

Research Article

Evaluation of Neonatal Hypoglycemia in Neonatal Intensive Care Unit (NICU) in Minia University Maternity & Children Hospital: Causes and Prognosis

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Abstract

Introduction: Neonatal hypoglycemia is the most common metabolic issue in the newborn. **Aim of the work:** This study was conducted to evaluate causes and prognosis of neonatal hypoglycemia in NICU in Minia university Maternity & Children hospital. **Study design:** The study was conducted between May and December 2019. First blood glucose concentrations of all infants admitted to the nursery were measured using a "point of care" analyzer. We recorded risk factors for hypoglycemia such as birth weight, gestational age, and maternal diabetes and analyze their association with hypoglycemia. **Results:** Among 398 neonates, 42(10.55%) were hypoglycemic confirmed by serum sample. A highly significant association was found between neonatal hypoglycemia with prematurity and infant of diabetic mother (IDM). The severity of hypoglycemia was significantly associated with gestational age and birth weight. **Conclusions:** Newborns of diabetic mother, premature and abnormal birth weight are at risk of hypoglycemia.

Keywords: Neonatal hypoglycemia, blood glucose, Intensive Care Unit

Introduction

Neonatal hypoglycemia is the most common metabolic issue in the newborn (Hegarty et al., 2017), the definition of neonatal hypoglycemia remains controversial (Tin, 2014), however hypoglycemia was defined as blood sugar levels less than 45 mg/dl (Tasker et al., 2013). Hypoglycemia in neonates can be symptomatic or asymptomatic. The most common symptoms include jitteriness, convulsions, apathy, hypotonia, coma, refusal to feed, cyanosis, high pitched cry and hypothermia. These symptoms are very non-specific and may be easily missed especially in small sick infants. Therefore, hypoglycemia must always be confirmed biochemically and by response to treatment (Dhananjaya and Kiran, 2011)

Patients and Methods

First capillary blood glucose of all newborns admitted to the nursery was measured using a "point of care" analyzer (On call plus), and then who had hypoglycemia we confirmed it by serum glucose test. Hypoglycemia was defined as blood sugar levels less than 45 mg/dl (Tasker et al., 2013). Among 398 neonates who delivered in the obstetric unit in our hospital

and admitted in our NICU, there were 42 neonates (10.55%) confirmed having hypoglycemia and were considered as the hypoglycemic group, and the remaining 356 neonates with normal initial glucose level considered as the normoglycemic group.

Inclusion criteria: All neonates born in our obstetric unit of our Maternity & Children Minia- University Hospital, both sex, different gestational age and different birth weight were included and co-operative parents.

Exclusion criteria: cases born outside our hospital, cases of different apparent congenital anomalies, cases with inadequate data and unco-operative parents.

The studied groups were subjected to the following:-

- Careful history taking & General and systemic examinations.
- Laboratory investigations: RBS (using spectrophotometric method), CBC (using NIHON KOHDEN celltac), Quantitative CRP (Biomed CRP "Egy-Chem" - catalog No.301040), ABG.

- Critical sample during the attack of persistent hypoglycemia: for measure-

ment of serum Insulin, cortisol, FFA, ammonia, lactate and urinary ketones.

Results

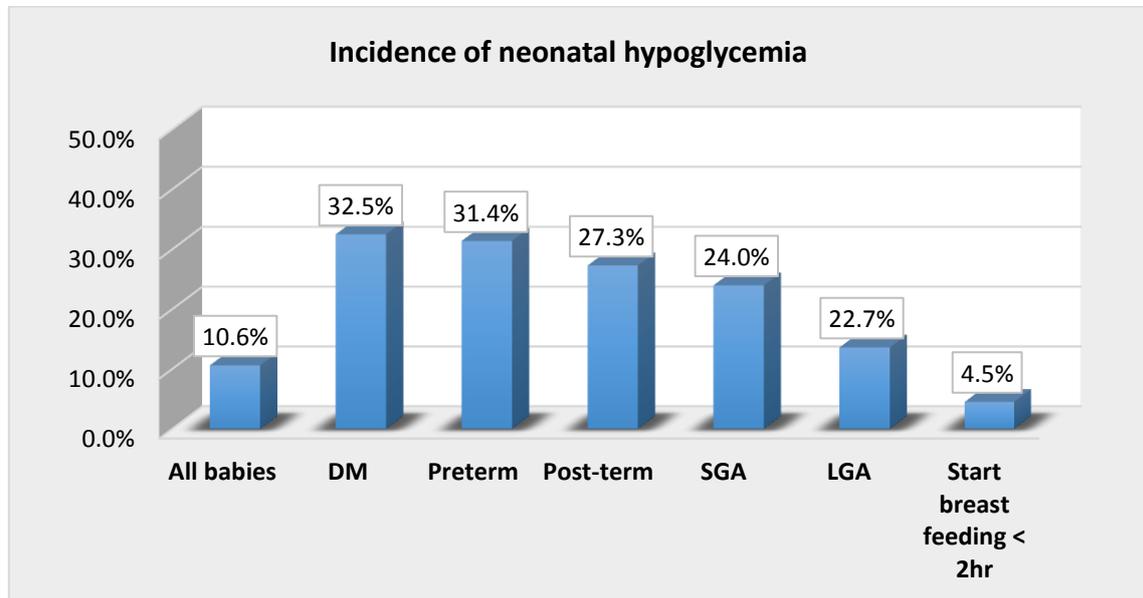


Figure (1) Incidence of neonatal hypoglycemia in neonates with different risk factors.

Majority of cases 37(88.1%) present hypoglycemia at age less than 24 hr. while only 5 cases (11.9%) at age more than 24 hr. Almost cases 41(97.9) were transient and only 1 case (2.4%) had persistent hypoglycemia more than 1 week and need GIR more than 10. Majority of cases 37(88.1%) were asymptomatic, 3 cases (7.1%) present with jitteriness, 2 cases (4.8%) present with poor suckling.

The incidence of hypoglycemia in preterm children, full-term children and post-term births were 31.4% (22/70), 5.4% (17/317) and 27.2% (2/11), respectively. There was a significant statistical difference in the incidence of hypoglycemia among the groups. The incidence of hypoglycemia in preterm children was significantly higher than full-term children or overdue births, which indicated that in preterm children hypoglycemia was more common than full-term children and overdue births.

The incidence of hypoglycemia was 50.0% (1/2), 40.0% (10/25), 30.0% (15/50), 4.7% (15/317) and 25.0% (1/4) in extremely low birth weight, very low birth weight, low birth weight,

normal birth weight and great children, respectively. Statistical analysis showed that there was a high statistically significant difference between the groups. The incidence of hypoglycemia in extremely low birth weight, very low birth weight children, low birth weight children and high birth weight children were all significantly higher than that of normal birth weight children. Between extremely low birth weight and very low birth weight, or very low birth weight children and low birth weight children, or low birth weight children and high birth weight children, there were also statistically significant difference. This suggested that hypoglycemia was clearly related to birth weight where lower the weight, the greater the risk of hypoglycemia. The risk of hypoglycemia in very high weight children was significantly higher than in normal weight children.

The incidence of hypoglycemia in cases who started first feed before 2 hour post-natal was (4/88) 4.5%, while who postpone first feed after 2 hour post-natal was (10/74) 13.5%. The above results indicated that early feeding decrease the incidence of neonatal hypoglycemia.

Out of 77 cases born to diabetic mother, 25 cases (32.5%) developed hypoglycemia. This indicated that infant of diabetic mother is high risk to develop hypoglycemia.

Discussion

In our study, 10.5% of newborns who admitted in NICU had admission glucose concentrations <45 mg/dl. This finding was relatively higher than many studies and might be due to the cutoff level of defining hypoglycemia was higher, according to our reference (most studies define it as < 40 mg/dl or even lower according to hours of age). Recently, Kaiser, using universal glucose screening in 1395 newborns with GA's between 23 and 42 weeks used three cutoffs for hypoglycemia : <35, <40 and <45 mg/dl, found incidences of hypoglycemia of 6.4%, 10.3%, and 19.3%, respectively, much higher than in the current study, possibly explained by the inclusion of much lower gestational ages (Bromiker et al., 2019). Smolkin found a 5% incidence of hypoglycemia below 35 mg/dl, among 519 full-term newborns with no risk factors born by elective caesarean section (Smolkin et al., 2017). In contrast, DePuy, using universal point of care glucose screening in 4892 full term infants born to non-diabetic mothers weighing >2500 g during the first day of life, found only 2.4% of glucose levels below 50 mg/dl (DePuy et al., 2009).

Analysis of the clinical data on hypoglycemic neonates showed a clear preponderance of asymptomatic cases. This result was in agreement with (Sasidharan et al., 2010) and (Al-Rabaty et al., 2018). This observation stresses the importance of prompt screening of the high risk neonates, irrespective of the symptoms. Jitteriness was more common (7.1%), followed by poor feeding and lethargic (4.8%), But in (Sasidharan et al., 2010) Poor feeding was the most common symptom (59.2%), followed by lethargy and irritability (31.2%), and in (Harris et al., 2012) 15% were too sleepy to feed when hypoglycemic and 7% were noted to be jittery.

The incidence of hypoglycemia was 50.0% (1/2), 40.0% (10/25), 30.0% (15/50), 4.7% (15/317) and 25.0% (1/4) in extremely low birth weight, very low birth weight, low birth weight, normal birth weight and great children, respectively. Statistical analysis showed that there was a high statistically significant differ-

rence between the groups. The incidence of hypoglycemia in low birth weight children and high birth weight children were all significantly higher than that of normal birth weight children.

Between low birth weight children and high birth weight children, there were also statistically significant difference. This result is in agreement of nearly all reports as in (Zhou et al., 2015), the incidence of hypoglycemia was 77.8% (7/9), 51.1% (23/45), 12.4% (72/581) and 33.3% (11/33) in very low birth weight, low birth weight, normal birth weight and great children, respectively. This suggested that hypoglycemia was clearly related to birth weight. Lower the weight, the greater the risk of hypoglycemia. The risk of hypoglycemia in very high weight children was significantly higher than in normal weight children.

In this study, low gestational age was one of the most robust risk factors with incidence hypoglycemia in preterm children, full-term children and post-term births 31.4% (22/70), 5.4% (17/317) and 27.2% (3/11), respectively. Prematurity increase risk by more than two times (Naif et al., 2013) that support significant relation with lower GA and hypoglycemia. In agreement with our findings (Zhou et al., 2015) who reported the incidence of hypoglycemia in preterm children, full-term children and overdue births 55.6% (19/34), 14.9% (93/625) and 11.1% (1/9), respectively. (Bromiker et al., 2019) and (Al-Rabaty et al., 2018) also agree with us.

A feeding delay of more than 2 h postnatal was also significantly associated with abnormally low blood glucose values in the neonate ($p = 0.01$). This 'modifiable' risk factor has been recognized as causative factors of neonatal hypoglycemia in (Sasidharan et al., 2010). In contrary, Stanley in 1979, when fasting after delivery was routine (Stanley et al., 1979), and recently, Zhou found relatively stable glucose levels unaffected by feeding (Zhou et al., 2017). We agree with the classical concept that diabetes during pregnancy is a risk factor. Half of infant of diabetic mother 50% (8/16) in (Sasidharan et al., 2010) had hypoglycemia. We reported 32.4% (25/77) in our study. In contrary with (Bromiker et al., 2019) infants of diabetic mothers treated with diet showed no association with hypoglycemia.

Conclusion & Recommendations

Early neonatal hypoglycemia is a dangerous phase. The strongest risk factors were early GA, LGA, SGA, infant of maternal diabetes. Long-term follow-up is necessary to evaluate the consequences of transient neonatal hypoglycemia and whether selective or universal early glucose screening should be employed.

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