Indian Academy of Pediatrics (IAP)

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Newer **R**esearch and recommendations **I**n **C**hild **H**ealth

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UNDER THE AUSPICES OF THE IAP ACTION PLAN 2023

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Dear fellow IAPans,

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Newer **R**esearch and recommendations **I**n **C**hild **H**ealth-aims to bring you the abstracts of some of the breakthrough developments in pediatrics, carefully selected from reputed journals published worldwide.

Expert commentaries will evaluate the importance and relevance of the article and discuss its application in Indian settings. nRICH will cover all the different subspecialities of pediatrics from neonatology, gastroenterology, hematology, adolescent medicine, allergy and immunology, to urology, neurology,vaccinology etc. Each issue will begin with a concise abstract and will represent the main points and ideas found in the originals. It will then be followed by the thoughtful and erudite commentary of Indian experts from various subspecialties who will give an insight on way to read and analyze these articles.

I'm sure students, practitioners and all those interested in knowing about the latest research and recommendations in child health will be immensely benefitted by this endeavor which will be published online on every Monday.

Happy reading!

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Reliability and Observer Dependence of Signs of Neonatal Hypoglycemia

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BASED ON ARTICLE

Hoermann H, Mokwa A, Roeper M, Salimi Dafsari R, Koestner F, Hagenbeck C, Mayatepek E, Kummer S, Meissner T. Reliability and Observer Dependence of Signs of Neonatal Hypoglycemia. J Pediatr. 2022 Jun;245:22-29.e2

ABSTRACT

Objectives: To evaluate, using video documentation, the sensitivity, specificity, and interobserver reliability of visualizable signs of neonatal hypoglycemia at different glucose concentrations in neonates.

Study design: In a prospective cohort study of 145 neonates with and without risk factors for hypoglycemia, 430 videos were recorded before blood glucose measurements and analyzed by 10 blinded investigators of different professions. The primary outcome measures were sensitivity and specificity for clinical detection of hypoglycemia.

Results: The overall sensitivity to detect low blood glucose (<55 mg/dL [<3.1 mmol/L]) based on signs was 30%, and the specificity was 82%. Significantly more investigators suspected hypoglycemia while viewing videos of infants with blood glucose levels of 46-54 mg/dL (2.6-3.0 mmol/L) and 30-45 mg/dL (1.7-2.5 mmol/L) compared with ≥55 mg/dL (≥3.1 mmol/L) (29 ± 3% and 31 ± 4% vs 18 ± 1%; P = .001; P = .007). After 48 hours of life, significantly more investigators suspected hypoglycemia in videos of infants with blood glucose levels of ≤45 mg/dL (≤2.5 mmol/L) compared with blood glucose levels of >45 mg/dL (>2.5 mmol/L) (28.9 ± 8.1% vs 10.9 ± 1.8%; P = .007). For blood glucose levels 30-45 mg/dL (1.7-2.5 mmol/L), sensitivity varied widely between investigators, ranging from 5% to 62%. Three hypoglycemic episodes <30 mg/dL (<1.7 mmol/L) were only partially recognized.

Conclusions: Clinical observation of signs is neither sensitive nor specific to detect neonatal hypoglycemia, and there are large interobserver differences. Thus, guidelines on neonatal hypoglycemia should reconsider whether distinguishing between asymptomatic and symptomatic hypoglycemia provides useful information for the management of neonatal hypoglycemia, because it may pose a risk for systematic under-recognition and undertreatment, leading to an increased risk for neurodevelopmental impairment.

COMMENTARY

Hypoglycaemia is the commonest metabolic disorder in the neonatal period. Current guidelines indicate routine screening for blood glucose in "at risk" newborns and measuring blood glucose if there is clinical suspicion of hypoglycaemia. No research has been conducted to assess the accuracy of signs and symptoms in diagnosing hypoglycaemia and their association with long term outcomes. This study evaluated the accuracy of various signs for detecting hypoglycaemia (blood glucose < 45 mg/dl) in neonates with and without risk factors for the condition. Additionally, the interobserver reliability of the signs was investigated.

This prospective, observational, single-centre study (> 36weeks, n= 145) screened blood glucose at the age of 2-3 hours, post feed in healthy newborns with and without risk factors and thereafter as per unit protocol. Short videos (n=430) of infants without risk factors (n=174) and with risk factors (n=256) were recorded and assessed by nurses, midwives and neonatologists who were blinded to history, using a questionnaire to identify if they suspect hypoglycaemia, whether the newborn is symptomatic and which signs were present. The signs were correlated with different blood glucose values.

The accuracy of detecting low blood glucose levels (<55 mg/dl) based on signs was 30%, with a specificity of 82%. A significantly higher proportion of observers suspected hypoglycemia when viewing videos of infants with blood glucose levels of 46-54 mg/dL and 30-45 mg/dL than those with levels higher than 55 mg/dL. After 48 hours of life, suspected hypoglycemia was better with blood glucose levels of < 45mg/dL compared with blood glucose levels of >45 mg/dL. Thus there were considerable variations between individuals, resulting in both low total and individual accuracy and sensitivity. No single sign was pathognomic for hypoglycaemia. The strength of the study was video documentation, simultaneous video assessment by various care providers, correlation of clinical suspicion with range of blood glucose values - <30, 30-45, 46-54 and > 55 mg/dl. The limitations of the study were less videos of glucose < 30mg/dl, no special training of the care providers for hypoglycaemia recognition and lack of long term follow up.

Hypoglycemia, if left untreated, has potential to cause brain injury leaving infants at risk for neurodevelopmental and cognitive delay. This study shows relying on clinical signs to detect hypoglycaemia seems to be error prone. This may lead to under recognition, delay in initiation of therapy and exposing newborns to long term adverse effects.

IMPLICATIONS FOR PRACTICE

1. Clinicians should recognize that clinical signs for recognition of hypoglycaemia are variable, subjective and may not correlate with hypoglycaemia severity. There is no single sign or symptom which is diagnostic of hypoglycaemia.
2. Neonatal hypoglycaemia is not a "clinical" diagnosis but a "biochemical" diagnosis.
3. A structured and organized blood glucose screening must be performed for all "at risk" newborns.
4. Differentiation of hypoglcyemia on clinical grounds as "asymptomatic" (without signs) or "symptomatic" (with signs) may be error prone. There are significant knowledge gaps in our understanding of clinical signs, severity and management of hypoglycaemia.