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Morphological patterns of malnutrition in children on the basis of clinical or anthropometric assessment

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Abstract

Background: Malnutrition is a widespread problem, affecting the global population at some stage of life. It includes both under nutrition (wasting, stunting, underweight, and mineral- and vitamin-related malnutrition) and over nutrition (overweight, obesity, and diet-related non-communicable diseases. The best-targeted age for addressing malnutrition is the first 1000 days of life as this window period is ideal for intervention implementation and tracking for the improvement of child growth and development. Therefore, it was a genuine necessity to find out the burden of all three categories of malnutrition such as Kwashiorkor, Marasmus, Marasmic kwashiorkor and also to find out age wise distribution of the protein energy malnutrition (PEM), so that these findings could help to design Nutritional Rehabilitation Policies by considering the category and age groups.

Aim: To Study Morphological Patterns of Malnutrition in Children in a Teaching Institute.

Design Descriptive study: Settings All the children who come to the OPD with some other complaints like Diarrhoea, respiratory tract infection but diagnosed with PEM were enrolled for the study.

Methods: All the children in the age group 6 months to 59 months of either gender were screened for malnutrition by anthropometry using standard techniques, and severe acute malnutrition (SAM) & moderate acute malnutrition (MAM) was diagnosed as per WHO guidelines, all were clinically classified into marasmus, kwashiorkar and mixed type.

Results: During this study 100 children were enrolled, with maximum no of cases between 12- 24 months of age with a male predominance & M: F ratio of 1.3:1, which mostly belonged to urban habituation. Out of the total malnourished children 69 % belonged to MAM & 31% was SAM. Most common type of clinical diagnosis was mixed type as marasmic- kwashiorkar (48%) of cases followed by marasmus (35%) & kwashiorkar (17%). Stunting, was seen in 30.70% cases, wasting in 29.03% and 33.27% were underweight.

Conclusion: Depending on the results revealed by the present study we conclude that the maximum number of cases belonged to Marasmic kwashiorkor, followed by marasmus and kwashiorkar 15.87%. Most common age of presentation is 12-24 months with a male predominance. Our data on age distribution of malnutrition underlies the importance of strengthening interventions before the age of 2 to ward off morbidity due to SAM

Keywords: Severe acute Malnutrition, Morphological Patterns, Stunting, Wasting, Marasmic-kwashiorkar.

Introduction

Malnutrition, which encompasses both under nutrition and overweight, is a global problem with important consequences for child survival, incidence of acute and chronic diseases, healthy development, and the economic productivity of individuals and societies. It underlies almost half of all childhood deaths in developing counutries[1]. Malnutrition is classified into two clinical syndromes as marasmus, kwashiorkor, and a mixture of both (marasmic-kwashiorkor). However, WHO classifies malnutrition into Severe acute malnutrition (SAM) and moderate acute malnutrition (MAM) predominantly on the basis of anthropometry and together, it is used as a measurement of nutritional status at a population level and as an indicator of the severity of an emergency situation.[2] SAM is a leading cause of death among children younger than five years of age. Management of severe acute malnutrition according to WHO guidelines can reduce the case-fatality rate by about 55% in hospital settings.[3]Globally, the case fatality rate of SAM has been decreased from 16 to 8% following the implementation of WHO protocols. However, it still remains a public health problem in India .[4]

Studies defining malnutrition clinically {moderate clinical malnutrition (McM) marasmus, kwashiorkor} rather than anthropometrically (stunting, wasting and underweight) are rare. Our aim was to see the burden, morphological/clinical patterns and course of malnutrition among children <5 years and to compare patterns and course of clinically and anthropometrically defined malnutrition

Methods

The present study is an observational study, conducted in the Department of Pediatrics in a tertiary care hospital in Jammu on children of either gender from 6–59 months of age attending OPD in hospital from June 2021 to 15 January 2022 were screened for malnutrition by anthropometry i.e., weight, height/length and Mid Upper arm Circumference (MUAC). For the present analysis, anthropometric scoring was done using the WHO-MGRS 2006 Child Growth Standards[5.] Nutritional status of children was assessed by clinical assessment as well as by anthropometrical assessment. Z-scores were calculated for weight for length/height (WHZ) and for length/height for age (HAZ). Children with a WHZ <-2 to >-3 were classified as moderately wasted, those with WHZ <-3 as severely wasted. Similarly, those with a HAZ <-2 to >-3 were categorized moderately stunted and those with HAZ<-3 as severely stunted. Underweight is defined as the children with weight-for-age Z-score (WAZ) <−3SD.The Observed weight was plotted on WHO growth standard charts for weight against the subject's age. Children with a WHZ and HAZ higher than -2 SD were classified as normal, that is no wasting and no stunting. The clinical assessment of nutritional status is described by Van den Broeck et al [6]. With this method marasmus was assessed by inspection of abnormal visibility of skeletal structures and by absence or near-absence of palpable gluteus muscle. Kwashiorkor was assessed using the presence of pitting oedema of the ankles and/or feet as a criterion. MAM is identified by

moderate wasting WHZ <-2SD AND ≥ -3 SD for children 0-59 months (or for children 6-59 months, MUAC 115 mm). SAM is identified by severe wasting WFH <-3SD, MUAC <115MM OR presence of bilateral pitting edema.[2]

Weight was measured using digital weighing scale weighing to a precision of 0.01 kg. In children ≥ 24 months, height was measured using Wall Mounted Stadiometer to the last completed 0.1 cm, and in children ≤ 24 months of age, length was measured using infantometer up to 0.1 cm. MUAC tape was used for measurement of MUAC (>6 months of age) up to 0.1 cm.

Inclusion criteria

Children age 6 months to 59 months both male and female with WHO case definition of SAM & MAM on admission were included in the study.[2]

Exclusion criteria

Children with acute secondary problems like cerebral palsy, meningitis, infiltrative disorders, congenital malformations, chronic systemic disease were excluded.

Methods

Detailed history & clinical examination of the enrolled subjects was done. Oedema of all subjects was carefully observed and recorded. Finally, all enrolled malnourished subjects were classified into kwashiorkor, marasmus, and marasmic kwashiorkor by using welcome classification system[7]. Weight was measured by infant and regular weighing scales. All were then categorized as Stunting**,** wasting, and underweight.

Ethical Aspects: Ethical approval for the study was granted from the university.

Results

A total of 100 children with malnutrition were taken up for study. 69 of the cases of malnutrition were MAM. Rest 31 children with any one of the inclusive criteria like weight for height/length <-3 SD/Z, visible severe wasting, presence of bipedal edema and /or mid upper arm circumference <11.5 cm was categorized under severe acute malnutrition cases. Following observations were made:

Out of the total 31 who were diagnosed as SAM, 25(80.64%) of them were diagnosed on the basis of presence of visible severe wasting, 12(38.70%) had B/L pedal oedema and 14(45.16%) had MUAC <115mm.Also more than one criterion was present in one child for diagnosis and 8 patients had both WHZ and MUAC criteria accounting for 25.8%.

Age characteristics (Table 1)

Most common age group of presentation was 12-18 months (32; 32%) with male 20 & females 12 in number, followed by 18-24 months (16; 16%) males 9 females 7.

Gender (Table 2)

Among all the cases, definite male predominance was seen with there being 58% males and 42% females & (M: F 1.3:1).

Place of residence (Table2)

More number of cases belonged from urban habituation especially slum dwellings (75%) as compared to rural (25%).

Clinical / morphological characteristics

On detailed anthropometric assessment it was seen that out of all the 100 cases of malnutrition, 69 were moderately (MAM) and 31 were severely malnourished (SAM). And 26% cases were stunted (Table 4). 23% were wasted 30% were underweight. Also, MUAC was <115mm in quite large number 12 cases (Table 3). Among 31 admitted children with SAM, maximum cases were marasmic- kwashiorkor type 48%, followed by marasmus 35%and kwashiorkar 16%) (Figure 1)

Discussion

Child under nutrition contributes to more than one third of the deaths. Undernourished children who survive may

get trapped in a vicious cycle of recurring illness and faltering growth, with irreversible damage to their development and cognitive abilities. Owing to high prevalence of malnutrition and high population, India contributes largely to global malnutrition. According to NFHS-3, the prevalence of underweight, stunting and wasting in India is 42.5%, 48% and 19.8% [8]. In developing countries over 220 million children less than 5 years of age have significantly impaired growth according to UNICEF. Malnutrition is frequently observed between 3 to 24 months of age. A study done in Kenya showed that most of the malnourished children were between 18-23 months of age, 44% were stunted and 34% were under weight[9]. Present study data have shown similar findings with increasing percentage of malnutrition occurring between 12 to 24 months of age, 23% were stunted,30% underweight. These results are in accordance with the previous studies [10]. It is apparent that children under 2 years of age are the most affected age group. This could be due to a number of factors including low rate of exclusive breast feeding as well as poor weaning and feeding practices.

In present study it was seen that malnutrition was seen more in males as compared to females with a M:F ratio of 1.38:1, which was in concordance to study by Sinha et al [11]. Studies by Gernaat et al [12] reported marasmus to be the most common type. Another study by Carmell et al [13] reported kwashiorkar and marasmus as the most common types but present study has shown highest number of Marasmic kwashiorkor type children 50%, followed by children with Marasmus 35% and kwashiorkor 15%(Fig1). Failure to the adoptive mechanism could be the main reason attributed for the high prevalence rate of Marasmic kwashiorkor. In the present study on admitted under-five children, 30% of the patients were underweight, 26% were stunted of which 23% were severely stunted and 23% were wasted of which 21% were severely wasted (Table 3). In a study of East India, the prevalence of underweight, stunting and wasting was 19.7%, 35.5% and 8.5%, respectively [14] which was similar to our study.

According to the latest update on management of SAM by WHO mentions only about 40% of the children are classified as having SAM using both WHZ score and MUAC [15]. In the present study, only 25% children had both the criteria. Singh et al. in their experience of management of children with SAM at NRCs in Uttar Pradesh found that 70.7% had both the criteria [16.]

Additional 69% of all under five enrolled patients had underlying MAM in our study. The prevalence of moderate wasting as per NFHS-3[16] is 13.4%. MAM itself has a high morbidity and mortality and there is an additional high risk of SAM with illness and continued faulty diet. These patients need to be counselled for appropriate feeding practices besides treating acute illness.

Conclusion

The problem of SAM is a complex study and this study presented a descriptive picture of morphological patterns of malnutrition in an inpatient setting in children with different types of malnutrition. Only a few population-based studies have addressed the occurrence dynamics of clinically and anthropometrically defined malnutrition. Our findings show the occurrence dynamics of general malnutrition in our institute, demonstrating that patterns can differ according to nutritional assessment method. None of the assessment methods can be described as superior as they partly measure different aspects of malnutrition. Our findings suggest the importance of applying a mix of clinical and anthropometric methods for assessing malnutrition instead of just one method. Functional validity of aspects of characterization of

individual nutritional status by single anthropometric scores or simple clinical classifications remains issues for further investigation. Our data on age distribution underlies the importance of early intervention to ward off short- and long-term morbidity caused by malnutrition.

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Legend Table and Figures

Table 1: Age and sex wise distribution of children

Age group (months)	Males		Females		Total
	No.	%	No.	%	
6 – 12	4	6	2	2	6
12 – 18	20	**20**	**12**	**12**	**32**
18 – 24	9	**9**	**7**	**7**	**16**
24 – 30	10	10	3	3	13
30 – 36	8	8	2	2	10
36 – 42	3	3	3	3	6
42 – 48	4	4	8	8	12
>48	3	3	2	2	5
Total	100	100.00			

Table 2: Demographic profile of children

	Cases (%)
Male	58(58)
Female	42(42)
M: F	1.3:1
Rural	25(25)
Urban (slum dwellings)	75(75)

Table 3: Anthropometry assessment of cases

Score	-2 to -3 SD	%	<-3SD	%
HAZ	20(stunting)	20	6 (severe stunting)	6
WAZ	22(underweight)	22	8 (severe underweight)	8
WHZ	18(wasting)	18	5 (severe wasting)	5
MUAC	9(115 TO 125mm)	9	12(<115mm)	12
Total	69		31	

More than criteria were present in one child

Table 4 Distribution of cases on the basis of anthropometry

Anthropometrical diagnosis	Number	Percentage (%)
Stunting (HAZ<-2)	26	26
Wasting (WHZ<-2)	23	23
Underweight (WAZ<-2)	30	30

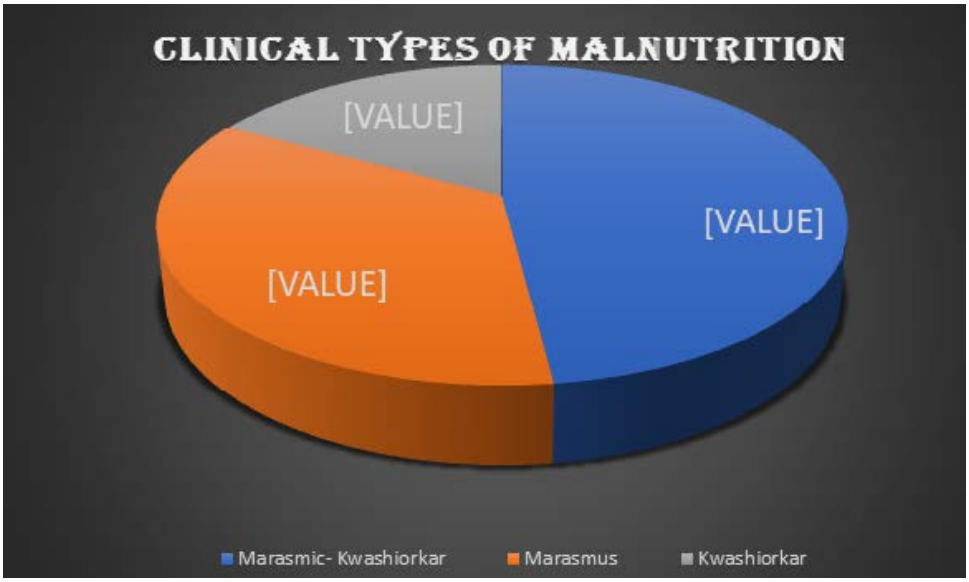

Figure 1: Clinical diagnosis of malnutrition in percentage

(marasmic kwashiorkar 48%, marasmus 35%, kwashiorkar 17%)