

ORIGINAL ARTICLE

Malnutrition in Children with Chronic Diarrhea During Early Childhood at A Tertiary Care Hospital, Lahore

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ABSTRACT

Background: There is a two way relationship between disease and malnutrition. The consequences of malnutrition during formative early years can extend long beyond the disease itself, necessitating the interception of this continuous cycle.

Objective: To assess the nutritional status of children having chronic diarrhea

Materials and Methods: The study was a cross-sectional survey. A purposive sample of 50 chronic diarrhea patients between 1-3 years of age was collected from pediatric outdoor patient department, Sir Ganga Ram Hospital, Lahore. Anthropometric data (height and weight) was compared to the reference population in terms of key malnutrition indices. The data was then analyzed for the frequency as well as severity of malnutrition in the study sample.

Results: Sixty eight percent of the sample was found to be underweight, 56% wasted and 64% stunted. The proportion of severely malnourished individuals (<-3 S.D.) was greater than those who scored <-2 S.D. Severe malnutrition was found to be linked to onset of chronic diarrhea at an early age.

Conclusions: Key anthropometric indices showed malnutrition to be quite prevalent in the sample. The findings suggest a possible link between diarrhea and malnutrition. Nutritional interventions are, therefore, recommended as an important component of health care of such children.

Key words: Chronic diarrhea, frequent infections, severe malnutrition, malnourished children

INTRODUCTION

Diarrhea, the passage of three or more loose/liquid stools per day, is a global health problem. It claims the lives of about 760, 000 children per year and is the second leading cause of under-five mortality¹. Recent report of Pakistan national nutrition survey² shows a high diarrheal prevalence in Pakistani children.

Persistent/chronic type of diarrhea, whether due to protracted infections³, mucosal surface damage or digestive enzyme deficiency⁴, presents major risk of developing malnutrition and related complications⁵, affects the cognitive abilities^{6, 7} and severely inflicts on the quality of patient's life⁸.

There is a strong and reciprocal relationship between disease process and malnutrition, which can also be linked to chronic diarrhea. Malnutrition involves stunting, underweight, overweight, and/or micronutrient deficiencies⁹. Several researches indicate that malnourished people have a greater risk of developing diarrheal disease¹⁰⁻¹⁵. This relationship can be attributed to impaired immune function¹⁶ or absorptive capabilities of malnourished individuals¹⁷. Malnutrition has also been found to be an outcome of diarrhea. All the

three major anthropometric indices used for measuring children's nutritional status^{18, 19}, have been found to be influenced by the presence of diarrhea^{20, 21, 22}.

Childhood under-nutrition is responsible for numerous long term and even lifelong consequences. According to the World Health Organization²³, in addition to being responsible for 35% of global under-five deaths, under-nutrition can also affect the capabilities of those who survive. Several routes through which childhood malnutrition affects a person's output throughout the life cycle include decreased immune function²⁴, reduced cognitive functions²⁵, shorter adult height, lowered educational achievement and reduced economic productivity²⁶. Keeping in view the long term effects of childhood malnutrition, the current study was conducted to document malnutrition in children suffering from chronic diarrhea.

MATERIAL AND METHODS

• Sample selection

A purposive sample of 50 children with chronic diarrhea, who visited the pediatric outdoor

patient department, Sir Ganga Ram Hospital, Lahore, was included in the study. The children falling in the selected age group (12 to 36 months) and who were diagnosed as having chronic diarrhea by physician attending the outdoor department were selected.

• **Data Collection Procedure**

Data was collected for a period of 5 weeks (from June 15, 2013 till July 19, 2013). Data regarding basic demographic variables was collected by predesigned, pre-tested questionnaires. Two anthropometric measurements, height and weight, were taken. Height was recorded to the nearest centimeter while weight to the nearest 0.1 kilogram.

• **Data Analysis**

Anthropometric measurements of each subject were plotted on WHO growth charts (height for age, weight for age and weight for height charts) suitable for the age and gender of each child. The three indices were then compared to the reference population using WHO z-score cut off points for malnutrition²⁷. Mean and standard deviation for quantitative variables and percentages for qualitative variables were calculated.

RESULTS

• **Sample characteristics**

The sample was of 50 children aged 12-36 months with 56% males and 44% females. 76% of the children were between 2 and 3

years of age while 24% were between 1 and 2 years.

• **Weight for age scores**

Out of the total sample, the number of underweight children was greater than those who had normal weight for age (figure 1). Only 32% of the sample had normal weight for age whereas 68% of the sample was underweight. 44% of the total sample scored <-3 S.D. on weight for age growth charts and so, was severely underweight.

• **Weight for height scores**

Thirty percent of the sample had normal weight for height. More than half (56%) of the sample was wasted. The sample showed a great deviation in weight for height z- scores. 14% scored >1 S.D. and were at risk of becoming overweight, while on other hand 30% showed severe wasting (figure 2).

• **Height for age scores**

Thirty-six percent of the children had normal height for age whereas, 64% were stunted when marked on height for age growth chart (figure 3). Height for age z-score of less than -3 S.D. was found in 56% of the sample.

• **Frequency of chronic diarrhea**

Fifty-six percent of the sample had been experiencing chronic diarrheal episodes (prolonged/recurrent) for more than a month. 30% had diarrhea since birth and 14% had it since less than one month. Therefore, 86% of children had been experiencing chronic diarrhea for more than a month.

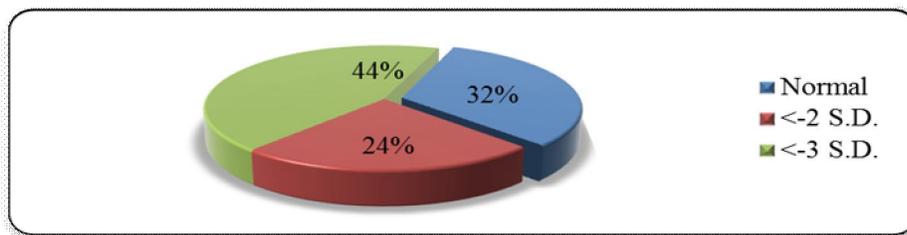


Figure 1: Weight for age z-scores of study sample

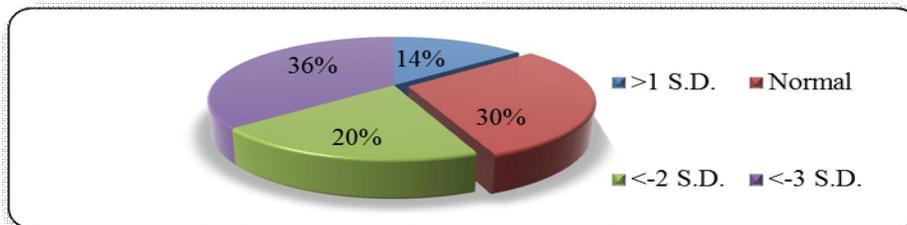


Figure 2: Weight for Height z-scores of study sample

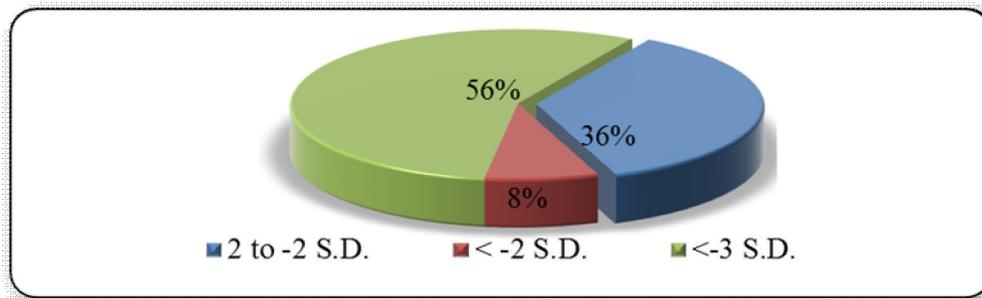


Figure 3: Height for Age z-scores of study sample

Table 1: Severe malnutrition in relation to duration of chronic diarrhea

Duration of diarrhea	Severely stunted	Severely wasted	Severely underweight
Since birth	53.3%	33.3%	46.7%
≥ 1 month	64.3%	35.7%	46.4%
< 1 month	28.6%	28.6%	28.6%

The horizontal entries in the table do not add up to hundred because the vertical variables are mutually overlapping.

The table describes only severe under nutrition (z-score <-3 S.D.), the individuals who scored 2 to <-2 S.D. are excluded from respective anthropometric indices.

- **Relationship between severe malnutrition and onset of chronic diarrhea**

Out of those children who had been experiencing chronic diarrhea since more than one month or from birth, majority scored < -3 S.D. on all or any of the three anthropometric indicators of malnutrition (table 1).

53.3% of the children who had been experiencing diarrhea from birth were severely stunted. Similarly, 64.3% of those children who had had diarrheal episodes from more than a month were severely stunted and out of those who had diarrhea more recently (less than a month), only 28.6% scored < -3 S.D. on height for age growth chart. The other two anthropometric indices also showed a similar trend, that is severe malnutrition was more prevalent in those who had an earlier onset of chronic diarrhea.

DISCUSSION

The present study was conducted with the objective of assessing nutritional status of children with chronic diarrhea. Recurrent and prolonged diarrhea has been recognized as one of the causes of malnutrition and morbidity²³ in the

absence of adequate dietary management. Malnutrition, especially during crucial life stages of infancy and childhood, can result in consequences which affect an individual's output throughout the life cycle²⁶ and impede national development in the long run.

For the purpose of conducting current study, a sample of 50 children with chronic diarrhea was chosen. The selected age range of sample was 12-36 months. 56% of the total sample consisted of males and 44% females. 76% of the sample lied between 1-2 years of age while 24% between 2-3 years of age which means that chronic diarrhea was more common in infants than in older children.

Underweight, wasting and stunting trends indicated a high prevalence of malnutrition in the study sample based on these anthropometric indicators. 68% of the sample was underweight, 56% was wasted and 64% was stunted when compared with WHO reference population. The study was limited to the use of international cut off points for malnutrition due to the lack of local standards.

Only 32% of the total sample was found to have normal weight for age. A total of 68% sample was underweight with 44% severely underweight.

The high prevalence (68%) of low weight for age found in the current study has previously been found by Schimdt et al.²¹, who established a strong relationship between number of days with diarrhea and low weight for age scores.

56% of the sample was wasted with 36% severely wasted. Lima et al.²⁰ found a significant decrease in weight age and weight height z-scores after persistent diarrheal episode, supporting the current findings of high underweight and wasting prevalence in the study sample.

A total of 64% of the sample was stunted. The incidence of severe stunting was greater (56%) than both severe wasting (36%) and severe underweight (44%). The long term effects of diarrhea on linear growth retardation have previously been studied by Checkley et al.²².

According to UNICEF²⁸, height deficits during early life can lead to permanent short stature and failure to achieve adult height in later life, affecting an individual's abilities forever. The current 64% stunting prevalence in children with chronic diarrhea suggests diarrhea to be a possible cause of stunted height though, not supported in study by Lima et al.²⁰. Height for age, being long term malnutrition indicator, may not be influenced shortly after diarrheal episode but after long standing nutritional deficiencies. In the current study, along with other two indices (severe wasting and underweight), severe stunting was also found to be greater in those who had an earlier onset of chronic diarrhea (table 1). The high malnutrition prevalence in the study sample was supported by Cheema et al.²⁹, who found 82% of Pakistani celiac disease patients to score below 3rd percentile for weight and height.

The findings of Checkley et al.²² suggest that partial or complete catch-up growth can follow after control of diarrhea, showing that recurrent or persistent diarrheal episodes may shorten time for catch-up growth and may result in permanent linear growth retardation. Several periodic measurements may be required to assess growth trends of children. However, because of the hospital based cross sectional design adopted for the current study, nutritional status was assessed only once.

The reciprocal relationship of diarrheal disease and malnutrition has been documented by Guerrant et al.¹³, suggesting that malnutrition can be a cause as well as an outcome of diarrhea. High percentages of underweight, wasted and stunted children in the current sample also support

this relationship, although diarrhea could not be distinguished as a cause or a result of malnutrition.

CONCLUSIONS

The poor nutritional status of children with chronic diarrhea suggests a possible link between the two variables. Although, establishment of cause-effect relationship between malnutrition and diarrhea was beyond the scope of this study, yet the poor nutritional status of study sample suggests consideration of chronic diarrheal control as a way of alleviating childhood malnutrition. Further community based studies may be conducted to document current trends in local population.

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