Changing Clinical Presentation of Severe Protein Malnutrition (PEM) in Infants.

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Abstract

The hospital based clinical cross-sectional study was designed to investigate the prevalence of oedematous malnutrition in early infancy.The study was undertaken among 65 infants who were suffering front severe malnutrition and admitted consecutively in the nutrition rehabilitation unit of Dhaka Shishu Hospital during 2004-2005. Nutritional status was determined anthropometrically. Anthropometric measurements were compared with that of NCHS standard. Clinical variables were recorded and analyzed according to WHO & Welcome classification. The study reflected majority)63%) of severely malnourished patients developed oedema before 6 months of age which meant that there was no age specificity regarding development of oedema in severe PEM. The study also showed that phase of wasting was not inevitable in oedematous malnutrition. Only 75% of kwashiorkor and 5.7% of patients with marasmic kwashiorkor developed oedema without passing through the phase of wasting ($P>0.05$). There was no significant ($p>0.05$) difference in the prevalence of hair and skin change between oedematous and non-oedematous patients. Some 31% of oedematous malnutrition and marasmic patient also shown hepatomegaly in 7% cases. All these findings showed a changing trend in the clinical presentation of severe PEM in comparison to classical presentation. Among the common associated illnesses, diarrhoea and pneumonia were most frequently observed. There was no age specificity regarding development of severe PEM in infancy. Contrary to classical view, a trend of oedematous malnutrition can occur at an earlier age without being prior passing through a state of wasting and without inevitably being associated with skin changes and mental abnormalities.

Key words: Infants, Clinical presentation, Nutritional Status, Z score.

Bangladesh Journal of Nutrition. Vol. 22-23 December, 2009-10. Institute of Nutrition and Food Science, University of Dhaka, Dhaka-1000, Bangladesh.

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Introduction

Malnutrition is the single most important child health problem of the developing world today. Over 200 million children of developing countries under the age of five years are malnourished[1]. About 80% of world's undernourished children live n Southeast Asia[2]. About 90% of children suffer from different grades of malnutrition. Malnutrition is a major health problem in Bangladesh[3]. The child nutrition survey of Bangladesh conducted in 1995-96 observed 59.7% of children between 6 and 71 months of age to be either stunted or wasted[4]. The median case fatality from severe malnutrition has remained unchanged over the past five decades and is typically 20-30% with the highest levels (50-60%) being among those with oedematous malnutrition[5]. It is an established fact that marasmus is usually present at a younger age than kwashiorkor, often in a child under 1 year of age and kwashiorkor is usually found in a child between 1 to 3 years of age. Our recent clinical observation indicates that severe PEM patients represent substantial number with nutritional oedema at a very early infancy without any other classically recognized manifestations of kwashiorkor, for example, without hepatomegaly or skin manifestations. These patients develop oedema usually without passing through the phase of wasting. Oedematous malnutrition is a medical emergency which needs immediate hospitalization for resuscitation and nutrition rehabilitation. So the delay in early diagnosis due to misleading clinical course and misleading clinical features of severe malnutrition results in increasing morbidity and mortality, which might have contributed to high unchanged mortality of severe malnutrition in last 50 years. Therefore if the clinical observations about these changing presentations of oedematous malnutrition are scientifically proved, it will help create awareness and knowledge about these charging presentations of severe PEM, particularly of oedematous malnutrition, among health workers and caretakers. As such these infants with severe malnutrition will be picked up, early diagnosed and treated accordingly, leading to reduction in morbidity and mortality of children in developing countries like Bangladesh.

Materials and methods

The present hospital based clinical cross-sectional study was conducted in Nutrition unit, Dhaka Shishu (Children) Hospital during April'2004 to April 2005. A total of sixty-five infants from either sex with severe malnutrition as per WHO[6] and Wellcome[7] classification were selected. After admission, a comprehensive medical history including familial, socio-economic, feeding history was collected by full interview with the mother or attendants. A thorough physical examination and anthropometry was done. Reference standard *was* taken as 50th centile of national center for health statistics (NCHS). Clinical variables were recorded. All

patients were examined on admission for complete blood count, hemoglobin estimation, routine *and* microscopic examination of urine and stool, serum total protein, serum albumin and globulin, serum electrolytes. Mantaux test and chest x-ray and urine for culture were done in relevant cases.

A questionnaire for interview was developed to obtain the cardinal feature of severe PEM. The questionnaire was field tested before commencement of the study. The data obtained were subjected to statistical analysis according to standard procedure. SPSS programmer was used for data analysis. Chi-square test (x^2) was used as the test of significance, value was calculated and p value <0.05 was considered as significant.

Results

All the 65 hospitalized severely malnourished infants included in this study were infants. They were divided into 3 groups, group I included infants up to 3 months, infants from 3 months to 6 months belonged to group II and group III included infants above 6 months. In each group infants were further stratified into severe wasting (marasmus), oedematous malnutrition (marasmic kwashiorkor and kwashiorkor) infants. Out of 65 studied cases 30 (46%) infants were severely wasted (marasmus) and 35 (54%) were suffering from oedematous malnutrition. Of the oedematous malnourished infants, 23 were marasmic kwashiorkor and 12 were kwashiorkor. The mean (± std) age of total cases (n=65) was 6.0 ± 2.8 months, while that of marasmic infants (n=30) was 5.2 ± 2.9 months, of marasmic kwashiorkor infants (n=23) was 5.2 ± 2.9 months, that of kwashiorkor infants (n=12) was 6.4 ± 2.2 months.

Nutritional status of studied infants were estimated by anthropometric measurement as presented in table 1. It shows that mean (±std) weight for age (W/A) of total studied cases (n=65) was 52.0±12.1%, weight for age z score (W/A z score) was -3.9±1.5; mean (±std) weight for length z score (W/L z score) was -1.3±1.5, mean (±std) length for age z (L/A z score) score was -3.9±2.1. Among the marasmic infants (n=30) mean weight for age was 46.3±6.7%, W/A z score was -4.6±0.9; mean (±std) W/L was 70.6±16.7%, W/L z score was --21.1±1.2; mean (±std) L/A was 83.0±5.4%, L/A z score was -4.3±1.6. Among the marasmic kwashiorkor infants (n=23) mean (±std) W/A was 50.4±9.9%, W/A z score was -3.9±1.4, mean (±std) W/L was 73.8± 25.4%, W/L z score was -1.3±1.4, mean (±std) L/A was 79.5±17.6 and L/A z score was -3.8±2.7. Among the kwashiorkor infants (n--12) mean (±std) W/A was 70.8±1.6%, W/A z score was -1.9±1.6, W/L was 102.4±18.9, W/L z score was 0.4±1.3; L/A was 82.1±1.26, L/A z score was -39±2.1. This shows that all the studied infants were suffering from chronic severe malnutrition.

Table-1: The anthropometrical status of studied population

Clinical Diagnosis		W/A	W/A (z score)	W/L	W/A (z score)	L/A	L/A (z score)
Marasmus (n=30)	Means± Std	46.3± 6.7%	-4.6:L 0.9	70.6± 16.7%	-2.1± 1.2	83.0± 5.4%	-4.3± 1.6
Marasmic Kwashiorkor (n=23)	Mean± Std	50.4± 9.9%	-3.9± 1.4	73.8± 25.4%	-1.3± 1.4	79.5± 17.6%	-3.8± 2.7
Kwashiorkor (n=12)	Mean± Std	70.8± 1.6%	-1.9± 1.6	102.4± 18.9%	+0.4± 1.3	82.1± 12.6%	-3.9 ± 2.1
Total (n=65)	Mean± Std	52.0± 12.1%	-3.9± 1.5	77.1± 23.4%	-1.3± 1.5	82.1± 12.6%	-3.9± 2.1

Age specific distribution of studied malnourished infants illustrates that out of 30 marasmus, infants in 5 (17%) cases ware diagnosed within three months of age, in 8 (27%) cases within 3 to 6 months and within 6 to 12 months in 17 (56%) cases. Marasmus kwashiorkor developed oedema within 3 months in 8 (35%) cases, within 3 to 6 months in 7 (30%) cases, within 6 to 12 months in 8 (35%) cases. Kwashiorkor developed oedema within 3 months in 1 (8%) case, within 3 to 6 months in 6 (50%) cases, within 6 to 12 months in 5 (42%) cases. Table-2 shows that 65% marasmic kwashiorkor patients and 58% kwashiorkor patients developed oedema before 6 months though it was not statistically significant (χ^2=6.07, df=4, p>0.05). It means that *there is no age specificity* for the development of marasmus, marasmic kwashiorkor and kwashiorkor

Table-2. Distribution of the infants according to Wellcome classification and age

Age	Marasmus	Marasmic kwashiorkor	Kwashiorkor
Up to 3 months	5 (17%,	8 (35%)	1 (8%)
3-6 months	8 (27%)	7 (30%)	6 (50%)
Above 6 months	17 (56%)	8 (35%)	5 (42%)
Total (n=65)	(n=30)	(n=23)	(n=12)

X^2=6.07, df=4, p>0.05.

Table-3. Distribution of infants according to clinical classification and sex (n=65)

Marasmus	Marasmic kwashiorkor	Kwashiorkor	Total
12 (40%)	15 (65%)	7(58%)	34
16 (60%)	8 (35%)	5 (42%)	31
30	23	12	65

Table-3 shows the sex distribution of studied patients. The infants were selected from either sex. This table shows that infants were predominantly male 22 (63%) out of 35 oedematous malnourished. Among 30 marasmic infants 12 (40%) were male and 18 (60%) were female, out of marasmic kwashiorkor 15 (65%) were male, 8 (35%) were female and in kwashiorkor patients 7 (58%) were male and 3 (42%) were female. The study shows that in the oedematous group infants were predominantly (63%) male.

Table-4. Phase of wasting of studied infants (n=65).

Wasting	Marasmic kwashiorkor		Kwashiorkor		Total	
Present	10	(43%)	3	(25%)	13	(37%)
Absent	13	(57%)	9	(75%)	22	(63%)
Total	23		12		65	

X^2 1.15, df=1, p>0.05.

Table-4 shows that only 10 (43%) of marasmic kwashiorkor and 3 (25%) kwashiorkor infants developed wasting before development of oedema, though it was not statistically significant (X^2= 1.15, df=1, p>0.05).

Table-5. Hair changes (n=65).

Hair changes	*Marasmus*	*Marasmic kwashiorkor*	*Kwashiorkor*	*Total*
Present	5 (17%)	5 (22%)	2 (17%)	12
Absent	25 (83%)	18 (78%)	10 (83%)	53
Total	30	23	12	65

X^2=0.25, df=2, p >0.05

Table-6. **Skin changes (n=65).**

Skin changes	*Marasmus*	*Marasmic kwashiorkor*	*Kwashiorkor*	*Total*
Present	5 (8%)	3 (5%)	5 (8%)	13
Absent	25 (37%)	20 (31%)	7 (11%)	52
Total	30	23	12	65

X^2=4.42, df=2, p >0.05

There was no significant difference in the prevalence of hair change

between oedematous (11%) and non-oedematous (8%) patients which is also a changing trend in the presentation of severe PEM. The study had also shown that typical skin change of malnutrition was present in only a few malnourished infants.

Table-7. Hepatomegaly of studied population (n=65).

Hepatomegaly	*Marasmus*	*Marasmus* **kwashiorkor**	*Kwashiorkor*	Total
Present	2 (7%)	13 (57%)	9 (75%)	34
Absent	28 (93%)	10 (43%)	3 (25%)	31
Total	30	23	12	65

X^2=23.05, df--2, p<0.001.

The table-7 shows that 2 (7%) of marasmic patients, 13(57%) of marasmic kwashiorkor patients and 9 (75%) of kwashiorkor patients developed hepatomegaly. Hepatomegaly was not invariably present except only in 63% of oedematous malnourished patients, while only 7% of marasmic patients had hepatomegaly. However, the result revealed that development of hepatomegaly was significant (X^2=23.05, df-2, p<0.001) in oedematous malnourished patients.

Table-8. Diarrhoeal Disease Prevalence in Studied Patients.

Clinical Diagnosis	Suffered	Not Suffered	Total
Marasmus	12 (40%)	18 (60%)	30
Oedematous Malnutrition	30 (86%)	5 (14%)	35
Total	42	23	65

Table-9. Pneumonia in Studied infants

Clinical diagnosis	Suffered	Not suffered	Total
Marasmus	9(33%)	21(67%)	30
Oedematous Malnutrition	25(71%)	10(29%)	35
Total	34	31	65

Among the associated illness, diarrhoea was the commonest 42 (65%) cases. Table-8 also shows that the oedematous malnourished patients suffered from diarrhoea in higher frequency (86%) than marasmic patients (40%) and the result was statistically significant. (X^2=14.75. df=1, p<00.1)

The next common illness was pneumonia (52%). Table-9 also shows that the oedematous malnourished patients suffered from pneumonia in higher frequency (71%) than marasmic patients (33%) and the result was statistically significant (X^2 =11. 11, df=1, p<.001).

Discussion

The present cross sectional study was unique in its kind, which attempted to reveal a new era in the knowledge of clinico-pathological features of severe PEM in infancy. The study reflected that 63% of oedematous malnourished patients developed oedema before 6 months indicating that there was no age specificity regarding development of severe PEM in infancy. Although the classical view is that oedematous malnutrition prevails late in infancy, between 1 to 3 years of life. It is well recognized for long time that kwashiorkor is a weaning disease and its age of onset depends on the local pattern of breast-feeding, time of introduction of non-milk diet and cessation of lactation. The study revealed that phase of wasting was not inevitable in oedematous malnourished. About 75% of patients with kwashiorkor and 57% of patients with marasmic kwashiorkor developed oedema without passing through phase of wasting which is also a changing trend in the development of oedematous malnutrition as per classical description. Our study revealed that a good number (31%) had normal appearance rather than the classical appearance of oedematous malnutrition like apathy, fretfulness and misery.

There was no significant difference in the prevalence of hair change between oedematous and non-oedematous infants which is also a changing pattern in the presentation of severe PEM. The study also revealed that typical skin change of malnutrition was present in an insignificant number of malnourished infants.

Hepatomegaly was not invariably present. Only 63% of oedematous malnourished and 7% of marasmic infants had hepatomegaly. Among the associated illness, diarrhoea was the commonest (65%). It has been postulated that malnutrition is a determining factor in diarrhoea. The next common infection was pneumonia (52%). In contrast Shakur et al[8]., found respiratory tract infection and diarrheoa in 80% and 76% cases respectively in a study among hospitalized severe PEM patients in Dhaka Shishu Hospital.It was observed in this study that some changing pattern in clinical presentation of severe PEM in infancy exists which might help to pick up, diagnose and manage oedematous malnutrition early and appropriately, which might add to the general improvement of health of children. Contrary to the classical view, we observed a trend of oedematous malnutrition to occur at an earlier age without prior passing through a state of wasting and without being inevitably associated with skin changes and mental abnormalities. However this was a limited study in a small population of cases with limited resource and time. Further multi-centered community-based controlled

trials would add to our knowledge regarding changing trend of clinical presentation of severe PEM in infancy.

Conclusion: It is urgent to create awareness about the changing clinical presentation of severe PEM particularly oedematous malnutrition in infancy so that they can be diagnosed and picked up early and thereby appropriate measures can be taken to reduce the unchanged and unexpected high mortality of severe PEM in developing countries like Bangladesh.

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