

PREVALENCE OF SEVERE ACUTE DIARRHEA IN CHILDREN AGED 2-6 MONTHS OLD AMONG HOSPITAL ADMISSION PATIENTS

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ABSTRACT

Background: Diarrhea is a global issue causing significant morbidity and mortality rates, particularly in developing countries. Children under 5 are most susceptible, accounting for 18% of fatalities. Risk factors include inadequate WASH practices, not breastfeeding, age <24 months, and low maternal education. Interventions like immunization and hand-washing effectively reduce diarrhea. **Aim:** To find the prevalence of severe acute diarrhea in children below two years old and to find the diarrhea specific admission rate in Mosul city. **Patients and Methods:** A cross-sectional study was conducted on children with diarrhea admitted to Al-Khansaa Teaching Hospital from May to August 2023. The participants were children 2-24 months old with acute diarrhea within the previous 2-4 days. Researchers used checklists and patients' medical files to collect detailed data. IBM-SPSS was used for statistical analysis, with chi square for goodness of fit. **Results:** The study found that out of 877 children admitted to pediatric wards, only 211 had diarrhea age from 2-24 months, with a disease-specific admission rate of 24.1%. The majority were between 2-6 months old, males, and females. Urban residents had higher rates of diarrhea. The diarrhea was categorized as bloody or non-bloody, with a significant association with fever. The duration of diarrhea was 3.6 days and hospitalization was 2.45 days. **Conclusion:** Diarrheal illness is the leading cause of death and morbidity globally, and it accounts for a notably high percentage of admissions in children under two. The study found a strong correlation with male gender, living in an urban area, not exclusively breastfeeding, low weight for age percentiles, and younger age than six months.

KEYWORDS: Diarrhea, Prevalence, Two years children.

INTRODUCTION

The tendency of diarrhea to produce high rates of morbidity and death among babies and children worldwide, especially in developing nations like Iraq, makes it a global concern.^[1,2] As one gets older, the frequency of diarrhea varies. Diarrhea is most common in children under five, who account for 18% of the mortality rate. In children, the incidence of diarrhea decreases with age.^[3]

Diarrhea is defined clinically as a change in stool, often three or more loose or watery stools or one or more bloody stools in a 24-hour period.^[4] Less than 14 days is considered acute diarrhea, more than 14 days is called persistent diarrhea, and more than one month is called chronic diarrhea. Hospitalization and prompt medical assessment are necessary for severe acute diarrhea. Volume depletion, fever, six or more stools in a 24-hour period, a sickness lasting more than 48 hours, severe

stomach discomfort in people over 50, and immunocompromised patients are all considered indicators of severe acute diarrhea.^[5]

Inadequate WASH practices, not nursing, being younger than 24 months, and low maternal education have all been linked to children diarrhea in previous research.^[6-8] It has been demonstrated that interventions that support vaccination, soapy handwashing, safe sanitation, water purification, and safe water storage techniques can successfully lower the incidence of diarrheal illnesses in children.^[10] Yet, risk factors for diarrhea differ within and between nations, indicating that there is no one-size-fits-all strategy to lower pediatric diarrhea.^[11]

AIM

To find the prevalence of severe acute diarrhea in children below two years old and to find the diarrhea specific admission rate in Mosul city.

PATIENTS AND METHODS

Study design, setting, and interval

A hospital based cross-sectional study was carried on children with diarrhea admitted to Al-Khansaa Teaching Hospital from 1st May to 1st August 2023.

The participants were chosen using the sequential sampling approach and were children between 2 months to 24 months old who had experienced acute diarrhea in the pediatric unit during the preceding two to four days.

Case definition: Children who had diarrhea 7 and more times per day and who associated with some or severe dehydration needed admission to the pediatric wards were considered as positive cases of severe diarrhea.

The exclusion criteria: diarrhea more than seven times per day without dehydration, diarrhea lasting 14 days or longer, children taking immunosuppressive drugs, children with gastrointestinal surgery history, children with comorbidities, children with a history of gastrointestinal surgery, children with metabolic disease,

malignant disease, or human immunodeficiency virus disease, and children with hospital-acquired diarrhea.

Data collecting tool: Detailed data was obtained by using checklist made by the researchers in addition to the review of the patients' medical files.

Statistical analysis: The analysis was done by using IBM-SPSS (26). The numerical data was expressed in means and standard deviations while the categorical data was expressed in frequencies and proportions. Chi square for goodness of fit performed to find the statistical difference in the studied parameters among the patients. The $p \leq 0.05$ considered as significant.

RESULTS

During the study period, the total number of children admitted to the pediatric wards age below 14 years was 877 child; and 211 child from them had diarrhea with age 2-24 months, the disease specific admission rate was 24.1% as shown in figure (1).

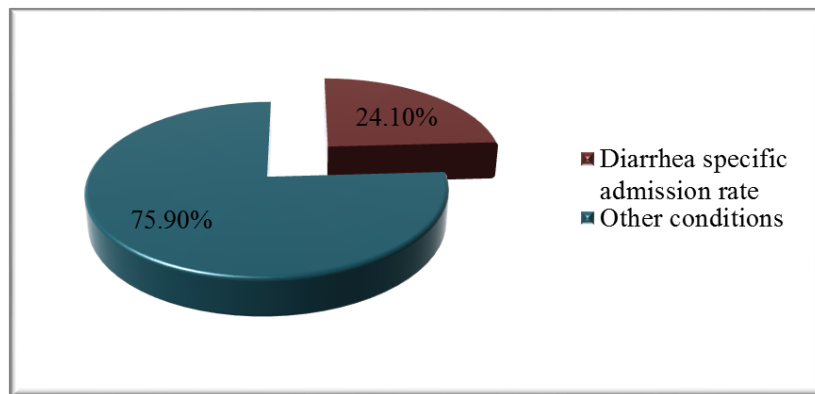


Figure 1: Admission rate of children with Diarrhea.

The distribution of the cases according to the socio-demographic characteristics was demonstrated in table (1) which revealed that 52.1% of cases were in the 2-6 months-age group with a significant statistical difference ($p=0.000$). Concerning the sex, 58.3% were males and

41.7% were females; the difference was statistically significant ($p=0.016$). Those living in urban (59.9%) were significantly higher ($p=0.046$) than those in rural (43.1%).

Table 1: Distribution of the cases according to socio-demographic characteristics.

socio-demographic characteristics.	Frequency	Percentage	p-value*
Age / months	2-6	110	52.1
	7-12	53	25.1
	13-24	48	22.8
Sex	Males	123	58.3
	Females	88	41.7
Residence	Rural	91	43.1
	Urban	120	56.9
Total	211	100.0	

*Chi square Goodness of fit

The body weights for age percentiles were estimated; The mean percentile for age group 2-6 months was 13.38 ± 20.29 . Among the age group 7-12, the finding was

25.70 ± 30.68 . At age group 13-24, the mean percentile was 24.31 ± 26.46 as shown in table (2).

Table 2: Statistical characteristics of the body weight for age percentile for the three age groups.

Age / months	Percentile	
	Mean	Standard deviation
2-6	13.38	20.29
7-12	25.70	30.68
13-24	24.31	26.46

The diarrhea was categorized as bloody and non-bloody; the bloody diarrhea found among 22(10.4%) of the children with significant statistical difference (p=0.000). fever was reported in 62.1% of the children with a statistically significant association (p=0.000) as demonstrated in table (3).

Table 3: Clinical features.

Clinical features		Frequency	Percentage	p-value*
Types of diarrhea	Bloody	22	10.4	0.000
	Non bloody	191	89.6	
Fever	Yes	131	62.1	0.000
	No	80	37.9	
Total		211	100.0	

*Chi square Goodness of fit

The mean duration for the diarrhea was 3.6±2.45 days and the mean day for the hospitalization was 2.45±1.36 as shown in table (4).

Table 4: Statistical characteristics of the duration and hospitalization.

Variable	Mean	SD	Minimum	Maximum	Q1	IQR	Q3
Duration	3.621	2.457	1.00	12.00	2.00	3.00	5.00
Hospitalization	2.459	1.367	1.00	8.00	2.00	1.00	3.00

The distribution of cases who aged 2-6 months according to their feeding types was demonstrated in figure (2)

which showed that out of the 112 cases; 25 was breast feeding, 59 artificial, and 28 mixed feeding.

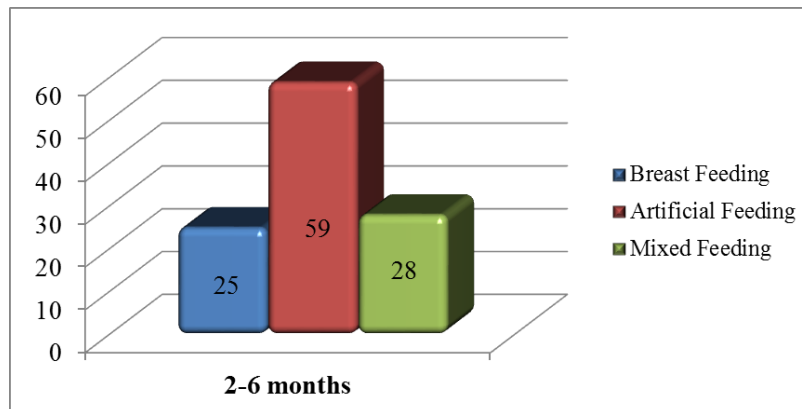


Figure (2): Distribution of the patients according to type of feeding among patients aged 2-6 months and below.

The comparison between types of feeding in relation to age interval 2-6 months was demonstrated in table (5)

which revealed no significant statistical difference (p=0.303).

Table 5: Relation of type of feeding among age groups.

	Breast feeding (n=25)	Artificial feeding (n=59)	Mixed feeding (n=28)	P-value*
	No.(%)	No.(%)	No.(%)	
2 months	9(36.0)	8(13.6)	5(17.9)	0.303
3 months	5(20.0)	9(15.3)	3(10.7)	
4 months	3(12.0)	12(20.3)	3(10.7)	
5 months	4(16.0)	13(22.0)	6(21.4)	
6 months	4(16.0)	17(28.8)	11(39.3)	

*Freeman-Halton Exact test

The distribution of the cases according to weight for age percentile was as 73 below 2, 33 were from 2 to 5, and

105 were more than 5; the difference was statistically significant (p=0.000).

Table 6: Associations of weight for age percentile and number of cases.

Weight for age percentile	Frequency	Percentage	p-value*
<2	73	34.6	0.000
2-5	33	15.6	
>5	105	49.8	

*Chi square Goodness of fit

DISCUSSION

Although the prevalence of severe acute diarrhea in children under two varies by country, the information that is currently available indicates that it is quite high. Numerous research indicate that 11% of children under five had severe diarrhea, according to a 2021 study conducted in Ethiopia.^[12] According to the current study, diarrhea accounted for 24.1% of all pediatric ward admissions. According to a 2017 research of Ethiopian children, the prevalence of diarrhea in children was almost 13% after two weeks.^[13]

Nearly 1.7 billion episodes of diarrheal illness occur annually, according to the World Health Organization (WHO), with children under the age of five accounting for a sizable majority of these occurrences. According to a 2024 research, children between the ages of one and two had a roughly four-fold higher risk of experiencing diarrhea than children under the age of one.^[14] According to a different 2020 research, children under the age of two had the highest incidence of diarrhea.^[15] According to a 2014 survey, 63.5% of children had diarrhea.^[16] According to a 2024 research, the total prevalence of diarrhea in children under five was 11.7%.^[17] According to a 2022 research, 15.5% of children under five had diarrheal illness.^[18] A 2024 research found that 24.9% of children had diarrhea, with a greater rate in children between the ages of 12 and 23 months.^[19] An estimated 2.5 billion instances of diarrhea among children under five are reported each year.^[20] In summary, there is a comparatively high frequency of severe acute diarrhea in children under two, with varied rates between studies.

According to the current study, the median age was 6.0 months, and the mean age was 8.69±5.825 months. According to Rahmat *et al.*^[21] the majority of cases were males, and the median age of the children was 12 months (6–24 months). According to a research by Natnael *et al.*^[12], children between the ages of 12 and 23 months had a greater chance of developing acute diarrhea. Children start to walk at this age and are very susceptible to contamination from contact with many environmental sources.

The majority of the patients in the current research were male. Similarly, a research by Olwedo *et al.*^[22] (2008) in Uganda discovered that male children are more likely than female children to get diarrhea. Additionally, according to Alaa *et al.*^[16], the majority of the kids were boys (57.5%). According to Mohammed and Omar's

study^[23] the prevalence of diarrhea was comparable in males and girls.

The proportion of urban dwellers in the current research was higher than that of rural residents. According to research by Manetu *et al.*^[20], the prevalence of diarrhea was somewhat greater in rural regions (25.1%) than in urban areas (23.4%). Additionally, according to Santika *et al.*^[15], 51.81% of the respondents were from a rural location.

Rotavirus and the bacterium *V. cholerae* or *E. coli* are the pathogens that typically cause acute watery diarrhea. Visible blood in the feces is a sign of bloody diarrhea, often known as dysentery.^[24] It is linked to nutritional losses and intestinal damage in an infected person. *Shigella* is the most frequent cause of bloody diarrhea, which is also the most prevalent cause of severe instances of chronic diarrhea, which is defined as an episode of diarrhea lasting at least 14 days, with or without blood.^[20] Merely 10.4% of the individuals who were currently tested had bloody diarrhea.

Major public health issues for children under five worldwide include fever and diarrhea, particularly in low- and middle-income countries (LMICs), where the 2-week prevalence rates of fever and diarrhea are 18.8% and 12.5%, respectively.^[25] Similar to the current study, which demonstrated that the majority of patients complained of fever, Manetu *et al.*^[20] discovered that children with a fever during the last two weeks had a greater prevalence of diarrhea (33.3%) than children without a recent fever (19.4%). The entire median length of hospitalization, according to Rahmat *et al.*^[21], was 4 days (2–14 days).

Even after adjusting for other factors, diarrhea in children under two years old is substantially linked to exclusive breastfeeding and bottle feeding.^[26] According to the present study, infants under 6 months old were more likely to be fed artificially, and children older than 6 months were not included in the study since weaning food at this age is not yet complete. Whether from the bottle or the fluids administered, children who are bottle-fed are more likely to be exposed to diarrheal pathogens.^[27] Improper hygiene when washing the bottle and preparing the fluid might lead to contamination. At the moment, bottle feeding is widespread in society. As a result, instruction on good hygiene is required for both cleaning the container and making the fluid. Diarrhea episodes can be avoided if the bottles or beverages are not contaminated by microorganisms. According to the study by Ogbo *et al.* (2018),^[28] babies who were not exclusively breastfed had a greater rate of diarrhea. Additionally, the risk of diarrhea in infants less than six months was greater for those who were not exclusively breastfed than for those who were. This result is in line with research from other developing nations, such as Bangladesh^[29], Vietnam^[30], and Nigeria^[27], which showed that EBF protected against diarrheal disease in

babies of the same age, even after controlling for inadequate sanitation and contaminated drinking water.^[27,30] Similarly, the preventive benefits of EBF in lowering the burden of diarrheal disease were also revealed by a meta-analysis of 18 trials.^[31] Breast milk's immunological properties, which shield the infant's gastrointestinal tract from invasive microorganisms, and EBF's ability to restrict the infant's exposure to contaminated foods and drinks are the main causes of its protective effect against diarrhea.^[32,33]

Furthermore, research has shown that breast milk also promotes the infant's innate immune system^[34,35] and epigenetic program, both of which are critical for infection prevention.^[36] Breastfed children aged 6–23 months had less than half the chance of dying from diarrhea compared to non-breastfed infants, according to a meta-analysis assessing the effect of breastfeeding on diarrhea-related morbidity and mortality.^[37] Despite inadequate nutritional diversity, breastfeeding decreased the risk of diarrhea in infants under two years old, according to another study conducted in rural China.^[38]

CONCLUSION

Diarrheal illness is the leading cause of death and morbidity globally, and it accounts for a notably high percentage of admissions in children under two. The study found a strong correlation with male gender, living in an urban area, not exclusively breastfeeding, low weight for age percentiles, and younger age than six months.

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