

NEONATAL HYPOGLYCEMIA. THE INCIDENCE OF THE RISK FACTORS IN SALVATOR VUIA OBSTETRICS-GYNECOLOGY HOSPITAL, ARAD

Dorina Rodica Burdan¹, Valentin Botiu², Doina Teodorescu¹

REZUMAT

Autorii și-au propus să efectueze un studiu clinico-statistic privind hipoglicemia neonatală pe nou-născuții din spital. Este acceptat că hipoglicemia precoce și prelungită determină afectare cerebrală, cu retard mental. Deci, trebuie să fie identificați toți nou-născuții cu risc de hipoglicemie, și să fie rapid inițiat tratamentul, deoarece recunoașterea precoce oferă cele mai bune rezultate. Datele au fost culese prin analiza a 2687 foi de observație a nou-născuților din Spitalul Clinic de Obstetrică-Ginecologie "Dr. Salvator Vuia" Arad. Au fost selectați nou-născuții cu hipoglicemie, depistată prin test screening. Screeningul a fost efectuat prin metoda Dextrostix, din sângele capilar, la 30 min. - 1 oră după naștere, la nou-născuții cu risc, și apoi la o oră, până când valoarea glicemiei a fost bună. Incidența hipoglicemiei neonatale în spitalul nostru, este inferioară datelor din literatură. În studiul nostru, categoria de nou-născuți cu greutate < 2500 g, reprezintă categoria cu riscul cel mai crescut de hipoglicemie. De asemenea, nou-născuții extrași prin operație cezariană sunt cu risc crescut de hipoglicemie. Patologia neonatală asociată cu hipoglicemia neonatală este, în ordinea frecvenței: hipoxia perinatală, hipotermia, detresa respiratorie, sepsa, șocul neonatal și policitemia.

Cuvinte cheie: hipoglicemie neonatală, incidență, factori de risc

ABSTRACT

The authors have performed a clinical-statistical study of newborns with neonatal hypoglycemia in their hospital. It is currently accepted that persistent early and prolonged hypoglycemia results in brain damage and mental retardation. Thus, the neonatal intensive care therapy units have to identify all neonates with risk of neonatal hypoglycemia, and to initiate treatment as early as possible, because early recognition leads to the best outcomes. The data analysis has been performed by examining 2687 clinical of the newsheets of newborns in the Clinical Obstetrical-Gynecology Hospital "Dr. Salvator Vuia" Arad. The neonates with neonatal hypoglycemia, after the screening test, were selected. The screening was performed with Dextrostix, from capillary blood at 30 min. - 1 hour after delivery in neonates with risk factors, and then at 1 hour, until the glucose level was normal. The incidence of neonatal hypoglycemia in our hospital is less than in the literature data. In our study, the newborns < 2500 g body weight represent the category with the greatest risk of hypoglycemia. Also, the neonates born by caesarian section had a greater risk of hypoglycemia. The neonatal pathology associated with neonatal hypoglycemia is, in order of frequency: prenatal hypoxia, hypothermia, respiratory distress, sepsis, neonatal shock, and policitemia.

Key Words: neonatal hypoglycemia, incidence, risk factors

INTRODUCTION

Neonatal hypoglycemia is one of the most common problems seen in neonatal intensive care units.

It is accepted that the persistent early and prolonged hypoglycemia results in brain damage and mental retardation.¹

Thus, neonatal intensive care therapy units must identify all neonates with risk of neonatal hypoglycemia, and to early initiate the treatment, because early recognition offers the best outcomes.

In the present the accepted definition of hypoglycemia is: whole-blood glucose level <40mg/dl, both in the term neonates and in the premature infants.

The risk category of newborns with neonatal hypoglycemia:

- Premature infants;
- Small for gestational age infants (SGA);
- Large for gestational age infants (LGA);
- Post maturity;
- Twins;
- Infants of diabetic mothers;
- Infants born from mothers who receive high-glucose infusion before delivery;
- Newborns with neonatal pathology;
- Others: Beckwith-Weidemann syndrome, erythroblastosis, wrong-positioned umbilical artery catheter.

¹ Salvator Vuia Obstetrics-Gynecology Clinical Hospital, Arad, ² Victor Babes University of Medicine and Pharmacy, Timisoara

Correspondence to:
Dorina Rodica Burdan, Salvator Vuia Obstetrics-Gynecology Clinical Hospital, 5 Episcopiei Str., Arad, Tel. +40-257-255052.
Email: dora_burdan@yahoo.com

Received for publication: Mar. 17, 2008. Revised: Feb. 11, 2009.

OBJECTIVE

The authors have proposed to perform a clinical-statistical study of newborns with neonatal

hypoglycemia in their hospital, for a period of 9 months, to find:

- The incidence of neonatal hypoglycemia in this period of time;

- The risk factors for neonatal hypoglycemia and the incidence of hypoglycemia at risk category newborns.

The screening was performed with Dextrostix, from capillary blood at 30 min. - 1 hour after delivery, at neonates with risk factors.

MATERIAL AND METHOD

The data has performed by the analysis of 2687 clinical sheets of the newborns born in Clinical Obstetrical-Gynecology “Dr. Salvator Vuia” Arad Hospital. Then, neonates with neonatal hypoglycemia were selected, after the screening test.

The study was performed prospectively for a period of 9 months.

The screening was performed with Dextrostix, from capillary blood at 30 min. - 1 hour after delivery in neonates with risk factors, and then at every 1 hour until the glucose level was normal.

The statistical interpretation was made by calculating in Microsoft Office – Excel the average value, standard deviation, F-test (to see if the variances of two or more value sets are significantly different or not).

The Gaussian distribution of neonate’s gestational age shows us:

- 99.7% from subjects were between Average -3SD and Average +3SD;

- 95% between Average -2SD and Average +2SD;

- 68% between Average -SD and Average +SD.

This means that the group of subjects was representative from the statistical point of view.

RESULTS

- From the 2687 newborns, 326 with hypoglycemia risk were selected;

- 124 newborns presented hypoglycemia, and received treatment;

- 202 newborns presented neonatal pathology, placed in neonatal intensive care unit, and didn’t need metabolic correction;

- The risk of neonatal hypoglycemia appeared at 12.13% from all the neonates in that period of time;

- From 2687 neonates, 4.61% presented hypoglycemia;

- The incidence of neonatal hypoglycemia in universal literature is 20.6%.

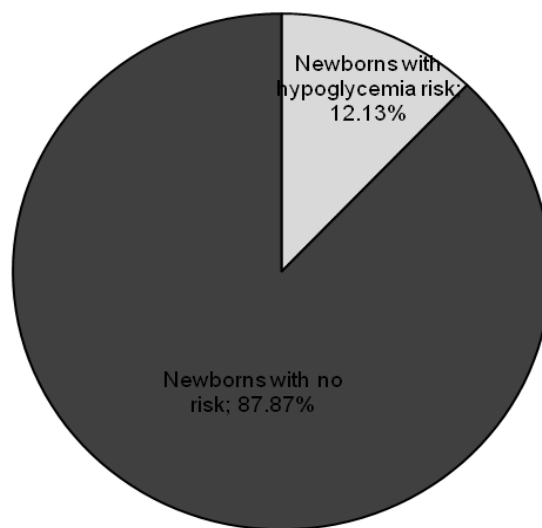
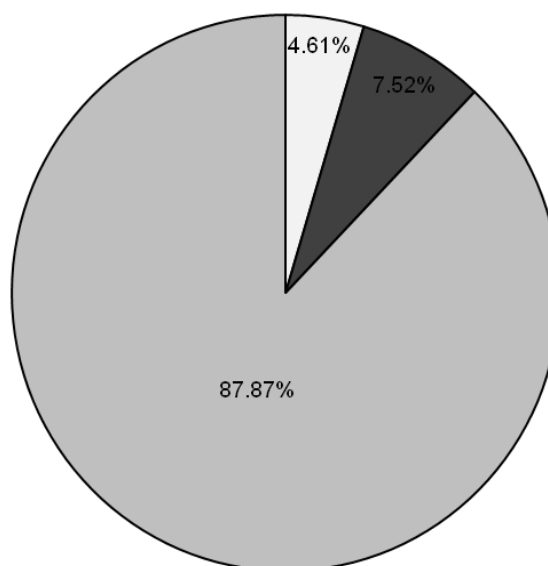


Figure 1. The incidence of hypoglycemia risk.



□ Newborns presented hypoglycemia

■ Newborns with pathological risk, but without hypoglycemia

□ Newborns with no risk

Figure 2. The incidence of neonatal hypoglycemia in our hospital.

- In our hospital, the neonatal hypoglycemia incidence is inferior to the universal data;

From all neonates with neonatal hypoglycemia, the neonates at term represent 45.53% the preterm infants represent 52.84%, and the post term infants represent 1.63%. The preterm infants are at greater risk of neonatal hypoglycemia in our study.

The literature data show that the incidence of neonatal hypoglycemia at preterm infants is 55%. Our data are similar to the literature data.

The mechanism of neonatal hypoglycemia in preterm infants is inadequate production of glucose, because of the limited deposits of glycogen.

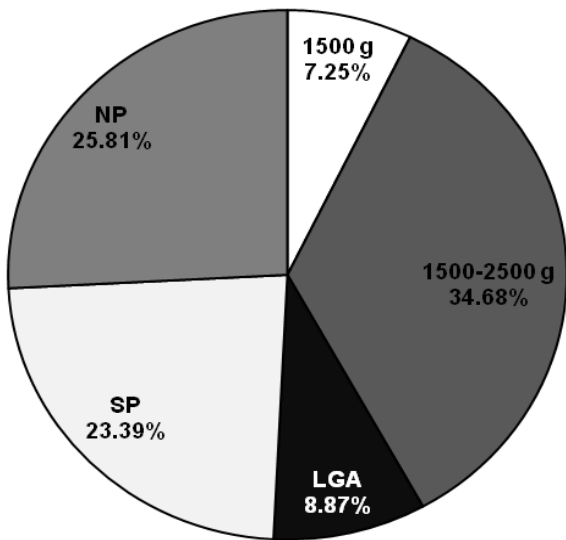


Figure 3. The evaluation of the newborns with neonatal hypoglycemia after body weight

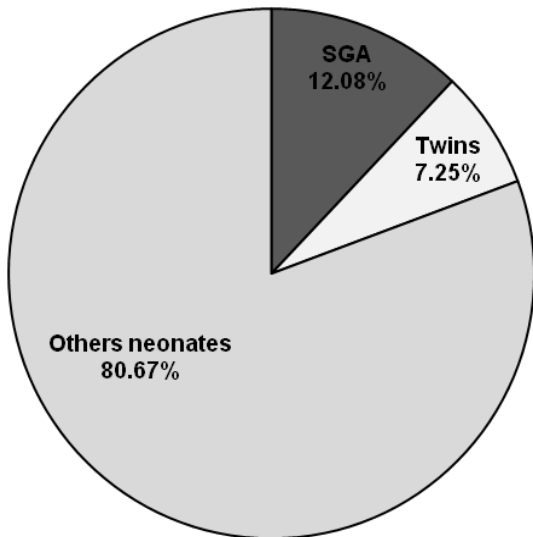


Figure 4. The incidence of the neonatal hypoglycemia in small for gestational age newborns (SGA) and twins:

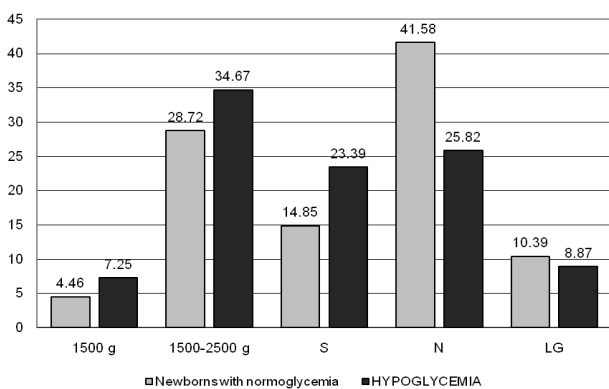


Figure 5. The evaluation of the newborns from neonatal intensive care units (NICU), with neonatal hypoglycemia by body weight, comparative with newborns from N ICU, without hypoglycemia

The small for gestational age (SGA) preterm neonates are at greater risk of neonatal hypoglycemia, because the fuels are directed towards growth, as opposed to glycogen deposits.² (Fig. 8)

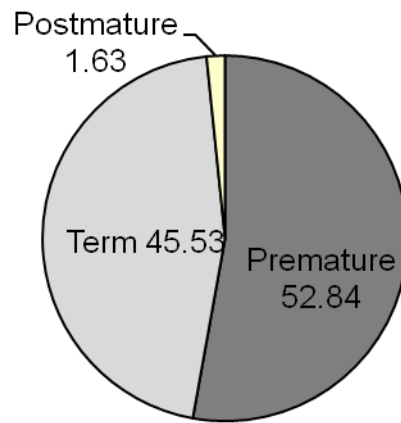


Figure 6. The evaluation by the gestational age

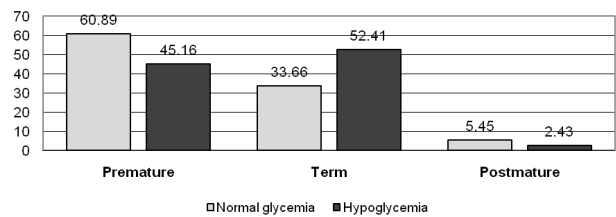


Figure 7. The evaluation by the gestational age

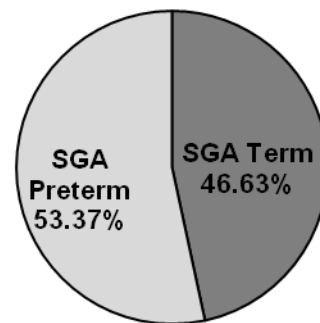


Figure 8. The evaluation of SGA Preterm

Caesarian section and abnormal presentation are factors that can affect the incidence of neonatal hypoglycemia.

In the group of neonates with neonatal hypoglycemia, those born by caesarian section were selected. They were at 37-38 weeks of gestational age. (Fig. 9,10)

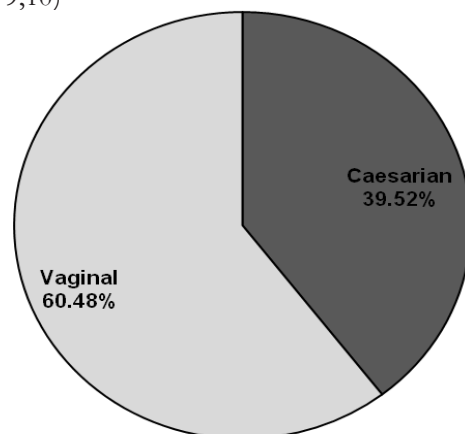


Figure 9. The influence of the type of delivery

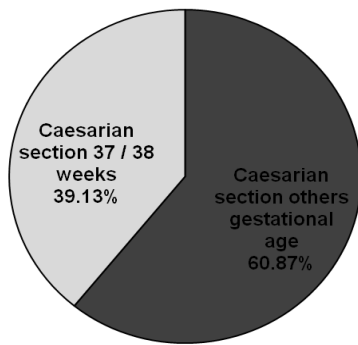


Figure 10. The influence of the type of delivery

The influence of Apgar score: Apgar score <7 at 1 minute, fetal distress indicator, shows the increase of incidence of neonatal hypoglycemia. (Fig. 11)

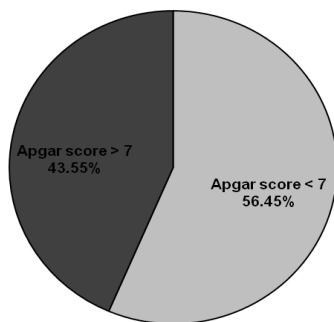


Figure 11. The influence of Apgar score

In our study, the most frequent pathology associated with neonatal hypoglycemia was: perinatal hypoxia - 40,31%, neonatal hypothermia - 31.45%, respiratory distress - 40.31%, sepsis - 12.09%, neonatal shock - 9.67% and polycythemia - 8.87%.

The pathogenic mechanism in hypoxia, hypothermia, shock, respiratory distress and sepsis is the increase of the consumption and/or the decrease of the production of the glucose.³

In polycythemia, the neonatal hypoglycemia appears because of the increase of the consumption of the glucose by the mass of erythrocytes. The decrease of plasmatic volume in polycythemia can limit the deposits of glucose.⁴ (Fig. 12)

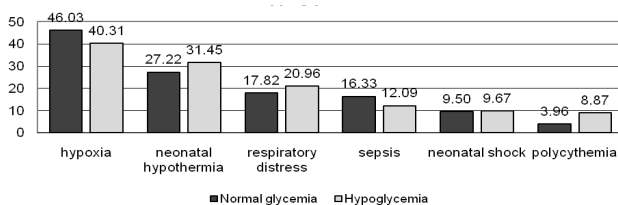


Figure 12. The neonatal pathology associated with neonatal hypoglycemia

The influence of maternal pathology

The mechanism of neonatal hypoglycemia in

neonates born from mothers with diabetes mellitus is fetal or neonatal hyperinsulinism. These babies are generally large for gestational age, because of the anabolisant effect of insulin.⁵

The premature rupture of membranes and urinary tract infections in mothers are risk factors for neonatal hypoglycemia. Mother's arterial hypertension is a risk factor for small for gestational age neonates.⁶

The diagram reveals the relation between mother pathology and neonatal hypoglycemia. (Fig. 13)

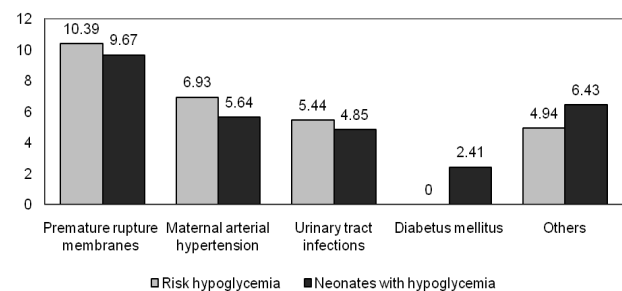


Figure 13. The influence of maternal pathology

CONCLUSIONS

- The incidence of neonatal hypoglycemia in Arad Maternity (4.61%) is inferior to the universal data;

- The results of our study suggest that newborns with low body weight are at the greater risk of hypoglycemia;

- The newborns born by caesarian section, 37/38 gestational age, are at risk of hypoglycemia;

- From all the neonates placed in the NICU, only a part presented hypoglycemia, so screening is necessary;

- The pathology associated with neonatal hypoglycemia, in order of frequency is: perinatal hypoxia, hypothermia, respiratory distress, infection, shock, polycythemia.

REFERENCES

1. Kalhan S, Peter-Wohl S. Hypoglycemia: What is it for the neonate? *Am J Prenatal* 2000;17:11-4.
2. Duvanel CB, et al. Long-term effects of neonatal hypoglycemia on brain growth and psychomotor development in small-for-gestational-age preterm infants. *J Pediatrics* 1990;134:492-8.
3. Cowet RM. Neonatal hypoglycemia: A little goes a long way. *J Pediatrics* 1999;134:389-94.
4. Lupea I. *Tratat de neonatologie*, Ed. Medicala, 2000, p. 774-80.
5. Gomella TL, et al. *Neonatology: management, procedures, on-call problems, diseases, and drugs*. Lange Medical Books, 2004; p. 262-7.
6. Cornblath M, Ichord R. Hypoglycemia in the neonate. *Semin Perinatol* 2000;24:136-42.