

## Neonatal Hypoglycemia: A Problem Not Well Addressed in Postnatal Wards

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### Abstract

**Background:** Neonatal hypoglycemia is a common metabolic problem, which is due to abrupt cessation of maternal glucose after birth and inability to maintain a normal glucose homeostasis but many a proportion of them do not manifest symptoms and may develop complications and sequelae of hypoglycemia.

### Objective:

- To estimate blood glucose level in newborns at different intervals in first 48 hour in postnatal ward.
- To correlate blood glucose level in newborns to gestational age, birth weight and initiation of feeding

**Method:** This is a cross sectional observational study on 196 neonates in postnatal wards of a government medical college hospital. The blood glucose level was assessed at birth, 30 min, 3hr, 6hr, 12hr, 24hr and 48hr independent of feeding time. Hypoglycemia was assessed by Glucometer using capillary blood against age of onset, birth weight, sex of baby, mode of delivery and time of initiation of breast feeding. Data was recorded on a pre-designed proforma.

**Results:** This study revealed that Incidence of Hypoglycemia was 23% in neonates in postnatal ward. High incidence of hypoglycemia was found in low birth weight babies (33.3%), preterm neonates (57.1%) and neonates with delayed breast feeding (32.3%). All 45 neonates with hypoglycemia had correction of Blood glucose level after 30 minutes of feeding.

**Conclusion:** Healthy, low birth weight & preterm neonates in postnatal wards have a very high possibility of Hypoglycemia need close monitoring for hypoglycemia in first 48 hrs of life.

**Keywords:** Hypoglycemia, Low birth weight, Preterm, Early Breast Feeding, Delayed breast feeding.

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## Introduction

Hypoglycemia is a real emergency, and its correction must be fast. At birth there is physiological change in the hormone profile of the newborn with increased stress hormones associated with a fall in insulin level. This leads to a cascade of events that maintain glycemic control. In some situations, this carbohydrate balance may get disturbed. There is, however, no universal definition for this condition. Currently there is insufficient evidence with respect to what constitutes hypoglycemia. As per NNF and AAP [American Academy Paediatric] recommendations Hypoglycemia [8] in neonates is defined as blood glucose level below 40 mg/dl (plasma glucose level than 45 mg /dl). Operational threshold defined as that concentration of plasma or whole blood glucose at which clinicians consider intervention, based on the evidence currently available in literature.[3] This is so called operational threshold values and they are useful guidelines for clinicians to take appropriate actions. It is commonly associated with a variety of conditions like preterm, low birth weight, intrauterine growth restriction, maternal diabetes. Screening of hypoglycemia is recommended in high-risk situations. However asymptomatic hypoglycemia treated with frequent breast feeding and symptomatic hypoglycemia should always be treated with a continuous infusion of parenteral dextrose. Neonates needing dextrose infusion rates above 12mg/kg/min should be investigated for a definite cause. Hypoglycemia is associated with poor neurodevelopmental outcome, and hence aggressive screening and treatment is recommended.

## Methods

Present study is a cross sectional

observational study conducted at the Department of pediatrics, Kamla Raja Hospital, Gajra Raja Medical College, Gwalior between December 2019 to June 2021 after getting approval committee. The aim of the study was to identify the early onset asymptomatic hypoglycemia as soon as possible, to observe the impact of early breastfeeding on hypoglycemia and to evaluate the effect of exclusive breast feeding on subsequent blood glucose values up to 48 hrs. As per the calculated sample size 196 newborn were included in the study.

**Sample size:** Sample size for a qualitative variable is calculated by following formula:  $Z1-a22P(1-p)/d^2$

Z1-a= is a standard normal variable (At 5% type 1 error  $p<0.05$  it is 1.96). P=expected proportion in the population based on previous studies.

D= absolute error or precision

Neonatal asphyxia, infant of diabetic mother, sepsis, babies who are on iv fluids for any other cause, factors not allowing for breast feeding (cleft palate), post tetm IUGR, Prelacteal feeds given, who did not give consent, in whom all readings could not be taken were excluded from the study. Proforma included data regarding demographic variables of mother, maternal characteristics (age, education, parity), family size, number of siblings, father occupation, antenatal complications (PROM, APH, PPH, PIH), mode of delivery and newborn (gestational age, birth weight, time of initiation of feeding, exclusive/mixed feeding, feeding difficulty, urine frequency, and blood glucose level at birth, 30 min, 3hr, 6hr, 12hr, 24hr, and 48hrs.

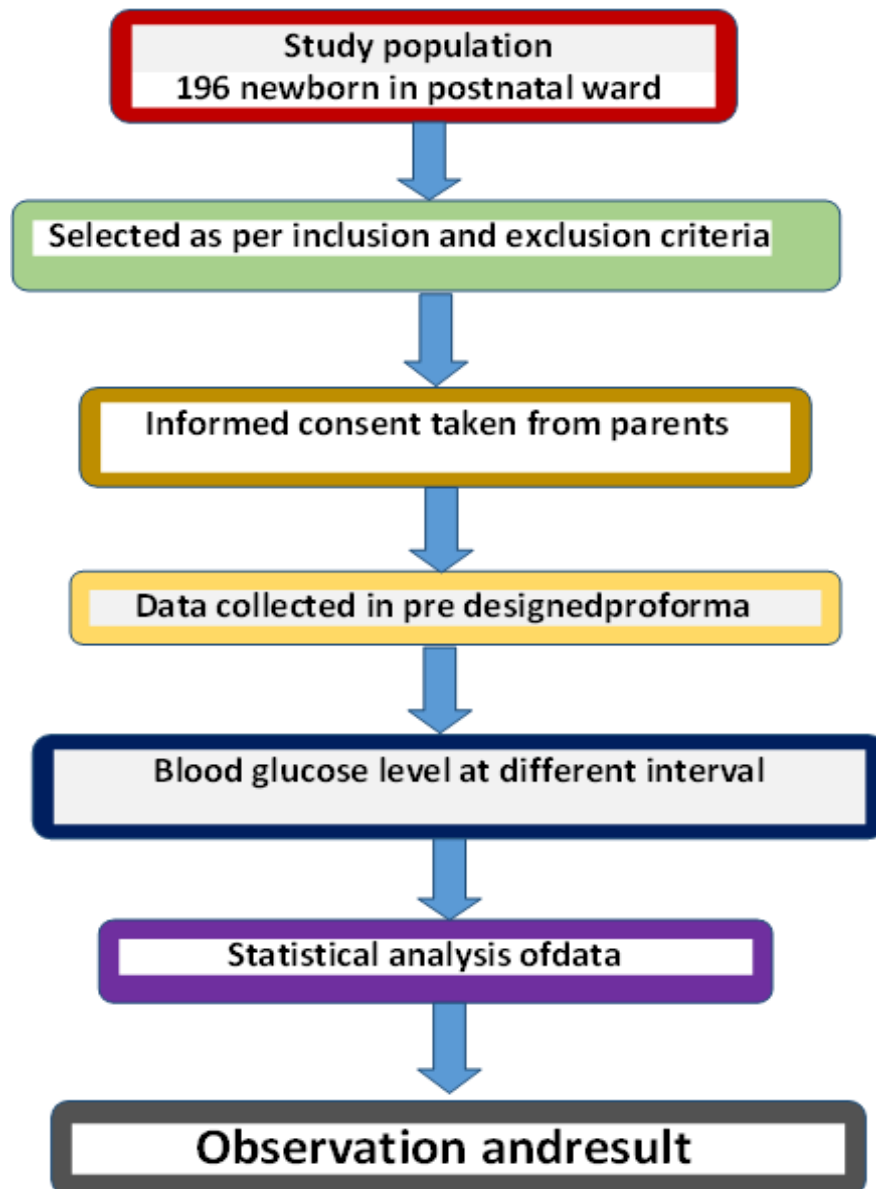


Figure1: Study flowchart

#### Statistical analysis :

All data were entered in Microsoft excel 2010 and analysed on computer using SPSS Version 11.5 package (Chicago, IL, USA). Continuous variables were presented as mean, standard deviation (SD). Data were analysed for mean and standard deviation, level of significance of difference bivariate analysis and regression analysis.

#### Results

Overall Incidence of Hypoglycemia among

neonates in Postnatal ward was 23%. Hypoglycemia was found to be more prevalent in low birth babies (33.3%) (p-value=0.049), preterm babies (57.1%) (p value= 0.029). Delayed breast feeding was associated with hypoglycemia (32.3%) (p value= 0.035). Among Neonates with Hypoglycemia Mean standard value of blood glucose was  $36.3 \pm 4.05$  and after feeding it was  $62.87 \pm 11.44$  (p-value =0.0001).

**Table 1: Blood sugar level in Low Birth Weight & Normal Birth Weight at different interval**

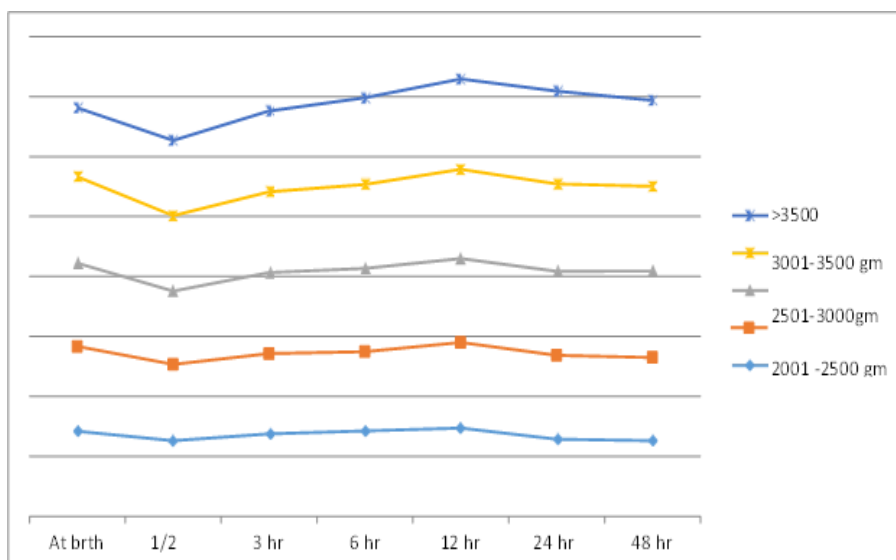
| BG       | Birth weight in Kg | N   | Mean  | Std. Deviation | Std. Error Mean | P value |
|----------|--------------------|-----|-------|----------------|-----------------|---------|
| At birth | LBW                | 48  | 71.96 | 19.284         | 2.783           | 0.224   |
|          | NBW                | 148 | 68.45 | 16.642         | 1.368           |         |
| ½ hr     | LBW                | 48  | 65.15 | 18.593         | 2.684           | 0.217   |
|          | NBW                | 148 | 61.51 | 13.900         | 1.143           |         |
| 3 hr     | LBW                | 48  | 67.75 | 14.055         | 2.029           | 0.818   |
|          | NBW                | 148 | 68.26 | 12.964         | 1.066           |         |
| 6hr      | LBW                | 48  | 70.58 | 15.835         | 2.286           | 0.333   |
|          | NBW                | 148 | 68.36 | 13.023         | 1.072           |         |
| 12 hr    | LBW                | 48  | 72.04 | 14.22          | 2.053           | 0.842   |
|          | NBW                | 148 | 71.64 | 11.578         | 0.952           |         |
| 24 hr    | LBW                | 48  | 67.85 | 13.172         | 1.901           | 0.089   |
|          | NBW                | 148 | 71.39 | 12.17          | 1.000           |         |
| 48 hr    | LBW                | 48  | 66.79 | 15.920         | 2.298           | 0.062   |
|          | NBW                | 148 | 71.39 | 14.326         | 1.178           |         |

No significant difference was observed in mean glucose level on the basis of birth weight at any interval after birth.

**Table 2: Correlation of the Initiation of feeding, Birth weight, Gestational age and Hypoglycemia in Newborn**

|         | Without Hypoglycemia | With Hypoglycemia | P value |
|---------|----------------------|-------------------|---------|
| Preterm | 3(42.9%)             | 4(57.1%)          | 0.029   |
| Term    | 148(78.3%)           | 41(21.7%)         |         |
| EBF     | 109(81.3%)           | 25(18.7%)         | 0.035   |
| DBF     | 42(62.7%)            | 20(32.3%)         |         |
| LBW     | 32(66.7%)            | 16 (33.3%)        | 0.049   |
| NBW     | 119 (80.4%)          | 29(19.6%)         |         |

Significantly lower incidence of hypoglycemia was seen Among early breast-feeding neonates (18.7%) as compared to delayed breast-feeding neonates (32%). Significantly higher incidence of hypoglycemia was observed in preterm (78.3%) as compared to term (41%) and higher in low birth weight (80.4%) as compared to normal birth weight. [19.6%]



**Graph: Mean blood sugar level among different birth weight categories at various interval (Mean [SD])**

No significant association of blood glucose was observed in various birth weight categories at any interval except at 24 hours in between groups.

**Table 3: Correlation of mode of delivery, feeding difficulty, sex and hypoglycemia in newborn.**

|                      | Without Hypoglycemia | With Hypoglycemia | P Value |
|----------------------|----------------------|-------------------|---------|
| LSCS                 | 115 (75.7%)          | 37 (24.8%)        | 0.392   |
| NVD                  | 36 (81.8%)           | 08 (18.2%)        |         |
| Feeding Difficulty   | 02 (66.7%)           | 01 (33.3%)        | 0.667   |
| No feeding Dificulty | 149 (77.2%)          | 44 (22.8%)        |         |
| Female               | 78 (78%)             | 22 (22%)          | 0.745   |
| Male                 | 73 (76%)             | 23 (24%)          |         |

On the basis of mode of delivery No significant difference was observed in Incidence of Hypoglycemia among neonates. A total of 24.8% LSCS born babies had hypoglycemia against only 18.2%, NVD babies. Mother complaining of feeding difficulty had no significant relation to incidence of hypoglycemia (33% Vs 22%). On gender basis no significant difference for hypoglycaemia was observed.

**Discussion**

The term hypoglycemia refers to a low glucose concentration. Neonatal hypoglycemia is not a medical condition in itself but a feature of illness or of failure to adapt from fetal state of continuous transplacental glucose consumption to

extrauterine pattern of nutrient supply. There is controversy over the definition of a ‘safe’ blood glucose concentration [1] , that is, a value below which there is risk of long-term neurodevelopment impairment. [2] Hypoglycemia associated with abnormal clinical signs [ symptomatic hypoglycemia ] has a poor short and long term outcome but evidence of risk in the absence of clinical signs [asymptomatic hypoglycemia ] is inconclusive. [3]

In the present study, of the 196 neonates who were exclusively on breast milk it was found that there is a high incidence of hypoglycemia (23%). A significantly higher incidence was seen in low birth weight (33%) and preterm newborns (57.1%) in the Gwalior region of central

India. This is because of inadequate glycogen storage, immature glycogenolytic, gluconeogenic, pathways and inadequate endocrine response. [4] Metabolic and endocrine disturbances frequently occur in neonates, because of developmental immaturity. Similarly the studies done in different parts of India in past showed high prevalence of hypoglycemia in low birth weight and preterm newborns. Laboratory confirmation of low blood sugar level was made in all cases. No hypoglycemia that required treatment was found among full term and preterm. Amrendra et al [2] (south India) found 24% low birth weight babies developed one episode of hypoglycemia, 9.4% had recurrent episodes. Our Results shows a higher incidence of Hypoglycemia than that reported by Purnima Sayyam et al. Banglore (10%) because in contrast to us they included neonates with normal birth weight only. [5]

Delayed breast feeding is associated with significantly higher Incidence of Hypoglycemia similar to reported by Purnima Sayyam et al [6] and Vitthal rao et

al.[4] and Arun Kumar D et al (56% vs 21%) [7].

No significant association between Mode of delivery and hypoglycemia is noted in our study. results are similar to those reported by Vitthal Rao et al but against Arun Kumar De et al who reported significantly higher incidence of hypoglycemia among LSCS born babies. [8]

Mean glucose level was at various intervals as comparable to those reported by Purnima Sayyam et al and Arun Kumar De et al [5]

Present study shows no significant difference in incidence of hypoglycemia in male versus female subjects [24% Vs 22%] but Princy et al found higher incidence of hypoglycemia in male [54.3% Vs 26.0%]

Above observations in the study suggest that Healthy newborns in postnatal wards should be exclusively breastfed but there needs to closely monitor their blood glucose level in first 48 hrs and if found asymptomatic hypoglycemia can be managed with frequent breastfeeding.

### What Is Already known?

There is high prevalence of hypoglycemia in neonates in postnatal ward of Gwalior region

### What this study adds?

Newborn in postnatal ward with high risk factor like preterm, LBW ,delayed initiation of breast feeding should be regularly monitored for asymptomatic hypoglycemia.

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