## **Original Research Article**

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# Study on morbidity pattern of neonates admitted to special new born care unit of M.K.C.G. medical college hospital with special reference to hypoglycemia

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## **ABSTRACT**

**Background:** Children under five are most fragile group of population and so subjected to high mortality and morbidity. Among them, neonatal group is highly suseptible due to poor adaptation of their premature organ system. Neonatal hypoglycemia is a common co-morbid condition contributing to mortality. The objective of the study was to assess the etiology and clinical profile of neonatal hypoglycemia among the neonates admitted to special newborn care unit and to assess the co-morbidity pattern among them.

**Methods:** Type of study was hospital based cross-sectional study at SNCU of MKCG Medical College Berhampur, Odisha. Sample size was 204 neonates who developed hypoglycaemia (blood glucose level <40 mg/dl). Study period was 2016-2017 statistical tests used-percentage and proportion. Statistical software used- SPSS 16 version.

**Results:** Out of total 2616 admission during study period, the incidence of hypoglycemia was 7.79%.52% were male babies and 58% were out borns. Among the maternal causes, anemia was the most common cause (37.7%). Low birth weight was highest (55.8%) among neonatal factors. Jitteriness and tremor were the major symptoms (32.5% cases). Lethargy and poor feeding were presenting symptoms (19.6% cases). On analysing the outcome, 7.8% neonate died and 78.4% recovered.

**Conclusions:** Being a common co morbid condition and presented with other neonatal problems it is more seen among outborn males and anemic mothers. Cause may be delay in initiation of feeding and interruption of feeding on the way during referral. However proper counseling should be given to caretaker of referral case about feeding on the way. Early detection of hypoglycemia is important to reduce mortality and prevent future sequelae in sick newborns.

Keywords: Hypoglycemia, Neonates, Morbidity

#### INTRODUCTION

Children under 5 years are the most vulnerable population. Globally under -five mortality rate has dropped from 93/1000 live births in 1990 to 41/1000 live births in 2016. With the global burden of 2.6 million neonatal death, approximately 7,000 deaths occurs every day – majority of them occurring in the first week, about

1 million dying on the first day and nearly 1 million within the next six days.<sup>2</sup> First 28 days of life are the most crucial time for child survival. Current global infant mortality rate is 30.5/1000 live births.<sup>3</sup> A global rate of neonatal death rate is19 per 1000 live births.<sup>2</sup>Almost a quarter of these deaths occur in India. As per statistics 2016, the under-five mortality rate of India is 50/1000 live birth and infant mortality rate is 41/1000 live birth

and neonatal mortality rate is 25/1000 live birth. 4Of all those infants dying before their first birthday, almost 2/3<sup>rd</sup> die in the first 28 days of life. Neonatal mortality rate contribute to half of under-five mortality rate. As per NFHS4, under-five mortality rate of Odisha is 49 and IMR is 40 per 1000 live birth respectively.<sup>5</sup> NMR of the state has declined from 53 (2005) to 37 (2013) keeping pace with Infant mortality rate as estimated by SRS. 6 The SDG aims at reducing neonatal mortality rate to atleast 12/1000 live births by 2030.7 The high neonatal morbidity and mortality is a result of poor adaptation to the environment following premature birth, low birth weight, intra uterine growth retardation, birth asphyxia, sepsis. Majority of these are also results of poor status of maternal health and lack of care during delivery or immediate post-partum, as the health status and survival of the mother and newborn are intrinsically related.

Hypoglycemia is a common co-morbid condition reported in association with prematurity, birth asphyxia, intra uterine growth retardation, infant of diabetic mother, sepsis. Neonatal hypoglycemia is challenge for child health which needs urgent attention failing which adverse consequences, like damage to CNS resulting in abnormal neuro-developmental outcome, decreased overall IQ, reading and learning ability, arithmetic proficiency and motor performance may result over long term.8 Though it is a common metabolic disorder it is often underestimated and overlooked. It is now recognized as an important cause of neonatal morbidity and mortality though the definition, significance and management of neonatal hypoglycemia remains still remain ambiguous. The brain depends on a normal supply of glucose for its energy needs. In a country like India with explosive population growth, the emergence of more mentally or physically h andicapped children in the society is a mental trauma to the parents and also is a burden for the country.

The present study was carried out with objective to assess the morbidity pattern in newborn care centre of M.K.C.G. Medical College and Hospital as well as the incidence and etiology of neonatal hypoglycemia among the admitted neonates.

## **METHODS**

This is a hospital based cross sectional study carried out in SNCU of MKCG Medical College Berhampur, Odisha. All neonates having low blood glucose level (<40 mg/dl) admitted during the study period 2016-2017 were taken as study participants. As per above criteria 204 cases were selected. After taking IEC approval, verbal consent from parents was taken for participation in the study. Detailed history of all cases was recorded giving due importance to maternal factors such as age, parity, history of gestational diabetes, hypertension, infection, medication like corticosteroid therapy, obstetric complications like fetal distress, mode of delivery and natal history such as APGAR scores, resuscitation, birth weight, gestational age was recorded. All neonates after

admission were screened for blood glucose level by glucometer and confirmed in laboratory by glucose-oxidase method. Other relevant investigations were done in the central Laboratory of M.K.C.G. Medical College, Berhampur to diagnose the co-morbidities associated with hypoglycemia. Statistical data was analysed with use of SPSS 16 version.

The babies were examined thoroughly soon after delivery and again on frequent intervals and the result of clinical examination noted in the proforma. Blood sample was collected at 1, 3, 12, 24 hrs and 72 hrs, for determination of blood glucose levels. Other relevant Investigations were also done taking into consideration the detailed history including antenatal, natal and post natal history and clinical presentation. Sepsis screening was done in whom there is h/o PROM, Maternal fever, foul smelling liquor, severe birth asphyxia with active resuscitation, prolonged labour or who presented with poor feeding, Lethargy, seizure, abdominal distension, bleeding. Treatment was given and later modified basing on culture report.

The parameters tested in the sepsis screen were CRP, TLC, ANC and IT ratio. Lumbar puncture was done in all case of late-onset neonatal sepsis and those having clinical features consistent of bacterial meningitis. Those children who presented with tachypnea, respiratory distress, chest x-ray P-A view was done to look for opacities and ground glass appearance in case of RDS, especially in preterm.

#### **RESULTS**

All admitted cases for various morbid conditions during period of 2 years, (January 2016 - December 2017) were screened for low blood sugar. The table number 1 shows the incidence of hypoglycemia was 7.79%. On observation of sex distribution of hypoglycemic cases, males outnumber the females i.e. 52.94% males and 47.06% females. Assessing the relation of hypoglycemia with place of delivery, 58.34% of out born babies were hypoglycemic as compared to 41.66% of inborn.55.8% babies of low birth weight were hypoglycemic. 85.7% of were appropriate for gestational age. Hypoglycemia was found in 54.4% of babies within 24 hours. APGAR score was less than 7 in 59.8% of babies. Assessing various antenatal factors associated with hypoglycemia, 37.7% mothers had anemia which is a predisposing factor for preterm delivery, IUGR and other complications. Mothers with history of prolonged labour contributed to 25% of hypoglycemic babies. 20.58% of mothers were at teen age. Antenatal risk factors like pre eclampsia and eclampsia, Gestational DM and Pregestational DM were associated with 5.88%, 1.47% respectively. As seen in the table 2, prematurity was the most common(49%) factor associated with hypoglycemia in babies, second most common (38.7%) associated condition was birth asphyxia. 59.8% of all hypoglycemic babies had low APGAR scores between 0-7.58. 8% of all hypoglycemic babies were symptomatic with varied clinical presentation though 41.18% were asymptomatic. The most common form of presentation in present study were jitteriness and tremor, lethargy and poor feeding, tachypnea, cyanosis, apnea, seizure and weak high pitched cry in that order. Analyzing the outcomes 78.43% of all hypoglycemic cases were completely cured, 13.72% were referred and death occurred in 7.84% cases.

Table 1: Clinico demographic profiles of neonates.

	No.	%		
Place of delivery				
Inborn	85	41.66		
Out born	119	58.34		
Sex				
Female	96	47.06		
Male	108	52.94		
Type of delivery				
NVD	162	79.41		
CS	42	20.59		
Birth weight				
Normal	90	44.1		
Low	114	55.8		
Status according to gestational age				
SGA	29	14.21		
AGA	175	85.7		
Development time after birth				
Within 24 hrs	111	54.41		
≥24 hrs	93	45.5		
APGAR score		_		
<7	122	59.8		
≥7	82	40.1		

Table 2: Neonatal factors associated with hypoglycemia.

Parameter	No. of hypoglycemia	%
Prematurity	100	49.01
SGA (Term +Preterm)	29	14.21
Sepsis excluding preterm	15	7.35
Birth asphyxia excluding preterm	79	38.72
IDM	3	1.47
IEM	6	2.94
LBW (Preterm+TermSGA)	114	55.88

**Table 3: Presenting symptoms of hypoglycemia.** 

Clinical features	No. of cases	%
Jitteriness and tremor,	66	32.57
Lethargy and poor feeding	40	19.6
Tachypnea	22	10.78
cyanosis, Apnea	18	8.82
seizure	11	5.39
weak high pitched cry	10	4.90
Asymptomatic	120	58.82

Table 4: Outcome of hypoglycemia.

Out come	No.	0/0
Death	16	7.84
Complete cure	160	78.43
Referred	28	13.72

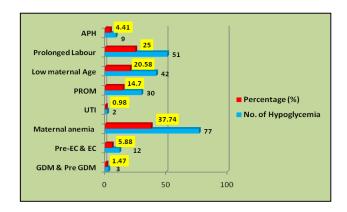


Figure 1: Profile of associated maternal factors.

#### **DISCUSSION**

As the admitted cases were associated with different high risk factors, the incidence for hypoglycemia was little high. It is also higher than the observation in study done by Kiran, Dhanjaya et al where the incidence was 4.2%. The variability in incidence could also be due to different nursery practice, feeding practice and different degree of neonatal sickness. Lubchenco and Bardhas found in their study that 11.4% of all nursery admissions were hypoglycemic. This high incidence may be due to use of higher threshold for hypoglycemia (<50 mg/dl).

The difference of hypoglycemia in different sex group may be due to the demographic trend of the country. More percentage of hypoglycemic cases had history of normal delivery. As more number of normal cases delivered in tertiary health care level counseling of mothers in normal delivery cases could have been deficient or absent. Lack of proper awareness of early feeding, lack of feeding or IV glucose during transport or variation in the level of care may have resulted in more number of hypoglycemia.

Observing the incidence of hypoglycemia in different morbid neonatal conditions, 11.84% of preterm babies were hypoglycemic which is comparable with the study done by Kiran and Dhananjaya et al. In their study they have found incidence of hypoglycemia in pre-term 11.9%, in term 2.9% and 14.75% in babies of SGA. Holtrophas also found incidence of hypoglycemia was 14.7% among babies of SGA. which is comparable to present study. i.e. 15.21%. In the study done by Howdon et al incidence of hypoglycemia in term infants is 0-8% and in preterm infants 3-15%. The variability in incidence among preterm babies in our country. Lubchenco

and Bard has found that 20.3% of preterm babies have hypoglycemia, taking blood glucose level of 50 mg/dl as the cut off.<sup>10</sup>

In present study, incidence of hypoglycemia in SGA was 14.21.8% which is lower than (26%) of Mishra et al and the observation (32.8%) of Lubchanco and Bard. 10,13 The reason of high incidence may be high cut off value for hypoglycemia i.e. 50 mg/dl or due to the discouragement of early feeding practices. In their study they found that 67% of preterm 7.64% of neonatal sepsis have hypoglycemia. But in case of neonatal sepsis with preterm, the incidence of hypoglycemia increased to 18.13%. Similarly, 38% neonates asphyxiatedat birth were hypoglycemic, but with preterm along with birth asphyxia, the incidence increased to 13.07%. In present study 15.21% of term SGA babies were hypoglycemic. But term SGA babies when suffered from sepsis, the incidence increased to 22.22%. This shows that multiple risk factors in neonates make them more susceptible for hypoglycemia.

In preterm, SGA babies, cause of hypoglycemia is mainly due to inadequate substrate (Low glycogen store) and immaturity of enzymes of gluconeogensis, If these babies also suffer from stressful conditions like birth Asphyxia, sepsis, the glucose demand is increased complicating the already lowered blood glucose levels. Considering the contribution of different morbid conditions or risk factors for developing hypoglycemia, the LBW (both preterm and term SGA) babies contributed the highest (55.88%). Prematurity as an independent factor contributing 49.01% of all hypoglycemia cases. 38.72% of all hypoglycemic babies were asphyxiated at birth with SGA babies contributing 14.21% of all hypoglycemics.

In the study by Najati and Saboktakin the underlying cause of hypoglycemia were prematurity (61.5%), diabetic mother (13.6%), septicemia (9.6%). The higher percentage babies of birth asphyxia contributing to hypoglycemia in present study may be due to presence of more number of asphyxiated neonates. The study by Mishra and Sharma in 1983 shows that new born of complicated pregnancies and delivery (48.2%), low birth weight 41.1% and asphyxia (10.7%) comprises of hypoglycemic babies. <sup>13</sup>

The fact that various indirect antenatal risk factor contributing to hypoglycemia like delivering more preterm, IUGR, presence of birth asphyxia and neonatal sepsis, has been reported in different studies.(Ali Beard; 1971, Sigh et al, 1991, NRC Robertson et al, 1999). The study by Mishra et al also shows that 48.2% of all symptomatic hypoglycemic cases were associated with complicated pregnancies and deliveries. Relation of hypoglycemia with APGAR score was assessed and it was found that babies having low APGAR score were more hypoglycemic. 48.03% of all hypoglycemic babies had APGAR score between 0-3 and 11.76% had APGAR score between 3-7. This is due to the fact that low

APGAR score is common in birth Asphyxia and preterm babies. As in our series we have more number of birth asphyxiated and preterm babies, So it was found that 59.79% of all hypoglycemic babies have low APGAR scores between 0-7.58.82% of all hypoglycemic babies were symptomatic having varied clinical presentation. 41.18% were asymptomatic. In the study by Kiran et al in 2011 the incidence of symptomatic hypoglycemia is 40%. <sup>13</sup> The high incidence of symptomatic hypoglycemia may be due to different neonatal conditions and more no of preterm, LBW neonates in present study and other associated risk factors like birth asphyxia and sepsis.

Several studies reported secondary hypoglycemia as a result of asphyxia, prematurity, respiratory distress, infection as observed by anderson et al.<sup>18</sup> Even 38% of uncomplicated term infants had low blood glucose concentration during first fifty hours of life.<sup>18</sup>

Comparing the most common form of presentation in present study Jitteriness and Tremor, Lethargy and Poor feeding, etc. Mishra et al also found the similar incidence of clinical presentations i.e. jitteriness and tremor 78.6%, lethargy 48.2% tachypnea 26.8%, cyanosis 21.4%, convulsion 7.1% Although none of the signs and symptoms of hypoglycemia are pathognomic, Jitteriness and Tremor were the most common feature also been found by Cornblath et al and Kumari et al. 11 Many have multiple combination of above presentations. The above signs may be found in other neonatal conditions like birth asphyxia, sepsis, hypothermia. Cornblath et al described 8 infants whose symptoms were apnea, cyanosis, coma, convulsions and were attributed to reduced blood glucose concentrations.

On assessing the development of hypoglycemia (first detected), 111 (54.41%) babies developed Hypoglycemia on Day-1 of life. With 16.66% of total, presenting between 2-12 hrs. of life. Kiran et al in 2011 found in their study that 55.26% were hypoglycemic on day-1, on day-2, 26.31% and on day 3, 18.42% which were comparable to present study. The more number of hypoglycemic babies on Day-1. may be due to more number of preterm. ELBW, SGA babies IDM also presented within 1st 12 hrs of life and SGA babies presented within 1<sup>St</sup> 24 hrs of life. Hundred percent recovery was not possible because the cases were multi factorial. Underlying causes were found out and treated accordingly. 78.43% of all hypoglycemic cases were completely cured, 13.72% patients cured and discharged with some seguelae and death occurred in 7.84% cases. The death rate was lower than the study by Mishra and Sharma et al. This may be due to the fact that they have included only the symptomatic hypoglycemic in their study. Neonatal mortality rate as per WHO-UNICEF-2009 data, is 34/1000 live births. As in present study the admitted cases were taken which had some or other morbidities, death rate found to be high. The deaths occurred mainly due to associated morbid conditions. Most of them were ELBW, Sepsis with Shock and IE.

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Institutional Ethics Committee

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