

Indian Academy of Pediatrics (IAP)



STANDARD TREATMENT GUIDELINES 2022



**Under the Auspices of the
IAP Action Plan 2022**

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Neonatal Hypoglycemia

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Neonatal Hypoglycemia

Introduction

- ☑ Hypoglycemia is low level of plasma or blood glucose in the neonate.
- ☑ In healthy term neonates, there is a transient, physiological fall in the blood glucose concentration with a nadir at 60–90 minutes after birth, without any symptoms later rising to levels above 60 mg/dL by 4 hours.
- ☑ Breastfed infants may tolerate lower blood sugar levels because of bioavailable alternate fuels like ketone bodies, thus facilitating adaptation during transition.

Adrenergic	Neuroglycopenic
☑ Tachypnea	☑ Lethargy and hypotonia
☑ Tachycardia	☑ Apnea or irregular breathing efforts
☑ Poor suck	☑ Cyanosis
☑ Poor feeding	☑ Seizures
☑ Pallor	
☑ Temperature instability	
☑ Sweating	

- ☑ It is prudent to prevent recurrent and persistent hypoglycemia due to associations with seizures, poor visual motor, and executive function at 4–5 years of age, however there is no clear association between asymptomatic hypoglycemia, treatment for the same and poor neurodevelopment.

Clinical Manifestations of Hypoglycemia in Neonate

Definition

Highly controversial and there is a lack of consensus at present.

Operational threshold cutoffs (indicate the need to intervene) providing reasonable margin of safety in late preterm and term at-risk neonates are as follows:

Symptomatic: Blood sugar <40 mg/dL

Asymptomatic:

- ☑ Less than 4 hours of age—25 mg/dL
- ☑ 4–24 hours of age—35 mg/dL
- ☑ 24–48 hours—45 mg/dL
- ☑ More than 48 hours—60 mg/dL

There is paucity of literature on preterm neonates <34 weeks GA and hence prudent to maintain blood glucose levels >50 mg/dL.

Testing

- ☑ Testing is warranted only for at-risk neonates and is not needed for healthy term newborns.
- ☑ Point-of-care testing using reagent strips is rapid, bed side, convenient, and cost-effective.
- ☑ Blood glucose measured by strip is 15% lesser than plasma glucose. In case of low blood glucose, a laboratory sample for blood glucose estimation should be sent.
- ☑ A delay in testing of sample after collection can lead to a blood glucose reduction of up to 6 mg/dL/hour.

Need for Further Workup

Infant with persistent hypoglycemia for >72 hours or severe hypoglycemia >10–12 mg/kg/min glucose requirement.

Decreased production/stores

Prematurity, intrauterine growth restriction (IUGR), delayed feeding, growth hormone (GH) and cortisol deficiency, inborn errors of metabolism (IEM)

Increased utilization

Infant of diabetic mother, large for gestational age (LGA), sepsis, asphyxia, hypothermia, polycythemia, hyperinsulinemia, maternal beta blockers, oral hypoglycemics

Gestation Age >35 Weeks**All infants:**

- Skin-to-skin care, keep warm
- Promote breastfeeding within first hour of birth
- Infants should continue breastfeeding on cue
- Not to give water or glucose water or formula may interfere with normal metabolic compensatory mechanisms

At risk infants:

Symptomatic and blood glucose < 40 mg/dL: Start intravenous (IV) glucose

Symptomatic with blood glucose < 25 mg/dL: Give bolus IV dextrose 10% 1–2 mL/kg followed by infusion at the rate of 5–8 mg/kg/min.

- Target glucose > 50 mg/dL
- Continue breastfeeding frequently
- Recheck plasma glucose within 30 minutes

Asymptomatic: <40 mg/dL and <4 hours of age:

- Start breastfeeding within half an hour
- Recheck blood glucose before next feeding
- Continue skin-to-skin care
- Intensify breastfeeding
- Evaluate for other underlying illnesses
- If glucose <35 mg/dL start IV glucose therapy
- Target blood glucose > 50 mg/dL
- Recheck until three normal levels
- Check glucose levels once at 24 hours of age in babies like small for gestational age (SGA)/low birth weight (LBW)/preterm

Parenteral Therapy

- ☑ Rate of start of IV fluids: Use graded approach
- ☑ IUGR: 5–7 mg/kg/min
- ☑ Mother with infants of diabetic mothers (IDM)/LGA infants: 3–5 mg/kg/min
- ☑ Infant with other risk group: 4–6 mg/kg/min
- ☑ Glucose infusion >12 mg/kg/min: Consider for further interventions
- ☑ Maximum dextrose concentration through peripheral IV cannula and central venous catheter is 12.5% and 25%, respectively

Discharge Criteria

Infant with persistent hypoglycemia for >72 hours or requiring IV therapy for symptomatic or asymptomatic low glucose levels should only be discharged if glucose level maintained above 70 mg/dL through several feed-fast cycles.

Neurodevelopment Outcome

Due to the potential deleterious effects on the neonatal brain, it is recommended to treat symptomatic hypoglycemia and prevent recurrent and persistent hypoglycemic episodes.

In asymptomatic hypoglycemia, although there is not much evidence for adverse outcomes, there are concerns about poor literacy scores and lower visual motor, executive function with recurrent or severe hypoglycemia.

In preterm neonates, associations have been reported between recurrent low sugars and lower bailey scores, developmental and cognitive delays. More research is needed in this group of neonates.

- ❑ Adamkin DH, Polin RA. Imperfect Advice: Neonatal Hypoglycemia. *J Pediatr.* 2016; 176:195-6.
- ❑ Committee on Fetus and Newborn, Adamkin DH. Postnatal glucose homeostasis in late-preterm and term infants. *Pediatrics.* 2011;127:575-9.
- ❑ Goode RH, Rettiganti M, Li J, Lyle RE, Whiteside-Mansell L, Barrett KW, et al. Developmental Outcomes of Preterm Infants with Neonatal Hypoglycemia. *Pediatrics.* 2016;138(6):e20161424.
- ❑ McKinlay CJD, Alsweller JM, Anstice NS, Burakevych N, Chakraborty A, Chase JG, et al. Association of Neonatal Glycemia with Neurodevelopmental Outcomes at 4.5 Years. *JAMA Pediatr.* 2017;171:972-83.
- ❑ Stanley CA, Rozance PJ, Thornton PS, De Leon DD, Harris D, Haymond MW, et al. Re-evaluating “transitional neonatal hypoglycemia”: mechanism and implications for management. *J Pediatr.* 2015;166:1520-5.e1.
- ❑ Thornton PS, Stanley CA, De Leon DD, Harris D, Haymond MW, Hussain K, et al. Recommendations from the Pediatric Endocrine Society for Evaluation and Management of Persistent Hypoglycemia in Neonates, Infants, and Children. *J Pediatr.* 2015;167: 238-45.