



SERUM CALCIUM LEVELS CORRELATION WITH SEVERITY OF HYPOXIC ISCHEMIC ENCEPHALOPATHY.

Pediatrics

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ABSTRACT

BACKGROUND: Perinatal asphyxia is one of the top causes of neonatal morbidity and mortality. It accentuates the physiological fall in serum calcium levels in neonates leading to hypocalcemia which may be due to several factors.

AIMS AND OBJECTIVES: assess the serum calcium levels of newborn after birth asphyxia and to find out any correlation of levels of serum calcium with severity of asphyxia.

METHODOLOGY: This is a Hospital based observational study conducted at tertiary care hospital in india. Babies with APGAR score of less than 7 at 5 minute were included in the study. Babies were divided in to two groups . Group A mild grade birth asphyxia and group B moderate to severe birth asphyxia. data was analyzed and appropriate statistical analysis done.

RESULTS: total 110 babies had birth asphyxia during this period of study and were included in the study. Group A had 80 babies mild birth asphyxia and group 2 had 30 babies moderate to severe birth asphyxia. Hypocalcemia was present in 41 cases of birth asphyxia babies of total 110 babies (37.7%). Group A 25 babies had hypocalcemia of total 80 babies (31.25%) with mean serum calcium levels of 5.85 and in group B 16 babies had hypocalcemia of total 30 babies (53.3%) with mean serum calcium levels of 5.81. Serum calcium values were not statistically significant between cases of hypocalcemia in Group A and Group B with p value of 0.80.

CONCLUSION: hypocalcemia was more common in moderate to severe cases of hypoxic encephalopathy cases compared to mild cases but serum calcium levels were not statistically significant between two groups.

KEYWORDS

Specific Skill Training, Performance Variable, Basketball Players.

INTRODUCTION :

Perinatal asphyxia is an insult to the fetus or newborn due to a lack of oxygen (hypoxia) and/or a lack of perfusion (ischemia) to various organs. Hypoxic-ischemic encephalopathy implies the interruption of supply of nutrients to the brain, mainly oxygen and glucose, sufficiently substantial to cause irreversible damage (1).

Perinatal asphyxia is one of the top causes of neonatal morbidity and mortality. Globally, it was estimated by Lancet in 2005 that 23% of the 4 million deaths and 26% of the 3.2 million stillbirths was due to hypoxia. (2). Hypocalcemia in birth asphyxia is thought to be due to several factors and may result in neuromuscular irritability (3). The present study is done to assess the serum calcium levels of newborn after birth to find out any correlation of levels of serum calcium with severity of asphyxia.

METHODOLOGY:

This is a Hospital based observational study for duration of 2 years at Niloufer hospital in Newborn up to 1 month age. Inclusion Criteria: Babies with APGAR score of less than 7 at 5 minute and only in born babies were included in the study. Exclusion criteria: Babies with congenital cardio pulmonary malformation, those born mother with diabetes mellitus and hypertension treated with diuretics, general anaesthesia, phenobarbitone, pethidine, magnesium sulphate and other drugs likely to cause depression.

Hypocalcemia is defined as total serum calcium of less than 7 mg/dL (1.75 mmol/L) or ionized calcium less than 4 mg/dL (1 mmol/L) in preterm infants and less than 8 mg/dL (2 mmol/L; total) or <1.2 mmol/L (ionic) in term neonates.

Babies were divided in to two groups . Group A mild grade birth asphyxia corresponding to stage 1 sarnat and sarnat staging and group B moderate to severe birth asphyxia corresponding to grade 2 and 3 of sarnat and sarnat staging of hypoxic ischemic encephalopathy.

Cases were selected based on inclusion criteria and detailed clinical examination was done and physical findings were recorded on pre designed proforma. After informed consent obtained from parents sample was collected and following investigations were done hemoglobin, total count. Differential count, serum sodium potassium and calcium. Serum total calcium was estimated in auto-analyzer. all data is entered in entered in to excel sheet and analyzed.

RESULTS:

Total 110 babies had birth asphyxia during this period of study and were included in the study.

Group A had 80 babies mild birth asphyxia and in Group B had 30 babies moderate to severe birth asphyxia as shown in table 1.

TABLE 1:

Group	Staging hie	Number of cases	Serum calcium levels mean and standard deviation
Group A	Mild hie	80	7.01 (1.91)
Group B	Moderate to severe hie	30	7.09 (1.93)

Total 110 babies in study 67 were male and 43 were female. Mean weight of the babies in study was 2.41 kg with standard deviation of

0.64.

Hypocalcemia was present in 41 cases of birth asphyxia babies of total 110 babies (37.7%).

In Group A 25 babies had hypocalcemia of total 80 babies (31.25%) and in Group B 16 babies had hypocalcemia of total 30 babies (53.3%) shown in Table 2

Table 2:

Group	Hypocalcemia cases (percentage)	Serum calcium levels mean and standard deviation
Group A (Mild hie)	25 (31.25%)	5.85 (0.87)
Group B (Moderate to severe)	16 (53.3%)	5.81 (1.41)

Serum calcium values were not statistically significant between hypocalcemia cases in Group A and Group B with t value of 0.24 and p value of 0.80 (>0.05).

In hypocalcemia in hypoxic ischemic encephalopathy 14 babies expired. Mild hypoxic ischemic encephalopathy 2 expired in 25 babies (8%) and in moderate to severe hypoxic ischemic encephalopathy 30 babies 12 babies expired (40%).

Table 3:

	Hypocalcemia cases	Deaths in hypocalcemia
Group A Mild HIE	16	2 (8%)
Group B Moderate to severe HIE	25	12 (40%)
Total	41	14 (34.1%)

DISCUSSION :

As described by Volpe Hypoxaemia is the 'diminished amount of oxygen in the blood supply' and cerebral ischaemia as the 'diminished amount of blood perfusing the brain'; ischaemia is the more important of the two forms of oxygen deprivation since it also results in deprivation of glucose which is also crucial in the genesis of neuronal injury. (4) Hypoxic-ischaemic brain injury of the term and near-term infant remains a significant problem throughout the world. Despite the important advances in perinatal care in the past decades, asphyxia remains a severe condition leading to significant mortality and morbidity. (5). Perinatal asphyxia one of the most common primary cause of mortality (28.8%) and morbidity among neonates in India and is the commonest cause of stillbirths (45.1%). (6) Fifteen percent to twenty percent of affected newborns will die in the postnatal period and an additional twenty five percent will develop severe and permanent neuropsychological sequelae, including mental retardation, visual motor or visual perceptible dysfunction, increased hyperactivity, cerebral palsy and epilepsy (7).

Sodium, potassium and calcium are the major electrolytes in human body, and any deviation from their normal levels in blood might cause convulsions, shock and other types of metabolic abnormalities. Calcium is an important second messenger in our body and also helps carrying out muscle function and acts as cofactor for several enzymatic activities. (6) Hypocalcemia may result in neuromuscular irritability which presents in the form of convulsions, jitteriness, twitchings and/or intability. Nonspecific symptoms like poor feeding, lethargy and vomiting may also result. The cause of this hypocalcemia in birth asphyxia is still debated. (3). Perinatal asphyxia Delayed introduction of feeds, increased calcitonin production, increased endogenous phosphate load, renal insufficiency, and diminished parathyroid hormone secretion all may contribute to hypocalcemia. (8).

In our study hypocalcemia was present in 41 (37%) cases of total 110 hypoxic ischemic encephalopathic cases .In Onyiriuka study, the overall prevalence (22.6%) of early-onset neonatal hypocalcaemia in birth asphyxia cases (9). Behrman et al, in 1974 in USA compared the serum calcium levels of 42 neonates with birth asphyxia with 42 control neonates, matched for gestational age and sex. Neonates with asphyxia had lower serum calcium levels at 12 and 24 hours of life.(10) Petersen et al. (1981), described hypocalcemia in asphyxiated infants with more severe degrees of asphyxia. (11) Jajoo et al showed a

significant low serum calcium levels in asphyxiated babies than controls. (12)

In our study moderate to severe HIE cases with hypocalcemia had more mortality rate (40%) than compared to mild cases of HIE (8%) Lila A et al, study concluded that significant correlation between severity of HIE and decreased serum levels ionized calcium, significant relation between decreased serum levels ionized calcium decreased survival rate. (1).

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