



2013

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I. Marete  
*Moi University*

J. Simba  
*Moi University*

Peter Gisore  
*Aga Khan University, peter.gisore@aku.edu*

C. Tenge  
*Moi University*

D. Bosire  
*Kenyatta University*

*See next page for additional authors*

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### Recommended Citation

Marete, I., Simba, J., Gisore, P., Tenge, C., Bosire, D., Mwangi, A., Esamai, F. (2013). Nutritional status of children admitted for diarrhoeal diseases in a referral hospital in western Kenya. *East African Medical Journal*, 90(7), 222-225.

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**Authors**

I. Marete, J. Simba, Peter Gisore, C. Tenge, D. Bosire, A. Mwangi, and F. Esamai

*East African Medical Journal Vol. 90 No. 7 July 2013*

## NUTRITIONAL STATUS OF CHILDREN ADMITTED FOR DIARRHOEAL DISEASES IN A REFERRAL HOSPITAL IN WESTERN KENYA

I. Marete, MBChB, MMed, Lecturer, J. Simba, MBChB, Assistant Lecturer, P. Gisore, MBChB, MMed, Lecturer, C. Tenge, MBChB, MMed, Senior Lecturer, Department of Child Health and Paediatrics, Moi University, P. O. Box 4606, Eldoret, D. Bosire, BSc, MSc, Lecturer, Department of Health Management, Kenyatta University, A. Mwangi, BSc, MSc, PhD, Department of Behavioural Sciences, Moi University and F. Esamai, MBChB, MMed, MPH, PhD, Senior Lecturer, Professor, Department of Child Health & Paediatrics, Moi University

## NUTRITIONAL STATUS OF CHILDREN ADMITTED FOR DIARRHOEAL DISEASES IN A REFERRAL HOSPITAL IN WESTERN KENYA

I. MARETE, J. SIMBA, P. GISORE, C. TENGE, D. BOSIRE, A. MWANGI and F. ESAMAI

### ABSTRACT

**Objectives:** To determine the prevalence of malnutrition among children admitted with acute diarrhoea disease at Moi Teaching and Referral Hospital and to establish the effect of malnutrition on duration of hospital stay.

**Design:** Prospective observational study.

**Setting:** Paediatric wards of Moi Teaching and Referral Hospital, Eldoret, Kenya

**Subjects:** A total of 191 children aged 6 and 59 months admitted with acute diarrhoea disease, without chronic co-morbidities or visible severe malnutrition, were systematically enrolled into the study between November 2011 and March 2012.

**Outcome Measures:** Nutritional status based on WHO WHZ scores taken at admission and duration of hospital stay.

**Results:** The mean age was 13.2 months with a male to female sex ratio of 1.16:1. Of all the children seen with acute diarrhoeal diseases, 43.9% had acute malnutrition (<-2 WHZ score), with 12% being severely malnourished (<-3 Z score). Average duration of hospital stay was 3.36 (SD=1.54) days. Among those with malnutrition the average duration of stay was 3.39 (SD=1.48) days while for those without malnutrition it was 3.21 (SD=1.20) days, which was not statistically different. No death was reported. WHO weight for Height Z scores picked 12% of severe form of malnutrition missed out by Welcome Trust classification (weight for age).

**Conclusion:** Routine anthropometry including weight for height identifies more children with malnutrition in acute diarrhoeal diseases. Presence of malnutrition did not affect duration of hospital stay.

### INTRODUCTION

Diarrhoea is an important cause of morbidity and mortality in the world causing 2,200 deaths per day in children under five years (1). In Kenya 17% of children experienced diarrhoea 2 weeks preceding a national survey while overall 7% of children are wasted, with 16% and 35% being underweight and stunted respectively (2). Malnutrition and diarrhoea usually coexist in children (3). The exact order of the relationship between the two may vary. Acute diarrhoea affects nutritional status through reduction in dietary intake and intestinal absorption. It also increases catabolism and sequestration of nutrients that a child requires to grow (3,4).

The presence of malnutrition in a child has been shown to increase the incidence of diarrhoea as well as prolong the duration of diarrhoea (4). This does not only occur in severe malnutrition but also in non-severe forms (5). Malnutrition if not actively looked

for through anthropometric measurements can be missed. This is because edema and visible wasting are not sensitive signs for all children with severe acute malnutrition. Malnutrition if not addressed at early stage may present in severe form later with increased mortality or co-morbidities.

We set out to determine the prevalence of malnutrition among children admitted with acute diarrhoeal diseases to the Moi Teaching and Referral Hospital, in western Kenya.

### MATERIALS AND METHODS

A prospective observational study was conducted in the general paediatric wards at the Moi Teaching and Referral Hospital, Eldoret, Kenya between November 2011 and March 2012. Moi Teaching and Referral Hospital is a teaching tertiary institution located in the Western part of Kenya. Patients meeting enrolment criteria, presenting to the hospital with

acute diarrhoeal diseases and meeting general criteria for admission to wards as per clinician at the sick child clinic based on guidelines for management of acute diarrhoea adopted from World Health Organisation (WHO) by Ministry of Health in Kenya (6), were followed up until discharge from the hospital to determine the length of hospital stay. These are children with at least two signs of dehydration (including sunken eyes, slow skin pinch, restlessness/irritability, and inability to drink or drinking eagerly) or one sign of dehydration but not retaining anything given orally or have accompanying profuse diarrhoea. However those in shock were excluded. We defined diarrhoea as passage of more than three loose stools per 24 hours. To qualify as acute the diarrhoea had to have been present for less than 14 days.

A total of 191 patients aged between six and 59 months were systematically sampled into the study. We excluded children with chronic co-morbidities and those with obvious severe malnutrition as per the Welcome Trust classification that is marasmus, kwashiorkor or with marasmus-kwashiorkor. The participants were part of a large study which involved use of oral medications. The selection was done by Medical Officers who had been trained on the expectations of the study. The investigators were involved in the whole study process including recruitment of the participants as well as other aspects of data interpretation. The principal investigator together with the biostatistician took responsibility for the study design including data analysis.

Patients recruited had their demographic (age and sex) and anthropometric measurements (height/length and weight [pre-rehydration]) recorded at admission. They were subsequently put on standard

treatment for diarrhoeal diseases adopted from WHO by Ministry of Health in Kenya (6) using low osmolarity Oral Rehydration Salt (ORS). Monitoring was done by checking for any new symptoms or signs while in the ward noting their duration of hospital stay and their outcome (death or discharge).

We analysed the demographic and anthropometric measurements described above, to check for acute malnutrition using Weight-for-Height Z (WHZ) scores as recommended by WHO. We checked for any statistical differences in duration of hospital stay between malnourished and non-malnourished children presenting with acute diarrhoeal disease. Linear regression analysis was done to determine any associations between age versus duration of hospital stay and nutritional status versus duration of hospital stay. Ordinal logistic regression was used to assess whether there is an association between the WHZ score and the age in categories. Data was analysed at 95% level of confidence. Ethical considerations including approval to carry out research were obtained from the Ethics committee and the hospital Director. Written consent from parents was also obtained. Children who were found to be malnourished were also accorded the necessary interventions.

## RESULTS

A total of 191 eligible children were recruited. The mean age at presentation was 13.2 months with a male to female sex ratio of 1.16:1. No death was reported in our population. It was noted that 43.9% of the children were malnourished (Z scores of <-2 Weight for Height) with 12% being severely malnourished (WHO WHZ score of less than -3) (Table 1).

**Table 1**  
*Nutritional status distribution by Age group of the study participants*

Age in months	WHO WHZ score			Total	P-value
	Less than -3 N (%)	-3 to -2 N (%)	>-2 to 2 N (%)		
6 to 12*	15 (12.2)	37 (30.1)	71 (57.7)	123	
13 to 24	5 (9.8)	19 (37.3)	27 (52.9)	51	0.712
≥25	3 (17.6)	5 (29.4)	9 (52.9)	17	0.613
Total	23 (12)	61 (31.9)	107 (56)	191	

\*Reference group

The average duration of hospital stay was 3.36 (SD=1.54) days. Among those with malnutrition the average duration of stay was 3.39 (SD=1.48) days while for those without malnutrition it was 3.21 (SD=1.20) days (Table 2).

**Table 2**  
*Linear regression results relating duration of hospital stay to age of child and their nutritional status*

Variable	Mean Duration of hospital stay in days(SD)	p-value
Age in months		
6 to 12*	3.41 (1.30)	
13 to 24	3.23 (1.63)	0.436
≥25	3.32 (1.67)	0.780
WHO WHZ score		
Less than -3 *	3.26 (1.18)	
-3 to -2	3.49 (1.67)	0.509
>-2 to 2	3.29 (1.31)	0.93

\*Reference group

### DISCUSSION

Acute diarrhoeal diseases have been shown to be commonest in children aged between six and 24 months. The mean age was 13.2 months with majority of patients enrolled being less than one year. There were slightly more males than females enrolled. These demographic characteristics of the children presenting with acute diarrhoea to our facility were similar to studies done elsewhere (2,7,8).

Overall 7% of children in Kenya have wasting using weight-for-height index in the general population (2). Non-severe malnutrition among the children presenting to our hospital with acute diarrhoeal diseases was high at 31.9%. This is not necessarily high as the study focussed on children likely to have malnutrition as relationship between diarrhoea and malnutrition is bidirectional (3). In a South African study evaluating presence of malnutrition among hospitalised children, 35% of them were found to have moderate malnutrition (9). Again, it has been documented that the hydration status may have an impact on nutritional status at admission of a child and thus this may have contributed to the high percentage as we only used admission weights (10).

The WHO weight for height Z scores have been shown to be more sensitive in identifying malnourished children compared to visible wasting and presence of edema (11). Despite excluding children with visible wasting and edema from our study, 12% were still identified to have severe malnutrition by WHZ scores. Our data shows that, a considerable number of children present with non-obvious malnutrition for other reasons to health facilities. This group is likely to be missed and hence may present later with severe malnutrition or other co-morbidities. On the other hand, this group may have similar complications and mortality as those with severe acute malnutrition (5).

Pre-existing malnutrition has been associated with prolonged illness and severity resulting in doubling of diarrhoea burden which is attributed to decreased turnover of epithelial cells resulting in delayed recovery (12,13). Although duration of diarrhoea in the two groups was not directly assessed, the presence of malnutrition was not associated with prolonged duration of hospital stay. Those with malnutrition had an average duration of 3.26 days versus 3.36 days for those without. Age does not appear to influence duration of hospital stay in our study. This parameter does not seem to have been reported in previous studies.

While we were not able to demonstrate whether moderate malnutrition affects duration of hospital stay in our set up, we acknowledge the limitation that we did not have exit / discharge weights which would have confirmed the malnutrition. Hydration status has previously been shown to affect admission weight (10). Our study however, brings to the fore the message that over-emphasis on Welcome Trust Classification as a means of identifying malnourished children is likely to miss out some children with malnutrition as the WHO classification has been shown to have better sensitivity (11). These children will end up being given focussed nutritional care as opposed to generalized nutritional care as it normally happens in our set up. We advocate that this therefore should be a basic evaluation in our set up.

### CONCLUSION

Routine anthropometry, including weight for height, identifies more children with malnutrition in acute diarrhoeal diseases. Presence of malnutrition did not affect duration of hospital stay in our set up.

### RECOMMENDATION

Hospitals should adopt the WHO recommended

weight for height measurements in all children admitted as this will decrease chances of missing malnourished children

#### ACKNOWLEDGEMENT

The authors wish to acknowledge the Director, Moi Teaching and Referral Hospital for giving us permission to conduct research and publish our results.

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