Treatment of third-degree marasmus among children admitted to Assiut University Children Hospital: a clinical audit

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Introduction
Optimal infant and young child feeding can be achieved easily by encouraging mothers to breastfeed exclusively for the first 6 months and to introduce nutritionally adequate, safe, age-appropriate, and responsive complementary feeding starting at 6 months.

Patients and methods
The present study aimed to assess the degree of adherence of medical physicians to protocols for treatment of severe marasmus among children attending Assiut University Children Hospital during the period from 1 January to 30 June 2015 according to WHO guidelines (2003), which is locally approved and documented by nutrition unit of Assiut University Children Hospital as a reference standard. The study included 31 patients with third-degree marasmus whose age ranged from 6 to 36 months.

Results and conclusion
Data about mid-upper arm circumference, Z-score, stabilization, transitional, and rehabilitation phases were not fully fulfilled. Regarding the assessment of conscious level, dehydration, hypothermia, hypoglycemia, severe anemia, shock, and types of complications, most items were fulfilled well.

Keywords:
Assiut University Children Hospital, audit and malnutrition, children, third-degree marasmus

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Introduction

Adequate nutrition is defined as the intake and use of enough energy and nutrients to maintain nutritional and health well-being. Adequate nutrition is essential in early childhood to ensure normal growth, neurological and cognitive development, and healthy life. Adequate feeding and access to appropriate quality and quantity of foods are essential components of optimal nutrition for children [1].

Optimal infant and young child feeding can be achieved easily by encouraging mothers to breastfeed exclusively for the first 6 months and to introduce nutritionally adequate, safe, age-appropriate, and responsive complementary feeding starting at 6 months [2].

Evidence has shown that health in old age is associated with adequate nutrition and good health in earlier years of life. Therefore, there is a need to introduce qualitative and quantitative foods at earlier ages for children [3].

Of the 7.6 million annual deaths among children younger than 5 years, ~35% are because of nutrition-related factors[4].

Definition of third-degree severe chronic malnutrition

In children who are 6–59 months of age, severe acute malnutrition is defined as weight-for-height less than −3 Z-score of the median of the WHO growth standards or less than 70% of the median National Center for Health Statistics/WHO reference values, and a mid-upper arm circumference less than 115 mm [5].

Guidelines of treatment

The guidelines are divided in five sections:
(1) Emergency treatment
(2) General principles for routine care (the '10 steps')
(3) Treatment of associated conditions
(4) Failure to respond to treatment
(5) Discharge before recovery is complete.

General principles for routine care (the '10 steps')

There are ten essential steps:
(1) Treat/prevent hypoglycemia

(2) Treat/prevent hypothermia
(3) Treat/prevent dehydration
(4) Correct electrolyte imbalance
(5) Treat/prevent infection
(6) Correct micronutrient deficiencies
(7) Start cautious feeding
(8) Achieve catch-up growth
(9) Provide sensory stimulation and emotional support
(10) Prepare for follow-up after recovery [6].

Aim

The aim was to assess the degree of adherence of medical physicians to Assiut University Children Hospital protocols for treatment of severe marasmus according to WHO guidelines.

Patients and methods

Study site

Assiut University Children Hospital, inpatient units.

Study population

All cases with severe (third-degree) marasmus admitted to Assiut University Children Hospital from 1 January to 30 June 2015 were included in the study.

Inclusion criteria

The inclusion criteria were as follows:
(1) Children with nutritional causes of severe marasmus below − 3 Z-score with or without complications
(2) Children from 6 to 59 months of age.

Exclusion criteria

The following were the exclusion criteria:
(1) Children older than 6 months and older than 59 months
(2) Children with mild and moderate marasmus
(3) Children with kwashiorkor and marasmic kwashiorkor
(4) Children with non-nutritional causes of severe marasmus such as chronic illness
(5) Postoperative cases.

Data collection

The data were collected through reviewing medical records of patient with severe marasmus admitted to Assiut University Children Hospital during the study duration.

Data management and analysis

Statistical analysis was carried out using statistical package for the social sciences version 16 (SPSS; SPSS Inc., Chicago, Illinois, USA). Z-score was calculated for classification of severe (third-degree) marasmus. Descriptive statistics was calculated such as frequencies and ranges.

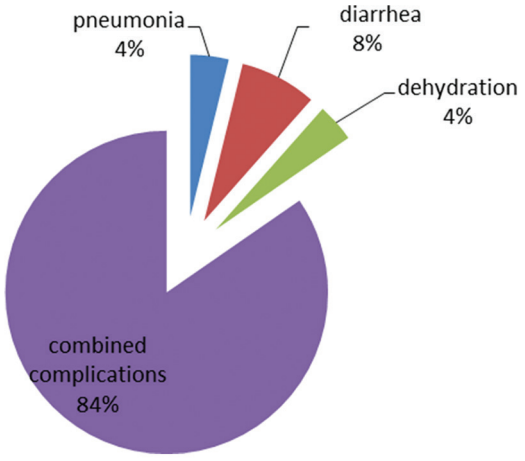
Results

The study results are given in Fig. 1 and Tables 1–7.

Conclusion and discussion

- Data about anthropometric measures (weight and height) were recorded, but mid-upper arm circumference was not recorded in 22.6% of cases, and Z-score was not recorded in 32.3% of cases.

Figure 1



Frequency of complications in children with severe marasmus.

Table 1 Recorded data about treatment of shock in seven cases with severe marasmus

	N=7 (*n* (%))
Treatment by giving oxygen	7 (100)
Giving intravenous glucose 10% (5 ml/kg)	
Yes	5 (71.4)
No	2 (28.6)
Intravenous fluids	
Treatment by intravenous fluids over 1 h	7 (100)
Dose of intravenous fluids	
Proper dose (15 ml/kg/dose)	4 (57.1)
Improper dose (20 ml/kg/dose)	3 (42.9)
Type of fluids used	
Ringer's lactate	2 (28.6)
Normal saline	5 (71.4)
Giving antibiotics	7 (100)
Measurement and recording pulse and respiratory rate every 10 min	
Properly done	5 (71.4)
Improperly done	2 (28.6)

Table 2 Recorded data about frequency and treatment of improved and nonimproved cases of shock in studied cases

	n (%)
Assessment of signs of improvement (*n*=7)	
Yes	6 (85.7)
No	1 (14.3)
Improved cases (*n*=6)	
Repeating intravenous fluids (15 ml/kg over 1 h)	
Yes	5 (83.3)
No	1 (16.7)
Switch to low hydran	
Yes	5 (83.3)
No	1 (16.7)
Route of giving low hydran (*n*=5)	
Oral	3 (60)
Nasogastric	2 (40)
Dose of low hydran	
Proper dose (10 ml/kg/h)	5 (100)
Improper dose	0.0 (0.0)
Duration of giving low hydran	
Proper duration (10 h)	4 (80)
Improper duration (>10 h)	1 (20)
Continuation of feeding with starter formula similar to F-75 (*n*=6)	
Yes	3 (50)
No	1 (16.7)
No available F-75 and continue feeding with F-67	2 (33.3)
Failure of improvement (*n*=1)	
Proper administration of maintenance intravenous fluids (4 ml/kg/h)	1 (100)
Transfusion of fresh whole blood slowly over 3 h	1 (100)
Dose of transfused blood	
Proper dose (10 ml/kg/h)	0.0 (0.0)
Improper dose (20 ml/kg/h)	1 (100)
Beginning feeding with starter formula similar to (F-75)	
Not done	1 (100)

F-75 is formula containing 75 kcal/100 ml and 0.9 g protein/100 ml, but formula similar to F-75 were used in studied cases. F-67 is formula containing 67 kcal/100 ml.

Table 3 Recorded data about treatment of hypoglycemia in children with severe marasmus

	n (%)
Conscious malnourished child	
Giving 50 ml glucose 10%	1 (100)
Route of administration by nasogastric tube	1 (100)
Advice to give formula similar to F-75 every 0.5 h for 2 h	1 (100)
Advice to give antibiotics	1 (100)
Advice to give feeding every 2 h	1 (100)

Table 4 Recorded data about treatment of severe anemia according to WHO guidelines

	N=31 (*n* (%))
Presence of severe anemia (Hb <4 g/dl or Hb 4-6 g/dl with respiratory distress)	
Present	4 (12.9)
Not present	27 (87.1)
Transfusion of whole blood (*n*=4)	4 (100)
Dose of transfused blood	
Proper dose (10 ml/kg/h)	2 (50)
Improper dose (>10 ml/kg/h)	2 (50)
Monitoring for signs of transfusion reactions (yes)	4 (100)
Monitoring of respiratory rate and pulse rate every 15 min (yes)	4 (100)
Treatment by iron in mild or moderate anemia for 2 months	
Yes	3 (75)
No	1 (25)

Table 5 Recorded data about treatment of hypothermia in four malnourished children according to WHO guidelines

	N=4 (*n* (%))
Follow-up of axillary temperature 2 hourly until it rises to >36°C	4 (100)
2-hourly feeding	
Properly done	2 (50)
Not done	1 (25)
Improperly done	1 (25)
Child warming	4 (100)
Giving antibiotics	4 (100)
Checkup random blood glucose	4 (100)
Ensuring child covering all the time	4 (100)

- Generalized edema was not assessed in 9.7% of cases.
- Regard treatment of hypothermia, resident doctors followed the guidelines, but 2 hourly feeding was not done in 25% of cases and improperly done in 25% of cases.
- Regard treatment of dehydration, treatment by giving low hydran dose was not done in 8.7% of cases, dose of low hydran was improperly done in 19.1% of cases, replacement of low hydran with formula similar to F-75 at 4–10 h was improperly done in 23.8% of cases, and monitoring of respiratory rate and pulse was improperly done in 4.8% of cases.
- Regarded oral feeding, most data were obtained, but improper advice for oral feeding was given in two cases.
- According to the timing of starting iron supplementation, 19 cases were given iron at proper time, two cases were given iron early before gaining weight, and seven cases were given iron therapy late.
- Data of management of electrolyte imbalance showed that potassium was not given in 3.2% of cases and magnesium was not given in 100% of cases.
- Recorded data of prevention and treatment of infection showed that improper choice of antibiotics was made in 19.4% of cases, treatment by improper dose of antibiotics in 6.5% of cases, and treatment by improper duration of antibiotics in 19.4% of cases.
- Regarding correction of micronutrient deficiency, vitamin A, multivitamin, folic acid, and zinc were not given in 6.5% of cases.

Table 6 Recorded data about stabilization phase in 29 studied cases

	N=29 (*n* (%))
Type of starter formula	
Properly done 'formula similar to F-75	14 (48.3)
Improperly done	
F-67 then formula (F-75)	8 (27.6)
F-67	4 (13.8)
Breast feeding then formula similar to F-75	3 (10.3)
Feeding by giving proper amount of milk	
Properly done	25 (86.2)
Improperly done (only in the first 2 days of stabilization phase)	4 (13.8)
Amount of calories	
Properly given (100 kcal/kg/day)	24 (82.8)
Improperly given (<100 kcal/kg/day)	5 (17.3)
Route of administration of feeding	
Oral	22 (75.9)
Nasogastric	1 (3.4)
Both	6 (20.7)
Duration of stabilization phase	
Properly done	
Follow the schedule properly	14 (48.3)
Improperly done	15 (51.7)
Presence of breast feeding (*n*=31)	
Present	18 (58.1)
Not present	13 (41.9)
Encouragement of breast feeding if present	
Yes	17 (94.4)
No	1 (5.6)
Encouragement of complementary starter formula beside breast feeding (*n*=18)	
Yes	17 (94.4)
No	1 (5.6)
Monitoring of:	
Daily body weight	29 (100)
Frequency of watery stool	29 (100)
Vomiting	29 (100)
Amounts of feeding offered and left over	29 (100)

- Data about advising for follow-up were fulfilled, but advising caregiver for feeding frequently with energy and nutrient-rich food was improperly done in four cases.

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Conflicts of interest

There are no conflicts of interest.

Table 7 Recorded data about rehabilitation phase in 29 studied cases

	n (%)
Type of milk formula used in rehabilitation phase	
Proper formula [formula similar to (F-100)]	24 (82.8)
Improper formula	
Feeding by F-67	3 (10.3)
Feeding by formula similar to F-75 alternative with F-67	2 (6.9)
Volume and frequency of milk formula	
Properly done	29 (100)
Encourage breast feeding if present in rehabilitation phase	
Yes	17 (94.4)
No	1 (5.6)

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