Nutrición Hospitalaria

Trabajo Original

Pediatría

Frequency of malnutrition in children and adolescents with child maltreatment
Frecuencias de mala nutrición en niños y adolescentes con maltrato infantil

Verónica Martín-Martín[1], Carolina Romo-González[2], José Francisco González-Zamora[3]

[1]Epidemiology Research Department; [2]Subdirección de Medicina Experimental; and [3]Subdirección de Investigación Médica. Instituto Nacional de Pediatría. Mexico City, Mexico

Abstract

Introduction: child maltreatment (CM) can have a negative impact on physical and mental health in childhood and throughout life.

Objective: to determine the frequency of malnutrition in cases of CM from the Clínica de Atención Integral al Niño Maltratado (CAINM) of the Instituto Nacional de Pediatría (INP), Mexico.

Material and methods: this was a cross-sectional, retrospective, descriptive study of children with CM. Height/age, weight/height, and body mass index/age were used to determine malnutrition status (undernutrition and overweight or obesity). The frequency of malnutrition by age group and sex were compared using χ^2 tests. The prevalence of malnutrition at CAINM was compared to that expected in Mexico (ENSANUT-2012), serving as a reference for children without CM, using one-sample Poisson tests.

Results: of the 117 cases, 41 % presented wasting or overweight/obesity, and 25 % were growth-stunted. Neither wasting nor stunting displayed any difference between age groups (p > 0.05). Overweight/obesity was observed more frequently in adolescents than in schoolchildren (p < 0.05). Being overweight or obese was most frequently associated with sexual abuse, and wasting and stunting were most often associated with neglect. Compared to the population without CM, the group under 5 years of age had a higher prevalence of wasting (p < 0.01), and those aged 5 to 11 years had a higher prevalence of both wasting and stunting (p < 0.001).

Conclusions: CM cases were characterized by acute undernutrition and stunting as well as by adolescents who were overweight or obese. Malnutrition in the pediatric population should be analyzed from a wider perspective, including possible CM.

Correspondence:

Verónica Martín-Martín. Departamento de Investigación en Epidemiología. Instituto Nacional de Pediatría. Av. Insurgentes Sur núm. 3700-C, Col. Insurgentes Cuicuilco, Del. Coyoacán. Mexico City 04530, Mexico
e-mail: veromar27@yahoo.com

Resumen

Introducción: el maltrato infantil (MI) puede afectar la salud física y mental en la niñez y a largo plazo.

Objetivo: determinar las frecuencias de mala nutrición en casos de MI de la Clínica de Atención Integral al Niño Maltratado (CAINM), perteneciente al Instituto Nacional de Pediatría de México.

Métodos: estudio transversal, retrospectivo y descriptivo. Se utilizaron los cocientes de peso/talla, talla/edad e IMC/edad. Las frecuencias de mala nutrición (desnutrición y sobrepeso/obesidad) se compararon entre los grupos de edad y sexo a través de la prueba del χ^2. Utilizando pruebas de Poisson para una sola muestra se compararon las prevalencias de la mala nutrición con las esperadas en México (ENSANUT-2012).

Palabras clave:

Maltrato infantil. Mala nutrición. Sobrepeso/obesidad. Desnutrición. Talla baja. Niños/adolescentes.

Resultados: de los 117 casos de MI, el 41 % presentaban emaciación o sobrepeso/obesidad, y el 25 % talla baja. Ni por emaciación ni por talla baja hubo diferencias entre los grupos de edad (p > 0,05). La frecuencia del sobrepeso/obesidad fue mayor en los adolescentes que en los escolares (p < 0,05). En el grupo de abuso sexual destacó el sobrepeso/obesidad; en el de negligencia, la emaciación y la talla baja. En comparación con las prevalencias de los niños sin MI, los niños < 5 años tuvieron prevalencias más altas de emaciación (p < 0,01); los de 5 a 11 años, de emaciación y talla baja (para ambas, p < 0,001).

Conclusiones: los niños con MI se caracterizaron por desnutrición y talla baja, así como también por sobrepeso/obesidad en los adolescentes. La mala nutrición en las poblaciones pediátricas debe analizarse desde una perspectiva amplia, incluido el posible maltrato infantil.

INTRODUCTION

The World Health Organization defines child maltreatment (CM) as abuse and neglect involving children and adolescents under 18 years of age (1). The diagnosis and care of a child with CM is not simple due to variations in the nature of the abuse or neglect, along with its clinical manifestations, severity, lack of knowledge, and the deficit of specialized interdisciplinary and multidisciplinary centers.

CM most often occurs in a combined form (2). The negative effects of CM, either due to neglect or physical and psychological/emotional abuse, can lead to malnutrition (3-5).

Malnutrition refers to deficiencies or excesses in nutrient intake, imbalance of essential nutrients, or impaired nutrient utilization. The double burden of malnutrition consists of both undernutrition and overweight and obesity, as well as diet-related noncommunicable diseases. Undernutrition manifests in four broad forms: wasting, stunting, underweight, and micronutrient deficiencies (6).

Malnutrition, such as acute undernutrition (wasting), stunting, overweight or obesity, involves a complex interaction of medical and psychosocial factors. Characteristics of acute undernutrition are the loss of lean and fatty tissue, manifested by wasting or thinness, which confers a greater risk for infections and death. Stunting is the most common manifestation of chronic undernutrition in low-income and middle-income countries, reflecting the cumulative negative effects of suboptimal health conditions and inadequate nutrition and psychosocial care over time. Stunting has medium- and long-term implications, such as lower school achievement, cognitive deficits, and diminished work capacity. Conversely, obesity is a complex and multifactorial disease characterized by an excess of body fat; it is associated throughout life with the earliest risk of suffering from chronic degenerative diseases and death (7,8).

Several reports show a relationship between malnutrition status and CM: between undernutrition and neglect (9,10) and between overweight/obesity and CM (mainly physical or sexual abuse) (11,12). However, most studies link a history of CM with overweight and obesity in adulthood (12-15). Little is known about the frequency of the different malnutrition conditions in children who have experienced CM (16-18).

It has been reported that the relationship between nutritional status and CM (specifically, physical and sexual abuse in children under 12 years) has a greater frequency of acute undernutrition and stunting in girls who were physically abused, and of overweight and obesity in girls who were sexually abused (18). However, there is no information among an important group of youth affected by CM: adolescents. Therefore, the aim of this study was to describe the frequency of undernutrition, stunting, overweight and obesity in children and adolescents admitted to the *Clínica de Atención Integral al Niño Maltratado* (CAINM) of our institution, the *Instituto Nacional de Pediatría* (INP), who experienced different types of CM.

METHODS

STUDY DESIGN

This was a cross-sectional, retrospective, descriptive study.

SETTING

A third-level pediatric hospital, INP, registered the cases of CM patients who were admitted for a year in the care of CAINM. This work was approved by the Institutional Review Board (Record No. 2020/015).

PARTICIPANTS

It included 131 medical records of cases of underage patients (under 18 years old) obtained from June 2013 to May 2014 who were admitted at CAINM-INP. The inclusion criteria were the availability of medical records of cases with a diagnosis of CM in any of its forms that contained complete information on registry number, birthdate, sex, weight, height, and family socio-economic status (SES), resulting in 117 cases.

In total, 90 % of all cases of CM came from the outpatient and emergency services of the INP; the remaining cases came from the orthopedics, internal medicine, gastronutrition, neonatology, and neurology services.

VARIABLES

Weight, height, body mass index (BMI), wasting, stunting, overweight/obesity, CM, and type of CM (physical abuse, sexual abuse, psychological/emotional abuse, neglect and polyvictimization).

CHILD MALTREATMENT

Four types of CM, physical abuse, sexual abuse, psychological/emotional and neglect, and polyvictimization, were considered. Polyvictimization cases refer to situations in which the medical records contain a description of more than one type of CM.

The child or adolescent was taken to the third level hospital by a parent or tutor (the father, mother, relative or foster care staff) in cases of the following: sexual abuse in any of its forms, physical injuries and trauma, neglect, abandonment, inappropriate behavior or emotional symptoms, or other situations.

Pediatricians who had initial contact with children with suspected CM referred them to CAINM. This clinic consists of an interdisciplinary group of experts in the CM area, including the following specialties:paediatrics, nutrition, mental health, social work and law. These experts are also trained according to the Consensus for the Study and Comprehensive Care of Maltreated Children (20,21). The records provide information on the SES of the patient based on the INP classification (22). SES was categorized as follows: level IX, which is the one that is exempt from payment of fees for medical services (they are mainly for foster children and adolescents); levels 1 and 2 have low SES, level 3 has medium-low SES, levels 4 and 5 have medium-high SES, level 6 has high SES or social security, and K level has higher SES (22).

NUTRITIONAL STATUS

All the participants were measured and weighed when they entered CAINM. The anthropometric evaluation was performed by the same nutrition expert at each consultation (the one who subscribes) according to Lohman's methodological criteria (23).

Before noon, the children were weighed and measured with minimal clothing. Recumbent length was measured until the age of two years with the help of a nurse. One measurer placed a hand on the child's feet and kept the heels against the vertical board to ensure that the knee was extended. The subject's head was held with the Frankfort Plane aligned perpendicular to the plane of the measuring table.

Stature was measured in the vertical stadiometer with the child's body weight distributed evenly on both feet, placing the head in the horizontal Frankfort Plane with arms hanging freely at the sides of the trunk.

BIAS

We identified selection bias because the patients included were those who attended a referral hospital. Furthermore, information bias was also included because CM diagnostic practices depend on place and time of evaluation. Last, we identified an information bias during the analysis, as it lacked a multivariate analysis, and possible confounding variables were not considered.

STUDY SIZE

The sample was non-probabilistic for convenience using the records of diagnosed CM cases collected over a year. Sample size was determined for a descriptive study based on the malnutrition frequencies of a study in the reference center for maltreated children under 11 years of age (18,19). The sample size was calculated according to an estimate based on previous results from the study by Martin-Martin and Loredo-Abdala 2010, resulting in the following sample sizes for wasting, stunting and overweight/obesity: 114, 115, and 117, respectively. This study was then analyzed by age group (< 5, 5-11 and 12-17 years).

NUTRITIONAL STATUS

The following indices were calculated based on age and sex: height or length/age (H/A), weight/length or weight/height (W/H) and BMI/age; [BMI = weight (kg) / height^2 (m^2)]. The Z-score indices from the OMS-2006 child growth standards were used as the reference for children younger than 2 years, and the Centers for Disease Control and Prevention (CDC-2000) standards were used for children over 2 years old. Overweight and obesity diagnoses were calculated by means of the BMI/age ratio. In children younger than 5 years old, the cut-off points for BMI/age were $Z = 2$ to 3 for overweight and $Z \geq 3$ for obesity. In children 5 to 17 years old, the cut-off points for BMI/age were $Z = 1$ to 2 for overweight and $Z \geq 2$ for obesity.

To determine acute undernutrition in children younger than five years old, the W/H indicator was used, whereas BMI/age was used for the remaining age groups. The classifications were as follows: for mild undernutrition, wasting (W/H) or thinness (BMI/age) ($Z = -1$ to -2); for moderate undernutrition, wasting (W/H) or thinness (BMI/age) ($Z = -2$ to -3); and for severe undernutrition, wasting (W/H) or thinness (BMI/age) ($Z \leq 3$). Chronic undernutrition (stunting) was determined by the index H/A ($Z \leq 2$) (24-26).

STATISTICAL METHODS

Descriptive statistics were used for age, sex and anthropometric variables; the chi-square (χ^2p) test was used to compare the frequencies of the nutrition states across age groups. The frequencies of acute undernutrition (moderate-severe), overweight/obesity and stunting of the groups were compared with those of the study mentioned above that described malnutrition states in a population of 178 children under 5 and 5-11 years old with only two types of CM — physical and sexual abuse; the children belonged to the same clinic as the children in this study (18).

The prevalence of malnutrition in CM was compared using a one-sample Poisson test, with the population prevalence of malnutrition expected in Mexico (ENSANUT-2012) serving as a reference for children without CM (27,28). In all cases, $p < 0.05$ was considered statistically significant.

RESULTS

PARTICIPANTS

Of a total of 131 cases of CM within a one-year period at the reference centre for maltreated children of a third level hospital, fourteen clinical files were excluded because they did not fulfil the inclusion criteria. Of the 117 remaining cases, 53 % were females.

The age ranged from 0.1-17.7 years old, with an average age of 6.8 ± 4.2 years (Table I describes the characteristics of the population studied). In total, 81 % of the population had a low SES (1X, 1N and 2N) whereas 16 % had a medium SES (3N).

CHILD MALTREATMENT TYPE

The most prevalent form of CM was physical abuse, and the least prevalent form was psychological/emotional abuse. With respect to age range, the most frequent types of CM were as follows: physical abuse in children younger than 5 years old, sexual abuse among schoolchildren, and physical abuse and polyvictimization among adolescents. However, polyvictimization had the same prevalence among both schoolchildren and adolescents (Table I). It is worth mentioning that 19.6 % of the studied sample also experienced domestic violence.

NUTRITIONAL STATUS

In total, 41 % (n = 48) of the sample suffered from acute undernutrition (mild, moderate and severe) or overweight/obesity. The distribution was 26 % (n = 31) undernutrition, 11 % (n = 13) overweight and 3 % (n = 4) obesity; however, there was no difference among the age groups or sexes ($p > 0.05$) (Table II).

Table I. Characteristics of the population studied

Characteristics	Children aged < 5 yrs n = 48	School-aged children (5-11 yrs) n = 46	Adolescents (12-17 yrs) n = 23	Total n = 117
Age, SD	2.1 ± 1.5	8.0 ± 2.0	14.4 ± 1.6	6.8 ± 4.2
Sex, n (%)				
Female	22 (46)	25 (54)	15 (65)	62 (53)
Male	26 (54)	21 (46)	8 (35)	55 (47)
Child maltreatment, n (%)				
Physical abuse	20 (42)	10 (22)	(30)	37 (32)
Sexual abuse	8 (17)	12 (28)	3 (13)	23 (20)
Psychological/emotional abuse	3 (6)	2 (4)	4 (17)	9 (8)
Neglect	12 (25)	10 (22)	3 (13)	25 (21)
Polyvictimization	5 (10)	12 (26)	6 (26)	23 (20)
Anthropometric measurements*				
Weight (kg)	10.9 ± 4.7	24.6 ± 10.1	48.3 ± 16.1	23.6 ± 16.9
Height (cm)	80.9 ± 17.0	119.7 ± 13.7	150.2 ± 10.3	109.8 ± 30.3
BMI (kg/m²)	15.9 ± 1.9	16.5 ± 3.4	20.9 ± 5.2	17.1 ± 3.8
Z height/age	-1.0 ± 1.5	-1.1 ± 1.7	-1.3 ± 1.6	-1.1 ± 1.6
Z weight/height	-0.3 ± 1.3	-----	-----	----
Z BMI/age	-0.17 ± 1.4	-0.38 ± 1.8	0.12 ± 1.47	-0.20 ± 1.6

*Values represent means and SDs.

Table II. Nutritional status by age group

Age group	Children < 5 yrs n = 48	School-aged children n = 46	Adolescents n = 23	Total n = 117
Nutritional status	n (%)	n (%)	n (%)	n (%)
Normal	34 (71)	25 (54)	10 (43)	36 (31)
Overweight	2 (4)	6 (13)	5 (22)	13 (11)
Obesity	0 (0)	2 (4)	2 (9)	4 (3)
Undernutrition[a+b+c]	12 (25)	13 (28)	6 (26)	31 (26)
Mild[a]	8 (17)	7 (15)	4 (17)	19 (16)
Moderate[b]	3 (6)	2 (4)	1 (4)	6 (5)
Severe[c]	1 (2)	4 (9)	1 (4)	6 (5)
Stunting	9 (19)	12 (26)	8 (35)	29 (25)

Degree of undernutrition (a, b and c).

Overweight and obesity

Obesity was not present in children younger than five years old; however, 4 % (n = 2) of these children were overweight. In the other age groups, the frequency of the combination of overweight and obesity was 17 % (n = 8) and 30 % (n = 7) in schoolchildren and adolescents, respectively, and statistically significant differences were found between these two age groups (χ^2p = 9.13, p < 0.05) (Table II).

Undernutrition

According to the level of undernutrition, 10 % (n = 12) of the cases presented moderate to severe undernutrition. The frequencies were similar across the age groups; additionally, there were no differences between sexes (p > 0.05) (Table II).

Stunting

In total, 25 % of the population presented stunting. The frequency of stunting was 9 %, 26 % and 35 % in children younger than five years old, in school-aged children and in adolescents, respectively; however, there were no differences between age groups or between sexes (p > 0.05) (Table II).

FREQUENCY OF STUNTING ACCORDING TO NUTRITION STATUS

There were no cases of obesity or stunting coexisting. Nevertheless, the frequency of stunting was accompanied by over-weight in 15 % of the total population, with a predominance in males (females 0 % and males 50 %; χ^2p = 5.31, p < 0.05).

However, the coexistence of stunting with undernutrition (moderate to severe) was 67 % (females 100 % and males 43 %; χ^2p = 4.28, p < 0.05) (Fig. 1).

FREQUENCY OF CHILD MALTREATMENT FOR TYPE OF MALNUTRITION

In children with overweight/obesity, sexual abuse was the most frequent form of CM. In children with undernutrition and stunting, it was neglect (Table III).
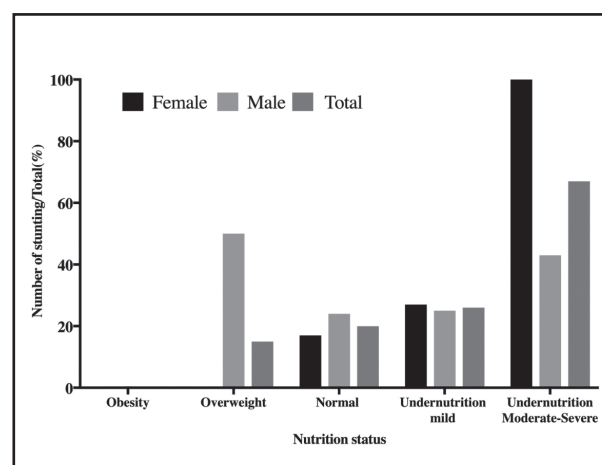

Figure 1.

Frequency of stunting according to nutrition status.

Table III. Nutritional status in different types of child maltreatment

Child maltreatment	Nutritional status				
	Normal 69	Overweight-obesity 17	Undernutrition* 31	Total 117	Stunting 29
n	n (%)	n (%)	n (%)	n (%)	n (%)
Physical n = 37	25 (68)	4 (11)	8 (22)	37/37 = 100	7 (19)
Sexual n = 23	12 (52)	7 (30)	4 (17)	23/23 = 100	1 (4)
Psychological/emotional n = 9	7 (78)	1 (11)	1 (11)	9/9 = 100	1 (11)
Neglect n = 25	14 (56)	1 (4)	10 (40)	25/25 = 100	14 (56)
Polyvictimization n = 23	11 (48)	4 (17)	8 (35)	23/23 = 100	6 (26)

*Moderate-severe.

COMPARISON STUDIES

The frequencies of malnutrition as compared with those of the study by Martín-Martín and Loredo-Abdala (18) in 2010 were not significantly different for undernutrition (moderate-severe) between the age groups under 5 years (8.3 % vs. 10.7 %, p > 0.05) or between the 5- to 11-year-old groups (13 % vs. 9.5 %, p > 0.05). Furthermore, there were no significant differences in the overweight-obesity frequencies among children under 5 years of age (4.2 % vs. 4.2 %, p > 0.05) or among those aged 5 to 11 (17.4 % vs. 22.6 %, p > 0.05). However, in the present study, the frequency of stunting in the age group 5 to 11 years was higher (26 % vs. 12 %, p < 0.05).

When the results were compared with those from ENSA-NUT-2012 (27) we observed that children under 5 years old with CM had a higher prevalence of undernutrition (moderate-severe) than expected for this population of children based on the national prevalence (p < 0.01).

For school-aged children with CM, the prevalence was higher than that expected based on the general population prevalence of undernutrition (moderate-severe) (p < 0.001) and stunting (p < 0.001).

In adolescents with CM, the prevalences of undernutrition and overweight/obesity did not differ from those expected based on the general population prevalence (p > 0.05).

The prevalence of stunting could not be compared with that expected in the population without CM because there was no information for this age group (Table IV).

DISCUSSION

The results of the study reveal the frequency of malnutrition status in children and adolescents with CM. The findings provide an indication of the presence of the two extremes of malnutrition (undernutrition and overweight/obesity).

Although the frequencies of stunting tended to increase with age, they did not differ between children and adolescents, nor did undernutrition. This study highlights the prominence in the frequency of undernutrition and stunting in all age groups, which can be attributed to the fact that one of the long-term consequences of undernutrition is stunting, as described by Mehta et al. (26).

The presence of CM is related to undernutrition in childhood (29). Some reports mention undernutrition as primarily a characteristic of neglect (9,30), since undernutrition is a prime example of neglect in childhood; stunting is also related to CM (31).

Undernutrition and stunting in some countries of the world remain unresolved (32). However, children with CM may be more vulnerable to these conditions. The presence of a higher prevalence of undernutrition and stunting in children with CM than in children without CM could be indicative of sequelae or causes of CM. Similarly, one study found a higher frequency of undernutrition in children with CM than in those without CM (33). Although it was not possible to compare the prevalence of stunting in adolescents vs. ENSANUT-2012, its prevalence is striking; however, the group of children under 5 years of age had a higher prevalence of undernutrition, and the school-age group had higher prevalences of undernutrition and stunting, which suggests a relationship of CM with undernutrition. Although the duration of CM (34) was not explored in this study, it is possible that at an older age, there is greater exposure to CM, which leads to chronic undernutrition reflected by stunting.

Additionally, socioeconomic factors are important because more than three-quarters of the study population had a low SES,

Table IV. Comparison of observed and expected prevalences of malnutrition in Mexican children with child maltreatment

Age group	Nutrition status	Observed cases	Observed prevalence (%)	95 % CI for observed prevalence	Expected prevalence by ENSANUT 2012 2012 (%)	1 sample Poisson Test p-value	
Children < 5 yrs (n = 48)	Overweight-obesity Undernutrition Stunting	2 4 9	4.2 8.3 18.7	0.5 0.5 8.6	15.1 21.3 35.6	9.7 1.6 13.6	0.4615 0.0079 0.3217
School-aged children (n = 46)	Overweight-obesity Undernutrition Stunting	8 6 12	17.4 13.0 26.1	7.5 4.8 13.5	34.3 28.4 45.6	34.4 1.5 7.0	0.0441 0.0001 0.0001
Adolescents (n = 23)	Overweight-obesity Undernutrition	7 2	30.4 8.7	12.2 1.0	6.2 31.4	35.0 1.9	0.8604 0.4583

and both undernutrition and stunting have been associated with low SES (35). On the other hand, we noticed that all the girls who presented with acute undernutrition also presented stunting, indicating that they are more affected than boys. This finding could be explained by discrimination against girls, which is conducive to undernutrition and a delay in obtaining medical attention (36).

With respect to overweight/obesity, adolescents had higher frequencies than school-aged children. Although the aetiology of obesity is multifactorial, the results could be related to hormonal-metabolic changes during this stage or to child maltreatment, as a possible consequence of CM is obesity (3). Additionally, there is a risk of obesity in adolescents who have suffered from CM (37,38).

Physical and sexual abuse have been related to the presence of overweight/obesity (39-41). Some reports also indicate a relationship between neglect and obesity in adolescents (5,42). In this study, within the group of adolescents, physical abuse and polyvictimization were the most frequent forms of CM, which may indicate a synergy between abuse and higher frequencies of overweight/obesity.

Conversely, children and adolescents with and without CM did not show any differences in overweight/obesity, suggesting that the frequency of this form of malnutrition may also be due to the overweight/obesity epidemic, which is a problem in Mexico (27).

Other studies have also failed to identify a difference in the prevalence of overweight and obesity in children and adolescents who are maltreated compared to those who are not maltreated (11,12).

This study has the strength that the cases were diagnosed by an interdisciplinary group and used anthropometric assessments conducted by a standardized researcher.

LIMITATION

There are few descriptive studies about malnutrition frequency in children with CM; they refer only to children, not to adoles-

cents, and they apply to only two specific types of CM (18). A limitation of the present study was that we did not have data that allowed us to determine whether the states of malnutrition described were a cause or consequence of CM. The high prevalence of malnutrition in our country, along with the multiple risk factors in its development, are confounding variables that were not considered in this study.

INTERPRETATION

In this studied population of CM, undernutrition and stunting were present in children, while overweight/obesity was present in adolescents. Malnutrition can be a reflection of CM, so its possible causes must be analysed, including this phenomenon.

GENERALITY

The frequencies observed in our study must be taken with caution, considering the national nutritional health problem of Mexican children. The high prevalence of malnutrition identified in patients with CM in this study must be considered only in countries with a similar prevalence of malnutrition in the general population.

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