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Research Article

**STUDY TO KNOW THE FREQUENCY OF HYPOGLYCEMIA IN  
CHILDREN WITH SEVERE ACUTE MALNUTRITION**<sup>1</sup>Dr Muhammad Hamza Laique, <sup>2</sup>Dr Farman Ullah, <sup>3</sup>Dr Nabeel Tariq<sup>1,3</sup> Federal Medical and Dental College, Islamabad<sup>2</sup>Post Graduate Resident, Lady Reading Hospital Peshawar**Article Received:** September 2020**Accepted:** October 2020**Published:** November 2020**Abstract:**

**Objective:** Malnutrition includes both under nutrition and over nutrition. Under-nutrition is preventable cause of morbidity and mortality among children aged below five years. To examine the incidence rate and outcomes of hypoglycemia in children presented with severe acute malnutrition.

**Study Design:** This was Cross-sectional study

**Place and Duration of Study:** This study was conducted at the Department of Paediatrics Medicine of Benazir Bhutto Shaheed Hospital Rawalpindi from January 2020 to June 2020.

**Materials and Methods:** Two hundred and five patients of both genders presented with severe acute malnutrition were included. Patients detailed demographic including age, sex and socio-economic status were recorded. Serum glucose level was examined in all the patients. Prevalence of hypoglycemia was recorded. Outcome in term of mortality was examined.

**Results:** One hundred and twenty (58.64%) patients were males and 85 (41.36%) patients were females. Majority of patients 132 (64.39%) were ages <1 years. Hypoglycemia was found in 40 (19.51%) patients. 32 (15.61%) patients were died among all the patients. Out of 40 hypoglycemic patients 24 (60%) were died and in normoglycemic 8/165 (4.85%) patients were died.

**Conclusion:** The frequency of hypoglycemia was high in children with severe acute malnutrition. Mortality rate was high in hypoglycemic patients as compared to normoglycemic children.

**Key Words:** Severe Acute Malnutrition, Hypoglycemia, Mortality

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**INTRODUCTION:**

Malnutrition includes both under nutrition and over nutrition.<sup>1</sup> Under-nutrition is preventable cause of morbidity and mortality among children aged below five years.<sup>2</sup> Moreover severe malnutrition is one of the reasons of hospital admissions in economically poor.<sup>3,4</sup> Diarrhea is the second most common life threatening condition worldwide among all infectious diseases in children younger than 5 years.<sup>5</sup> Diarrhea and malnutrition are inter-related. Hypoglycemia is usually associated with severe malnutrition and persistent diarrhea.<sup>6</sup> Decreased stores of glycogen, increased peripheral utilization of glucose, and intestinal mal-absorption have all been associated with hypoglycemia.<sup>7</sup>

The WHO guidelines on the inpatient treatment of SAM at nutritional rehabilitation units recommend small 2–3 hourly feeds in the early stages of treatment with an aim to prevent episodes of hypoglycemia<sup>8</sup>. They provide clear guidance on the screening, recognition, and treatment of hypoglycemia in emergency situations. Despite this, mortality rates in ill, severely malnourished children who are hospitalized often continue to be higher than the WHO target of 5–10% nHemodynamic instability and metabolic disturbances are thought to be important risk factors for death during hospital admission<sup>9</sup>. It is, however, not clear from the WHO guidelines what the prevalence of dysglycemic events is in children with SAM, nor to what extent dysglycemia affects the risk of morbidity and mortality in this vulnerable population. In children, hypoglycemia resulting from impaired gluconeogenesis is associated with mortality from infectious diarrhea regardless of their nutritional status. The major long term sequel of severe prolonged hypoglycemia are neurological damage resulting in mental retardation, cognitive impairment, neurological deficit and recurrent seizure activity.<sup>10</sup> Incidence of hypoglycemia varies with the

definition, population, method and timing of feeding, and the type of glucose assay.<sup>11</sup> The age is also helpful in assessing the probable diagnosis of hypoglycemia. The incidence is highest in the immediate post neonatal period.<sup>12</sup>

**MATERIALS AND METHODS:**

This observational cross sectional study was conducted at Department of Paediatrics Medicine of Benazir Bhutto Shaheed Hospital Rawalpindi from January 2020 to June 2020. A total of 205 patients of both genders presented with severe acute malnutrition according to the WHO criteria of severe acute malnutrition. Patients detailed demographic including age, sex and socio-economic status were recorded. Patients with congenital heart disease, renal failure patients, cerebral palsy patients and patients with ages above 2 years were excluded. Blood sample was obtained from all the patients to examine the serum glucose level. Hypoglycemia was defined as serum glucose level <54mg/dl. Complete examination was done. Frequency of hypoglycemia was recorded. Outcomes in term of mortality associated to hypoglycemia were examined. Data was analyzed by SPSS 24. Chi-square and student t' test was applied to compare the mortality between hypoglycemic and normoglycemic patients. P-value <0.05 was considered as significant.

**RESULTS:**

One hundred and twenty (58.64%) patients were males and 85 (41.36%) patients were females. Majority of patients 132 (64.39%) were ages <1 year while 73 (35.61%) patients had ages above 1 year. 128 (62.44%) patients had low-socioeconomic status while remaining 77 (37.56%) patients had middle socio-economic status. 175 (85.37%) patients were marasmic while 30 (14.63%) patients were khwashikor (Table 1). From all the patients 40 (19.51%) patients were hypoglycemic while 165 (80.49%) patients were normoglycemic.

**Table No.1: Baseline characteristics of all the patients**

Variable	No.	%
<b>Gender</b>		
Male	120	58.64
Female	85	41.36
<b>Age (years)</b>		
≤1r	132	64.39
>1	73	35.61
<b>Socioeconomic status</b>		
Low	128	62.44
Middle	77	37.56
<b>Type of SAM</b>		
Marasmus	175	85.37
Khwashikor	30	14.63

Among 175 marasmic patients 33 (18.86%) patients had hypoglycemia and among 30 khwashikor patients 7 (23.33%) patients had hypoglycemia (Table 2). The overall mortality observed in 32 (15.61%) patients. Out of 40 hypoglycemic patients 24 (60%) were died and in normoglycemic 8/165 (4.85%) patients were died. We found a significant difference in term of mortality between hypoglycemic and normoglycemic patients p-value <0.001 (Table 3).

**Table No. 2: Frequency of hypoglycemia according to the bilateral pedal edema**

Hypoglycemia	With edema (n=30)	Without edema (n=175)	P-value
Yes	7 (23.33%)	33 (18.86%)	0.046
No	23 (76.67%)	142 (81.14%)	

**Table No.3: Mortality between hypoglycemic and normoglycemic patients**

Mortality	With edema (n=30)	Without edema (n=175)	P-value
Yes	24 (60%)	8 (4.85%)	<0.0001
No	16 (40%)	157 (95.15%)	

### DISCUSSION:

Severe acute malnutrition is one of the most common pediatric disorders in developing countries and it accounted 5 to 50% of mortality among children with ages less than 5 years.<sup>13,14</sup> Worldwide children with severe acute malnutrition had high rate of morbidity and mortality. Hypoglycemia is one of the common complications in severe acute malnutrition patients and directly associated with high rate of morbidity and mortality.<sup>15,16</sup> The present study was conducted to examine the prevalence of hypoglycemia and mortality associated to hypoglycemia in children with severe acute malnutrition. In present study 120 (58.64%) patients were males and 85 (41.36%) patients were females. Majority of patients 132 (64.39%) were ages <1 year while 73 (35.61%) patients had ages above 1 year. These results were similar to many of previous studies in which male patients were high in numbers 55 to 70% as compared to females and mostly patients with severe acute malnutrition were ages less than 12 months.<sup>17,18</sup>

In the present study 175 (85.37%) patients were marasmic while 30 (14.63%) patients were khwashikor. These results were similar to the study conducted by Khan et al<sup>19</sup> regarding frequency of hypoglycemia in severe acute malnutrition children and they reported 83.67% patients were without edema and 16.33% patients were with bilateral pedal edema.

We found that 40 (19.51%) patients were hypoglycemic while 165 (80.49%) patients were normoglycemic. Khan et al<sup>19</sup> reported frequency of hypoglycemia in severe acute malnutrition patients was 8.2%. Another study conducted by Tahseen et al<sup>20</sup> reported that 30.4% patients were hypoglycemic among 184 severe acute malnutrition patients. A study conducted by Meena et al<sup>21</sup> reported the prevalence of hypoglycemia was 11.1%.

This study showed that overall mortality observed in 32 (15.61%) patients. Out of 40 hypoglycemic

patients 24 (60%) were died and in normoglycemic 8/165 (4.85%) patients were died. We found a significant difference in term of mortality between hypoglycemic and normoglycemic patients. These results were similar to the study by Tahseen *et al*<sup>20</sup> reported that 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=0.000). Our study results regarding outcomes of hypoglycemia were similar to some other previous studies in which mortality rate in hypoglycemic patients was high 40-70% as compared to normoglycemic patients.<sup>22-24</sup>

### CONCLUSION:

Severe acute malnutrition is one of the commonest disorders in infants and children less than 24 months with high morbidity and mortality rate. We concluded that the frequency of hypoglycemia was high in children with severe acute malnutrition. Mortality rate was high in hypoglycemic patients as compared to normoglycemic children.

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