

Original research article

REPEATED HOSPITAL ADMISSIONS AMONG UNDER FIVES DUE TO GASTROENTERITIS AND ITS ASSOCIATION WITH THEIR NUTRITIONAL STATUS - A CROSS SECTIONAL STUDY IN A TERTIARY CARE HOSPITAL, TELANGANA, INDIA

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Abstract

Background: Acute GE(gastroenteritis) causes diarrhea which contributes to malnutrition through reduction in food intake, decrease in absorption of nutrients and increase in catabolism of nutrient reserves. Malnutrition reduces the immunity to defend against diseases and recurrent infections in turn deprive the body of essential nutrients, which causes a vicious cycle. This study has been taken up with the aim to assess the child's nutritional status and recommend appropriate dietary regimen to manage the condition and prevent its recurrence.

Methods: The informant was asked about the nature and quantity of foods the child usually eats for 7 days (as it forms one complete dietary cycle) to determine the child's daily calorie and protein intake. The weight-for-age and height-for-age values collected were compared to WHO standard values to determine the type of undernutrition. Total 230 under five children were covered.

Results: It was found that 54.8% children were undernourished out of which 15.6%, 15.2%, 13% and 11% were underweight, stunted, wasted, and severely malnourished respectively. Around 11% children had single and 13% had multiple hospital admissions respectively due to GE. Wasted and SAM (severe acute malnutrition) patients showed significant association with multiple hospital admissions due to GE.

Conclusion: A statistically significant association has been found between undernourished children and multiple hospital admissions due to GE which shows that more studies with larger sample sizes are required to find the definitive association between nutritional status and recurrence of GE.

By strengthening ICDS and redirecting malnourished children to local anganwadis, the child's nutritional status can be normalized which can prevent further episodes of GE and other infectious diseases.

Keywords: Gastroenteritis, Malnutrition, Repeated Hospital Admissions

Introduction

Gastroenteritis is an acute infectious syndrome of the stomach lining and the intestine which is characterized by diarrhea, vomiting and abdominal pain. Previous studies show that GE has a reduced prevalence from lower to higher age groups [1]. Worldwide 3-5 billion cases of acute GE and nearly 2 million deaths occur each year making it the second leading cause of death in children under five years of age [2]. Around 9% of under five children worldwide die of diarrhea caused due to gastroenteritis [3]. One of the major risk factors for GE is malnutrition. Children with poor nutrition are also at increased risk of complications which include dehydration, metabolic acidosis, lactose intolerance and systemic infections (pneumonia, meningitis etc.) [4].

Acute GE causes diarrhea which contributes to malnutrition through reduction in food intake, decrease in absorption of nutrients and increase in catabolism of nutrient reserves [5]. Malnutrition reduces the immunological capacity to defend against diseases and recurrent infections in turn deprive the body of essential nutrients,[6] which causes a vicious cycle.

According to the latest report of United Nations International Children's Emergency Fund (UNICEF), deaths among under five children are mostly caused by malnourishment (45%), pneumonia (15%), diarrhoea (8%), malaria (5%) and others (9%).[7] Published reviews concluded that the risk of diarrhea is 20% in normal participants and around 30% in undernourished children. Based on NFHS-5(National Family Health Survey) data, the nutritional status of children in India barely improved in 2019-20 from the levels in 2015-16, which shows that malnutrition is still a complex issue to be solved [8].

According to previous studies, mother's age at child's birth, family monthly income, socio-economic status, duration of breast feeding of children have significance association with malnutrition [9-11]. Hence, all these variables were considered for this study. Malnutrition can also develop due to neglect, abnormal mealtimes, insufficient quantities of food and insufficient parental knowledge [12].

Prevalence of undernutrition among under five children according to NFHS-5 in India shows that 32.1% of them were underweight and 35.5% were stunted [8]. Despite global efforts for improving maternal and child health and specific efforts, malnutrition among children remains a significant problem in India. In spite of having many Anganwadi centres, long-running national program, ICDS (Integrated Child Development Scheme), providing nutrition and health services to mother and children, levels of child malnutrition still remain high. This shows that malnutrition among children is a chronic problem and a longstanding challenge for the public administration of India.

Malnutrition has been coined as the "silent emergency" by the United Nations children's fund [13-15]. Acute GE leads to nutritional disturbances in children which makes them prone to other infectious diseases which may be fatal to the child.

This study has been taken up with the aim to assess the child's nutritional status and its association with repeated hospital admissions due to GE and recommend appropriate dietary regimen to manage the condition and prevent its recurrence. Many of the previous studies focused only on the risk factors of malnutrition in under five children. In this study, association between child's nutritional status and history of diarrheal episodes and hospitalizations has also been touched upon.

Material and Methods

A cross sectional study was conducted from mid-August to mid-October 2022 in Niloufer hospital, a tertiary health care center in Hyderabad, India. Subjects admitted in wards, satisfying the inclusion criteria were taken for the study.

Inclusion criteria:

*Children under five years of age (from the time of birth until five years) diagnosed with gastroenteritis and admitted in wards (presenting with chief complaints of diarrhea and vomiting).

Exclusion criteria:

- *Children >5 years of age.
- *Children whose parent/informant does not give consent.
- *Children presenting with diarrhea due to causes other than gastroenteritis (diarrhea proven to have been caused by dysentery, food poisoning or any other non-infectious cause).

Study tools: pre-designed questionnaire, measuring tape, stadiometer, infantometer, weighing machine, measurement glasses and bowls of different sizes. Data collection has been done after attaining permission from the Ethical Committee. All the under five children admitted in wards from mid-August to mid October 2022, diagnosed with acute GE have been considered for the study. Data has been collected after explaining the procedure to the child's informant and obtaining the necessary consent. The child's socio-demographic details have been collected from informant by face-to-face interview method using a pre-designed questionnaire.

The dietary intake of child has been assessed by oral questionnaire method in which the informant is asked about the nature and quantity of foods the child usually eats for 7 days (as it forms one complete dietary cycle). Seven-day dietary cycle has the advantage that since an entire week's diet is noted, the bias related to the variations in diet in certain days of the week can be reduced. Based on the data collected the child's daily calorie and protein intake has been calculated. Values obtained were compared to standard RDA values [16] and the nutritional status was assessed. Details about the history of hospital admissions due to GE (excluding the current episode) have been asked and noted. The height, weight, head, chest and arm circumferences of the child were measured and recorded. The weight-for-age and height-for-age values collected were compared to the WHO standard values (median, -2SD, +2SD, -3SD, +3SD) [17] and the type of undernutrition has been determined [18].

Data analysis: All the data collected has been recorded, coded, and managed using Microsoft Excel worksheet. All variables have been analyzed and frequencies, percentages thus obtained have been presented as tables, bar graphs using SPSS software. Chi square test and Fishers exact test (wherever indicated) have been applied to check for the association between variables.

Results

Out of all the children admitted in the emergency and general wards from August 2022 to October 2022, a total of 230 subjects were found to satisfy the inclusion and exclusion criteria. These subjects were enrolled for the study. Data has been collected using a pretested semi-structured questionnaire after obtaining consent from the informant. On analyzing the data, the following results were obtained:

Table 1: Sociodemographic details of the child

Child's sociodemographic variable	Category	Frequency (n)	Percentage (%)
Gender	Male	126	54.8
	Female	104	45.2
Age	0-6 months	66	28.7
	6 months-2 years	109	47.4
	2-3 years	24	10.4
	3-5 years	31	13.5
Locality	Urban	154	67
	Rural	76	33
Religion	Hindu	119	51.7
	Muslim	107	46.5
	Christian	4	1.7
Family type	Nuclear	134	58.3
	Joint	60	26.1
	3 generation	36	15.6
Socio-economic class	Upper	2	0.87
	Middle	217	94.3
	Lower	11	4.8

From the above table it was observed that 54.8% of the children were males and the rest were females. Most of them belonged to 6 months - 2 years age group and belonged to middle class nuclear families. It can also be observed that 67% of the children were from urban areas and 51.7% were Hindus.

Table 2: Mother's details of the cases included in the study.

Mother's	Category	Frequency (n)	Percentage (%)
Age at birth of child	15-20 years	43	18.7
	21-25 years	135	58.7
	26-30 years	41	17.8
	>30 years	10	13
Education	Illiterate	63	27.4
	Primary/middle/high	112	48.7
	Inter and above	55	24

Mother's	Category	Frequency (n)	Percentage (%)
Occupation	Unemployed	27	12
	Employed	203	88

From table 2 it can be inferred that majority of the mothers were educated and employed. Out of 230 children, 90% of them had good access to pediatrician advice and were vaccinated up to date. Most of the children 82%, had normal birth weight, whereas 18% had low birth weight. The degree of dehydration associated with current episode of GE has been assessed and it was observed that 46% of children showed no signs of dehydration. A notable number of them, 40% had mild to moderate dehydration and 15% of them had severe dehydration. Around 44.3% of patients were seen to be facing health problems other than GE which can be attributed to their compromised nutritional status. About 11.7% were having lower respiratory tract infections, 7.8% suffered from top fed sepsis and 5.3% of them faced complications such as hypovolemic shock, metabolic acidosis due to severe dehydration infections, 7.8% suffered from top fed sepsis and 5.3% of them faced complications such as hypovolemic shock, metabolic acidosis due to severe dehydration.

Figure 1 shows the details of number of previous hospitalizations due to GE (excluding the current episode). It is seen that 75.6% of patients had no previous hospital admissions, 11.3% were admitted once previously and 13% had been admitted multiple times previously because of GE. Considering duration of exclusive breast feeding for >6 months (in children >6 months age) and breast milk being given currently (in children <6 months) as good breast-feeding practices, 41.7% of mothers followed good breast-feeding practices, and the rest, 58.3% followed poor breast-feeding practices. Deficient intake of calorie and protein was seen in 56% and 23% of the study participants respectively.

Figure 2 shows the nutritional status of children based on anthropometry. The weight-for-age, height-for-age and weight-for-height values of the child were collected and compared to WHO standard values to classify them into normal, underweight, stunted, wasted and SAM. According to the figure, most of the children, 45.2% were normal. A notable number of them, 15.6% and 15.2% were underweight and stunted respectively. Around 13% of the children were wasted and 10.8% of them suffered from severe acute malnutrition.

Table 3: Nutritional status of children

Nutritional status	Total N(%)
Normal	104 (45.2)
Malnourished	126 (54.8)
Total	230

The Table 3 shows that out of 230 study participants, more than half of the children(54.8%) were malnourished.

Table 4: Association between child's nutritional status and the history of multiple hospital admissions due to GE

Nutritional status	Multiple previous admissions present (32) N (%)	Multiple previous admissions absent (198) N (%)	Total	p value
Underweight	4 (11)	32 (88.9)	36	0.57
Not underweight	28 (14.4)	166 (85.6)	194	
Stunted	7 (20)	28 (80)	35	0.25
Not stunted	25 (12.8)	170 (87.2)	195	
Wasted	9 (30)	21 (70)	30	0.006
Not wasted	23 (11.5)	177 (88.5)	200	
Severe malnutrition acute	10 (40)	15 (60)	25	0.0001
No severe malnourishment acute	22 (10.7)	183 (89.3)	205	

Table 4 is showing the association between nutritional status of child and the history of multiple hospital admissions due to GE. On evaluating the variables using Pearson chi-square test and Fisher's exact test, there was no statistically significant association between underweight and stunted nutritional status of child and the history of hospitalizations due to GE. However, wasted and SAM patients showed a direct and statistically significant association with multiple hospital admissions due to GE.

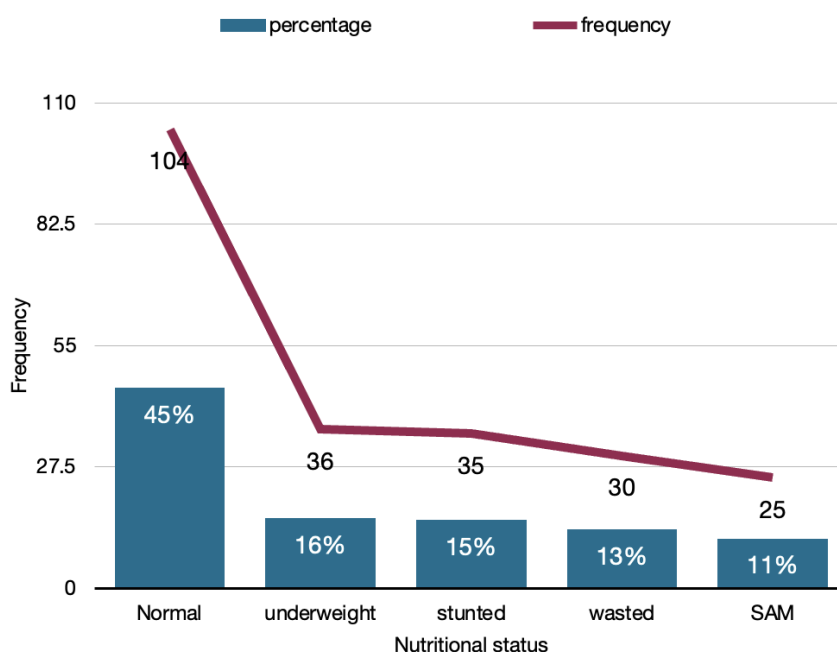


Figure 1: Nutritional status of children

Discussion

A hospital based cross sectional study was conducted among under five children with GE. The nutritional status of 230 such children was assessed and its association with multiple hospitalizations due to GE was found. The findings of this study with reference to the study objectives have been discussed here. It is seen that 6m-2y is the most common age group involved in this study followed by 0-6m (28.7%), 3y-5yrs (13.5%) and 2y-3y(10.4%), while in the study conducted by A.G.Wasihun et al.,[9], the mean age was 35.2 months. Both the studies showed a higher prevalence of malnutrition in males. The prevalence of malnutrition among under five children did not vary significantly with the religion status in the study by Sanjit Sarkar[10] which corresponds to the findings made in this study. This study showed a greater percentage of mothers to be educated up to high school (49%) which was in concordance to the study by Sujata Murarkar et al.,[11] with the percentage of educated mothers (up to high school) being 56% whereas an inverse relation was hypothesized by A.G.Wasihun et al.,[9] wherein 58% mothers had no educational background. Majority of the study participants (94.3%) belonged to middle class which contrasts with the study done by Kavita Vasudevan et al.,[19] in which 62.5% children belonged to lower socio-economic class as per BG Prasad's classification. Both the studies revealed that around 60% of the study population belonged to nuclear families. According to the study by Sujata Murarkar et al., [11], 95% of children were fully immunized which is similar to the findings of this study. The study also showed that exclusive breastfeeding was given to 46.3% of children which also is like the findings of this study. On examination for the signs of dehydration, 15% had severe dehydration, 40% had mild to moderate dehydration and 46% had no dehydration.

Out of 230 children, 5% suffered from complications such as metabolic acidosis and hypovolemic shock. Around 44% children had other health problems besides gastroenteritis. Pneumonia (8.7%), bronchiolitis (3%), anemia(3.5%) were some of the common health issues found in these patients. We could not find any previous studies which considered other health problems in children with GE. In this study, children were categorized based on their nutritional status and the following results were obtained; 45.2% were normal, 15.6% were underweight, 15.2% were stunted, 13% were wasted and 10.8% suffered from SAM. These findings were consistent with previous studies done by A.G Wasihun et al., [9], Sanjit Sarkar et al.,[10] and Sujata Murarkar et al.,[11]. Underweight and stunting were the most common forms of undernutrition in this study and other studies done by A.G Wasihun et al.,[9] and Sujata Murarkar et al.,[11]. Wasted and SAM patients were found to have a statistically significant association with multiple previous hospital admissions due to GE. This could be due to the compromised nutritional status and reduced immunological capacity of the child which in turn were disturbed due to multiple episodes of diarrhea. Many of the previous studies focused only on the risk factors of malnutrition in under five children. In this study, association between child's nutritional status and history of diarrheal episodes and hospitalizations has also been found. Further research in this aspect also taking into consideration mother's nutritional status (prior to pregnancy and at the time of delivery), breastfeeding history, full term or preterm baby, birth order and rotavirus vaccination status of the child can give us a more comprehensive picture which can help prevent recurrent GE episodes in children.

Conclusion

Acute GE patients are usually given symptomatic treatment for the ongoing episode and discharged. It is important to assess the child's nutritional status and recommend necessary modifications in their diet. By doing so, the child's nutritional status can be normalized which

can prevent further episodes of GE and other infectious diseases. This in turn can reduce morbidity and improves quality of life socio-economically. More extensive research must be done at community level which could bring out the burden of malnourishment among children. Health education campaigns should focus on spreading awareness about negative effects of malnutrition on child's health. Malnourished children should be referred to local anganwadis which help in providing supplementary nutrition to children, besides providing health and nutrition education to families. Integrated Child Development Scheme (ICDS), a government launched nutrition program, if strengthened through effective implementations and proper strategies, could itself play a vital role in improving the child nutrition status in their early ages.[10]

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