

FREQUENCY AND OUTCOME OF HYPOGLYCEMIA IN CHILDREN HAVING SEVERE PROTEIN ENERGY MALNUTRITION PRESENTING WITH DIARRHEA

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ABSTRACT

Background: Hypoglycemia in malnourished child with diarrhea is a complicated situation faced by pediatrician in emergency department. **Objective:** To determine the frequency and outcome of hypoglycemia in severely malnourished children suffering from diarrhea at time of admission. **Methodology:** Study Design: Cross sectional study. Sampling Technique: Non probability, consecutive sampling. Setting and Duration of Study: This study was conducted in Pediatric Medicine Unit-1, Bahawal Victoria Hospital, Bahawalpur from 16th May to 15th November 2012. Total 184 patients were selected. All were suffering from severe malnutrition and had acute diarrhea at admission. Serum sugar levels of all patients were checked and results were noted on the performa. SPSS version 10 was used for data analysis. **Results:** Among the 184 children 56 (30.4%) were hypoglycemic and 128 (69.6%) were normoglycemic. 41 (67.21%) out of 56 children from hypoglycemic group while 20 (15.6%) out 128 children from normoglycemic group expired. The mortality was significantly more in hypoglycemic children. (P Value = 0.000). **Conclusion:** The frequency of hypoglycemia and mortality in severely malnourished children suffering from diarrhea at the time of admission was significantly higher than normoglycemic children in this study.

Keywords: Malnutrition, Serum sugar level, Hypoglycemia, Mortality.

JSZMC 2015;7(1):930-933

INTRODUCTION

Malnutrition includes both under nutrition and over nutrition.¹ Undernutrition is preventable cause of morbidity and mortality among children aged below five years.² Moreover severe malnutrition is one of the reasons of hospital admissions in economically poor.^{3,4,5} Diarrhea is the second most common life threatening condition worldwide among all infectious diseases in children younger than 5 years.⁶ Diarrhea and malnutrition are inter-related.^{7,8} Hypoglycemia is usually associated with severe malnutrition⁹⁻¹² and persistent diarrhea.¹³ Decreased stores of glycogen, increased peripheral utilization of glucose, and intestinal malabsorption have all been associated with hypoglycemia.^{14,15} In children, hypoglycemia resulting from impaired glucogenesis is associated with mortality from infectious diarrhoea regardless of their nutritional status. The major long term sequelae of severe prolonged hypoglycemia are neurological damage resulting in mental retardation, cognitive impairment, neurological deficit and recurrent seizure activity.^{14,16,17,18}

Since both malnutrition as well as diarrheal

diseases are common in Pakistan so this study was planned to determine the frequency of hypoglycemia and mortality in 6 – 59 months old children with severe protein energy malnutrition presenting with diarrhea in pediatric emergency.

METHODOLOGY

This cross sectional study was conducted at Pediatrics Unit I, Bahawal Victoria Hospital, Bahawalpur from 16th May to 15th November 2012. The study was approved by Hospital ethical committee. Children from 6 months to 59 months suffering from severe malnutrition (weight less than 60% of the age) and presenting with diarrhea (more than three watery stools per day) were included in the study. The children having diarrhea for more than 14 days, having unknown age at the time of admission or if their parents/guardians did not give consent were excluded.

A total of 184 severely malnourished children with acute diarrhea were included in the study following inclusion and exclusion criteria. Verbal consent from parents/ guardian was taken. The brief history was taken from the mother/guardian about the age, the presenting complaint, frequency of stool in last 24 hours, the time since the intake of last meal/ fluid and

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Received: 26-11-2015

Accepted: 10-01-2016

its nature, and the complaint of vomiting. The weight was taken by digital weight machine after removing the baby's cloths and measured the weight (to the nearest 10 g) and blood glucose level was checked by pricking the patient's index finger and using the glucometer (model: Lever Chek). In cases of hypoglycemia (blood glucose level <54mg/dl) detected by glucometer, patient blood sample obtained by venous puncture was sent to the pathology laboratory of Bahawal Victoria Hospital for confirmation of hypoglycemia. Patients were examined time to time and their outcome (mortality) was noted during first 48 hours of hospital stay.

SPSS-10.0 was used for statistical data analysis. Frequency of hypoglycemia was calculated. For quantitative data, mean and standard deviation was calculated. Chi-square test was used to compare the two groups (hypoglycemic and normoglycemic) and level of significance taken was 5%.

RESULTS

A total of 184 children were included. Male to female ratio was 1:1. Seventy eight (42.4%) children were of age group 6-17 months, 34 (18.5%) of age group 18-28 months, 26 (14.1%) of age group 29-39 months, 24 (13%) of age group 40-50 months and 22 (12%) children were of age group 51-59 months. The mean weight of the children was 6.6 ± 2.89 kg and the mean duration of diarrhea prior to admission was 5.66 ± 3.93 days. The mean stay in hospital was 5.45 ± 5.48 days. Overall frequency of hypoglycemia in this study was 56 (30.4%). Among the hypoglycemic children 33 (59%) were females and 23 (41%) were males.

Among the 184 children, 61 (33.2%) expired within the 48 hours of hospital stay. 41 (67.21%) out of 56 children from hypoglycemic group while 20 (15.6%) out of 128 children from normoglycemic group expired. (P value= 0.000) (Table I) In the hypoglycemic expired group 26 (63.41%) were females and 15 (36.59%) were males while in expired normoglycemic group 10 (50%) were females and 10 (50%) were males. (P value 0.3) (Table II). Among the 41 children who expired due to hypoglycemia, 39 (95.12%) had vomiting as compared to 16 (80%) out of 20 children who have vomiting but normoglycemic and died. Among the 41 children who expired due

to hypoglycemia 20 (48.7%) children took intravenous fluid prior to admission while among the normoglycemic who expired 9 (45%) children took intravenous fluid prior to admission.(P value = 0.7) (Table IV).

Table I: Mortality among hypoglycemic and normoglycemic children

Outcome	Hypoglycemic No (%)	Normoglycemic No (%)	P value
Survived	15 (32.8)	108 (84.4)	0.0001
Expired	41(67.2)	20 (15.6)	
Total	56 (100)	128 (100)	

Table II: Sex distribution among expired hypoglycemic and expired normoglycemic children

Sex	Hypoglycemic Expired No (%)	Normoglycemic Expired No (%)	P value
Female	26 (36.4)	10 (50)	0.3173
Males	15 (36.6)	10 (50)	
Total	41 (100)	20 (100)	

Table III: Vomiting among expired hypoglycemic and expired normoglycemic children

Vomiting	Hypoglycemic Expired No (%)	Normoglycemic Expired No (%)	P value
Yes	39 (95.1)	16 (80)	0.0626
No	2 (4.9)	4 (20)	
Total	41 (100)	20 (100)	

Table IV: Intravenous fluid before admission among expired hypoglycemic and expired normoglycemic children

I/V fluid given	Hypoglycemic Expired No (%)	Normoglycemic Expired No (%)	P value
Yes	20 (48.7)	9 (45)	0.7
No	21 (51.3)	11 (55)	
Total	41 (100)	20 (100)	

DISCUSSION

Malnutrition is a condition responsible for majority of all child deaths under the age of 5 years.¹⁸ Diarrhea may be fatal when superimposed upon malnutrition.¹⁷ There is evidence describing hypoglycemia as a complication of acute

gastroenteritis, a common problem in undeveloped countries where a common comorbidity is malnutrition.¹³⁻¹⁸ Chisti et al¹⁶ and Talbert et al¹⁷ also used cut off point similar to that of our study while Bennish et al¹⁸ used 39.6 mg/dl as cut off value.

The children belonged to age group 6-59 months in current study. The study population in a study by Huq et al¹³ was under five years of age, infants in a study by Chisti et al,¹⁶ 6-months to 12 years in the study by Talbert et al¹⁷ and less than 15 years in the study by Bennish et al.¹⁸

The male to female ratio was equal in current study while in a study by Talbert et al¹⁷ 52% were male. The children were having severe malnutrition in that study. The population in a study by Chisti et al¹⁶ and by Talbert et al¹⁷ were severely malnourished while in a study by Huq et al¹³ the population was both normal as well as malnourished children. The children were suffering from diarrhea of less than 14 days duration in current study while other studies¹⁶⁻¹⁸ did not have any time limit for diarrhea. The frequency of hypoglycemia noted in current study was 30.4% and Chisti et al¹⁶ showed hypoglycemia in 16.39% cases, Talbert et al showed¹⁷ in 15% cases and Huq et al¹³ showed in 11%. The reason of this low frequency of hypoglycemia in other studies as compared to our study may be due to the type of selection of children.

The overall mortality in current study was 33.2% while 67.21% among children with hypoglycemia and 15.6% in normoglycemic children. The mortality was significantly more in hypoglycemic children. Chisti et al¹⁶ showed overall case fatality of 16.39%. The mortality among hypoglycemic infants was 66.67% while 11.76% in normoglycemic children. Infants with fatal outcome were more often having hypoglycaemia on admission than those without fatal outcome.¹⁶ Talbert et al¹⁷ showed mortality in 24.35% in hypoglycemic children. Bennish et al¹⁸ showed mortality in 8.04% cases. The mortality among hypoglycemic infants was 42.9% while 6.9% in normoglycemic children. Huq et al¹³ showed mortality of 28% in hypoglycemic versus 11% in normoglycemic children. Both overall mortality and mortality in hypoglycemic children was higher in our study as compared to others¹³⁻¹⁸ may be due to selection in patients as well most probably delay of the referral of children to

tertiary care centers. There was no association of presence of vomiting, sex, and history of prior intravenous fluids on the mortality of hypoglycemic children.

CONCLUSION

The frequency of hypoglycemia in severely malnourished children suffering from diarrhea at the time of admission was high, with significantly higher mortality in hypoglycemic children.

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