants can be prevented. Paying close attention to the afore-mentioned problems and timely recognition of hypocalcemia and appropriate management will prevent the undesirable consequences of this disease.

Further study is recommended to detect other causes of infantile hypocalcemia, the effects of increasing care during pregnancy (nutrition or treating complications of pregnancy and prescribing vitamin D) and its effect on the occurrence of infantile hypocalcemia and the consequences of pregnancy on the prevalence of hypocalcemia and also ways of preventing prematurity and IUGR to reduce hypocalcemia in newborns.

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Table II: Frequency of infants with hypocalcemia according to APGAR scores and weight.

	Low APGAR		Normal APGAR		Total
	Weight		Weight		
Hypocalcemia	1500-2500g	Less than 1500g	1500-2500g	Less than 1500g	
Positive	21 (30)	9 (26.5)	18 (13.8)	13 (81.2)	61 (24.4)
Negative	49 (70)	25 (73.5)	112 (86.2)	3 (18.8)	189 (75.6)
Total	70 (100)	34 (100)	130 (100)	16 (100)	250 (100)

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