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METABOLIC CHANGES IN NEONATES WITH BIRTH ASPHYXIA WITHOUT ACUTE KIDNEY INJURY

Paediatrics

KEYWORDS: Birth asphyxia, calcium

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ABSTRACT

Aim: To determine serum metabolites viz. calcium and electrolytes levels in newborns with birth asphyxia. **Materials and methods:** This study done at IQ City Medical College and NH multispeciality Hospital comprised of 58 neonates with birth asphyxia and 38 in control group. The serum calcium and electrolytes were recorded. The two groups were compared using unpaired student's t test. **Result:** The mean serum calcium, sodium and potassium levels were 7.96±0.66 mg/dl, 136.76±5.6 meq/L and 5.33±0.89 meq/L in cases. In control group these were 9.5±0.64 mg/dl, 134.97±5.44 meq/L and 5.27±0.99 meq/L respectively. In birth asphyxia cases serum calcium was significantly low ($p < 0.005$). The serum sodium and potassium levels in both the groups were parallel. **Conclusion:** Early diagnosis and proper treatment of metabolic changes commonly occurring in neonates with birth asphyxia may improve their life and also decrease the mortality rate.

INTRODUCTION

According to World Health Organization, birth asphyxia is defined as "failure to initiate and sustain breathing at birth." (1) In India, birth asphyxia is one of the most common cause of morbidity and mortality(28.8%) among neonates(2).This is mainly caused by systemic hypoxia and or reduced cerebral blood flow. This condition is frequently associated with metabolic changes like hypocalcemia, hypoglycaemia, hyponatremia, hyperphosphatemia etc. This has been found to be associated with metabolic acidosis as well.(3) After birth calcium levels may fall in neonates with birth asphyxia due to abrupt cessation of placental transfer. The calcium plays different roles in body being the secondary messenger. Calcium helps in carrying out muscular functions and acts as co-factor for several enzymes as well. This may lead to neuromuscular irritability, present as twitching, convulsion or jitteriness. (4,5) Hyperphosphatemia may also be seen due to endogenous breakdown of glycogen and tissue protein which impairs the functions of parathyroid gland.(5) Glucose being an essential nutrient for the brain, hypoglycaemia may lead to encephalopathy and neurological injury. In birth asphyxia, hypoglycaemia may be seen due catecholamine release.(6)

MATERIALS & METHODS

This retrospective study was conducted at IQ City Medical College and NH Multispeciality Hospital Durgapur. The study was conducted from November 2015 to October 2016. Newborns with birth asphyxia of having Apgar score 7 or less at 1 min.were selected as cases. Newborn with suspected metabolic disease, creatinine more than 1.5mg/dl, born to mother having diabetes mellitus, toxaemia pregnancy were excluded from the study. Control group comprised of newborn with Apgar score >7 without birth asphyxia.

In this study 58newborns were enrolled in study as cases of birth asphyxia. The 38newborns without birth asphyxia served as control. The serum calcium and electrolytes levels wererecorded for the selected neonates. The above mentioned detailwas obtained from Medical Record Department (MRD).The research study was approved by institutional ethics committee.

The serum calcium was analyzed using o-cresolphthalein method(1) in autoanalyzer Siemens Dimension series. The serum electrolytes was assessed using ion selective electrode(ISE) method(2) in autoanalyzer.

In this case control study, the unpaired student's t-test was used to compare both the groups.

RESULT

Among 58 selected cases of birth asphyxia 40 were male and 18 female. Among 38 control, 24 were male and 14 female. The serum calcium, sodium and potassium levels of the two groups are displayed in table1 and Fig 1,2,3.

Table 1 The mean serum calcium and electrolytes levels in both the groups

parameters	Cases (n=58)	Control (n=38)	p value
Serum Calcium (mean±SD)	7.96±0.66 mg/dl	9.5±0.64 mg/dl	**<0.005***
Serum Sodium (mean±SD)	136.76±5.6 meq/L	134.97±5.44 meq/L	**0.129****
Serum Potassium (mean±SD)	5.33±0.89 meq/L	5.27±0.99 meq/L	**0.78****

***highly significant, **not significant**

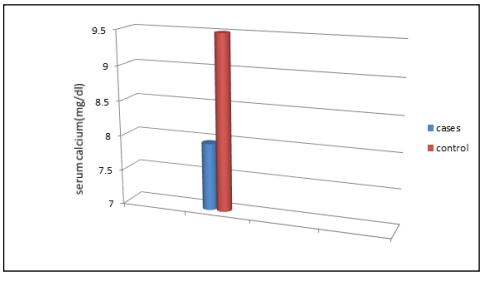

Fig. 1 – serum calcium levels in cases and control

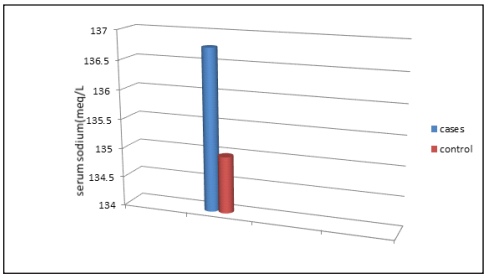

Fig. 2 – serum sodium levels in cases and control

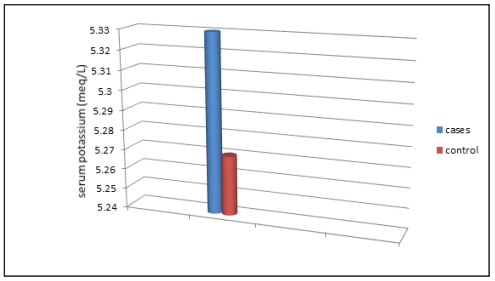

Fig. 3 – serum potassium levels in cases and control

DISCUSSION

In current study in birth asphyxia neonates serum calcium was found significantly lower ($p<0.005$) than that in control group. Study by Jain et.al(5)showed significant low total calcium (7.9±1.7mg/dl) as compared to control having total calcium(9.5±0.9mg/dl) at 48 hrs of life. In Rai et al(1)study mean calcium level was found 8.31±0.48mg /dl and 9.47±1.7mg/dl in study group (birth asphyxia) and control group respectively which is significantly lower for asphyxiated babies. The similar findings were seen in current study as well. In the same study by Rai et al(1) serum calcium levels were also compared among asphyxiated babies with having different degree of asphyxia based on Apgar score. Severely asphyxiated babies were having significantly lower total calcium levels to moderately asphyxiated and moderately the same to mild one. The calcium levels of newborn with birth asphyxia was found significantly lower (6.85±0.95 mg/dl) in comparison with control (9.50±0.51mg/dl) in study of Basuet al(2). Similar finding of significant lower levels of serum calcium in birth asphyxia was noticed in study by Jadoo et al.(7) as well.

In Basu et al(2)study the serum sodium levels were 122.1±6.0meq/L which is significantly lower than that of control group (138.8±2.7 meq/L). The serum potassium levels were 5.05±0.63meq/L which is significantly lower than that of control group (4.19±0.40meq/L). In our study serum sodium and potassium levels are similar in both the groups.

CONCLUSION

Development of hypocalcemia in birth asphyxia may require medical attention. Early diagnosis and proper treatment of metabolic changes commonly occurring in neonates with birth asphyxia may improve their life specially neurodevelopmental aspect and also decrease the mortality rate.

REFERENCES

1. Rai S, Bhatyani KK, Kaur S. Effect of Birth asphyxia on serum calcium and glucose level: a prospective study. Int J Sci stud 2015;3(7):3-6.
2. Basu P, Som S, Das H and Choudhuri N. Electrolyte status in birth asphyxia. Indian J Pediat.r2010;77:259-62.[DOI-10.1007/s12098-010-0034-0]
3. Tsang RC, Donovan EF, SteichenJJ. Calcium physiology and pathology in the neonate. PediatrClin North Am 1976;23:611-26.
4. Tsang RC, Light JJ, Sutherland JM, Kleinman LI. Possible pathogenetic factors in neonatal hypocalcemia of prematurity. The role of gestation, hyperphosphatemia, hypermagnesemia, urinary calcium loss and parathormone responsiveness. J Pediatr 1973;82:423-9.
5. Jain BK, Singh D, Singh H, Narang APS, Praveen C, Sobti and Gupta A. Serum ionized calcium in birth asphyxia. Ind J of clinbiochem 2000;15(1):36-9.
6. Aurora S, Snyder EY. Perinatal asphyxiaIn: Cloherty JP, Eichenwald EC, Stark AR, editors. Manual of neonatal care. 7th ed. Philadelphia:Lippincott Williams and Wilkins publishers; 2014p. 536-55.
7. JadooD, Kumar A, Shankar R and Bhargava V. Effect of birth asphyxia on serum calcium levels in neonates. Indian J Pediatr. 1995;62(4): 455-9.