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STATUS AND ITS EFFECT OF BLOOD GLUCOSE LEVEL IN NEONATAL SEPSIS IN NEWBORNS ADMITTED IN DMCH

Pediatrics

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ABSTRACT

Objectives: The objective of the study was to determine the status and its effect of blood glucose level in neonatal sepsis in newborns admitted in DMCH.

Materials and methods: Data were collected from the children admitted in Darbhanga Medical Hospital, Laheriasarai. Blood sample were collected from the children at the time of admission.

Results: Out of 96 neonates, 80 (83.3%) neonates were found to be CRP positive and 16 (16.7%) neonates were CRP negative.32 (33.3%) neonates were blood culture positive and 64 (66.7%) neonates were culture negative. 76 (79.1%) neonates were cured and 20 (20.9%) neonates expired. Among the 20 expired neonates, all neonates were CRP positive and 9 neonates were also culture positive.

Conclusion: There is alteration in glycemic status in neonates of neonatal sepsis. Mortality is higher in neonates of neonatal sepsis with hyperglycemia.

KEYWORDS

Neonatal sepsis, Hypoglycemia, Hyperglycemia.

INTRODUCTION

Deaths occurring in the neonatal period each year account for 41% (3.6 million) of all deaths in children under 5 years. [1]Neonatal sepsis contributes substantially to neonatal morbidity and mortality and is an ongoing major global public health challenge.[2] Neonatal sepsis is a diagnosis made in infants less than 28 days of life and consists of a clinical syndrome that may include systemic signs of infection, circulatory shock, and multi-system organ failure. Neonatal sepsis may be divided into two types: early-onset neonatal sepsis (EONS) and late-onset neonatal sepsis (LONS). EONS is typically described as infection and sepsis occurring within the first 24 hours to first week of life. LONS has been labeled as after 24 hours or after the first week of life, up to 28 days or 1 month.[3-4] Neonatal sepsis is the third leading cause of neonatal mortality, only behind prematurity and intrapartum related complications (or birth asphyxia).[5] Signs and symptoms of infection in neonates are subtle and non-specific, may present with one or more of the following: hypothermia or fever, lethargy, poor cry, refusal to suck, poor perfusion, prolonged capillary refill time, hypotonia, absent neonatal reflexes, bulging fontanel, bradycardia or tachycardia, respiratory distress, apnea and gasping respiration, hypoglycemia or hyperglycemia, and metabolic acidosis.[6-8] Hypoglycemia develops when the latter fails to respond to the former, secondary to cytokine-induced inhibition of gluconeogenesis in the setting of glycogen depletion.[9-10] Aim of this study is to find out the Status and its effect of blood glucose level in neonatal sepsis in newborns admitted in DMCH.

MATERIALS AND METHODS

The study was carried out in the Department of Pediatrics, DMCH. A total of 228 neonates were selected from the neonates admitted in the SNCU of the hospital. Permission from the hospital authority and ethical committee was taken before conducting this study. Term neonate having birth weight ≥ 2000 gm and ≤ 4000 gm with clinically suspected neonatal sepsis presented with one or more of the clinical features of neonatal sepsis were included in this study. Clinical features of neonatal sepsis are: 1) Not feeding well 2) Convulsions 3) Fast breathing (>60 breath/min on second count) 4) Severe chest indrawing 5) Low body temperature (less than 35.5ºC or 95.9ºF) 6) Fever (more than 37.5ºC or 99.5ºF) 7) Movement only when stimulated or no movement at all. A detailed informed consent was taken from the mothers whose neonates were included in the study. Neonates that were excluded from the study were Infants of diabetic mother, perinatal asphyxia, meconium aspiration syndrome, Congenital anomalies and also neonates who received intravenous glucose or antibiotics before admission.

A detailed history from the mothers of neonates and thorough physical examination of each neonates that were included in the study was done at the time of admission. History included age of newborn, sex, gestational age, h/o prolonged rupture of membrane (PROM), intrapartum fever or fever 3 days before delivery, per vaginal foul smelling discharge, prolonged labour and features of sepsis. Before giving any intravenous fluid or antibiotics to the neonates, venous blood were collected of each neonates for blood sugar, full blood counts, CRP levels and blood culture. Samples were sent to laboratory within half hour of collection. CRP levels >6mg/L considered as positive and <6mg/L considered as negative. For this study glucose levels were divided into three groups i.e. < 45 mg/dl, 45-145mg/dl, and > 145 mg/dl. The neonates were managed as per hospital protocols.

Blood glucose level and mortality of neonates having hypoglycemia and hyperglycemia were analysed. Glycemic status was analysed among CRP positive and culture positive patients.

P-value < 0.05 was considered significant.

RESULTS

A total of 228 deliveries occurred in the hospital during the study, out of which 96 neonates, were included in the study. Overall 132 neonates were excluded from the study.

A total of 96 neonates who were clinically diagnosed as neonatal sepsis were studied. The mean age was found10.1±8.5 days with range from 1 to 28 days and more than half (51.6%) neonates belonged to age ≤7 days. More than two third (67.7%) neonates were male and 32.3% were female. 80 (83.3%) neonates were found to be CRP positive and 16 (16.7%) neonates were CRP negative. 32 (33.3%) neonates were blood culture positive and 64 (66.7%) neonates were culture negative. 76 (79.1%) neonates were cured and 20 (20.9%) neonates expired. Among the 20 expired neonates, all neonates were CRP positive and 9 neonates were also culture positive.

In the study, it was found that out of 80 neonates that were CRP positive, 10 (12.5%) neonates were hypoglycemic, 58 (72.5%) neonates were normoglycemic and 12 (15%) neonates were hyperglycemic. Out of 32 neonates that were culture positive, 5 (15.6%) neonates were hypoglycemic, 20 (62.5%) neonates were normoglycemic and 7 (21.9%) neonates were hyperglycemic. Out of 20 neonates that were expired, 4 (20%) neonates were hypoglycemic, 8 (40%) neonates were normoglycemic and 8 (40%) neonates were hyperglycemic. **Table 1**

Table 1: Glycemic status among various groups of neonates.

Groups	Hypoglycemic<45mg/dl	Normoglycemic 45-145 mg/dl	Hyperglycemic >145 mg/dl
CRP positive(N=80)	10	58	12
Culture positive(N=32)	5	20	7

Expired neonates(N=20)	4	8	8

In the study it was found that, among all CRP positive neonates that were expired, 66.7% (8/12) of neonates were hyperglycemic, 40% (8/58) of neonates were hypoglycemic and only 13.8% (4/10) of neonates were normoglycemic. **Table 2**

Table 2: Glycemic status in Expired neonates among CRP positive neonates.

Glucose level	Number of neonates	Expired neonates	Percentage of expired neonates
Hypoglycemia <45mg/dl	10	4	40%
Normoglycemia 45-145mg/dl	58	8	13.8%
Hyperglycemia >145mg/dl	12	8	66.7%

In the study it was found that, mortality was high in hypoglycemic neonates (40%) in comparison with normoglycemic neonates (13.8%) and the difference was not statistically significant. (Proportion test, p-value: 0.1). **Table 3**

Table 3: Association of hypoglycemia with mortality.

Glucose level	Number of neonates	Expired neonates	P-value
Normoglycemia 45-145mg/dl	58	8	0.1
Hypoglycemia <45mg/dl	10	4	

In the study it was found that, mortality was also high in hyperglycemic patient (66.7%) in comparison with normoglycemic patient (13.8%) and the difference was statistically significant (Proportion test, p-value: 0.005). **Table 4**

Table 4: Association of hyperglycemia with mortality

Glucose level	Number of neonates	Expired neonates	P-value
Normoglycemia 45-145mg/dl	58	8	0.005
Hyperglycemia >145mg/dl	12	8	

DISCUSSION

This study was carried out to determine the glycemic status in neonatal sepsis and to evaluate the association of hypoglycemia and hyperglycemia with mortality in neonates of neonatal sepsis. Several studies have shown that hyperglycemia is associated with adverse outcomes in the pediatric age group. A study by Wintergerst et alhas shown that hyperglycemia, hypoglycemia and glucose variability are associated with increased mortality rates and increased length of stay in PICU.[11] In this study, it was found that 72.5% neonates were normoglycemic (45-145 mg/dl), 12.5% were hypoglycemic (<45 mg/dl) and 15% were hyperglycemic (>145 mg/dl) which was similar to the results that was obtained in the study conducted by Begum et al.[12] A neonate having sepsis develops reluctance to take feed properly and this can lead to hypoglycemia. Similarly increased metabolic demand and hypothermia caused by sepsis can bring down the glucose level. In the study it was found that, mortality was high in hypoglycemic neonates (40%) in comparison with normoglycemic neonates (13.8%) and the difference was not statistically significant. (Proportion test, p-value: 0.1). Similar results were found in the study conducted by Branco et al in which mortality in hypoglycemic neonates was 32% which is consistent with the findings in this study.[13]

In the study it was found that, mortality was also high in hyperglycemic patient (66.7%) in comparison with normoglycemic patient (13.8%) and the difference was statistically significant (Proportion test, p-value: 0.005). Similar results were found in the study conducted by Lugtet al in which mortality in hyperglycemic neonates was 41% which is consistent with the findings in this study.[14]

CONCLUSION

From this study it is concluded that, there is alteration in glycemic status in neonates of neonatal sepsis. Mortality is higher in neonates of neonatal sepsis with hyperglycemia. Newborns of neonatal sepsis that are having high blood glucose levels are at increased risk of death and should be treated as high risk newborns. Neonatal sepsis should be detected early and prompt treatment should be done, before hyperglycemia sets in.

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