Profile of mothers of newborns with blood glucose control in the first hours of life

PERFIL DAS MÃES DE NEONATOS COM CONTROLE GLICÊMICO NAS PRIMEIRAS HORAS DE VIDA

PERFIL DE LAS MADRES DE NEONATOS CON CONTROL GLUCÉMICO EN LAS PRIMERAS HORAS DE VIDA

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ABSTRACT

Some maternal factors associated with neonatal hypoglycemia justify monitoring blood glucose levels in the first 24 hours of life. The objective of this study was to describe the socio-demographic and obstetric characteristics of mothers to newborns undergoing capillary blood glucose control in the first 24 hours of life, hospitalized in a rooming-in maternity ward of a Baby Friendly Hospital. This is a descriptive exploratory study which involved the analysis of data from 380 medical records of mothers hospitalized from July to December, 2006 at the maternity ward of the University of São Paulo Teaching Hospital. It was found that 18 (5.6%) mothers developed gestational diabetes, none of them were treated with oral hypoglycemic agents, 53 (16.2%) had hypertension during pregnancy and 17 (32.1%) used anti-hypertensive medication, 215 (56.6%) received glucose 5% continuous infusion during labor and delivery. Correlation studies linking maternal variables and neonatal hypoglycemia are needed to identify the predicting factors of this neonatal morbidity.

KEY WORDS

Infant, newborn.
Hypoglycemia.
Blood glucose.
Neonatal nursing

RESUMO

Alguns fatores maternos associados ao quadro de hipoglicemia neonatal indicam a monitoração dos níveis glicêmicos nas primeiras 24 horas de vida. O estudo objetivou descrever as características sócio-demográficas e obstétricas de mães de neonatos com controle de glicemia capilar nas primeiras 24 horas de vida, internadas em Alojamento Conjunto de um Hospital Amigo da Criança. Estudo descritivo-exploratório que analisou dados de 380 prontuários médicos de mães internadas entre julho e dezembro de 2006, na unidade de Alojamento Conjunto do Hospital Universitário da Universidade de São Paulo. Diabetes gestacional foi verificado em 18 (5,6%) mães; nenhuma tratou com hipoglicemiante oral; 53 (16,2%) tiveram hipertensão arterial na gestação, e 17 (32,1%) fizeram uso de anti-hipertensivo; 215 (56,6%) receberam soro glicosado, 5% no trabalho de parto e parto. Estudos correlacionais analisando variáveis maternas e ocorrência de hipoglicemia neonatal devem ser realizados, objetivando identificar os fatores preditores desta morbidade neonatal.

DESCRITORES

Recém-nascido.
Hipoglicemia.
Glicemia.
Enfermagem neonatal.

RESUMEN

Algunos factores maternos asociados al cuadro de hipoglucemia neonatal indican la monitorización de los niveles de glucemia en las primeras 24 horas de vida. El estudio tuvo como objetivo describir las características sociodemográficas y obstétricas de madres de neonatos con control de glucemia capilar en las primeras 24 horas de vida, internadas en Alojamiento Conjunto de un Hospital Amigo de la Niñez. Estudio de tipo descriptivo exploratorio que analizó datos de 380 historias clínicas de madres internadas entre julio y diciembre de 2006 en la Unidad de Alojamiento Conjunto del Hospital Universitario de la Universidad de San Pablo. Se verificó diabetes gestacional en 18 madres (5,6%), ninguna recibió tratamiento con hipoglucemiantes orales, 53 de ellas (16,2%) tuvieron hipertensión arterial durante la gestación y 17 (32,1%) hicieron uso de antihipertensivos; 215 (56,6%) recibieron suero glucosado al 5% durante el trabajo de parto y el parto en sí. Deben ser efectuados estudios correlacionales, analizando variables maternas y ocurrencia de hipoglucemia neonatal, con el objetivo de identificar los factores predictores de esta patología neonatal.

DESCRIPTORES

Recién nacido.
Hipoglicemia.
Glucemia.
Enfermería neonatal.

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INTRODUCTION

Glucose is the key substrate for maintaining cells metabolism of the neurological system as oxygen is essential for brain functioning. During the pregnancy, 60% to 70% of fetal energy needs is supplied by glucose[1]. The full-term newborn, appropriate for gestational age (AGA) develops homeostatic mechanisms that preserve energy substrates for supplying brain and other vital organs. The maintenance of the thermal stability, as well as the early free demand breastfeeding are key factors for the adaptation of the newborn from the intrauterine to extrauterine environment[2].

Transient hypoglycemia affects the newborn in the first hours of life and is the most prevalent metabolic disorder. In the intrauterine environment, the fetal glucose is provided from maternal blood circulation, through the maternal-fetal diffusion that keeps the concentration of fetal glucose at, approximately, two thirds of the maternal glucose concentration. At birth, the maternal glucose supply is interrupted with the umbilical cord section. In order to keep the appropriate levels of glucose, the newborn mobilizes the glycogenolysis process from the hepatic storage, inducing the neoglucogenesis, using nutrients deriving from the diet[1-2].

To analyze family history, prenatal data and neonatal and maternal clinical assessment are key elements for the identification of maternal and neonatal factors associated to the occurrence of hypoglycemia. Important aspects of the newborn history include maternal diseases like glucose regulation disorder, the use of oral hypoglycemic agents, insulin, ß-agonist tocolysis (terbutaline, propranolol), obesity, specific hypertensive disease of pregnancy or essential hypertension, family history of hypoglycemia, intravenous infusion of glucose before and during the delivery, previous histories of macrosomic newborns with hypoglycemia or unexplained death of infant in childhood[3-4], gestational age and information that indicates the possibility of perinatal hypoxia and/or ischemia. Risk factors related to the physical aspects of the newborn including the determination of the gestational age and its respective classification regarding the child's weight, facial defects that may compromise the central nervous system, pituitary disorder and hepatomegaly, besides the clinical manifestations of hypoglycemia that must be considered[5].

To analyze family history, prenatal data and neonatal and maternal clinical assessment are key elements for the identification of maternal and neonatal factors associated to the occurrence of hypoglycemia.

These factors indicate the monitoring of the plasma levels of neonatal blood glucose, particularly, in the first week of life, since deep organic changes take place in the neonatal transition, causing a significant metabolic increase with a higher consumption of glucose.

The introduction of the care model that aims to promote the exclusive maternal breastfeeding, as it happens with the Baby-Friendly Hospital, creates the need to check whether the maternal and neonatal risk factors described in the literature are valid for the population assisted in maternities that adopt the model.

The American Academy of Pediatrics and the World Health Organization recommend that the tests for blood glucose control be reserved to symptomatic newborns or those who are considered to be at risk. These organizations criticize the practice of blood glucose control as a universal measure for term newborns, since they consider it inappropriate, unnecessary and potentially harmful, even though this is a usual practice in several services, including the Baby-Friendly Hospitals. Blood glucose control must be reserved for risk babies, who include maternal metabolic change, specially, diabetes mellitus and others such as the indiscriminate administration of glucose during labor, mothers treated with oral hypoglycemic agents during pregnancy, hypertension during pregnancy, the use of illicit drugs, previous fetal macrosomia, maternal use of b-blockers, without mentioning the neonatal risk factors[5-6].

The occurrence of neonatal transient hypoglycemia in populations assisted by maternities that adopt the Baby-Friendly Hospital model is poorly studied, which justifies the present study.

OBJECTIVE

The objective was to describe the socio-demographic and obstetric characteristics of mothers who had newborns undergoing capillary blood glucose control in the first 24 hours of life, hospitalized in a rooming-in maternity ward of a Baby-Friendly Hospital.

METHOD

Study Design - a descriptive exploratory study whose data were collected retrospectively.

Place: the study was carried out at the Rooming-in Ward of the School Hospital of the University of São Paulo, an institution certified as Baby-Friendly Hospital by the Health Ministry on June, 2006.

Sample - medical records of mothers whose newborns were undergoing capillary blood glucose control in the first 24 hours of life that remained hospitalized at a rooming-in ward, in the period from July 01 to December 31, 2006, after the institution was certified as a Baby-Friendly Hospital were analysed. According to the eligibility criteria, this study did not include mothers whose newborns had diagnosis of malformation.

Variables - socio-demographic variables as age, skin color, marital status, education level, paid work. Clinical-obstetric variables: parity, prenatal care, gestational dia-

betes diagnosis, use of oral hypoglycemic agents during pregnancy, diagnosis of hypertension during pregnancy, delivery, use of anesthesia, type of labor anesthesia, use of glucose during labor, length of labor.

Data Collection - form dedicated to data registration of the mother's medical records, number of the hospital record and socio-demographic and clinical-obstetric data extracted from maternal medical records and their respective newborns.

Operationalization of Data Collection - initially, the authors identified the newborns undergoing capillary blood glucose in the first 24 hours of life. This information was obtained from the records of occurrences in the rooming-in ward. Based on this identification, the number of the mother's medical record was obtained from the hospitalization records of the rooming-in ward. Data were obtained from the medical records of the mothers and newborns at the Service of Medical Archive of the institution, provided with a previous authorization for this search. The following documents were analyzed in the medical record: obstetric form, labor evolution form, medical prescription, birth and evolution form, diagnosis, prescription and nursing notes. These data were registered on a form designed for the study, which presented the identification data and variables that were going to be analyzed.

Data Treatment and Analysis - the collected data were stored in a database in order to be analyzed using the SPSS package software, 13.0 version. Data were grouped and displayed in tables and presented in absolute and relative frequency.

Ethical Aspects - the research project was approved by the Ethics Committee of the School Hospital of the University of São Paulo (Process CEP HU/USP no. 794/08).

RESULTS

From July 01 to December 31, 2006, 1,585 post-partum women were hospitalized at the rooming-in ward of the institution and 380 of them having their newborns undergoing capillary blood glucose control in the first 24 hours of life that composing the casuistic of this study.

The Table 1 shows that 286 (75.3%) mothers were older than 20 years old and 261 (68.7%) were white-skinned. There was an equitable distribution of mothers who finished the elementary school and the high school, and a minority of illiterate women, 5 (1.3%) and those who took a graduation course, 21 (5.5%).

Most of the women cohabited with their partner, either married or in a consensual union, 301 (79.2%), and 230 (60.5%) mothers did not perform a paid work.

Table 1 - Socio-demographic characteristics of mothers whose newborns were submitted to capillary blood glucose control in the first 24 hours of life; July-December 2006, HU/USP - São Paulo - 2008

Variables	N	%
Age Range		
≤ 20	94	24.7
21 - 30	216	56.8
> 30	70	18.5
Skin Color		
White	261	68.7
Mulatto	100	26.3
Black	19	5.0
Level of Schooling		
Illiterate	5	1.3
Elementary School	172	45.3
High School	176	46.3
College	21	5.5
No record	6	1.6
Marital Status		
No Partner	79	20.8
Partner	301	79.2
Paid Work		
No	230	60.5
Yes	150	39.5

Note: (N=380)

Table 2 presents the maternal clinical-obstetric characteristics. It is worth highlighting that a majority of 368 (99.5%) mothers received prenatal care and 280 (76.1%) went to six or more medical appointments. The use of illicit drugs was identified in 11 (2.9%) women among the studied population. The frequency of mothers with a diagnosis of pregnancy hypertension was 53 (16.2%) and that of diabetes, 18 (5.6%), but none of them referred treatment with hypoglycemic agents during pregnancy. Most of the women, 215 (56.6%), received continuous intravenous infusion of glucose serum 5% during labor and 270 (71.1%) remained hospitalized and fasting during the period of labor.

Table 2 - Clinical-obstetrical characteristics of mothers whose newborns were submitted to capillary blood glucose control in the first 24 hours of life; July-December 2006, HU/USP - São Paulo - 2008

Variables	N	%
Parity (N=380)		
Primipara	199	52.4
Multipara	181	47.6
Prenatal care (N=370)		
No	2	0.5
Yes	368	99.5
Prenatal appointments (N=368)		
< 6	88	23.9
≥ 6	280	76.1
Smoking (N=379)		
No	296	78.1
Yes	83	21.9
Alcohol consumption (N=376)		
No	351	93.4
Yes	25	6.6
Use of illicit drugs (N=379)		
No	368	97.1
Yes	11	2.9
Hypertension in pregnancy (N=327)		
No	274	83.8
Yes	53	16.2
Diabetes in pregnancy (N=320)		
No	302	94.4
Yes	18	5.6
Use of hypoglycemic medication		
No	18	100
Yes	0	0
Length of stay in labor at the hospital		
≤ 6 h	200	52.7
> 6 h	180	47.3
Infusion of glucose 5% in labor (N=380)		
No	165	43.4
Yes	215	56.6
Infusion of hypertonic glucose during labor (N=380)		
No	274	72.1
Yes	106	27.9
Jejum no trabalho de parto (N=380)		
No	110	28.9
Yes	270	71.1
Type of labor (N=380)		
Normal	185	48.7
Forceps	65	17.1
Cesarean Section	130	34.2
Labor anesthesia (N=380)		
No	45	11.8
Yes	335	88.2
Type of anesthesia (N=335)		
Spinal	181	54.0
Combined spinal and epidural	84	25.1
Local	62	18.5
Epidural	8	2.4

DISCUSSION

Studies developed at the same hospitalization unit of the institution of the present study found a prevalence of post-partum women aged between 20 and 29 years old, with the minimum age varying between 13-14 years old and the maximum age from 42-43 years old[7-9], similarly to the ages found in the present study, in which the mean of the mother's age was 25 years old, varying between 14 and 41 years old. The findings in literature show that the mother's age profile has not changed over the last 20 years among the population assisted by this institution.

Most of the mothers had finished the elementary or the high school, 348 (91.6%), agreeing with another study developed in the same institution, in 2001, which found 94.0% of the post-partum women had finished the elementary or the high school[9].

A case-control study with term newborns weighing over 2,500 grams, born from non-diabetic mothers and involving 116 newborns in the group considered case and 232 newborns in the control group, was developed at a North-American hospital in the city of Allentown, Pennsylvania, in order to analyze the factors associated to the neonatal hypoglycemia. The results indicated that the mean of the mother's age was 27.9 years old, only 15 (4.0%) were not white-skinned, 47 (13.5%) smoked, 5 (2.0%) consumed alcohol and 12 (4.8%) used illicit drugs. As for the clinical characteristics, 19 (5.5%) had hypertension and 41 (11.8%), asthma. None of the variables previously mentioned presented a statistical significance related to the occurrence of neonatal hypoglycemia. The maternal variables that presented statistical significance ($p < 0.01$) regarding the occurrence of hypoglycemia were: type of hospital care received (public or not public), period of labor, gestational age and maternal fever. The variable type of labor did not show statistical significance towards the occurrence of neonatal hypoglycemia [10].

Regarding the period of hospitalization in labor, the present study showed that, over half of the women, 200 (52.7%) remained in labor for up to 6 hours.

Some maternal variables are mentioned as risk factors for the occurrence of neonatal hypoglycemia, which are: pregestational and gestational diabetes, irregular result in the test of glucose tolerance, pre-eclampsia, specific hypertensive disease of pregnancy, systemic arterial hypertension, use of illicit drugs, use of b-blockers and oral hypoglycemic agents, intrapartum administration of glucose[6,11-12].

The results of the present study show that 53 (16.2%) mothers had arterial hypertension during pregnancy.

The newborns of diabetic mothers or mothers who had gestational diabetes are classified at risk to develop hypogly-

cemia in the first hours of life[13]. In the present study, 18 (5.6%) mothers presented gestational diabetes and none of them used hypoglycemic agents.

The data collected for this study show that the continuous infusion of glucose serum at 5% was used in most of the mothers during labor or delivery, 215 (56.6%), and 106 (27.9%) mothers received intermittent intravenous hypertonic glucose. The data in literature state that the administration of glucose in labor and delivery constitutes a risk factor for the occurrence of neonatal hypoglycemia[6,14].

Regarding the parturient's nutrition, the present study showed that only 110 (28.9%) women received some sort of food during labor, unlike what is recommended by the World Health Organization, which states that feeding the low risk parturient is a care practice that must be recommended[15].

At the delivery room, the prevalence for the breastfeeding practice found in this study was 74.3%. The institution, study field, is certified as a Baby-Friendly Hospital, and the breastfeeding at the first thirty minutes of life constitutes the step 4 of this program, even though this practice does not have the explicit objective of reducing the prevalence of hypoglycemia; however, it is possible to infer that newborns who are given to feed from them mothers receive the maternal colostrum that contributes to increase their glycemic levels[16].

Free demand breastfeeding is the best way to prevent asymptomatic hypoglycemia, and the continuous support and assessment in breastfeeding are still the best strategies to avoid the newborns to develop hypoglycemia[17], besides the fact that the nursing professional is responsible for all the alternatives for breastfeeding, since she is the one who shares the maternal experience, being with the woman most of the time, specially in the initial moments of breastfeeding[18].

CONCLUSION

The data in literature indicate that obesity, pre-gestational and gestational diabetes, the use of oral hypoglycemic agents, treatment in pregnancy with insulin, specific hypertensive disease of pregnancy and systemic arterial hypertension, use of antihypertensive drugs, history of previous macrosomic child with hypoglycemia, unexplained death of a child in childhood and intrapartum administration of glucose are factors related to the occurrence of neonatal transitory hypoglycemia. The present study outlined the profile of mothers to healthy term newborns who remained hospitalized in a rooming-in facility, therefore, with low risk to present neonatal morbidities. Nevertheless, 5.6% of the mothers to newborns with capillary blood glucose control in the first 24 hours of life presented gestational diabetes, but none of them had undergone a treatment with hypoglycemic medication and 16.2% had a history of arterial hypertension in pregnancy, 32.1% of them were treated with antihypertensive drugs, 56.6% received continuous intravenous 5% glucose infusion during labor and delivery. The findings of this study point out that more correlational studies, analyzing the maternal variables and the neonatal hypoglycemia, are necessary to validate the maternal risk factors in the population of newborns hospitalized in maternity hospitals that adopt the Baby-Friendly Hospital.

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