Hypoglycemia Rates in the First Days of Life Among Term Infants Born to Diabetic Mothers

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Dedication

To my dear little family

To the soul of my dear father

Who gave me everything and took nothing

My great mother who supported me in every step of my life

My brother who helped me a lot

This work would have never come true without their

support and encouragement.

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Abstract:

This prospective study included all IDMs who were born at EL Kasr EL-Aini Hospital delivered from May 2010 to September 2011 with exclusion of major congenital anomalies, polycythemia, respiratory distress, sepsis, asphyxia or other clinical manifestations not clearly attributed to hypoglycemia. Blood glucose level was measured immediately after delivery and over 48 hours, taking into consideration maternal data before and during pregnancy and neonatal data including gestational age, sex, body weight, Apgar score, clinical manifestations of hypoglycemia and nutrition of the newborn.

Hypoglycemia at 0 hour was more among those born to uncontrolled diabetic mothers, mothers who were on insulin therapy (either GDM-A2 or IDDM) , severe hypoglycemia after birth and on the 1st day of life was more common in neonates that were born to hypertensive, uncontrolled diabetic mothers as well as to mothers on insulin therapy. The mean of glucose values on the 2nd day of life showed improvement for the majority of the neonates.

Key words: Hypoglycemia-Neonates- Diabetic mothers.

Table of content

List of Abbreviations

Abbreviation	Full-term
1.AC	Abdominal circumference
2. ADA	American Diabetes Association
3. AGA .	Appropriate for gestational age
4.BMI	Body mass index
5.CPAP	Continous-positive Airway Pressure
6.PEPCK	Phosphoenolpyruvate carboxykinase
7. D/W	Dextrose in water
8. DKA	Diabetic-Ketoacidosis
9. ER	Extended release
10.FBG	Fasting blood glucose
11.FFA	Free-fatty acid
12.FLM	Fetal-lung maturity
13.GDM	Gestational Diabetes Mellitus
14.GDM-A0	Gestational diabetes not on insulin therapy or diet control
15.GDM- A1	Gestational diabetes on diet-control
16.GDM-A2	Gestational diabetes on insulin therapy
17.GH	Growth hormone
18. G.I diet	Glycemic index
18. GIR	Glucose-infusion rate

19. GIT	Gastro-intestinal tract
20.GLUT3	Glucose transporter 3
21.GNG	Gluconeogensis
22.HAPO	Hyperglycemia and Adverse Pregnancy outcome
23 HCS .	Human-Chorionigonadotropins
24.HMD	Hyaline Membrane Disease
25.IDDM	Insulin-Dependant Diabetes Mellitus
26.IDM	Infant of diabetic mother
27.IGF-1	Insulin like growth factor-1
28.IGFBP-3	Insulin like growth factor binding protein
29.IM	Intramuscular
30.IR	Immediate release
31.IUGR	Intrauterine growth restriction
32.IV	Intravenous- infusion
33.LGA	Large for Gestational age
34.L/S	Lecithin-Shingomyelin ratio
35.NDDG	National Diabetes Data Group
36.NE	Nor-epinephrine
38.OGTT	Oral -Glucose Tolerance Test
39.PDA	Patent ductus Arterious
40.PET	Partial exchange transfusion

41.PGT	Placental -glucose transfer
42.PHHI	Persistent hyperinsulinemic hypoglycemia of infancy
43.ProBNP	ProB- Natriuretic Peptide
44.RDS	Respiratory Distress Syndrome
45.SGA	Small for gestational age
46.SPC	Saturated Phosphatidyl-Choline
47.TG	Triglyceride
48.TGA	Transposition of great arteries
49.TnT	Troponin-T
50.VSD	Ventricular septal defect
51.WHO	World Health Organization

List of Tables

List of Figures

Introduction

Almost all fetal glucose is derived from maternal circulation by means of facilitated diffusion and thereby keeping fetal glucose level at second and third trimester. There is a maternal cut off as soon as the umbilical cord is cut, so the newborn must rapidly respond by glycogenolysis of hepatic stores , gluconeogenesis and utilization of exogenous nutrients **(Cowett and Farrag; 2004).**

Hypoglycemia is the most common metabolic problem occurring in newborn infants, in the majority it merely reflects a normal process of adaptation to extra uterine life. Hypoglycemia is literally translated as low blood sugar, hypoglycemia occurs when low blood sugar or (bood glucose concentration falls below a level necessary to properly support the body's need for energy and stability throughout its cells **(Cornblath et al; 2000).**

The reported incidence of hypoglycemia varies with its definition, but it has been estimated to occur in about 25-50% of infants of diabetic mothers and 15-25% of infants of mothers with gestational diabetes but only a small percentage become symptomatic **(Stoll; 2008).**

Hypoglycemia is a major problem as it leads to many serious short and long term complications as convulsions, apnea, cyanosis and mental retardation and blood glucose values in term neonates vary greatly and low values less than 30 mg/dl are frequently seen due to immaturity of gluconeogenesis and ketogenesis **(Van Howke and Storms; 2006).**

Better control of diabetes and early recognition of gestational diabetes has decreased the number and severity of problems in infants

born to mothers with diabetes. Birth defects in infants of diabetic mothers have risen from 1-2% to 8-15% as a consequence of increased perinatal survival **(Rudolph et al; 2003).**

Aim of work

The objectives of this study were to discover risk factors for developing hypoglycemia among term infants born to diabetic mothers and to characterize rates of glucose concentrations in the first 2 days of life.

Glucose metabolism

The fetus is entirely dependant on the mother for nutrient, but is hormonally independent, fetal endocrine and paracrine responses are mediated by the transport of nutrients such as Glucose and amino acids to the fetus **(Kalhan and Parimi;2002).**

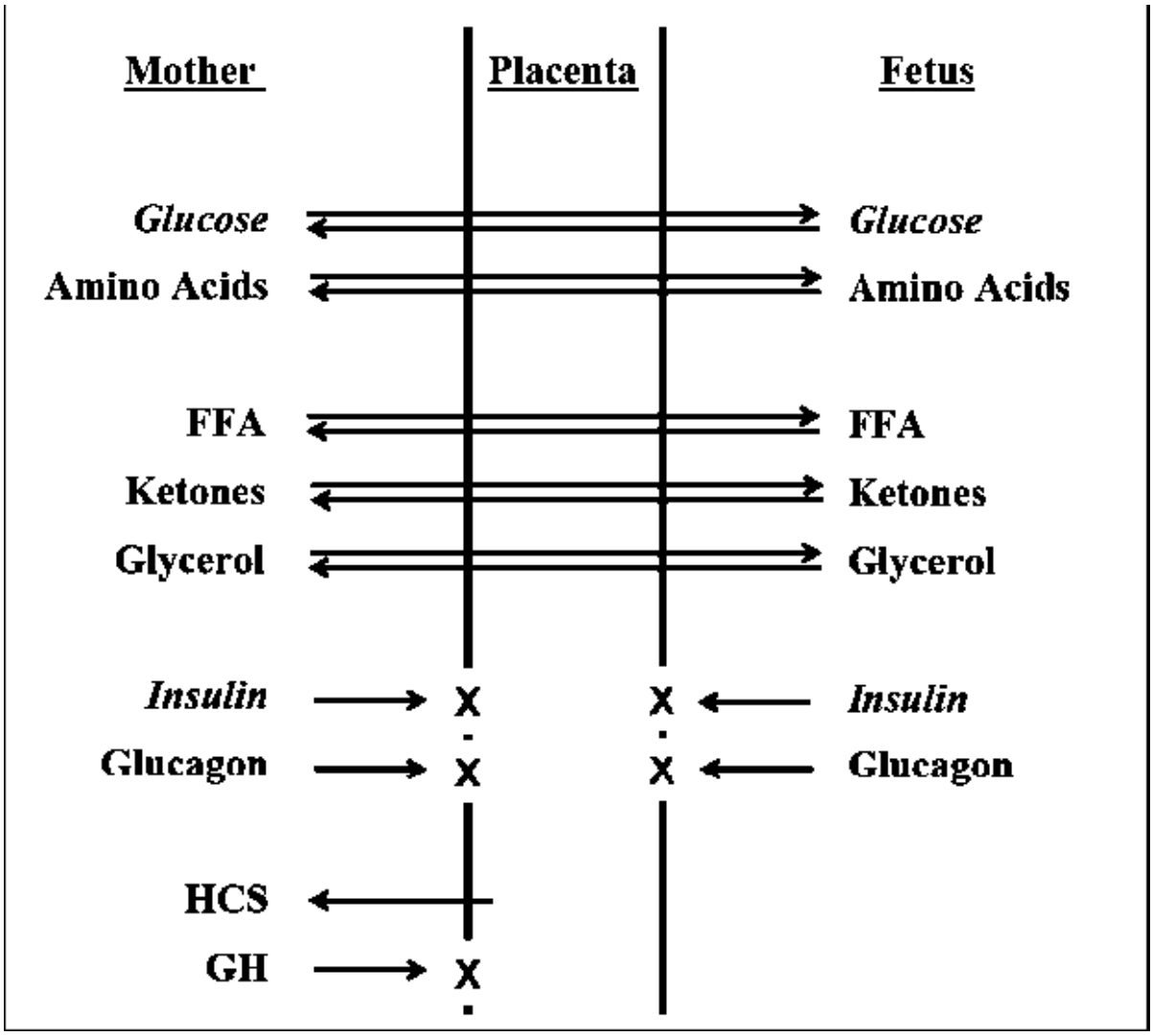

Figure (1): Transport of nutrients and hormones from the mother to the fetus across the placenta. **(Kalhan and Parimi; 2002).**