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Epidemiological and Clinical Aspects of Severe Acute Malnutrition in Children Aged 0 to 59 Months Hospitalized at the Reference Health Center of the Commune I of Bamako (Mali)

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Abstract   Original Research Article

Severe acute malnutrition (SAM) is characterized by a weight/height (W/T) ratio below -3Zscore and/or nutritional edema and/or arm circumference (MUAC) below 115 mm. This is a priority public health problem in Mali, because the nutritional situation remains very worrying for years. During our study period, 159 children suffering from severe acute malnutrition (SAM) with medical complications were hospitalized in the pediatric department. ***Materials and method:*** This is a prospective and descriptive study of children aged 0 to 59 months hospitalized for severe acute malnutrition with medical complications at the pediatrics department of the commune I from June 1, 2018 to May 31, 2019. All children from 0 to 59 months hospitalized in pediatrics during the study period and having parameters in favor of SAM were included. ***Results:*** We have a hospital prevalence of 14.7%. The average age of the children was 18 months with extremes of 3 to 59 months. Children aged 12-24 months were in the majority 55% and children under 12 months accounted for 40%. Most of the children were male with a sex ratio of 1.17. The majority of children (61.6%) came from the health district of the commune I. The frequency of admissions was higher in July and August (15.7% and 19.5%). The reasons for consultation were: anorexia (lack of appetite) 32.7%, diarrhea 26.4%, cough 9.4%, edema 8.2%, fever 7.6%, vomiting 7.6%, weight loss 5%. Marasmus was the most noticed form of malnutrition with 83.6%. The average length of hospitalization was 8 days with extremes of 3 to 17 days. Lethality reached 6.9%. The state of shock was the most marked factor of death 54.5%, cases of false route (food inhalation) 27.3% and respiratory distress 18.2%.
Keywords: Malnutrition, Prevalence, Commune 1, Bamako.

INTRODUCTION

Severe acute malnutrition (SAM) is defined by the WHO as a very low weight-to-height (W/T) ratio below -3Zscore and/or the presence of bilateral edema of nutritional origin, and/or a very low mid-arm circumference (MU) less than 115mm in children aged 6-59 months [1]. Worldwide, 50.5 million children under 5 years of age (7.5%) suffer from wasting (acute malnutrition); the prevalence of wasting in children under 5 years of age remains high in Asia where 1/10 children weigh little for their height, while in Latin America and the Caribbean this prevalence is 1/100 [2].

In Mali, according to the Demographic and Health Survey (EDSM-VI) in 2018 [3], 9% of children under 5 years of age developed acute malnutrition, including 3% of severe form as regards the Anthropometric Nutritional Survey and of Retrospective Mortality of September 2022 [4], the prevalence of acute malnutrition is 10.8%; including 2.1% of severe form. In 2015 the DIARRA N. study [5] conducted at the Reference Health Center of the Commune I of Bamako, reported 3.38% acute malnutrition in children aged 6 to 59 months in hospital. The objective of our study was to determine the frequency of severe acute malnutrition in

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children aged 0 to 59 months hospitalized in the pediatric department of reference health center of the commune 1 of Bamako.

MATERIALS AND METHOD

Our study took place at the pediatrics of the Reference Health Center (CSRéf) of the commune I of Bamako. The Commune I referral health center is a public health care institution whose mission is to participate in the implementation of the national health policy of the Government of Mali. According to the health system of Mali, each circle or commune of the district of Bamako represents a Health District (DS). The health district of the commune I is made up of a CSRéf, 12 Community Health Centers (CSCOM), 03 denominational centers, 53 private structures (clinic and medical office). Concerning public establishments, only CSRéfs and hospitals have specialized services such as paediatrics. As a result, all children suffering from severe acute malnutrition with medical complications are referred from the peripheral structures of the district and admitted to the pediatrics of the municipality. This is a prospective and descriptive study for the benefit of children from 0 to 59 months hospitalized for severe acute malnutrition at the pediatrics of commune I from June 1, 2018 to May 31, 2019.

During this period we included all children from 0 to 59 months hospitalized in pediatrics whose criteria for severe acute malnutrition were clearly defined (PT< -3 Z score and/or PB< 115mm and/or Presence of nutritional edema. Were considered as medical complications: All infections, a weak appetite test or the presence of nutritional edema of severity two or three (++ or +++) Children hospitalized for other pathologies and not who did not have severe acute malnutrition, were not included in the study. The data were collected from a survey form previously developed. The variables entered were: The socio-demographic parameters of the mothers and children, clinical parameters, feeding practices from mothers to children, the nutritional status of children and their future. The materials used consisted of: measuring rod, Shakir strip (MUAC), SECA electronic scale equipped with a double weighing function, standard WHO P/T report form and an evaluation sheet for the test of appetite.

The children were undressed during weight gain while taking the necessary measures against hypothermia, the accuracy of the scales being checked beforehand using a 5 kg control weight. Children aged $\geq$ 24 months with a height $\geq$ 87 cm were measured standing, the arm circumference was carefully taken on the left arm at mid distance between the acromion and the olecranon. The P/T report was read on the WHO P/T sheet. When there were no obvious medical complications, the appetite test is done by giving the child a packet of RUTF. The quantity consumed is checked 15 to 30 minutes later. The data was analyzed using SPSS version 2.5 software and then entered using Word 2016 software. The agreement of the CSRéf administration was obtained before starting the study and that of the parents of children before collecting the data. Aspects of ethics including the anonymity of participants were respected.

Operational Definitions:
- Nutritional oedema: pitting swelling with the following characteristics: bilateral, symmetrical, painless with upward progression from the feet to the upper part of the body.
- The Z score: Z Scores or Standard Deviation Scores (SD) are reference lines on growth charts used to describe a deviation between a measurement and the median (mean).
- State of shock: Severe clinical manifestation characterized by: coldness of the extremities, prolonged skin recoloration time of more than 3 seconds, fine and thready peripheral pulse.
- MUAC: Circumference of the arm measured halfway between the shoulder and the elbow)
- Shakir band (MUAC): tri-coloured strip, graduated in centimeters used to measure the PB (in English Mid-Upper Arm circumference), bracelet for measuring the PB.

RESULTS

During the study period, 1,080 children were hospitalized in the pediatric ward, of which 159 children under 5 years old were cases of severe acute malnutrition with medical complications, i.e. a hospital frequency of 14.7%. The reasons for consultation were: lack of appetite (anorexia) 32.7%, diarrhea 26.4%, cough 9.4%, nutritional edema 8.2%, fever 7.6%, vomiting 7.6%, weight loss 5%.

Table 1: Distribution of mothers according to socio-demographic profile

Age of mothers	Number (n = 159)	Percentage
Age of mothers		
Under years	49	30,8
20 to 35 years	83	52,2
Over 35 years	27	17
The education of mothers		
No schooling	98	61,6
Schooled	61	38,4

| Age of mothers	Number (n = 159)	Percentage
Occupation		
Housewife	105	66
Saleswoman	33	20,8
Student	15	9,4
Civil servant	6	3,8
Marital status		
Married	151	95
Unmarried	8	5
Parity		
Primiparous	47	29,6
Multiparous	86	54,1
Grand multipara	26	16,3

Most of the mothers of our children were between 20 and 35 years old (52.2), uneducated (61.6%), married (95%), housewife (66%) and multiparous (54.1%).

Table 2: Distribution of children according to socio-demographic characteristics

| Socio-demographic characteristics of children	Number (n = 159)	percentage
Origin of children		
Health district of the commune I of Bamako	98	61,6
Other health district of Bamako	51	32,1
Outside the health districts of Bamako	10	6,3
Age of children		
0 to 11 months	64	40,3
12 to 24 months	87	54,7
25 to 59 months	8	5
Sex		
Male	86	54
Female	73	46
Birth weight of children		
< 2500g	23	14,4
≥ 2500g	81	51
unknown	55	34,6
Immunization status of children		
Correct vaccination	100	62,9
Incorrect vaccination	52	32,7
Not vaccinated	7	4,4
Age of introduction of complementary foods		
< 6 months	26	16,4
At 6 months	88	55,3
After 6 months	37	23,3
Not introduced	8	5
Child weaning age		
Before 24 months	67	42,1
At 24 months	6	3,8
Unweaned	86	54,1

The majority of children came from the health district of commune I, i.e. 61.6%; they had an average age of 18 months with extremes of 3 to 59 months. Most of the children were male, giving a sex ratio of 1.17. Those with a normal birth weight predominated (51%), their vaccination was incorrect in 32.7% of cases. In terms of food, 55.3% of children benefited from complementary food from 6 months and late after 6 months in 23.3% of cases. Weaning occurred before 24 months for 42.1% of children.
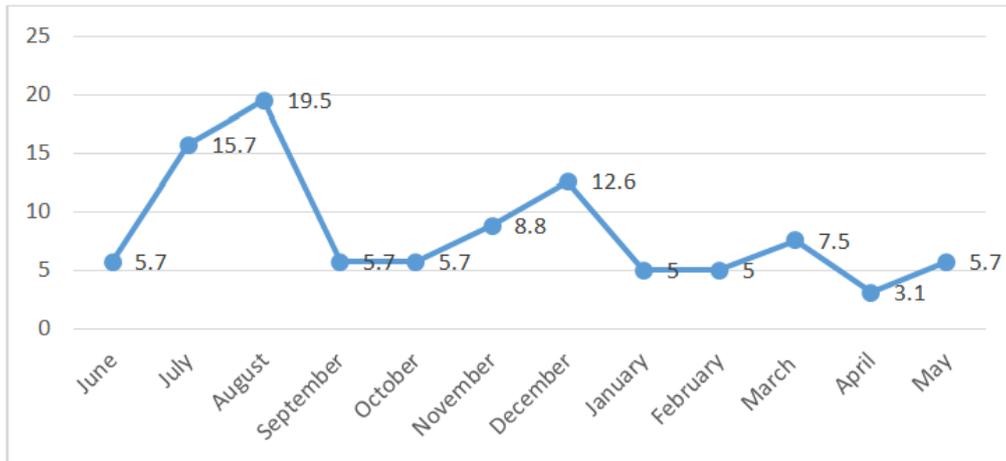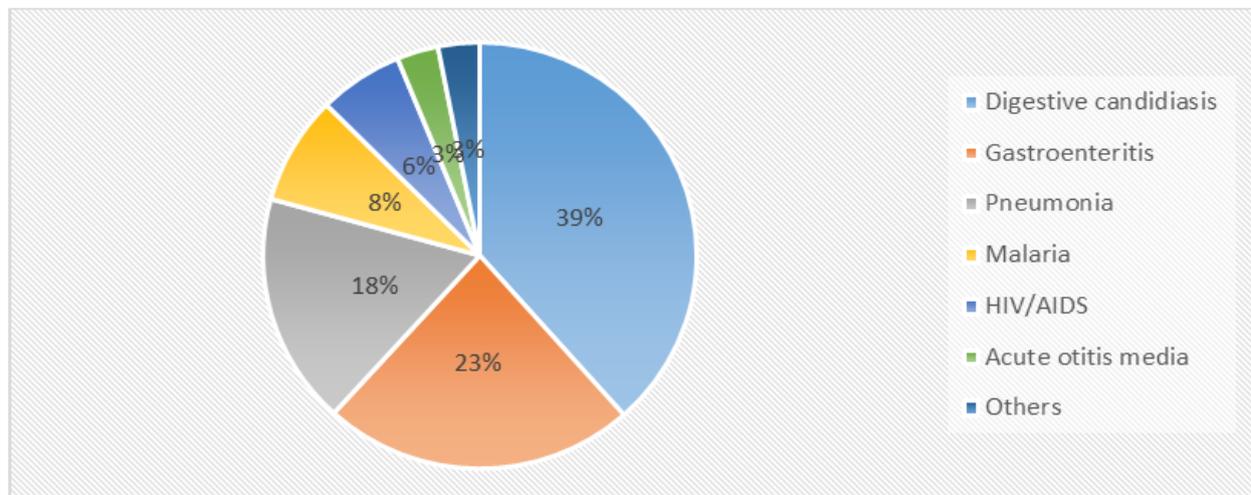
Figure 1: Distribution of children by admission period

The months of July and August represented the peak of admissions with 15.7% and 19.5% respectively.
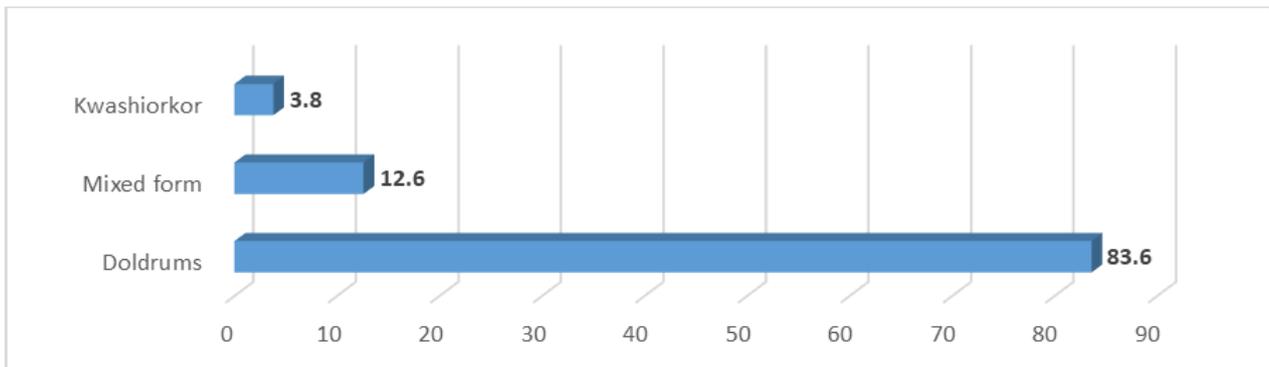
Figure 2: Distribution of children according to the clinical form of severe acute malnutrition

Marasmus was the most common clinical form, 83.6%.

**Figure 3: Distribution of malnourished children according to the associated pathology**
Others*= Cerebral palsy (3), Meningitis (1), Trisomy 21 (1).

Oral candidiasis and gastroenteritis were the most frequent associated pathologies 38.4% and 23.3%.

Table 3: Distribution of malnourished children according to length of hospitalization, outcome

Variables	Frequency	percentage
Duration of hospitalization		
≤ 7 days	87	54,7
8 to 10 days	53	33,3
> 10	19	12
Become		
Successfully treated	148	93,1
Died	11	6,9

The average length of hospitalization was 8 days with extremes of 3 to 17 days, the lethality was 6.9%.
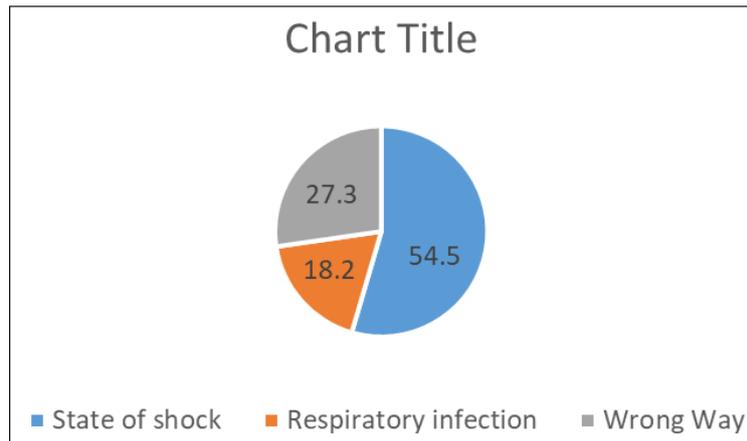
Figure 4: Distribution of children according to death factor

The state of shock was the most noted factor of death with 54.5% of cases.

DISCUSSION

During our study, the hospital prevalence of severe acute malnutrition was 14.7%. Our result is comparable with that of Camara Emmanuel, Diop Mamadou Moustapha, Barry Ibrahima Koolo [6] in 2021 at the pediatric department of Labé (regional hospital) in Conakry (17.62%) [6]. Traoré F had found in 2014 at the CHU-GT of Bamako (national hospital) [7] a lower prevalence of 2.6% [2, 8]. In the health pyramid of Mali, the CSRéf represent the first level of reference, they receive patients coming directly from the communities, but it is the community that is at the heart of screening and referral of cases of malnutrition. We have seen the maximum admissions during the months of July and August with 15.7% and 19.5% respectively. These results agree with those of Bagayoko A in 2017 [8] who found 17.9% and 25.6% in July and August respectively. This period of high admission of cases of severe acute malnutrition corresponds in Mali to the lean season when households no longer have enough stock for food security.

The socio-demographic profile of the mothers of children hospitalized for severe acute malnutrition in the pediatric service of CSRéf of the commune I had the following characteristics: Mothers aged 20 to 35 (52.2%), with no schooling (61.6%), married (95%), housewives (66%) and multiparous (54.1%). Our results

are comparable to those of Camara Emmanuel, Diop Mamadou Moustapha, Barry Ibrahima Koolo [6] where mothers are uneducated (69.57%), married (91.30%) and housewives (65.22%). Diarra N. in 2015 [5] has in his study mothers with no schooling at 74.4%, married at 92.9%, multipara at 35.3%, housewives at 75.6%. The results of these studies are comparable. In Africa, in most of our countries, improving the rate of schooling for girls remains a major challenge. We identified 54.1% of boys, i.e. a sex ratio of 1.17. Our results are consistent with those of studies [6, 7, 9] who respectively have a male/female sex ratio of 1.19; 1.3 and 1.1. On the other hand, Bagayoko A. 2017 [8]; Diarra I. [10] in 2015 and Diarra N. 2015 [5] respectively have a girls/boys sex ratio of 0.77; 0.79 and 0.9. This discrepancy could be explained by the difference between the study periods. The average age of our children was 18 months. Our result is consistent with that of the study [6], which had an average age of 17.76 months ± 13.08.

Children aged 12 to 24 months were more affected by severe acute malnutrition in our sample, i.e. 55%, Traoré F. 2014 [7] and Sissoko F. 2010 [11] had the same predominance of children aged 12 to 24 months, i.e. 58 respectively, 50% and 53.2%. Camara Emmanuel, Diop Mamadou Moustapha, Barry Ibrahima Koolo [6] also noted that 59.78% of children are between 6 and 23 months old. This period of life (12 to

24 months) corresponds to the weaning of children and the transition to family food, which in most cases is not carried out under ideal conditions, which makes the stage difficult to cross for children of this age. We have 42.1% of weaning before 24 months, the main cause of which was the occurrence of a new pregnancy in 53.4% of cases. Azagoh-K R et al., at the Treichville University Hospital [12] published in 2013 a rate of 94% weaning before 18 months. In the EDSM-VI [3], the average duration of breastfeeding was 21.7 months in 2018. This finding is explained by the fact that mothers of children are generally too busy with housework, which is why pushes them to rapidly wean infants without waiting 24 months or more.

In our study, 55.3% of children benefited from complementary feeding from 6 months and late after 6 months in 23.3% of cases. Diarra N., in 2015 [5] in his study found that 46.15% of severely malnourished children received complementary feeding from 6 months and 21.7% had received it late after 6 months.

Lack of appetite was the main reason for consultation in our study, i.e. 32.7%. Traoré F. and Diarra N. 2015 [7, 5] also reported anorexia but at a higher frequency 64.7% and 91.7%.

The marasmus (doldrums) was the most frequent clinical form of severe acute malnutrition 83.6% followed by kwashiorkor 3.8% and the mixed form 12.6%. Other studies [11, 6, 8] have respectively 80.3%; 89% and 91.1% for marasmus. Our results are comparable, this is explained by the fact that indeed undernutrition in the majority of cases relates to energy intake.

The pathologies associated with severe acute malnutrition in hospitalization were: digestive candidiasis 32.1%, gastroenteritis 23.3%, pneumopathy 17.5%, HIV 6.3%. The same pathologies were identified by Sissoko F. in 2010 [11] at different frequencies: diarrhea in 41.6%, oral candidiasis in 35.8% and pneumopathy in 30.1%. On the other hand, Bagayoko A. [8] mainly found malaria associated with acute malnutrition in 92.9% of cases. In our study the mortality was 6.9%, Traoré F. [7], Camara Emmanuel, Diop Mamadou Moustapha, Barry Ibrahima Koolo et al., [6] and Sissoko F. [11] reported higher mortality of 9%, 11% and 11.6% respectively. In fact, the CSRéf refer serious cases to the University Hospitals, but even in the presence of effective care, mortality remains unpredictable in the event of severe acute malnutrition with complications.

CONCLUSION
In the health district of Commune I of Bamako, the hospital prevalence of severe acute malnutrition is now very high. The best solution to this

high morbidity of severe acute malnutrition involves good birth control and the promotion of best feeding practices (exclusive breastfeeding up to 6 months, complementary feeding and dietary diversification from 6 months, continued breastfeeding up to 24 months or more, etc.) for the benefit of infants and young children.

Conflicts of interest: This work is free from any conflict of interest.

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