A case-control study of severe acute malnutrition in children inTete (Mozambique)

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INTRODUCTION

Undernutrition is one of the most prevalent pathologies worldwide, and its eradication would significantly rise life expectancy of the affected population. However, knowledge about its pathogenesis and its epidemiological context, as well as its links with other pathologies, is largely limited[1].

According to the WHO, in 2015, the acute malnutrition affected a total of 50 million of children younger than 5-year-old, a 7% of all the children in the world[2]. Among these, more than a quarter out of the total live in Africa. Of theses, 4.3 million of children suffer from acute severe malnutrition according to the WHO estimates in 2016[3].

In 2015, 45% of deaths of children younger than 5-year-old was related in one way or another to malnutrition[4]. Children suffering from serious acute malnutrition have 9 times more chances of dying than the non-undernourished ones[5].

Acute malnutrition is a pathological state whose determinant and causal factors are still a complex enigma[6]. This has impeded to clarify the reason why some children, under the same conditioning factors, develop different clinical manifestations and mixt forms[7].

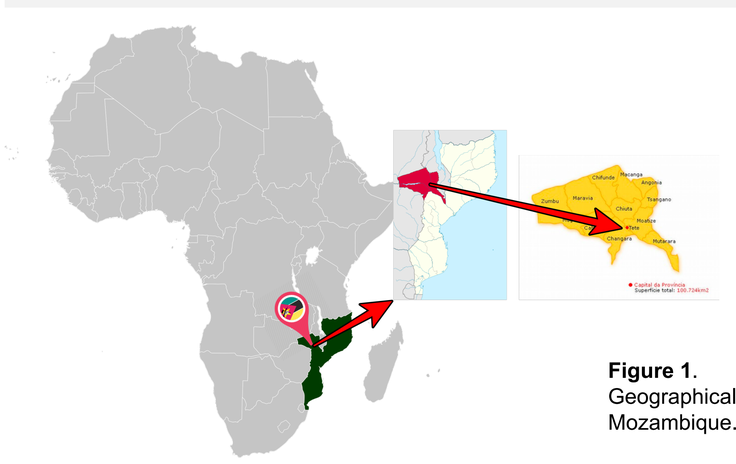

Figure 1.
Geographical location of Tete, Mozambique.

MATERIAL AND METHODS

DESIGN OF THE STUDY

A study of cases and controls was carried out with a final sample of 69 children (23 cases and 46 controls), aged from 28 days to 5-year-old, coming to the Tete Provincial Hospital and the health centres #2 and #3, in Mozambique. Data were collected during the following periods: 1st – 30th September 2015 and 1st – 10th October 2016.

PROCEDURE OF SAMPLING AND SELECTION OF PARTICIPANTS

Using the WHO Anthro® software and the parameters of weight, length and height, the z-score value was calculated for the following anthropometrics indexes:

- **WHZ**: Z score of Weight for the height. Short term nutritional state is reflected.
- **WAZ**: Z score of Weight for the age. Short term nutritional state is reflected.
- **HAZ**: Z score of height for the age. Long term nutritional state is reflected.

Using this information we get classified the children in cases and controls (fig. 2)

DATA COLLECTION

Data were collected through a structured questionnaire translated to Portuguese (official language) by data collectors with an specific trained focused on the questionnaire and the anthropometrics measures.

DATA COLLECTED

Age, socio-environmental, personal and obstetric medical background data and a diet survey were collected.

STATITICAL PROCESSING AND DATA ANALYSIS

Data were introduced with Epi-Info, 3.5.4 version, they were then exported to an IBM Statistic Program for Social Sciences (SPSS®), 21 version, for the data cleaning and analysis

Odds Ratio (OR), the p-value and the confidence interval up to 95% (CI 95%) were calculated through the chi-square (Pearson) test. If the test application criteria weren't fulfilled, the exact Fisher test was applied.

Means and standard deviations were used for continuous variables. In the continuous numeric ones, the Student t test was used to calculate the mean, the DS, the p-value, the value of t and the CI 95%.

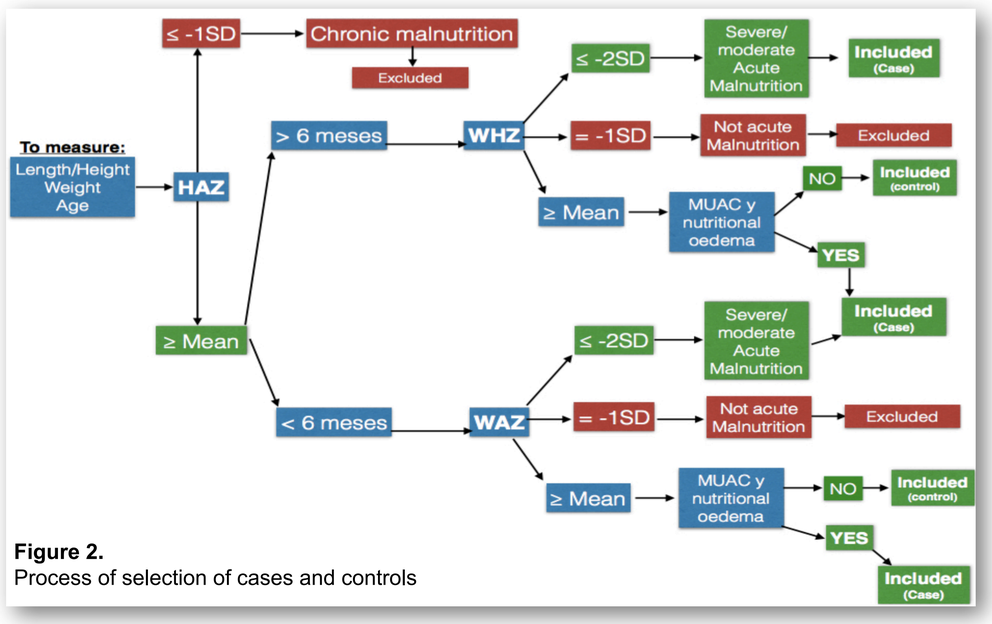

Figure 2.
Process of selection of cases and controls

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ABSTRACT

Introduction: Acute malnutrition is a highly prevalent disease and it is linked to a great deal of younger than 5-year-old children deaths. The knowledge in the scientific community about the pathogenesis and epidemiological context is not fully defined. There are few data about the social, economic, environmental features of acute malnutrition and its risk factors.

Aims: To establish the risk factors related to severe and moderate acute malnutrition. To compare with the existent data about acute malnutrition and to carry out a comparative between the observed characteristics and those of the chronic form. To suggest actuation plans from this study's conclusions.

Material and methods: In Tete, Mozambique, a study of 69 patients' cases and controls (23 cases and 46 controls) was carried out. Their ages went from 28 days to 5-year-old. Familial and maternal variables, medical and diet history and socio-environmental features of the child's habitat were evaluated.

Results: Risk factors were found to be the oldest maternal age now (p 0,001; OR=2,97 [CI95% 1,03 – 8,60] for those older than 24), the fact of having siblings (OR 7,39 [CI95% 1,55 – 35,33]; p 0,006), a bigger average of siblings (p 0,016) and the use of eating tools (p 0,045). As a protective factor, the fact of having had the first pregnancy at teenage (OR 0,233 [CI95% 0,074 – 0,738]; p 0,01).

Conclusions: Acute malnutrition risk factors were found to be: at the maternal level, her oldest age; in the family structure, the fact of having siblings and the highest number of these; and regarding the eating habits, the use of tools when eating. As a protective factor, the fact of having had the first pregnancy at teenage.

We confirm the hypothesis that there are multiple factors affecting the acute malnutrition development, and that action must start from the perinatal period, both at health and political levels.

In order to be able to assess the differences between chronic and acute malnutrition risk factors, new studies will be needed: studies that determine in an isolated way the specific characteristics of each one of them.

AIMS

This study's main objective is to determine the socio-environmental, family and personal characteristics that are related to the apparition of serious acute malnutrition in the child population. As a secondary goal of this study, we will compare with the existent data about acute and chronic malnutrition characteristics.

RESULTS

***Table 1**. Distribution of moderate/serious acute malnutrition according to mother's characteristics (N=69). Data are expressed in frequency (%) or mean ± SD (Standard Deviation)*

	Acute malnutrition	Non-malnourished	Total	p	OR Crude	CI95%
	N=23	N=46	N=69			
	n (%)	n (%)	n (%)			
	Mean ± SD	Mean ± SD	Mean ± SD			
Current mean age	26.4 ± 5.05	22.76 ± 3.45	-	0.001*	2.97**	1.03 – 8.60
Studies						
No studies	9 (39.1%)	26 (56.5%)	35 (50.7%)	0.173	-	-
With studies	14 (60.9%)	20 (43.5%)	34 (49.3%)			
Mother with own revenues	7 (30.4%)	6 (13%)	13 (18.8%)	0.107	-	-
Age of the mother at her first pregnancy	18.78 ± 2.68	17.78 ± 2.11	-	0.095	-	-
First pregnancy during teenage	13 (56.5%)	39 (84.8%)	52 (75.4%)	0.01*	0.233	0.07 – 0.74
Number of pregnancies	3.04 ± 1.74	2.28 ± 1.48	-	0.063	-	-

*Statistically significant variable (p value < 0.05).
**OR Crude of mothers older than 24-year-old VS younger.

***Table 2**. Distribution of the moderate/serious acute malnutrition depending on socio-environmental characteristics of the child's entourage (origin, housing and family) (N=69). Data are expressed in frequency (%) or mean ± SD (Standard Deviation)*

	Acute malnutrition	Non-malnourished	Total	p	OR Crude	CI 95%
	N=23	N=46	N=69			
	n (%)	n (%)	n (%)			
	mean ± SD	mean ± SD	mean ± SD			
Origin area						
Urban	21 (91.3%)	43 (93.5%)	64 (92.8%)	1	-	-
Rural	2 (8.7%)	3 (6.5%)	5 (7.2%)			
Family characteristics						
Siblings	21 (91.3%)	27 (58.7%)	48 (69.6%)	0.006*	7.39	1.55 – 35.33
Being the youngest of siblings	17 (73.9%)	26 (56.5%)	43 (62.3%)	0.160	-	-
Mean of siblings	2.04 ± 1.22	1.25 ± 1.26	-	0.016*	-	-
Living with other family members	19 (82.6%)	36 (78.3%)	55 (79.7%)	0.760	-	-
Environmental characteristics						
House's walls material						
Wood	2 (8.7%)	19 (21.7%)	12 (17.4%)	0.312	-	-
Cement	16 (69.6%)	30 (65.2%)	46 (66.7%)	0.718	-	-
Mud	5 (21.7%)	6 (13%)	11 (15.9%)	0.487	-	-
Floor material						
Earth	6 (26.1%)	14 (30.4%)	20 (29%)	0.707	-	-
Cement	17 (73.9%)	32 (69.6%)	49 (71%)	0.707	-	-

*Statistically significant variable (p value < 0.05).

***Table 3.** Distribution of the moderate/serious acute malnutrition depending on their dietary background and their diet habits (N=69). Data are expressed in frequency (%) or mean ± SD (Standard Deviation)*

	Acute malnutrition	Non-malnourished	Total	p
	N=23	N=46	N=69	
	n (%)	n (%)	n (%)	
	Mean ± SD	Mean ± SD	Mean ± SD	
Breastfeeding months	12.09 ± 7.29	10.43 ± 6.91	-	0.361
Exclusive breastfeeding until 6-month-old	11 (47.8%)	14 (30.4%)	25 (36.2%)	0.157
Beikost introduction age				
<6 months	12 (52.2%)	30 (65.2%)	42 (60.9%)	0.295
≥6 months	11 (47.8%)	16 (34.8%)	27 (39.1%)	
Beginning of consumption of foods				
Cereal	5.09 ± 1.51	4.9 ± 2.21	-	0.731
Fruit	7.24 ± 2.49	8.17 ± 2.90	-	0.283
Vegetables	9.37 ± 2.17	9.32 ± 7.54	-	0.981
Meat	10.21 ± 3.72	10.0 ± 4.22	-	0.885
Fish	9.41 ± 2.85	9.19 ± 3.41	-	0.824
Eggs	9.13 ± 2.74	13.45 ± 10.02	-	0.141
Legumes (beans)	9.3 ± 2.94	7.27 ± 3.19	-	0.212
Juice	6.53 ± 1.96	7.32 ± 3.91	-	0.416
Tools for eating	23 (100%)	38 (82.6%)	61 (88.4%)	0.045*
Tools washed with soap	20 (87%)	35 (89.5%)	55 (88.5%)	0.765

*Statistically significant variable (p value < 0,05).

CONCLUSIONS

- Acute malnutrition risk factors were found to be: at the maternal level, her oldest age; in the family structure, the fact of having siblings and the highest number of these; and regarding the eating habits, the use of tools when eating. As a protective factor, the fact of having had the first pregnancy at teenage.
- We confirm the hypothesis that there are multiple factors affecting the acute malnutrition development, and that action must start from the perinatal period, both at health and political levels.
- In order to be able to assess the differences between chronic and acute malnutrition risk factors, new studies will be needed: studies that determine in an isolated way the specific characteristics of each one of them.