Original Article

Frequency and Outcome of Hypoglycemia in Children Having Severe Protein Energy Malnutrition Presenting With Diarrhea

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ABSTRACT

Objective: The objective of this study was to determine the frequency and outcome of hypoglycemia in severely malnourished children suffering from diarrhea at the time of admission in pediatric department of a teaching hospital.

Study Design: Cross Section Study

Place and Duration of Study: This study was conducted at the Pediatric Unit 1 of Bahawal Victoria Hospital Bahawalpur from May to November 2015.

Materials and Methods: Total 220 patients were selected in this study. Non-probability sampling technique was used. All the patients suffering from severe malnutrition and acute diarrhea at the time of admission were included. Serum sugar level of patients of was checked and the results were noted. Data was analyzed by using SPSS version 19.

Results: Out of 210 children, 76 (36.19%) were expired in hospital within 48 hours at hospital stay. 50 (66.5%) children died within 48 hours from hypoglycemic group of 76 children, though 26 (15%) out of 134 children with normoglycemic group expired from this group. (P = 0.0001).In the Expired hypoglycemic group 32 (64.41%) were female and 18 (36%) were male, while in the expired normoglycemic group 14 (55%) were female and 12 (45%) were male (P = 0.4615).Expired due to hypoglycemia in 50 children, 47 (95%) were having history of vomiting while Expired due to hypoglycemia in 26 children, 19(75%) had vomiting and died (P = 0.0264). The children died with hypoglycemia 24(47.7%) received I/V fluids before hospital admission while the children died with normoglycemia 12(46%) of the children had access to the venous fluid before admission. (P = 0.9).

Conclusion: The incidence of hypoglycemia in severe malnourished children suffering from diarrhea at admission time was higher and significantly associated with higher mortality in hypoglycemic children.

Key Words: Malnutrition; Serum Sugar Levels; Hypoglycemia; Mortality.

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INTRODUCTION

Malnutrition includes both under or over nutrition .[1] Nutritional deficiencies are preventable causes of illness and death in children under five years of age [2] and severe malnutrition is the leading cause of hospital admission in under developed countries.[3-5] Diarrhea is the world's second most common cause of life-threatening disease with all infectious diseases in children younger than 5 years of age.[6]

Diarrhea and malnutrition are inter-related.[7,8] Hypoglycemia is usually linked with severe malnutrition [9-12] and constant diarrhea.[13] Decreased supplies of glycogen, augmented tangential consumption of glucose, intestinal mal absorption all these have been linked with hypoglycemia in children. Impaired Glucogenesis in children with hypoglycemia is associated with mortality from infectious diarrhea, regardless of their nutritional status. Long term severe hypoglycemia causes nerve damage leading to mental retardation, cognitive disorders, neurological discrepancy and recurrent convulsions .[14-18]

Since both malnutrition as well as diarrheal disease is common in Pakistan so the objective of this study was to determine the frequency and outcome of hypoglycemia in severely malnourished children suffering from diarrhea at the time of admission in pediatric emergency of a teaching hospital.

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MATERIALS AND METHODS

This cross sectional study was conducted at pediatric unit 1 of Bahawal Victoria Hospital Bahawalpur from May to November 2015.

The study was approved by the Hospital Ethics Committee. Children with age 6 months to 59 months with severe malnutrition (less than 60% of body weight) and diarrhea (more than three daily watery

stools) were included in the study. Diarrhea from more than 14 days, having an unknown age at the time of admission or if the parent / guardian did not agree to participate were excluded. Total 220 cases were examined.

After Verbal Consent from parents/guardian a detailed history from mother or guardian about age, the number of stools in the past 24 hours, the last meal intake time / fluid and its nature and vomiting complaints were taken.

After taking the weight of the children the blood sugar level was checked by the use of glucometer. In the case of hypoglycemia (blood glucose levels <54 mg / dL), venipuncture was done to obtain the patient's blood sample and was sent to the pathology lab of Bahawal Victoria Hospital for confirmation of hypoglycemia. Patients were examined for time to time and their results (mortality) were noted in the first 48 hours of hospitalization. Data was analyzed by using SPSS version19. The frequency of hypoglycemia was noted. The chi-square test was used to compare the two groups (hypoglycemic and normoglycemic) and level of significance was 5%.

RESULTS

210 children were included in this study. The ratio of male to female was 1: 1.ninty one children (43.7%) were belong to the children with age group 6-17 months, 39 (19%) were in age group 18-28 months, 30 (14.28%) were age group 29-39 months, 29 (13.80%) were in the age group of 40-50 months and 21 (10%) of the children's age group was 51-59 months. The average weight of the children was 6.5 ± 2.75 kg and the average time of diarrhea before admission was 5.65 ± 3.75 days. The average stay in the hospital was 5.25 ± 5.50 days. The overall frequency of hypoglycemia in this study was 70 (33.4%). Hypoglycemic children 41 (58%) were females, and 29 (42%) were males.

Table No. 1: Mortality Among Hypoglycemic and Normoglycemic Children

Outcome	Hypoglycemic No	Normoglycemic No	
Survived	26	108	0.0001
Expired	50	26	
Total	76	134	

Table No. 2: Gender Distribution among Hypoglycemic expired and Normoglycemic expired Children

Sex	Hypoglycemic Expired No	Normoglycemic Expired No	
Female	32	14	0.4615
Male	18	12	
Total	50	26	

Out of 210 children, 76 (36.19%) were expired in hospital within 48 hours at hospital stay. 50 (66.5%) children died within 48 hours from hypoglycemic group of children, though 26 (15%) out of 134 children with normoglycemic group expired from this group. (P = 0.0001) (Table 1). In the Expired hypoglycemic group 32 (64.41%) were female and 18 (36%) were men, while in the expired normoglycemic group 14 (55%) were females and 12 (45%) were males (P = 0.4615) (Table 2). Expired due to hypoglycemia in 50 children, 47 (95%) were having history of vomiting while Expired due to hypoglycemia in 26 children, 19 (75%) had vomiting and died (P = 0.0264) (Table 3). The children died with hypoglycemia 24 (47.7%) received I/V fluids before hospital admission while the children died with normoglycemia 12 (46%) of the children had access to the venous fluid before admission. (P = 0.9) (Table 4).

Table No. 3: Vomiting among Hypoglycemic expired and Normoglycemic expired Children

Vomiting	Hypoglycemic Expired No	Normoglycemic Expired No	P Value
Yes	47	19	0.0264
No	3	7	
Total	50	26	

Table No. 4: Intravenous fluid before admission among Hypoglycemic expired and Normoglycemic expired Children

I/V fluids given	Hypoglycemic Expired No	Normoglycemic Expired No	
Yes	24	12	0.9
No	26	14	
Total	50	26	

DISCUSSION

Severe malnutrition is the leading cause of all children death under five year of age.[18,19] The evidence shows hypoglycemia acute complication of diarrhea is a common problem in countries where co-morbidity is malnutrition. [13 18] Chisti et al[16] and Talbert et al[17] used same cut off value, similar to our study while Bennish et al[18] uses 39.6 mg / dl as the cut value.

The Children with age group 6 month to five year were included in our study. In Huq et al study population age was under five year of age while, the infants in Chisti et al study , [16] 6 months to 12 years by Tal study et al[17] study and less than 15 years by Bennish et al study were included. [18]

The ratio of male to female is equal in the current study while in a study of Talbert et al where 52% were male. Children were facing serious malnutrition in current study. In a study by the Chishti et al & by Talbert et al showed that children were severely malnourished, at the same time in a study by Huq et al [13] population was both normal as well as malnourished.

The children suffering from diarrhea less than 2 weeks were included in our study while other did not have any time-limited diarrhea. The finding of our scrutiny Indicating that the frequency of hypoglycemia in the current study was 30.4% and Chisti et al [16] showed low blood glucose in 16.39% & Huq et al study showed 11%.low frequency of other studies compared to our study of hypoglycemic causes may be due to the type of child selection.

In the current study the overall mortality rate was 33.2%, while 67% in children with low blood sugar and 15.6% of in children with normal blood sugar level (normoglycemic). Mortality was more pronounced in hypoglycemic children. Baby with fatal results more often have hypoglycemia at the time of admission than those who do not have fatal outcome.[16]

Talbot et al[17] showed a mortality rate of 24.35% of children with hypoglycemic. Bennish et al[18] showed a 8.04% mortality rate. Hypoglycemic infant mortality rate was 42.9%, compared with 6.9% in normoglycemic children. Huq et al[13] showed mortality at 28% in 11% of children with hypoglycemia. Overall mortality and hypoglycemic mortality were higher in our study compared to others may be due to the choice of patients and the most likely to delay child referral to tertiary care centers. There was no association between vomiting, sex, and prior intravenous rehydration on the history of the mortality of hypoglycemic children..

CONCLUSION

The incidence of hypoglycemia in severe malnourished children suffering from diarrhea at admission time was higher and significantly associated with higher mortality in hypoglycemic children.

Conflict of Interest: The study has no conflict of interest to declare by any author.

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