



# Complications of Severe Acute Malnutrition in Children at Nutrition Stabilization Center Hyderabad, Pakistan

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## ABSTRACT

**Introduction:** About 3 lac deaths are cause by malnutrition all over the world each year in children 1-5 years of age. About 5.9 million children of less than 5 years die each year globally and malnutrition is top of the list causing deaths due to its complications like Pneumonia Diarrhea and measles.

**Aim:** To assess the complications at admission in children having Severe Acute Malnutrition (SAM).

**Methods:** This Cross-sectional Study was conducted in the Pediatrics Department Unit-I, Liaquat University of Medical & Health Sciences from 1<sup>st</sup> January 2019 to 31<sup>st</sup> December 2019. Total 99 children aged 6-59 months with WHO defined severe acute malnutrition along with complications were selected and admitted. Strict monitoring done for vitals, development of complications and response to treatment. Outcome was monitored and recorded in term of complete recovery, development of new complication (s), and/or Expiry.

**Results:** Out of 99 children 91 (92%) had Marasmus, 05 (5%) had Kwashiorkor and 3 (3%) had (Marasmus and Kwashiorkor). Total 37.4% children were between the ages of 6-11 months. The most common complications at the time of admission were fever, diarrhoea, and anaemia. The mean stay at NSC was 7.864+4.4 days. Out of total 99 Patients, (91.9%) recovered fully from complication while the remaining 08 patients (8.1%) were in poor condition which was transferred to intensive care unit.

**Conclusion:** We found higher recovery rate from complications along with good weight gain. Few children developed new complication and become sicker, hence shifted to intensive care unit. There was no expiry in children of SAM with complications.

**Key words:** Severe acute malnutrition, Complications, Children, Nutritional stabilization unit, Weight gain, Marasmus

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## INTRODUCTION

Protein and energy malnutrition causes kwashiorkor, marasmus and marasmus kwashiorkor. According to World Health Organization one common name is given to all these conditions i.e. Severe Acute Malnutrition (SAM). Children with SAM can present with complications or without complications [1]. SAM is defined as weight for height <70% or <-3 below the standard deviation or bilateral pitting edema due to nutritional deficiency or mid upper arm circumference <115 mm in children between 6 months to 5 years of age.

About 3 lac deaths are cause by malnutrition all over the world each year in children 1-5 years of age [2]. About 12 million children with SAM resides in Six Asian countries among them 0.6 million in Afghanistan, 0.6 million in Bangladesh, 8.0 million in India, 1.2 million in Indonesia, 1.4 million in Pakistan, and 0.6 million in Yemen [3]. About 5.9 million children of less than 5 years die each year globally and malnutrition is top of the list causing deaths due to its complications like Pneumonia Diarrhea and measles [4]. According to a recent local study prevalence of severe acute malnutrition in Pakistan is 11.3% [5].

Children having severe acute malnutrition should first be assessed for medical complications and whether they have an appetite. Children who have appetite and are clinically well and alert should be treated as outpatients. Children who have medical complications, severe oedema (+++), or poor appetite, or present with one or more Integrated Management of Childhood Illness (IMCI) danger signs should be treated as inpatients [6]. Severe acute malnutrition is managed in 2 phases. In 1<sup>st</sup> phase children

are stabilized and complications are treated, while in 2<sup>nd</sup> phase catch up growth is the main focus [7]. In an international study the common complications in SAM children were Pneumonia (54.8%) and diarrhea (41.8%) [8].

In Pakistan there is little epidemiologic research on the complications in Severe Acute Malnutrition children. That's why this study is planned to assess the frequency of various complications in SAM children.

### MATERIALS AND METHODS

This cross sectional study was conducted by non-probability convenient sampling technique at NSC ward in the Department of Pediatrics, Liaquat University Hospital over a period of 12 months. Total 99 children age 6 to 59 months having Severe Acute Malnutrition with Complications was enrolled. Children who did not have complications were excluded from the study.

At the time to admission every patient was managed according to WHO critical care pathway protocol for the SAM patients and then data collected through structure CCP form. The patients who fulfil inclusion criteria were enrolled in the study and written consent was taken. Data entered in the proforma by the researcher herself. The outcome in relation to complication was measured by duration for hospital stay, time required gaining weight,

time required for complication to improve, tolerance of feed. The data was analysed by using SPSS version 22. Mean and standard deviations computed for age and sex while frequency and percentage calculated for complication hypoglycemia, Hypothermia, Severe anaemia etc.

### RESULT

During the study period, 99 patients were selected according to inclusion criteria. All patients were severely malnourished, out of them 91% (91.91%) had marasmus 5 (5.05%) had kwashiorkor and 3 (3.03%) had both marasmus and kwashiorkor. In this study male to female ratio was 1:1, male children were 42 (42.42%) and female children were 57 (57.57%). Total 38 (38.38%) children were under 6 to 11 months age, 30 (30.30%) children were under 12 to 23 months of age (Table 1). The percentage of common symptoms is given in Table 2 which shows history of fever 27 (27.27%) as a common factor. Out of total 99 children 71% children had 3 or more complications (Table 2). Total 91 (91.9%) children recovered fully and discharge to home while remaining 08 (8.1%) became sicker and shifted to Intensive Care Unit. The Mean weight gain was  $6.689 \pm 5.680$  (Table 3). There was no expiry during this study.

**Table 1: Profile of study participants (n=99).**

| Characteristics              | n (%)      |
|------------------------------|------------|
| <b>Gender</b>                |            |
| Male                         | 42 (42.42) |
| Female                       | 57 (57.57) |
| <b>Age group in month</b>    |            |
| 6-11 months                  | 38 (38.38) |
| 12-23 months                 | 30 (30.30) |
| 24-59 months                 | 32 (32.32) |
| <b>Malnourished children</b> |            |
| Marasmus                     | 91 (91.91) |
| Kwashiorkor                  | 5 (5.05)   |
| Marasmic Kwashiorkor         | 3 (3.03)   |
| <b>Z-score (WHZ)</b>         |            |
| <-3                          | 67 (67.67) |
| >-3                          | 23 (23.23) |
| <b>Seasonal Cases</b>        |            |
| Dry                          | 64 (64.64) |
| Rainy                        | 36 (36.36) |

**Table 2: Symptoms and complications of study participants (n=99).**

| Characteristics  | N (%)      |
|--|------------|
| <b>Common symptoms</b>                                 |            |
| Shock  | 1 (1.01)   |
| UTI  | 3 (3.03)   |
| Cough  | 6 (6.06)   |
| Vomiting   | 16 (16.16) |
| Fits   | 6 (6.06)   |
| Respiratory distress                                   | 3 (3.03)   |
| Abdominal Pain   | 3 (3.03)   |
| Diarrhea   | 35 (35.35) |
| Fever  | 27 (27.27) |
| <b>Complications in malnutrition children</b>          |            |
| Hypernatremia  | 9 (9.09)   |
| Hyponatremia   | 4 (4.04)   |
| Sepsis   | 3 (3.03)   |
| Cardiac Failure  | 6 (6.06)   |
| Corneal Opacification                                  | 6 (6.06)   |
| Hypokalemia  | 28 (28.28) |
| Hypoglycemia   | 36 (36.36) |
| Hypothermia  | 19 (19.19) |
| Poor Appetite  | 43 (43.43) |
| Dermatitis   | 65 (65.65) |
| <b>Anemia in malnutrition children</b>                 |            |
| Anemia present   | 74 (74.74) |
| Anemia Absent  | 26 (26.26) |
| <b>Patients developed more than one complications</b>  |            |
| 2 or <2  | 29 (29.99) |
| 3 or >3  | 71 (71.71) |
| >48 hours  |            |
| <b>Time to improve complications</b>                   |            |
| <24 hours  | 23 (23.6)  |
| 24-48  | 31 (31.3)  |
| >150 Kcal/kg/day                                       | 43 (43.2)  |
| <b>Calorie consumption in the NSC for SAM children</b> |            |
| <150 Kcal/kg/day                                       | 71 (71.3)  |
|  | 28 (28.7)  |
| <b>OUTCOME</b>   |            |
| Improved   | 91 (91.9)  |
| Worse  | 8 (8.1)    |

**Table 3: Number of days and weight gain status of study participants (n=99).**

| No. (99)                   | %  | Mean   | Standard Deviation      |
|----------------------------|----|--------|-------------------------|
| Number of days Stay at NSC |    |        |                         |
| 1-7 days                   | 57 | 57.60% |                         |
| 8-14 days                  | 36 | 36.30% | 7.864 days<br>+4.4 days |
| 15-21 days                 | 6  | 6.10%  |                         |
| Weight gain                |    |        |                         |
| >7 g/kg/day                | 39 | 39.30% |                         |
| 5 to <7 g/kg/day           | 38 | 38.30% | 6.689<br>± 5.680        |
| <5 g/kg/day                | 22 | 22.20% |                         |

## DISCUSSION

About 13 million children suffers Severe Acute Malnutrition every year, among them about 2 million deaths are preventable. Child Survival Programme has ignored this component. Treatment of children with SAM needs lot of resources and needs skilled and motivated staff.

This study was conducted at Liaquat University Hospital, Hyderabad over period of 12 months, 99 malnourished children with complications were assessed; females were higher 57 (57.57%) than malnourished males 42 (42.42%). In this study all of the children were 6 to 59 months old. 91% children had Marasmus, 5.05% had Kwashiorkor and 3.03% had both marasmus and kwashiorkor. 67% children had <-3 score (Z score of weight and height). Most common complaints were fever 27 (27.27%) and loose motion 35 (35.35%).

Most common complications were severe anaemia 74 (74.74%), hypoglycaemia 36 (36.36%) and Poor appetite 43 (43.43%). 71% children had 3 or more than 3 complications.

A couple of studies show different result as compared to our study. In their study most represented age group was 6 to 12 months with 34.6% of the children. In an international study common complication at the time of admission were evaluated, fever was present in 210 (51.7%), pneumonia was 179 (44.1%), and diarrhoea was 164 (40.4%) [9].

The most frequent complication on admission was fever (53.6%). Respiratory tract infections were the most common comorbidities and were present in 45 patients (25.1%), followed by malaria in 15.1% of cases [10]. While an Indian study had similar results to us, Anaemia (50%) and Diarrhoea (46.30%) was most common complications in children with SAM [11]. In a meta-analysis study Diarrhoea, dehydration and anemia were statistically significant predictors of mortality among SAM children [12].

Total 23.6% children recovered within 24 hours, while 43.2% children improved after 48 hours. 57.6% remained hospitalized for 1-7 weeks, while 6.1% children discharged after 15-21 days.

Regarding length of stay in the hospital, 57.6% patients remained hospitalized for 1-7 days, 36.3% for 8-14 days, while 6.1% for greater than 15-21 days. In a similar study 89.1% of children with kwashiorkor and 69.4% of

children with marasmus were recovered. The median time of recovery was 35 days for children with kwashiorkor and 49 days for children with marasmus [13].

Weight gain was >7 g/kg/day in 39.9% children, while 22.2% children's weight gain was <5 g/kg/day. Out of total 99 patients, 91 (91.9%) recovered fully and discharged to home, while 8 (8, 1%) children did not improve and shifted to intensive care unit. There was no expiry in our study participants. In an Ethiopian study the mean age of children was 16 months. Out of 413 children with SAM, 231 (55.9%) recovered, 24 (5.8%) died. The mean weight gain was 15.61 g/kg/day. In a study outcome in SAM children with complications was assessed that showed, treatment outcome was successful (cured) in 168 (66.9 %) and potentially unsatisfactory in 53 (21.2%), while 30 (11.9%) died [14]. In another study Among 633 patients admitted with SAM, 13.1% were lost to follow-up and 9.2% died while in hospital. Children infected with HIV were 3.90 times more likely to die compared to their counterparts [15]. There were no expiries in our patients because we have separate team allocated for the care of Severe Acute Malnutrition children, they picked the complications earlier and managed them appropriately. Further there was proper vigilance, as the patients become sicker; they were shifted to Intensive Care Unit.

## CONCLUSION

We found higher recovery rate from complications along with good weight gain. Few children developed new complication and become sicker, hence shifted to intensive care unit. There was no expiry in children of SAM with complications. Early identification of complications at triage in severe acute malnutrition children can decrease the mortality.

## REFERENCES

1. Ghosh-Jerath S, Singh A, Jerath N, et al. Undernutrition and severe acute malnutrition in children. BMJ 2017; 359:4877.
2. Grover Z, Ee LC. Protein energy malnutrition. Pediatric Clin 2009; 56:1055-1068.
3. Ahmed T, Hossain M, Mahfuz M, et al. Severe acute malnutrition in Asia. Food Nutrit Bullet 2014; 35:S14-26.

4. Linters L, Wazny K, Bhutta ZA. Management of severe and moderate acute malnutrition in children. Reproductive, maternal, newborn, and child health: disease control priorities. 3rd edition. Washington, DC: World Bank 2016; 205-223.
5. Kumar R, Abbas F, Mahmood T, et al. Prevalence and factors associated with underweight children: a population-based subnational analysis from Pakistan. *BMJ open* 2019; 9:e028972.
6. Deen JL, Funk M, Guevara VC, et al. Implementation of WHO guidelines on management of severe malnutrition in hospitals in Africa. *Bullet World Health Org* 2003; 81:237-245.
7. Schoonees A, Lombard MJ, Musekiwa A, et al. Ready-to-use therapeutic food (RUTF) for home-based nutritional rehabilitation of severe acute malnutrition in children from six months to five years of age. *Cochrane Database of Systematic Rev* 2019; 5:1-182.
8. Derseh B, Mruts K, Demie T, et al. Co-morbidity, treatment outcomes and factors affecting the recovery rate of under-five children with severe acute malnutrition admitted in selected hospitals from Ethiopia: retrospective follow up study. *Nutrition J* 2018; 17:1-8.
9. Hassen SL, Astatkie A, Mekonnen TC, et al. Survival status and its determinants among under-five children with severe acute malnutrition admitted to inpatient therapeutic feeding centers in south Wollo zone, Amhara region, Ethiopia. *J Nutrit metabol* 2019.
10. Chiabi A, Malangue B, Nguefack S, et al. The clinical spectrum of severe acute malnutrition in children in Cameroon: a hospital based study in Y aounde, Cameroon. *Translat Pediatric* 2017; 6:32.
11. Kapil U, Sachdev HP. Management of children with severe acute malnutrition: a national priority. *Indian pediatrics* 2010; 47:651.
12. Wagnew F, Dessie G, Takele WW, et al. A meta-analysis of inpatient treatment outcomes of severe acute malnutrition and predictors of mortality among under-five children in Ethiopia. *BMC Pub Health* 2019; 19:1-1.
13. Mengesha MM, Deyessa N, Tegegne BS, et al. Treatment outcome and factors affecting time to recovery in children with severe acute malnutrition treated at outpatient therapeutic care program. *Glob Healt act* 2016; 9:30704.
14. Nyeko R, Calbi V, Ssegujja BO, et al. Treatment outcome among children under-five years hospitalized with severe acute malnutrition in St. Mary's hospital Lacor, Northern Uganda. *BMC Nutrition* 2016; 2(1):1-7.
15. Kambale RM, Ngaboyeka GA, Ntagazibwa JN, et al. Severe acute malnutrition in children admitted in an Intensive Therapeutic and Feeding Centre of South Kivu, Eastern Democratic Republic of Congo: Why do our patients die? *Plos one* 2020; 15:e0236022.