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Association of azotemia with hypoglycemia in severe acute malnutrition how much concerning?

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ABSTRACT

Background: Hypoglycemia is a known complication of SAM which is to be managed early to prevent morbidity and mortality. There is lack of literature regarding hypoglycemia and its associated factors in SAM children. This study aimed to evaluate predicting factors associated with hypoglycemia in children with severe acute malnutrition (SAM) in NRC.

Methods: In this case-control design, we compared clinical and laboratory characteristics of children with and without hypoglycemia taken from a population of 299 children with SAM admitted in NRC.

Results: Prevalence of hypoglycemia in SAM was 14%. Amongst the association it was found that deranged creatinine (P value of 0.002, odds ratio 2.9, 95% C.I.1.48 - 5.97) and deranged urea (P value 0.0001, odds ratio 3.6, 95% C.I. 1.79 - 7.2) were statistically significant. Diarrhoea (P value 0.7, odds ratio 1.14, 95% C.I. 0.57 - 2.26), leucocytosis (P value 0.23, odds ratio 0.54, 95% C.I. 0.21 - 2.26), leucopenia (P value 0.6, odds ratio 0.42, 95% C.I. 0.05 - 3.35) were found statistically insignificant.

Conclusions: Azotemia in SAM was found significantly associated with hyponatremia.

Keywords: Azotemia, Hypoglycemia, Severe acute malnutrition

INTRODUCTION

Severe acute malnutrition affects nearly twenty million under-five children. About one million child deaths yearly are caused due to SAM. High mortality rate even in inpatient management can be explained on the basis of complications and co-morbidities associated with SAM. Hypoglycemia is a common complication in SAM. No published literatures are present on associated factors with hypoglycemia in SAM. Here we are evaluating predictive factors associated with hypoglycemia in SAM

METHODS

A case control study was designed. The study was conducted in Nutritional rehabilitation centre of

Department of Paediatrics, Jawaharlal Nehru Medical College, Aligarh Muslim University, Aligarh, Uttar Pradesh, India. Children aged 1 to 60 months were included in the study. Study was conducted from January 2013 to October 2014. Study was approved by Ethical committee of JNMCH, AMU, Aligarh, Uttar Pradesh, India. Complete history and systemic examination of SAM children was done. Co-morbidities were identified and managed according to WHO protocol. Laboratory examination were done.

Procedure

 Hemoglobin by LabLife 3D hematological autoanalyzer and anaemia was defined as per WHO guidelines

- Total leucocyte count by LabLife 3D hematological autoanalyzer
- TLC < 4,000 cells as leucopenia and TLC > 16,000 was taken as leucocytosis
- Random blood glucose by Accu-Check® Active (Roche Diagnostics GmbH 68298 Mannheim, Germany). < 54 mg% was taken hypoglycemia
- Urea with values >40 mmol/l as deranged and creatinine with values >0.90 as deranged
- Serum sodium of < 135mEq/l
- Serum potassium <3.5 as hypocalemia was taken in our study
- The eligible cases were divided into two groups those with hypoglycemia and those without hypoglycemia.

Statistical analysis was done, using the statistical package for social science (SPSS 17) for Windows Software. Continuous variables were expressed as means, standard deviation (SD), confidence intervals (95% CI), frequency and range. Independent sample t-test was used to compare means of a variable for 2 groups of cases, whereas paired sample t-test was used to compare means of 2 variables for a single group. P value < 0.05 was

taken as significant. The univariate analysis was done for computing factor association separately. Multilogistic regression analysis was done for finding association of dependent factor in relation to other factors.

RESULTS

Out of the 299 cases analysed 42 cases (14%) (95% C.I. 10% - 18%) had hypoglycemia. Mean blood sugar level of the SAM children was mean age (SD) of the SAM children with hypoglycemia was 39(9) (95% C.I. 36.2 - 41.7). These cases were then treated in lines of WHO guidelines for SAM management in hypoglycemia.

Table 1 showed univariate analysis of the predictive factors. Amongst the association it was found that Deranged creatinine (p value of 0.002, odds ratio 2.9, 95% C.I. 1.48 - 5.97) and deranged urea (P value 0.0001, odd ratio 3.6, 95% C.I. 1.79 - 7.2) were statistically significant. Diarrhea (P value 0.7, odds ratio 1.14, 95% C.I. 0.57 - 2.26), leucocytosis (P value 0.23, odds ratio 0.54, 95% C.I. 0.21 - 2.26), leucopenia (P value 0.6, odds ratio 0.42, 95% C.I. 0.05 - 3.35) were found statistically insignificant.

Table 1: Univariate analysis of clinical &laboratory characteristics of SAM children with hypoglycemia.

Predictive factors	Hypoglycemia (n = 42)	No hypoglycemia (n= 257)	P value	Odds ratio	95.0% C.I.	
					Lower	Upper
Age<24months	34	222	0.32	1.63	0.69	3.86
Male sex	24	162	0.66	1.26	0.63	2.422
Edema	10	65	0.85	0.8	0.4	1.87
Tuberculosis	9	30	0.13	1.97	0.86	4.52
Pneumonia	15	76	0.589	1.26	0.63	2.51
Diarrhea	27	156	0.7	1.14	0.57	2.26
Anemia	38	226	0.728	0.86	0.43	1.71
Leucopenia	1	12	0.6	0.42	0.05	3.35
Leucocytosis	6	59	0.23	0.54	0.21	1.35
Uremia	25	69	0.001	3.6	1.79	7.2
Deranged creatinine	24	87	0.002	2.9	1.48	5.97
Hyponatremia	24	139	0.73	1.17	0.59	2.279
Hypokalemia	5	61	0.151	0.46	0.17	1.23

On further analysis by multiple regression analysis Hypoglycemia was significantly associated with deranged urea (P value 0.004) and creatinine (P value 0.0001). 7.6% of the children from SAM were presented with hyperglycemia. 2.3% of which belonged to < 6months of age while 5.3% belonged to > 6 months of age.

DISCUSSION

14% of children from SAM were presented with hypoglycemia on admission which is higher than 3.9% from Madhya Pradesh as reported by Gangaraj et al and

10% from Delhi as reported by Seth et.al. 4.5 This may be due to severity of the sickness of the children with SAM at the time of admission. The etiology of hypoglycemia in malnutrition is poorly understood. High case fatality rate was found in previous studies in SAM children presenting as hypoglycemia. 6

It was further observed that hypoglycemia was significantly associated with azotemia and leucocytosis. However none of the study in present literature is showing association of hypoglycemia with azotemia. These many cases of azotemia in SAM children is a matter of concern in management of SAM.

7.6% of the children from SAM were presented with hyperglycemia which is lower compared to previous studies.⁵

CONCLUSION

Hypoglycemia is a common complication in SAM children and its association with azotemia cannot be overlooked. This study highlights that measures to manage azotemia in SAM should be emphasized.

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