



HYPOGLYCEMIA IN NEWBORNS WITH RISK FACTORS OF HYPOGLYCEMIA.

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ABSTRACT... Objectives: Hypoglycemia is a matter of great concern especially in newborns. Its prevalence varies globally as different protocols and feeding policies exist. We aimed this study to find out the incidence of hypoglycemia in newborns with risk factors of hypoglycemia. **Study Design:** Observational study **Setting:** Pediatric Medicine Unit-2, Mayo Hospital, Lahore. **Period:** From 1st January 2018 to 31st December 2018. **Material & Methods:** A total of 342 babies born with risk factors for hypoglycemia fulfilling the inclusion and exclusion criteria were considered for this study. Screening for hypoglycemia was performed prior to feeding at 2, 6, 12, 24 and 48 hours of life. **Results:** Out of a total of 342 newborns with risk factors, 109 (31.9%) were found to have hypoglycemia. Amongst these newborns, 99 (28.9%) and 10 (2.9%) newborns had asymptomatic and symptomatic hypoglycemia respectively. Among these 109 newborns, majority were male 56 (51.4%), 70 (64.2%) with gestational age more than 37 weeks, 66 (60.6%) with birth weight more than 2500 grams and 62 (56.9%) small for gestational age (SGA). Amongst newborns who developed at least 1 hypoglycemia episode, 52 (47.7%) were at 2 hours of life, 31 (28.4%) at 6 hours whereas no hypoglycemia episode recorded beyond 24 hours of life. **Conclusions:** Screening for hypoglycemia should always be performed in babies who had risk factors of hypoglycemia especially within 24 hours of life. As per our study blood glucose screening should be mandatory in all newborns who are SGA.

Key words: Hypoglycemia, Incidence, Newborns, Risk Factors.

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INTRODUCTION

Low levels of blood glucose depict hypoglycemia that can adversely hamper neurological and developmental outcomes in newborns.¹ Defining hypoglycemia has been a debatable issue in the last few decades especially because it is mostly asymptomatic as brain of the newborn is not fully matured.

In 2011, American Academy of Pediatrics (AAP) stated that it is impossible to label values of glucose for hypoglycemia and AAP defined safe glucose concentrations in their recommendations related to newborns who were at risk of hypoglycemia.^{2,3} Hypoglycemia was defined as blood glucose value less than or equal to 40 mg/dL by AAP and subsequent breastfeeding and an intervention as per requirement was recommended.

As far as risk factors related to hypoglycemia in

newborns are concerned, large for gestational age, small for gestational age, low birth weight, preterms and maternal history of diabetes or hypertension are known ones.^{4,5}

Studies calculating incidence of hypoglycemia from around the world have variation in results. This may be due different methods of screening for hypoglycemia as well as difference in practices related to feeding. In a country like Pakistan with limited healthcare facilities and lack of awareness amongst general population, early breastfeeding and warm chain maintenance is not always possible. Blood glucose screening for all newborn in all newborns has its own hazards. It is very important to detect the burden of hypoglycemia in newborns in our setting specially those who have risk factors so this study this study to find out the incidence of hypoglycemia in newborns with risk factors.

MATERIAL AND METHODS

This was an observational study done at Pediatric Medicine Unit-2, Mayo Hospital, Lahore from 1st January 2018 to 31st December 2018. Permission from Institutional Ethical Committee was taken before the start of this study. A total of 342 newborns having hypoglycemia risk factors were enrolled. Healthy newborns but those whose mothers were diabetic or had hypertension, birth weight > 90th percentile (LGA), birth weight < 10th percentile (SGA), low birth weight (1800 to 2500 grams) and preterm babies (35-37 weeks) were included in this study. All newborns who were having formula feed or pre-lacteal feed, congenital malformations or those who were admitted in neonatology intensive care unit (NICU) for any reason were not included in this study.

Parents or guardians of newborns were explained about hypoglycemia and its risk to newborns and consent for this study as well as blood testing spanning regular intervals were acquired. Under aseptic precautions, heel prick was done and capillary blood glucose was tested using Accu-Chek Glucometer (Roche) at 2, 6, 12, 24 and 48 hours of life, prior to feeds. If capillary glucose levels turned out to be < 25 mg/dl, a blood sample was obtained and sent to institution laboratory for confirmatory blood glucose level.

Descriptive statistical analysis was done and measurements were shown in number and percentages using SPSS Version 20.0. Chi square test was applied to see the impact of studied variables on hypoglycemia and p value ≤ 0.05 was taken as statistically significant.

RESULTS

Out of a total of 342 newborns with risk factors, 109 (31.9%) were found to have hypoglycemia. Amongst these newborns, 99 (28.9%) and 10 (2.9%) newborns had asymptomatic and symptomatic hypoglycemia respectively. Among these 109 newborns, majority were male 56 (51.4%), 70 (64.2%) with gestational age more than 37 weeks, 66 (60.6%) with birth weight more than 2500 grams, 62 (56.9%) small for gestational age, 59 (54.1%) maternal age less than 30 years,

55 (50.5%) with maternal BMI over 30, 76 (69.7%) parity status of mothers as multigravida and 70 (64.2%) as LSCS mode of delivery. As per history of maternal morbidity, 32 (29.4%) had history of diabetes mellitus while 48 (44.0%) hypertensive.

When newborns were compared for the all the studied risk factors, small for gestational age newborns were seen significantly (0.025) more having hypoglycemia while others turned out to be statistically insignificant ($P > 0.05$).

Amongst newborns who developed at least 1 hypoglycemia episode, 52 (47.7%) were at 2 hours of life, 31 (28.4%) at 6 hours whereas no hypoglycemia episode recorded beyond 24 hours of life.

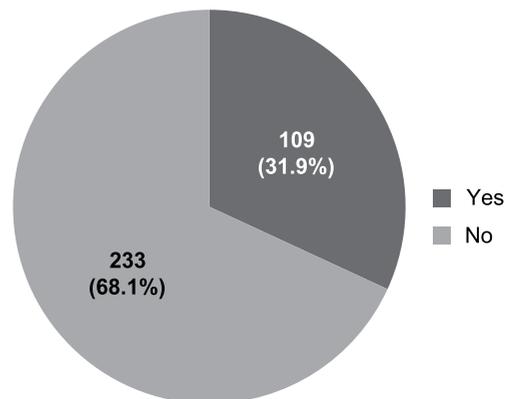


Figure-1. Hypoglycemia amongst newborns with risk factors

DISCUSSION

As this study was aimed to find out the incidence of hypoglycemia in newborns with risk factors, we found 31.9% newborns to have at least 1 hypoglycemia episode during the study period. Kumar TJ and coworkers in a recent study from Tehran found that 33.3% newborns with risk factors had hypoglycemia.⁶ Kaiser et al reported 19.3% incidence of hypoglycemia in 1395 newborns with 23-42 weeks of gestational age using a blood glucose cutoff of <45 mg/dl.⁷ These numbers were much lower in comparison to the present study, possibly due to universal screening.

Characteristics	Hypoglycemia		P-Value
	Yes (n=109)	No (n=233)	
Gender			
Male	56 (51.4%)	138 (59.2%)	0.172
Female	53 (48.6%)	95 (40.8%)	
Gestational Age			
Preterm (<37 weeks)	39 (35.8%)	94 (40.3%)	0.420
Term (≥ 37 weeks)	70 (64.2%)	139 (59.7%)	
Birth Weight			
< 2500 gm	43 (39.4%)	109 (46.8%)	0.204
> 2500 gm	66 (60.6%)	124 (53.2%)	
Status at Birth			
Small for Gestational Age	62 (56.9%)	96 (41.2%)	0.025
Large for Gestational Age	18 (16.5%)	50 (21.5%)	
Appropriate for Gestational Age	29 (26.6%)	87 (37.3%)	
Maternal Age (Years)			
< 30	59 (54.1%)	147 (63.1%)	0.115
> 30	50 (45.9%)	86 (36.9%)	
Maternal BMI			
< 25	20 (18.3%)	60 (25.8%)	0.114
25-30	34 (31.2%)	82 (35.2%)	
> 30	55 (50.5%)	91 (39.1%)	
Maternal History of Diabetes			
Yes	32 (29.4%)	90 (38.6%)	0.095
No	77 (70.6%)	143 (68.4%)	
Maternal History of Hypertension			
Yes	48 (44.0%)	99 (42.5%)	0.788
No	61 (56.0%)	134 (57.5%)	
Mode of Delivery			
LSCS	70 (64.2%)	131 (56.2%)	0.162
Vaginal Delivery	39 (35.8%)	102 (43.8%)	
Parity			
Primi Mother	33 (30.3%)	86 (36.9%)	0.230
Multi Gravida	76 (69.7%)	147 (63.1%)	

**Table-I. Characteristics of newborns with risk factors
(n=342)**

Smolkin et al also reported a lower number (5%) as compared to present study, to have hypoglycemia amongst term newborns without any risk factors. The cutoff value was labeled as 35 mg/dl in that study.⁸ DePuy et al⁹ 2.4% while Singh et al¹⁰ from India showed 27% incidence of hypoglycemia amongst newborns.

In the current study, incidence of hypoglycemia was more in male newborns. This pattern was also depicted by studies from Iran⁶ as well as India.¹⁰ The incidence of hypoglycemia was 56.9% in present work while Kumar TJ et al⁶ got 42% incidence of hypoglycemia in SGA. Our findings had significantly more (p value < 0.05) newborns as SGA in comparison to what Holtrop et al¹¹ (14.7%) and in Bhat et al¹² (25.2%) reported in their studies. In Holtrop et al the frequency of hypoglycemia in SGA infants was 14.7%. De AK and colleagues noted this as 64.2%, but sample size was very small in that study. Holtrop, et al had excluded newborns of diabetic mothers and their newborns were not exclusively breastfed. High incidence of hypoglycemia in SGA in our study can be explained due to high risk pregnancies managed in our institution.

The incidence of hypoglycemia in low birth weight newborns was 39.4%. Singh et al¹⁰ study showed incidence of hypoglycemia in low birth weight newborns 29.5%, De AK et al¹³ showed 64.8% incidence of hypoglycemia in low birth weight newborns but the population size was small.¹³

We noted 29.4% newborns to have born with maternal history of Diabetes. Very similar results were noted in another study⁶ where this figure was 33% in Infants of diabetic mothers. Incidence of hypoglycemia in diabetes was found to be 28.6% in Singh et al¹⁰ reports and 30% in Cordero et al study.¹⁴

The frequency of hypoglycemia in LGA infants was 5% in Holtrop et al study¹¹ and 14.6% in an Indian study.¹⁰ The incidence of hypoglycemia in LGA in this study was 16.5%.

The incidence of hypoglycemia in preterm babies was 35.8%, which is pretty similar to Singh et al¹⁰

(36.9%) but much lower what De AK et al¹³ got (77.7%). Most of our preterm babies are high risk with morbidities like very low birth weight (<1500 grams), RDS etc., requiring NICU admission and hence not included in the present study.

In the present study, the incidence of hypoglycemia in babies born to mothers with hypertension was 44% whereas the incidence in babies born to hypertensive mothers reported by Singh et al.¹⁰ was 33.3% and 39.0% by Kumar TJ et al.⁶

In the present study, newborns who developed at least 1 hypoglycemia episode, 52 (47.7%) were at 2 hours of life, 31 (28.4%) at 6 hours whereas no hypoglycemia episode recorded beyond 24 hours of life. These result are very consistent what Kumar TJ et al⁶ from Iran observed in his findings. No babies developed hypoglycemia after 24 hours of life. So, newborns with risk factors for hypoglycemia should be screened at regular interval for blood glucose level more specifically at first 24 hours of life to enable us to support breastfeeding to prevent hypoglycemia and potential neurodevelopmental damage.

As far as limitations of present study are concerned, all infants could not feed within the first hour. This study showed that health professionals should be informed about the follow-up of infants bearing the risk of hypoglycemia.

CONCLUSION

Screening for hypoglycemia should always be performed in babies who had risk factors of hypoglycemia especially within 24 hours of life. As per our study blood glucose screening should be mandatory in all newborns who are SGA.

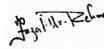
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AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. #	Author(s) Full Name	Contribution to the paper	Author(s) Signature
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2	Fazal ur Rehman	Methodology, Literature Review, Data analysis, Drafting.	
3	Muhammad Ashfaq Zafar	Data collection, Data handling, Literature Review.	