



KASR ALAINY

# **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 1<sup>st</sup> 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 2<sup>nd</sup> day of life showed improvement for the majority of the neonates.

**Key words: Hypoglycemia-Neonates- Diabetic mothers.**

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## List of Abbreviations

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

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

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



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## 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 (blood 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

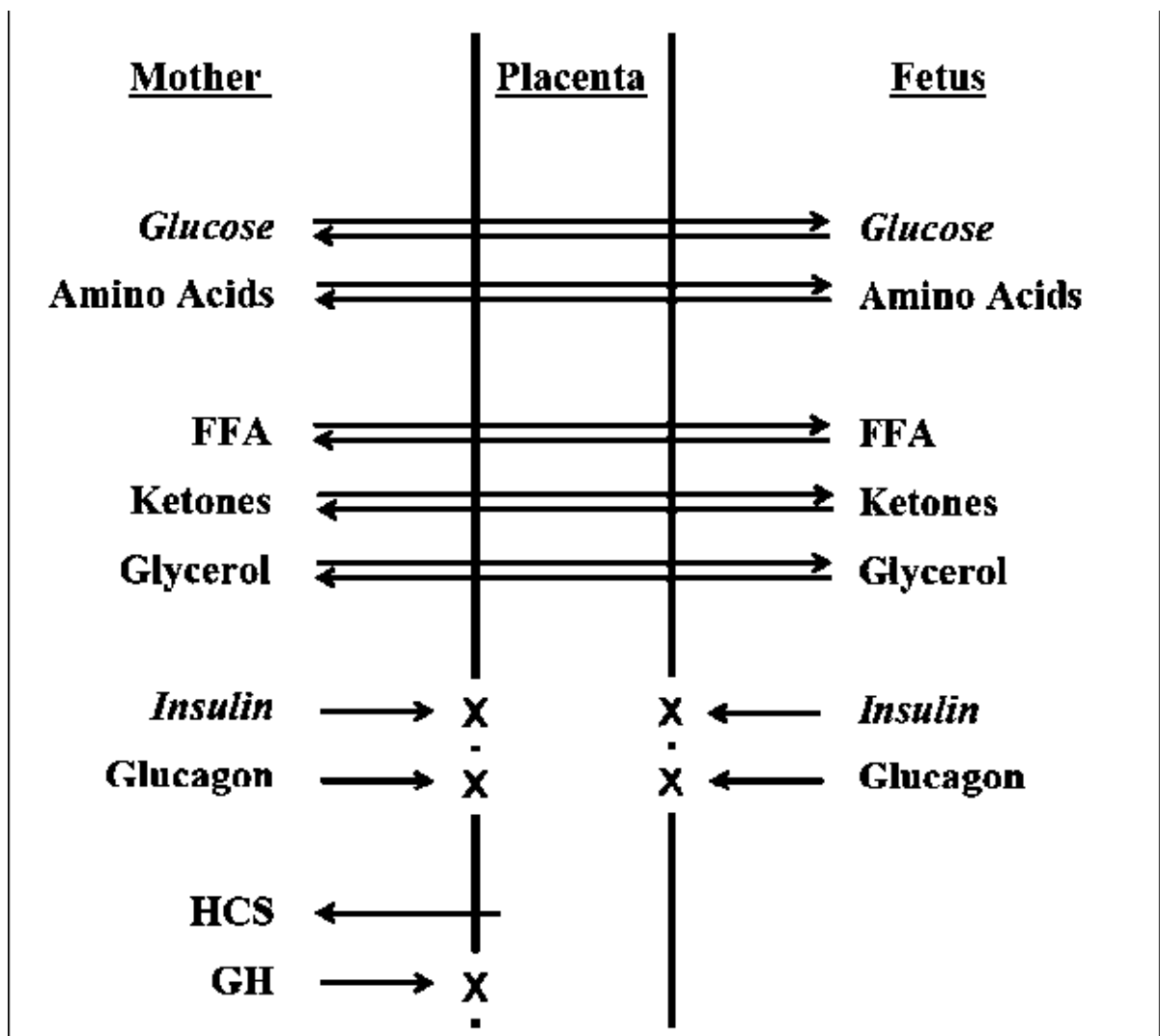
born to mothers with diabetes. Birth defects in infants of diabetic mothers have risen from 1-2% to 8-15% as a consequence of increased perinatal survival (**Rudolph et al; 2003**).

## **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**).