

Research Article

Severe Acute Malnutrition in Children Admitted to Sendwe Hospital in Lubumbashi, Democratic Republic of Congo

Sinanduku JS¹, Mishika PL², Mukunda FM³, Mukuku O^{4*}, Luboya ON^{1,4} and Wembonyama SO¹

¹Department of Pediatrics, University of Lubumbashi, Democratic Republic of Congo

²Public Health School, University of Lubumbashi, Democratic Republic of Congo

³Minister of Public Health, Kinshasa, République Démocratique du Congo

⁴Institut Supérieur des Techniques Médicales, Lubumbashi, Democratic Republic of Congo

*Corresponding author: Olivier Mukuku, Department of Paediatrics, University of Lubumbashi, Democratic Republic of Congo

Received: May 06, 2020; Accepted: June 02, 2020;

Published: June 09, 2020

Abstract

Objective: To describe the socio-demographic, clinical and outcomes characteristics of children under five years hospitalized for Severe Acute Malnutrition (SAM) at the Intensive Nutritional and Therapeutic Unit (INTU) of Sendwe Hospital in Lubumbashi.

Methods: This is a descriptive cross-sectional study from January 1st to June 30th, 2017 on a sample of 173 children aged 6 to 59 months hospitalized at the INTU at Jason Sendwe Hospital in Lubumbashi (Democratic Republic of Congo).

Results: The mean age was 16.23 months and 53.18% were between 6 and 11 months old; 61.27% were male (sex ratio 1.58) and 73.4% lived in urban-rural areas. HIV infection was noted in 6.36%. The marasmus was found in 48.55% and the edematous malnutrition in 50.8%. We noted that 30.06% had gastroenteritis, 27.7% had severe anemia, 11.56% had lung infection, 10.98% had malaria and 6.9% had tuberculosis. The mean length of hospital stay was 10.41 days. The outcome was favorable in 76.3% and 9.83% had died. The prevalence of SAM had dropped from 96.5% on admission to 1.5% on discharge.

Conclusion: Malnutrition is still a problem in our environment as shown by these results, and its reduction will surely require the improvement of parents' living and education conditions.

Keywords: Severe acute malnutrition; Children; Lubumbashi

Introduction

The World Health Organization (WHO) has estimated that Severe Acute Malnutrition (SAM) affects around 16 million children under-5 [1]. Although known to be a major public health problem in low-income countries, malnutrition contributes significantly to mortality in children under-5 and in 2011 it was estimated that around 45% of deaths children are attributed to malnutrition [2,3]. The Democratic Republic of Congo (DRC) is one of the countries with a high mortality rate among children under 5 years [1] and malnutrition is one of the main causes of death in these countries when associated with others diseases such as diarrhea, pneumonia and malaria; more common diseases in children under 5 years [3]. In developing countries, feeding practices are very often inadequate and incompatible with WHO recommendations [4]. Poor nutritional status in early childhood also has health consequences in adulthood [5].

Severe acute malnutrition or severe wasting is a complex condition resulting from the clinical, biological and metabolic consequences of an insufficient diet or one that does not meet the body's needs [6,7]. Apart from the high mortality and the disabilities it generates, in the long term it has an impact on adult size, intellectual capacities, economic productivity, fertility, the occurrence of metabolic and cardiovascular diseases [1]. It remains a major global public health

issue with 16 million cases in children under-5 responsible for one million deaths a year. Mortality in hospital can reach 30 to 50% [1].

SAM is a major public health problem in the DRC. According to the Demographic and Health Survey (DHS-DRC 2014), 43% of children aged 0-59 months have chronic malnutrition, 8% suffer from acute malnutrition and 23% are underweight [8].

This study aims to describe the socio-demographic, clinical and outcomes characteristics of children under five years hospitalized in the Intensive Therapeutic Nutrition Unit (INTU) of Sendwe Hospital in Lubumbashi, DRC.

Material and Methods

This is a descriptive cross-sectional study of 173 severely malnourished children, admitted during the period from January 1st to June 30th, 2017 in the Intensive Therapeutic Nutrition Unit (INTU) in charge of SAM at Jason hospital Sendwe from Lubumbashi in Haut-Katanga Province (DRC).

The study targets all children aged 6 to 59 months, hospitalized for severe acute malnutrition in the INTU of Sendwe hospital in Lubumbashi. Sampling was done exhaustively. In total, based on our selection criteria above, 173 cases of SAM were retained and were the subject of analysis, the results of which are presented in the following section.

Malnourished children received an average of 6 meals a day 4 hours apart. Therapeutic milk F75 (130 ml = 100 Kcal) was used for phase 1 and F100 (130 ml = 130 kcal) in the transition phase. The quantities of milk were distributed according to the national protocol. The criteria for leaving the INTU were a positive appetite test and taking at least 90% of the quantity of F100 milk prescribed, resolution of complications and total melting or cross edema for children with Kwashiorkor. Phase 2 or rehabilitation phase was carried out in a therapeutic nutrition unit on an outpatient basis after discharge.

Routine medical treatment was administered including folic acid (5 mg taken once daily), vitamin A in case of marasmus (100,000 IU for infants 6 to 11 months and 200,000 IU for children over 12 months) and an antifungal for 7 days.

Routine antibiotic therapy and other therapies were based on clinical parameters. A biological assessment comprising a blood count, a thick smear and an HIV serology were carried out in all the children.

Study variables were: age, sex, residence, nutritional status (Weight-for-Age z-score, Weight-for-Height z-score, Height-for-Age z-score, Mid-Upper Arm Circumference (MUAC)), type of malnutrition, presence of edema, associated pathologies or complications, length of hospital stay, outcome (recovery or death).

Data entry and analysis was done using STATA 12 software. Analysis and interpretation used the calculation of proportion, mean and Standard Deviation (SD).

Results

The children's age ranged from 6 to 59 months around a mean of 16.23 ± 14.03 months; 53.18% (92/173) of our patients were between 6 and 11 months old. The male sex was the most represented (61.27%) with a sex ratio M/F of 1.58. Almost $\frac{3}{4}$ of children lived in semi-urban areas (Table 1).

Nutritional status assessment

The mean Weight/Age z-score was -2.72 (SD = 1.66) ranging from -7.61 to -0.01. Referring to the WHO standards (green curve in Figure 1), we notice that the Weight/Age z-score curve (in blue for boys and in red for girls) is deviated to the left. The underweight rate (Weight/Age z-score < -2 SD) was 71.5%; it was severe in 48.3% and moderate in 23.3%.

The mean Height/Age z-score was 0.05 (SD = 4.09) ranging from -3.36 to 5.73. Referring to the WHO standards (green curve in Figure 2), we notice that the curve of the Height/Age z-score (in blue for boys and in red for girls) is not deviated; it is almost in the middle. The rate of postural delay (Height/Age z-score < -2 SD) was 16.8%; it was severe in 48.3% and moderate in 8.1%.

The mean Weight/Height z-score is -3.64 (SD = 1.91) ranging from -9.51 to 4.03. Referring to the WHO standards (green curve in Figure 3), we notice that the curve of the Weight/Height z-score (in blue for boys and in red for girls) is totally deviated to the left. The rate of acute malnutrition (Weight/Height z-score < -2 SD) was 81.2%; it was severe in 58.8% and moderate in 22.4%.

On admission, the mean MUAC was 103.5 ± 7.7 mm. Taking into account the MUAC, the rate of global acute malnutrition (MUAC

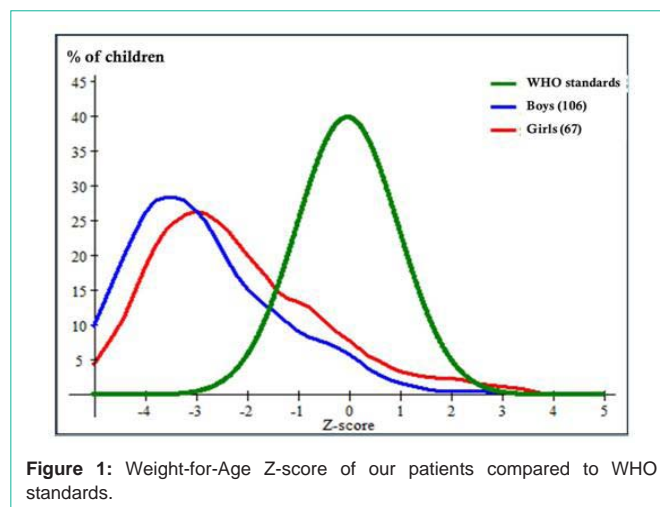


Figure 1: Weight-for-Age Z-score of our patients compared to WHO standards.

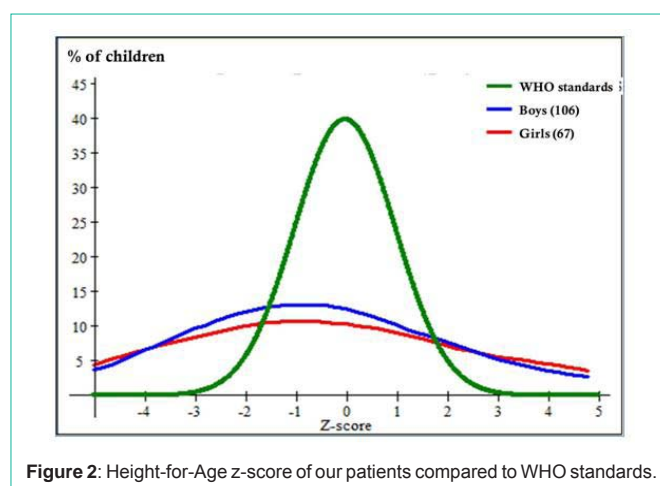


Figure 2: Height-for-Age z-score of our patients compared to WHO standards.

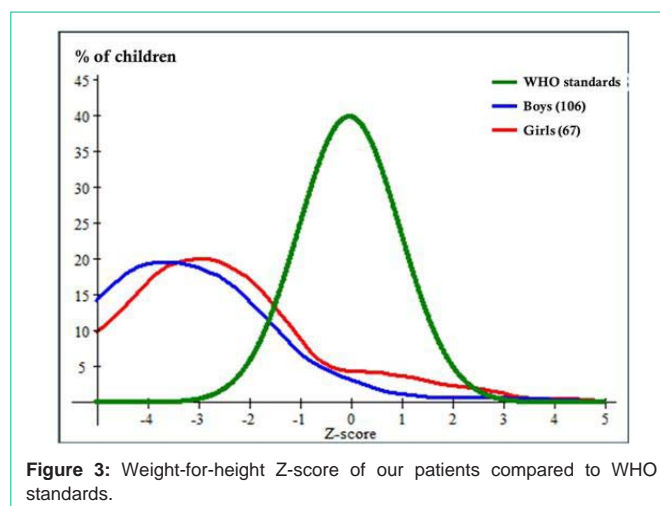


Figure 3: Weight-for-height Z-score of our patients compared to WHO standards.

<125 mm) was 98.8%; it was moderate (MUAC <125 and ≥ 115 mm) in 2.3% and severe (MUAC <115 mm) in 96.5%. On discharge from the hospital, the mean MUAC for the 132 children declared cured was 117.7 ± 2.6 mm. When we classify malnutrition according to the MUAC, we found that the prevalence of severe acute malnutrition was 1.5%. Thus, this prevalence dropped from 96.5% to 1.5% on

Table 1: Socio-demographic characteristics.

Variable	Number (n=173)	Percentage
Age		
6-11 months	92	53.18
12-23 months	57	32.95
≥24 months	24	13.87
Sex		
Male	106	61.27
Female	67	38.73
Residence		
Urban	46	26.6
Semi-urban	127	73.4

discharge.

Nearly half of the cases (48.55%) of the children suffered from the marasmus alone, kwashiorkor was found in 41.04% and 10.4% of the patients had presented mixed malnutrition. Edematous malnutrition reflecting the severity and nutritional urgency is found in more than half of the cases (50.87%).

Associated pathologies or complications of SAM were gastroenteritis (30.06%), severe anemia (27.75%), lung infections (11.56%), malaria (10.98%), tuberculosis (6.94%) and HIV infection (6.36%) (Table 2).

The mean length of hospital stay for our patients is 10.41 ± 5.70 days (range: 1 and 76 days). Seventy-six point thirty percent (132/173) of our patients were declared cured and 9.83% (17/173) died. The dropout rate was 13.87%.

Discussion

Our study finds a mean age of 16.23 ± 14.03 months and 53.18% of patients aged 6 to 11 months. Children aged 6 to 12 months were the most represented in the Ouédraogo-Yugbaré's study [9]. The dominant age group in Milcent's study [6] concerned children aged 6 to 17 months. Savadogo [10] recorded 49.3% of malnourished children aged 12 to 23 months with a median age of 15 months. These results also agree with those of Côte d'Ivoire [7] and Togo [11].

This predominance can be explained by the fact that this age group corresponds to the stage of life during which the infectious episode of childhood develops and where the incidence of diarrheal diseases is greatest, but also by the insufficiency of breast milk beyond the age of 6 months and the inadequate implementation of weaning for better coverage of the nutritional needs of the infant. This age group corresponds to the period of food diversification which is often difficult because of the parents' ignorance and the poor eating habits of the populations [12].

For Caulfield [13], adequate nutrition during the first years of life is essential for the child's long-term growth, development and health. Insufficient food during this critical period has an adverse influence on morbidity and mortality.

Regarding the sex of children, we noted a predominance of the male sex with 61.27% of the cases. This male predominance was also noted by Malonga et al. [14] at the Makélékélé hospital (Brazzaville-

Table 2: Clinical parameters.

Variable	Number (n=173)	Percentage
MUAC		
<115 mm (severemalnutrition)	167	96.5
115 - 124 mm (moderaternalnutrition)	4	2.3
≥ 125 mm (slightmalnutrition)	2	1.2
Type of malnutrition		
Marasmus	127	48.55
Kwashiorkor	71	41.04
Mixed	18	10.4
Edema		
Present	88	50.87
Absent	85	49.13
Associated pathologies or complications		
Gastroenteritis	52	30.06
Severe anemia	48	27.75
Lung infections	20	11.56
Malaria	19	10.98
Tuberculosis	12	6.94
HIV infection	11	6.36

Congo). Savadogo et al. [10] made a similar observation at the urban nutrition rehabilitation and education center in Burkina-Faso. According to some authors, this association between the male sex and the nutritional deficit could be linked to a greater biological vulnerability in boys than in girls in a disadvantaged socio-economic environment [15,16]. Contrary to this observation, two studies carried out in Togo and in the Republic of Congo had highlighted a female predominance with a sex ratio M/F of 0.9 [11,17].

In our study, the marasmus was the most common type of malnutrition (48.55%) followed by kwashiorkor (41.05%) and the mixed type (10.40%). This is in line with other studies carried out in Togo [11] and Senegal [18] showing a predominance of marasmus and this in larger proportions. On the other hand, another study conducted in Lomé (Togo) found kwashiorkor (59%) first, followed by marasmus (31%) and kwashiorkor-marasmus (10%) [19]. This predominance of the marasmus can be explained on the one hand by the deterioration of the food situation and poverty in the African countries; and on the other hand, by the spread of the HIV/AIDS pandemic, the seroprevalence of HIV infection is higher in malnourished children [20]. In the HIV infection, malnutrition is readily expressed in the marasmus, probably due to excess mortality in HIV-infected children with kwashiorkor [21].

Concerning associated pathologies or complications noted in our patients, the prevalence of HIV infection was 9.1%. This is in line with several studies showing a high seroprevalence of HIV infection in malnourished children [22,23]. One of the major complications in the course of the course of the disease is an alteration in nutritional status in HIV-infected children [21]. In contrast, pulmonary tuberculosis was only observed in 6.94% of our patients. This could be explained by the fact that screening for tuberculosis was not systematic in our study; he had pulmonary clinical signs and/or an abnormality noted

on the chest x-ray. In addition, when diagnostic tests for tuberculosis (including tuberculin intradermal reaction and bacilloscopy) were performed, most were negative. Hence the need to perform a Polymerase Chain Reaction method which has the advantage of providing a rapid diagnosis, although this technique is not available in practice [24]. Bhat et al. [25], at the nutritional rehabilitation center of Karnataka in 2012 in India, found a rate of 2% among the 1,173 malnourished children tested.

In our study, gastroenteritis, severe anemia and lung infections were the most common complications. This result corroborates with those of other studies carried out by several authors [9,26]. This can be explained by the fact that malnutrition is accompanied by immunosuppression which is the cause of various infections (of which lung infections are the most frequent). According to Beau and Imboua-Coulibaly [21], these medical complications of an infectious nature are often frequent and are observed in 70% in cases of severe acute malnutrition.

The mean length of hospital stay was 10.41 ± 5.70 days and almost 60.59% of the children were hospitalized for more than 15 days. About the outcome, 76.47% of our patients had a favorable outcome against 9.41% died. This result is close to that of Sylla et al. [27] showing a mean hospital duration of 15 ± 3 days and a rehabilitation rate of 79.5%; the case fatality rate was 12%. Our results are also comparable to those of Malonga et al. [14] who found a mean length of hospital stay of 12 days (range: 24 hours and 53 days) and a mortality rate of 11.4%. Savadogo et al. [10] reported 16% of deaths. Yénan [28] found a shorter mean of hospital stay (8.5 days), a cure rate (78.67%) and a lower dropout rate (12%). The observed differences could be explained by the severity of the complications presented by our malnourished people leading to a high mortality rate, a longer hospital stay responsible for the significant dropout rate observed [10,17].

Compared to the indicators for monitoring the integrated management of malnutrition, for the number of cured patients we say that there is effective treatment since the cure rate is greater than 75%. Compared to the number of deaths, we qualify the treatment as less acceptable because mortality is higher than 5% recommended by the Ministry of Public Health in our country. Relative to the number of dropouts, treatment is effective because the dropout rate is less than 15%.

Conclusion

Severe acute malnutrition is responsible for high morbidity and mortality in Lubumbashi children. In view of these results, it appears that the impact of morbidity and mortality due to malnutrition in hospital is significant. Certain interventions could be beneficial for monitoring the growth of infants, systematic nutritional assessment in consultation, active screening for malnutrition in the community and nutritional education for mothers or caregivers of children under 5 years.

References

- UNICEF, WHO. The World Bank, United Nations Population Division. The Inter-agency Group for Child Mortality Estimation (UN IGME). Levels and Trends in Child Mortality. 2015.
- Black RE, Victora CG, Walker SP, Bhutta ZA, Christian P, De Onis M, et al. Maternal and child undernutrition and overweight in low-income and middle-income countries. *Lancet*. 2013; 382: 427-51.
- <https://www.who.int/wer/2015/wer9013.pdf>
- World Health Organization. Report of the expert consultation on the optimal duration of exclusive breastfeeding. 2001.
- Victora CG, Adair L, Fall C, Hallal PC, Martorell R, Richter L. Sachdev HS for the Maternal and Child Undernutrition Study Group. Maternal and Child Undernutrition. Consequences for Adult Health and Human Capital. *Lancet*. 2008; 371: 340-57.
- Milcent K, Stoffel V, Chagué F, Barthelmé B, Roubertou C, Colson J. Malnutrition infant-juvénile à données anthropométriques et prise en charge des enfants malnutris. *Arch Pediatr*. 2008 ; 15: 1289-95.
- Ake O, Koffi M, Dagnan S, Toure B, Adamou B, Angbo B, et al. Etude de la durée de suivi des malnutris réhabilités à l'INSP d'Adjamé. *Médecine d'Afrique Noire*. 2005; 52: 14-23.
- Ministère De , Santé Publique LA. ICF International 2014. Enquête Démographique et de Santé en République Démocratique du Congo 2013.
- Ouédraogo-Yugbaré SO, Kouéta F, Dembélé E, Konaté-Boly C, Kaboré A, Sawadogo H , et al. Facteurs de risque de mortalité au cours de la malnutrition aiguë sévère dans le service de pédiatrie du Centre Hospitalier Régional (CHR) de Kaya. *Ashdin Publishing, Clinics in Mother and Child Health*. 2013; 10: 120104.
- Savadogo L, Zoetaba I, Donnen P, Hennart P, Sondo BK, Dramaix M. Prise en charge de la malnutrition aiguë sévère dans un centre de réhabilitation et d'éducation nutritionnelle urbain au Burkina Faso. *Revue d'Epidémiologie et de Santé Publique*. 2007; 55: 265-74.
- Azoumah KD, Guedihoussou T, Tsolenyanu E, Douli K, Yarbondjoa Y, Bakondé B, et al. Aspects épidémiologiques et diagnostiques de la malnutrition aiguë sévère chez les enfants de moins de 5 ans dans la commune de KARA. *J RechSciUniv Lomé*. 2014; 14: 85-90.
- Mukuku O, Mutombo AM, Kamona LK, Lubala TK, Mawaw PM, Aloni MN, et al. Développement d'un score prédictif de malnutrition aiguë sévère chez les enfants de moins de 5 ans. *Pan Afr Med J*. 2018; 29: 185.
- Caulfield LE, De Onis M, Blössner M, et al. Undernutrition as an underlying cause of child deaths associated with diarrhea, pneumonia, malaria and measles. *Am J Clin Nutr*. 2004; 80: 193-198.
- Malonga DA, Mouyokani EI, Baghamboula P, Ndoundi L, Ndoudi M, Ndoumba T, et al. Prise en charge des enfants malnutris sévères à l'hôpital de base de Makélékélé Brazzaville-Congo. *Méd. Afr. Noire*. 2008; 55: 258-262.
- Kandala NB, Mandungu TP, Emina JB, Nzita KP, Cappuccio FP. Malnutrition among children under the age of five in the Democratic Republic of Congo. Does geographic location matter. *BMC Public Health*. 2011; 11: 261.
- Semba R, De Pee S, Sun K, Sari M, Akhter N, Bloem M. Effect of parental formal education on risk of child stunting in Indonesia and Bangladesh: a cross-sectional study *Lancet*. 2008; 371: 322-328.
- Mouko A, MbikaCardorelle A, Louaka Samba C. Prise en charge de la malnutrition sévère dans un service de pédiatrie au CHU de Brazzaville *Archives de pédiatrie*. 2007; 14 : 1111-4.
- Sall MG, Badji ML, Martin SL, Kuakivi N. Récupération nutritionnelle en milieu hospitalier régional. Le cas de l'hôpital régional de Kaolack . *Med Afr Noire*. 2000; 47: 425-427.
- Atakouma D, Kolsteren P, Tellier V, Assimadi K, Beghin I. Evaluation du coût du traitement de la malnutrition protéino-énergétique grave de l'enfant dans le service de pédiatrie CHU de Lomé-Tokoin. *MédAfr Noire*. 1995; 42: 580-6.
- Pelletier JG. Les malnutritions sévères. Approches globales. *L'enfant en milieu africain*. 1993; 21: 2089.
- Beau JP, Imboua-Coulibaly L. Malnutrition et infection par le VIH1. Pourquoi une moindre séropositivité chez le kwashiorkor. *Med Afr Noire*. 1998 ; 45: 381-3.
- Karande S, Bhalke S, Kelkar A, Ahuja S, Kulkarni M, Mathur M. Utility of clinically directed selective screening to diagnose HIV infection in hospitalized children. *Journal of Tropical Pediatrics*. 2002; 48: 149-55.

23. Madec Y, Germanaud D, Moya-Alvarez V, et al. HIV prevalence and impact on renutrition in children hospitalized for severe malnutrition in Niger: an argument for more systematic screening. *Plos ONE*. 2011; 6: 22787.
24. Donato L. Tuberculose. In Beydon N eds. *Pneumologie pédiatrique guide pratique*. Paris : Elsevier Masson. 2011; 105-36.
25. Bhat PG, Kumar AMV, Naik B, Satyanarayana S, Deepak KG, Nair SA et al. Intensified Tuberculosis Case Finding among Malnourished Children in Nutritional Rehabilitation Centres . Missed Opportunities. *PLOS ONE*. 2013; 8: 84255.
26. Golden M. *Les signes cliniques de la malnutrition sévère*. Paris. Masson. 2015.
27. Sylla A, Diouf s, Sall MG, Ndiaye O, Moreira C, Kuakivi N. Epidémiologie et prise en charge de la malnutrition chez les enfants âgés de zéro à cinq ans hospitalisés à Dakar. *Archives de pédiatrie*. 2002; 9: 101-12.
28. Yenan JP, Plo KJ, Asse KV, Kondji YS, Yeboua YKR, Ouattara KS, et al. Prise en charge de la malnutrition aiguë sévère à l'unité de nutrition thérapeutique du CHU de Bouake. *Rev Int ScMéd*. 2014; 16: 94-9.