ORIGINAL ARTICLE

Clinical Spectrum of Admitted Severely Acute Malnourished Children at The Indus Hospital Karachi: An Evaluation of One Year's Experience

Unaisa Kazi[1], Sana Tariq[2], Sarosh Saleem[2] and Muhammad Fareeduddin[1]

ABSTRACT

Malnutrition is a major health problem and causes deaths of nearly one million infants and children across the globe, annually. A large population of children in Pakistan suffers from malnutrition.

Objective: The study aims to review the clinical disease spectrum of admitted paediatric patients at The Indus Hospital (TIH), Karachi

Methodology: A retrospective audit review of admitted paediatric patients with diagnosis of Severe Acute Malnutrition (SAM) during June 2014 to June 2015 was performed. The electronic medical records of all malnourished children under five years of age were included in the review.

Results: A total of 341 children with average age of 2.2 years was admitted at The Indus Hospital, Karachi. In all, 54.5 percent (n=186) children were female while the rest of them were male. The mean weight of children subjected to SAM was 5.42 kgs. The majority of the children had Marasmus malnutrition (96.3%) while the Kwashiorkor was observed in only 3.7%. The common morbidities found were different infections (n=313), electrolyte imbalances (n=112), and Congenital/Chromosomal/Hormonal disorders (n=45). Anemia was found in most (95.38%) of the children with SAM.

Conclusion: The (SAM) is associated with different clinical presentations and metabolic as well as congenital abnormalities. Due to the weak immune system and low levels of nutrients in the body, children with SAM are synergistically associated with high mortality rate. Further studies from Pakistan are required to gather data from different regions and to develop policies and strategies to effectively manage malnutrition in Pakistan.

Key words: Acute Malnutrition; Childhood Malnutrition; Marasmus; Childhood Morbidity

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انڈس ہسپتال کراچی میں شدید غذائیت کی کمی کے شکار زیر علاج بچوں کا طبی زاویوں سے جائزہ

خلاصہ: غذائیت کی کمی دنیا بھر میں سالانہ تقریباً دس لاکھ بچوں اور نومولود کی صحت کے مسائل اور موت کی ایک وجہ ہیں۔ جبکہ پاکستان میں ایک بڑی آبادی غذائیت کی کمی کا شکار ہے۔

مقصد: اس تحقیق کا مقصد کراچی کے انڈس ہسپتال میں زیر علاج بچوں کے طبی امراض کے مختلف زاویوں سے نظر ثانی کرنا ہے۔

طریقہ: ہسپتال میں زیر علاج شدید غذائی کمی کا شکار بچوں کا جون 2014 سے جون 2015 کے ریکارڈ کا جائزہ لیا گیا۔ جس میں پانچ سال سے کم عمر غذائیت کی کمی کا شکار بچوں کے حوالے سے تمام طبی اور برقی ریکارڈ شامل ہیں۔

نتائج: اوسطاً 2.2 سال کی عمر کے 341 بچے اسپتال میں زیر علاج تھے، جن میں سے 54.5 فیصد (n=186) لڑکیاں اور باقی لڑکے تھے۔ انتہائی غذائیت کی کمی کے حوالے سے بچوں کا اوسط وزن 5.42 کلو پایا گیا۔ زیادہ تر بچوں میں (96.3) فیصد Marasmus غذائیت کی کمی پائی گئی اور 3.7 فیصد میں Kwashiorkor قسم کی غذائیت کی کمی پائی گئی۔ جبکہ عام امراض میں مختلف قسم کے وبائی امراض 313 بچوں میں، electrolyte imbalance 112 بچوں میں اور ہارمونز کی بدنظمی 45 بچوں میں پائی گئی۔ ساتھ ساتھ شدید غذائیت کی کمی کے شکار زیادہ تر بچوں میں یعنی 95.38 فیصد میں خون کی کمی کی بیماری پائی گئی۔

حاصل مطالعہ:: شدید غذائیت کی کمی کا تعلق مختلف کلینیکل پریزنٹیشن تحویلی اور خلقی بے اعتدالی سے ہے جبکہ کمزور قوت مدافعت اور جسم میں غذائیت کی کمی کی وجہ سے مشترکہ طور پر سیم کے شکار بچوں کی شرح اموات میں اضافے کا باعث ہیں۔ جبکہ سیم سے بچاؤ کے لیے پاکستان میں مختلف علاقوں میں مزید تحقیق کی ضرورت ہے تاکہ ایسی حکمت عملی اور طریقہ کار استعمال کیے جائیں جن سے شدید غذائیت کی کمی کو دور کیا جا سکے۔

INTRODUCTION

Severe Acute Malnutrition (SAM) is an extreme form of undernutrition found in children under the age of 5 years. It is defined as the imbalance between demand and supply of body's nutrients and energy for its growth, maintenance, and normal functioning.[1] All around the

1. The Indus Hospital, Karachi, Pakistan
2. Shalamar Medical & Dental College, Lahore, Pakistan

Correspondence: Dr. Sarosh Saleem, Assistant Professor, Shalamar Medical & Dental College, Lahore, Pakistan

Email: sarosh.saleem@sihs.org.pk

world, there are about 165 million malnourished children[2]. This major health problem is a cause of nearly 1 million infant and child deaths around the world. According to a study, about 44 per cent of the Pakistani children suffer from stunted growth which makes it the third highest percentage worldwide.[3]

About 13 million children under age 5 years have SAM and the disorder is associated with 1 million to 2 million preventable child deaths each year[4]. In most developing countries, case fatality rates (CFR) in hospitals treating SAM remain at 20–30% and few of those requiring care actually access treatment[5]. Pakistan has one of the highest prevalences of SAM in South East Asia; others being India and Bangladesh, proving to be a fundamental cause of morbidity and mortality in children[2].

The Indus Hospital is a tertiary care hospital in Karachi, Pakistan that provides free of cost services and health care facilities. According to data, the hospital has managed to serve over 800,000 patients with premium healthcare. A large number of paediatric population with a variety of illnesses, including Severe Acute Malnutrition (SAM) are being managed by the Department of Paediatrics at TIH since 2008. It is important to understand the spectrum of diseases being admitted and treated in the hospital so as to anticipate and manage the wide variety of patients efficiently.

Malnutrition can disrupt future socio-economic development of the society. An updated literature on malnutrition in children under five years of age from Pakistan is needed to update management strategies.

METHODOLOGY

The electronic medical record of all SAM patients, who were admitted in the Paediatrics ward of The Indus Hospital, Karachi was included in the study. Inpatient record of patients was reviewed from June 1st 2014 to 30th June 2015. The inclusion criteria were inpatient children between the ages of 6 months and 59 months, diagnosed as severe malnutrition (according to WHO definition[6]), having Weight for Height z-score less than -3 Standard Deviation and bilateral pedal oedema. The patients with incomplete data or those not fulfilling the mentioned inclusion criteria were excluded from the study. All records were thoroughly audited for clinical manifestations, various morbidities like infections, metabolic abnormalities, congenital/ hereditary disorders and outcomes of treatment given. Laboratory findings of the patients were also analyzed. The data was collected and saved in password-protected computers that only the investigators had access to. Serial numbers were allocated to patients and patient identification parameters like name and medical record numbers were not recorded. A pre-designed data sheet was used. The data sheet included demographic details along with the attributes of illness and treatment. The collected data was analyzed on SPSS version 19.

The patients admitted in the paediatric ward of TIH were managed according to the guidelines of World Health Organizations (WHO) for severely malnourished children[7]. The aim of treatment is to prevent and treat Hypoglycemia as well as Hypothermia. Blood glucose levels are routinely checked (6-8 hourly on day 1; 12 hourly and then 24 hourly until the patient is stable), optimal temperature is maintained in order to avoid Hypothermia. Management of shock, anaemia and sepsis is simultaneously started according to standard protocols. Eye and skin care for ulcerations is an essential part of management of severe malnutrition. For patients suffering from diarrhoea or vomiting, WHO recommended ReSoMol (special rehydration solution for malnourished children) is initiated, as it contains less Sodium (Na) and more Potassium (K) in comparison with regular Oral Rehydration Solution (ORS). Feeds with WHO/UNICEF recommended special formula feed, known as F-75 (low in Na and proteins; high in Carbohydrates) is initiated (130 ml/kg/day 2-hourly in children with no or mild pedal oedema and 100 ml/kg/day if child has moderate to severe pedal oedema) as soon as possible. This feed is continued for 2-7 days, until the child is stabilized. After initial stabilization, a catch-up formula feed (F-100) is initiated to rebuild wasted tissues of child as it has higher number of calories. The aim is to increase the calories up to 220 kcal/kg/day, gradually. These patients are given Vitamin A, Folic Acid and other vitamins along with Vitamin D, if needed, because these patients have poor immunity secondary to malnutrition.

The discharge criteria includes: weight gain of at least 15%; resolved pedal oedema (if present); Achievement of -1 SD or -2 SD on weight for height chart, according to age and gender.

A designated nutrition nurse and attendant *(Aya)* is assigned for preparation of the WHO recommended formula feeds, training of mothers, record keeping and ensuring regular follow up visits on discharge from TIH. The parents of these patients are advised to follow up, one week after discharge, in nutrition clinic. They are also facilitated visits to nutrition clinic and anthropometric record keeping, 1-3 monthly.

RESULTS

In this study, a total of 341 children was enrolled in Indus Hospital, Karachi. Out of this, females were 54.5 percent (n=186) while rest of them n=155 were male. The median age of patients was 2.2 years with the Interquartile range (IQR) of 1.45-2.90 years. The mean weight in children with malnutrition was calculated as 5.42 kgs. About 1.5 per cent of the patients were readmitted to the hospital after a specific time interval.

The percentage of patients discharged on parental request (DOR) was about 9.7 percent while the patients expired (EXP) due to SAM were 2.6 percent. About 3.8 percent patients Left Against Medical Advice (LAMA), from the hospital. A total of 83 percent patients were discharged after recovery from the hospital.

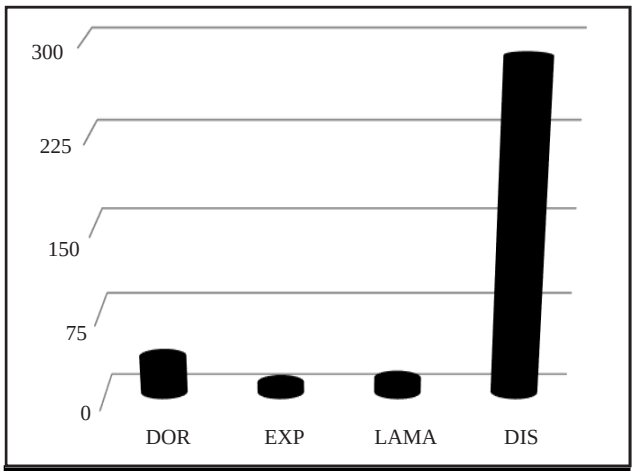

Fig. 1: Discharge status of children with SAM

Morbidities Associated with SAM:

The audit showed several morbidities in the studied patients, along with SAM. Patients were observed to suffer from co-morbidities like micronutrient deficiencies, electrolyte imbalance, and various congenital, chromosomal, and hormonal abnormalities. Infectious diseases were frequently observed and managed in children with SAM.

In total 341 patients of malnutrition, Marasmus was found to be the most common type of malnutrition as it was prevalent in 329 patients (96.3%). Kwashiorkor was observed in relatively low percentage of about 3.7 percent (n=12).

Among the infectious diseases of respiratory tract, Tuberculosis was suspected in 19.4 percent (n=66) while other Lower Respiratory Tract Iinfections (LRTI) were present in n=54 patients, which makes it 15.8 percent of the total 341 individuals. The other infectious diseases found commonly among the malnourished children were Acute Gastroenteritis (AGE) 31.4 percent, Sepsis in 15.6 percent (n=53) and Urinary Tract Infection (UTI) in 10.7 percent (n=36). About 0.9 percent (n=3) of malnourished patients had scabies and measles each. The fungal diseases found in total two malnourished children were amoebiasis and oral thrush. (Table 1)

Table 1: Prevalence of diseases in patients with SAM

	Number	Percentage
Infectious diseases		
AGE	106	31.4
LRTI	54	15.4
UTI	36	10.7
SCABIES	3	0.9
FUNGAL	2	0.6
Metabolic disorders		
Hypokalemia	159	46.6
Hyperkalemia	7	2
Hyponatremia	91	26
Hypernatremia	30	8.8
Haematological disorder		
Anaemia	325	95.3
vitamin B12 deficiency	1	0.3
Thalassemia	2	0.6
Thrombosis	4	1.2
Congenital/Chromosomal/ Hormonal disorders		
Cleft Palate	1	0.3
CP	19	4.6
Chédiak–Higashi	1	0.3
Nephrotic syndrome	1	0.3
Neurogenic bladder	6	1.8
Down's syndrome	1	0.3
PDA	3	0.9
Other illness and symptoms		
Rectal prolapse	7	2.1
Renal stones	9	2.8
Rickets	16	4.7
Diarrhoea	42	12.9

The metabolic disorders characterized by electrolyte imbalances were commonly observed. Hypokalemia was the most common metabolic disorder found in 46.66 (n=159) percent of the malnourished children. However, Hyperkalemia was found in only 2 percent (n=7) patients. Hyponatremia was found in 26 percent patients (n=91) whereas, Hypernatremia was observed in 8.8 percent (n=30) malnourished children.

The most common hematological disorder was found to be anaemia with a percentage of 95.3 percent (n=325) of all malnourished children. The deficiency of vitamin B12, thalassemia and thrombosis was found in 0.3, 0.6, and 1.2 percent patients, respectively.

Among the other (congenital/chromosomal/hormonal) disorders found in malnourished children, the cerebral palsy (CP) was the most common with the highest percentage of 4.6 percent (n=19) children. Neurogenic bladder was found in 1.8 percent (n=6) patients. While cleft palate, chédiak–higashi, nephrotic syndrome and down's syndrome were prevalent in n=1 patient each. However, the only Congenital Heart Disease (CHD) found was Patent Ductus Arteriosus (PDA) in n=3 patients. Other common morbidities found to be present with malnutrition were, rectal prolapse, renal stones and rickets in 2.1 percent (n=7), 2.9 percent (n=10) and 4.7 percent (n=16), respectively.

DISCUSSION

In this study of children under the age of five years with SAM, the average age group was observed to be 2.2 years. A literature review from Pakistan shows that children younger than 2 years of age have considerably high prevalence of malnourishment[2].

The majority of children had Marasmus type of malnutrition which is also termed as SAM, whereas, Kwashiorkor, also known as edematous malnutrition was found in lesser number of patients in this study. Similar percentages were found in studies reported from Karachi, Pakistan by Sameen *et al.* in 2014 where severe wasting was observed in 80.8%, while edematous malnutrition was present only in 19.2% cases[8]. A study from African countries indicated that the percentage of stunting was higher than severe wasting. Stunting was found in 42.5 percent of children while the severely wasted and underweight children were merely 12.1 and 32.7 percent respectively[9]. The figures reported form eighteen studies from Ethiopia where stunting, underweight and wasting was observed as 42.0 percent, 33.0 percent and 15.0 percent respectively.[10]

The malnourished children are more prone to infectious diseases. Lower Respiratory Tract Infections (LRTI), such as pneumonia, were observed in our study with almost the same statistics as found in another study from Karachi, Pakistan where pneumonia was found in 20 percent of the malnourished children[4]. Another common infectious disease we found in our study (30.3%) was also found in the earlier mentioned study from Karachi, where they found even higher rates of AGE, nearly in 51 percent of patients with SAM. We observed sepsis in more children (>15%) as compared to the values reported in WHO reports[11].

High prevalence of iron deficient anaemia was observed in our study which is an important risk factor for children all over Pakistan. Similar stats were observed in other studies where Sameen *et al*. and Ejaz *et al*. reported 88.4 and 80 percent of Iron deficient anaemia respectively[6,12]. The other most common micronutrient deficiency was found to be of vitamin D, which is responsible for causing rickets in malnourished children. Ejaz *et al*. reported 35.7 percent cases of malnourished children with rickets. The study from Sameen *et al.* on the other hand observed a lower (7.7 percent) of vitamin D deficient children which is much similar to our study. The congenital or chromosomal disorders were seen as total 8.5 percent in our study while the congenital or chromosomal disorders reported by Sameen *et al*. were 16.51 percent[6].

High percentage of hypokalemia, which serves as one of the major risk factors for mortality, was found in our study. Contrary to our findings (46.6%), Sameen *et al.* reported hypokalemia in 13.7 percent of the malnourished children in National Institute of Child Health (NICH). However, Hyponatremia was found in similar percentages to our study i.e. 22.6 percent.

Limitations:

The data collected in our study comes from only one tertiary care hospital of Karachi, The Indus Hospital (TIH). It is worth mentioning that even though TIH serves a large population of Karachi, it is a free of cost hospital and therefore, patients from low socio-economic status are more commonly cared for in this hospital. The data, however, is not representative of population of Pakistan or Karachi for that matter. The retrospective data was collected for the purposes of audit and improving the facilities available for children suffering from SAM. It being a retrospective inquiry, we were dependent on the documentation and data available. This data cannot be extrapolated or concluded for the morbidity patterns found in malnourished children all over Pakistan.

CONCLUSION

SAM is a major cause of morbidity and mortality in children under the age of five years. It is usually associated with high rates of co-morbidities like life threatening infections and metabolic disorders. WHO recommended protocol provides prompt and effective results while managing these sick children. However, factors that require in-depth evaluation include factors leading to malnutrition in children, explanations of failure to access healthcare assistance earlier by parents, lack of early identification, intervention and follow up visits. Further studies from Pakistan are required to

gather data from different regions and to develop policies and strategies to effectively manage malnutrition in Pakistan.

Authors' contributions:

Dr. Unaisa Kazi conceived the idea, worked on literature search, data collection, data analysis and review, and worked on the introduction. Dr. Sana Tariq worked on literature search, results, and discussion. Dr. Sarosh Saleem reviewed the literature, worked on discussion, and edited the manuscript. Dr. Muhammad Fareeduddin reviewed the article. All authors discussed the results and contributed to the final manuscript.

References

1. Ocheke I, Thandi P. Malnutrition in acutely ill children at the pediatric emergency unit in a tertiary hospital in Nigeria. Niger Med J. 2015; 56(2):113-7
2. Asim M, Nawaz Y. Child Malnutrition in Pakistan: Evidence from Literature. Children (Basel).2018; 5(5): 60
3. [Internet]. Unicef.org. 2019 [cited 14 January 2019]. Available from: https://www.unicef.org/pakistan/Stop_Stunting.pdf
4. . Black RE, Allen LH, Bhutta ZA, Caulfield LE, De Onis M, Ezzati M, Mathers C, Rivera J, Maternal and Child Undernutrition Study Group. Maternal and child undernutrition: global and regional exposures and health consequences. Lancet. 2008;371(9608):243-60
5. Collins S. Treating severe acute malnutrition seriously. Arch Di Child. 2007; 92(5):453-461
6. WHO | Severe Acute Malnutrition [Internet]. Who.int. 2019 [cited 23 January 2019]. Available from: https://www.who.int/nutrition/topics/malnutrition/en/
7. [Internet]. Who.int. 2019 [cited 14 January 2019]. Available from: https://www.who.int/selection_medicines/ committees/expert/21/applications/s6_paed_antibiotics_appendix7_sam.pdf
8. Anjum M, Moorani K, Sameen I, Mustufa M, Kulsoom S. Functional and structural abnormalities of the kidney and urinary tract in severely malnourished children - A hospital based study. Pak J Med Sci. 2016; 32(5): 1135–1140
9. Ahmed M, Sulaiman A, Bushara S, Elmadhoun W, Noor S, Abdelkarim M et al. Prevalence and determinants of undernutrition among children under 5-year-old in rural areas: A cross-sectional survey in North Sudan. J Family Med Prim Care. 2018; 7(1):104-110
10. Abdulahi A, Shab-Bidar S, Rezaei S, Djafarian K. Nutritional status of under five children in Ethiopia: a systematic review and meta-analysis. Ethiop J Health Sci. 2017; 27(2): 175-188
11. World Health Organization, Unicef. WHO child growth standards and the identification of severe acute malnutrition in infants and children: joint statement by the World Health Organization and the United Nations Children's Fund
12. Ejaz MS,Ahmed IR, Zehra H. Clinical pattern of infections in malnourished children. Medical Channel. 2010; 16(3):352-56

Authorship for Multi-center Study

When a large, multi-center group has conducted the work, the group should identify the individuals who accept direct responsibility for the manuscript (3). These individuals should fully meet the criteria for authorship defined above and editors will ask these individuals to complete journal-specific author and conflict of interest disclosure forms. When submitting a group author manuscript, the corresponding author should clearly indicate the preferred citation and should clearly identify all individual authors as well as the group name. Journals will generally list other members of the group in the acknowledgements. The National Library of Medicine indexes the group name and the names of individuals the group has identified as being directly responsible for the manuscript.