



Frequency and Outcome of Hypoglycemia in Severely Malnourished Children at Tertiary Care Hospital Larkana

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Objective: To determine frequency and outcome of hypoglycemia in severely malnourished children at tertiary care Hospital Larkana.

Methodology: This descriptive, case series study was carried out at the department of Pediatric Medicine Chandka Medical Hospital Larkana, during 6 months. Severely malnourished children of both gender and age between 6 months to 5 years were enrolled. Severity of malnutrition was evaluated as per standard anthropometric measures i.e. height, body weight, MUAC (mid upper arm circumference) by standard MUAC tape. Hypoglycemia was assessed by checking random blood sugar on glucometer. All the data was recorded via self-made proforma and analyzed by using SPSS version 20.

Results: Mean age of the patients was 24.27±15.30 months. Mean MUAC was 9.39±1.56. There

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were 96 (52.20%) females and 88 (47.80%) males. Mean serum glucose level was found to be 86.02 ± 21.58 mg/dL. There were 23(12.50%) patients with hypoglycemia and out of which 16 (69.60%) patients expired and 7 (30.40%) patients survived.

Conclusion: Hypoglycemia was found to be 12.50% in severely malnourished children and it was significantly associated with adverse outcome.

Keywords: Hypoglycemia; SAM; mortality.

1. INTRODUCTION

The WHO defines Malnutrition as a cellular imbalance between supply of energy & nutrients to the body and their amount needed by the body to ensure specific functions, maintenance, and growth [1]. Presently, 30 percent of adults and children suffer from certain types of malnutrition in the developing nations. [2] About 10.6 million young children die annually before they hit their 5th birthday. Malnutrition, pneumonia, diarrhea, malaria or measles are responsible for 7 deaths out of previously reported 10.6 million deaths [3]. Thirty five percent of these deaths globally are caused by indirect or direct reference of malnutrition [4]. Malnutrition not just raises the risk of death but also increases the susceptibility to disease, due to impaired immunological functions. These children do not respond well to medical treatment and are more likely to develop complications leading to death. Frequent diseases lessen the nutritional level for all those who manage to survive, trapping them into a painful cycle of faltering growth and recurrent sickness.

According to UNICEF-WHO-the World bank joint child malnutrition estimates of 2011, [5] globally one quarter of under-five children were stunted i.e 0.165 billion children aged below 5 years (i.e., undersized-for-age) and Africa (36%) and Asia (27%) had the highest prevalence rates. Around 16% of children aged below five years i.e. 101 million children worldwide were underweight with highest prevalence in South Asia (estimated 1 in 3 children), whereas, Latin America and the Central, Caribbean and Eastern European /CIS were found to have the lowest rates of around 3% and 2% in that order. According to National Nutritional Survey 2001-02 of Pakistan, reanalyzed by WHO 2007 [6], 31% of children aged below five years are underweight, 13% severely underweight and 42% stunted and 14% severely wasted.

SAM is potentially fatal condition that demands prompt treatment [7]. Hypoglycemia is readily acquired by children suffering from SAM because of decreased glucose supplies in the body

caused by muscle wasting, fat & protein reserves' impaired processing into glucose, elevated glucose intake caused by stress because of infection. Hypoglycemia, particularly among malnourished kids with serious childhood diseases, is linked to poor prognosis [8]. Death due to hypoglycemia can occur in children with SAM, if not adequately resuscitated during initial 24-48 hours. A study from Bangladesh reported a 2.8% deaths [9] while 3.6% deaths were reported in severely malnourished children in Ethiopia [10]. In order to reduce case fatality associated with hypoglycemia in severely malnourished children, in suspected cases of hypoglycemia, treatment must be initiated immediately, even though blood sugars cannot be confirmed. Past 10 years' experience demonstrates that the survival in children with malnutrition increases dramatically when the WHO recommendations for management of SAM are followed systematically [11,12]. As there is no such local study in our area, and international studies are showing variable outcome, so this study has been conducted for assessment of magnitude of hypoglycemia in severely malnourished children, so that better policy can be developed, to decrease the morbidity and mortality and to improve the health status in severely malnourished children.

2. MATERIALS AND METHODS

This cross-sectional study was conducted at Department of Pediatric Medicine Chandka Medical Hospital Larkana, during 6 months after ethical approval. Non-probability consecutive sampling technique was used. All the severely malnourished children aged between 6 months to 5 year and either of gender were included. All the cases presented with other causes of hypoglycemia e.g. known cases of the Diabetes mellitus, already received 10% dextrose water or sugar water orally and taken meal within half an hour on admission were excluded. Detailed information regarding demography, and clinical presentation was taken and general physical examinations were carried out. Severity of malnutrition was measured as per standard anthropometric measures i.e. height, body

weight, MUAC (Mid upper arm circumference) by standard MUAC tape. Hypoglycemia was assessed via random blood sugar checking with glucometer. In a conscious child with blood glucose level of less than 54 mg/dl, 50 ml bolus of sucrose solution 10% (1 rounded teaspoon of sugar in 3.5 tablespoons water) or 10% glucose, was given orally or by nasogastric (NG) tube. While in a convulsing, lethargic or unconscious child on presentation, IV sterile 10% glucose (5 ml/kg), followed by 50 ml of 10% glucose or sucrose by Ng tube was given. Severe acute malnutrition was defined as having an MUAC < 11.5 cm. Hypoglycemia was defined as having an MUAC < 11.5 cm. The response to treatment was assessed both clinically and by checking blood sugar level after two hours. A further bolus of 10% glucose or sucrose solution was given if the patient does not improve, and observed for 48 for survival or death. The Data was analyzed on computer using SPSS version 17. Frequency and percentages was computed for the categorical variables. Mean and standard deviation were computed for numerical variables. Chi-Square test was applied. P-value ≤ 0.05 was taken as significance.

3. RESULTS

Mean age of the patients was 24.27±15.30 months. Mean weight of the patients was 5.89±1.83 kg. Most of the patients had weight under 6.5 Kg, i.e. 126 (68.50%). Mean height of the patients was 70.45±10.05 cm. Mean MUAC was 9.39±1.56. Mean serum glucose level was found to be 86.02±21.58 mg/dL (Table 1).

There were 96 (52.20%) females and 88 (47.80%) males. Most of the patients 178 (96.70%) were poor socioeconomically. Majority of the parents had lower level of education as 164(89.10%) had primary education. There were 23 (12.50%) patients presented with hypoglycemia (Table 2).

Out of these 23 cases of hypoglycemia 7 (30.40%) survived, while 16 (69.60%) patients expired (Fig. 1).

Hypoglycemia and mortality rate were statistically insignificant according to age, gender, height and weight P-values were quite insignificant. Results have been shown in Table 3 & 4.

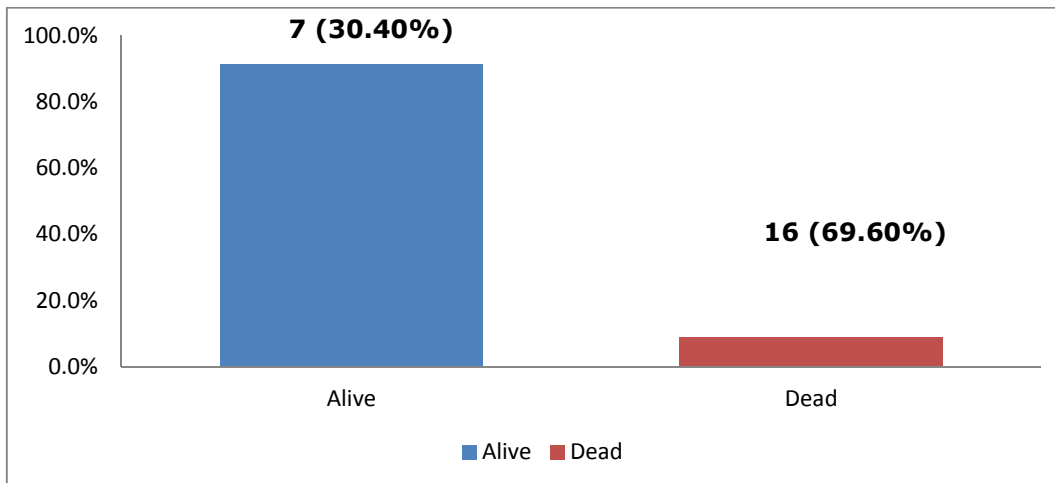


Fig. 1. Outcome of the patients n=23

Table 1. Numerical statistics of the patients (n=184)

Variables	Statistics	Minimum	Maximum
Age (months)	24.27 ±15.30 months	6	60
Weight (Kg)	5.89 ±1.83 Kg	2	12
Height (cm)	70.45±10.05 cm	48	105
MUAC	9.39 ±1.56	5	11.5
Glucose level	86.02 ±21.58 mg/dL	30	120

Table 2. Categorical statistics of the patients, n=184

Variables	Statistics	Frequency (%)
Gender	Male	96(52.20%)
	Female	88(47.80%)
SES	Poor	178(96.70%)
	Middle	6(3.30%)
Educational status	Primary	164(89.10%)
	Middle	15(8.20%)
	Matric	5(2.70%)
Hypoglycemia	No	168(87.50%)
	Yes	23(12.50%)

Table 3. Hypoglycemia with respect to effect modifiers n=184

Variables		Hypoglycemia		P-Value
		Yes	No	
Age groups	≤36	18 (11.9)	133 (88.1)	0.611
	>36	5 (15.2)	28 (84.8)	
Weight (kg)	≤6.5	17 (13.5)	109 (86.5)	0.549
	>6.5	6 (10.3)	52 (89.7)	
Gender	Male	13 (14.8)	75 (85.2)	0.372
	Female	10 (10.4)	86 (89.6)	
Height (cms)	≤75	16 (12.1)	116 (87.9)	0.804
	>75	7 (13.5)	45 (86.5)	

Table 4. Outcome of hypoglycemia with respect to effect modifiers n=23

Variables		Outcome		p-value
		Alive	Died	
Age groups	≤36	6 (33.3)	12 (66.7)	0.567
	>36	1 (20)	4 (80)	
Weight (kg)	≤6.5kg	5 (29.4)	12 (70.6)	0.858
	>6.5kg	2 (33.3)	4 (66.7)	
Gender	Male	4 (30.8)	9 (69.2)	0.968
	Female	3 (30)	7 (70)	
Height	≤75	5 (31.2)	11 (68.8)	0.898
	>75	2 (28.6)	5 (71.4)	

4. DISCUSSION

SAM is potentially fatal condition that demands prompt treatment [7]. Hypoglycemia is readily acquired by children suffering from SAM because of decreased glucose supplies in the body caused by muscle wasting, fat & protein reserves' impaired processing into glucose, elevated glucose intake caused by stress because of infection. Hypoglycemia, particularly among malnourished kids with serious childhood diseases, is linked to poor prognosis. Death due to hypoglycemia can occur in children with SAM, if not adequately resuscitated during initial 24-48 hours. A study from Bangladesh reported 2.8% deaths [9] while 3.6% deaths were reported in severely malnourished children in Ethiopia [10]. In order to reduce case fatality associated with

hypoglycemia in severely malnourished children, in suspected cases of hypoglycemia, treatment must be initiated immediately, even though blood sugars cannot be confirmed. Past 10 years' experience demonstrates that the survival in children with malnutrition increases dramatically when the WHO recommendations for management of SAM are followed systematically [11,12]. In this study there were 23 (12.50%) patients presented with hypoglycemia and out of these 16 patients were died. On other hand Ninama R et al. [13] observed that overall incidence of hypoglycemia was 12% and 20% in diarrheal dehydration and the SAM respectively. In another study of Ali SM et al. [14] demonstrated that prevalence of hypoglycemia in severe acute malnutrition was 14%. On other hand in systemic review and meta-analysis

observed that the hypoglycemia was linked to higher chance of death rate during hospitalization among children having SAM [15]. In another study of Tahseen SA et al. [15] also found greater rate of mortality among children with hypoglycemia. Malnutrition is often associated with a higher risk of mortality in kids with diarrhoea and acute lower respiratory infections, and can possibly also be associated with malaria and probably measles [17].

In present study, the patients' mean age was 24.27±15.30 months and there were 96 (52.20%) females and 88 (47.80%) males. In comparison to our study, by Gavhi F et al. [18] reported median age was 13 months and 50.2% were males and 49.8% were females. Another study conducted by Negussie AS et al. [19] reported that majority were males 51.4% and most of the cases 82.6% were found to be < 24 months of age with 17.5 months of median age. Severely malnourished kids during rehabilitation and acute periods must be treated in hospital [20]. Though, relatively short hospital stays for initial stabilisation, followed by home treatment, can possibly be equally successful. The case fatality among severely malnourished kids managed in hospital before their recovery and of children rehabilitated at home or by day care following a week of hospitalisation was comparable in a Bangladeshi study (< 5%) [21]. The latter method was less expensive, however in a cautiously selected group, the outcomes were achieved and therefore might not reflect the broader population. Home-based regimes can lead to just partial recovery, [22]. Treatment involves the timely implementation of feeding for two-hour (day & night); holding the infant well dressed in a comfortable environment, with the properly covered head; and antibiotics. Checking for hypoglycemia (level of glucose below 54 mg/dl) with Dextrostix must be performed regularly. In case of positive test results, 10% sucrose or glucose solution at a dosage of 50 ml must be administered orally or via a nasogastric tube, accompanied by a feeding procedure promptly. [20]. In case of unconscious child, nasogastric tubing or intravenous management must be considered with 5 ml/kg of 10 percent glucose. Following 30 minutes, blood glucose must be monitored and more than 10 percent glucose solution must be offered if it is low. If rectal temperature drops below 35.5°C or when the condition of consciousness deteriorates, the Dextrostix measure must be performed again and the procedure must be administered accordingly.

5. CONCLUSION

Hypoglycemia was found to be 12.50% in severely malnourished children. It was observed that hypoglycemia is the significant factor of mortality of severely malnourished children. This was a small sample size and single Centre study. Further large sample size and multi-central studies are suggested on this subject.

CONSENT AND ETHICAL APPROVAL

After approval of synopses and permission of ethical committee, study was conducted in nutrition ward in department of pediatrics Chandka Medical College Hospital Larkana.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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