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PREVALENCE OF ACUTE AND PERSISTENT DIARRHOEA IN NORTH GONDAR ZONE, ETHIOPIA
G. Mitike, MD, MPH, Department of Community Health, Faculty of Medicine, Addis Ababa University, P.O. Box 9086, Addis Ababa, Ethiopia.

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G. MITIKE

ABSTRACT

Objectives: **A study was conducted to determine the magnitude of dysentery and persistent diarrhoea in children aged under-five.**
Design: **A cross-sectional community- based survey was used to enroll the under-five children. A two-stage random sampling technique was applied to identify the households with under-five children.**
Setting: **The study was conducted from March to May 1997 in two districts of North Gondar Administrative Zone that is located in northwest Ethiopia. Two urban dwellers associations and twelve peasant associations were covered by the study.**
Subjects: **A total of 1101 under-five children were involved.**
Main outcome measures: **Bloody diarrhoea and diarrhoea that persisted for fourteen days or more were the main outcome variables.**
Results: **One hundred and ninety seven (18%) of the under five children had diarrhoeal attacks within two-week recall period. Sixty five (33%) of these had persistent diarrhoea. The prevalence of persistent diarrhoea was 6%. Of those who had diarrhoea, forty four (22.3%) had dysentery. Access to protected water source was significantly lower in children with diarrhoeal diseases than without ($\chi 2 = 4.31$, $p<0.05$). Significantly a higher number of children with diarrhoea had recent attacks of diarrhoea than those without diarrhoea ($\chi 2=176.82$, $p<0.00001$).**
Conclusions: **A particularly high prevalence of dysentery and persistent diarrhoea was observed. Establishment of a simple surveillance system and taking of control measures to reduce the burden of dysentery is recommended.**

INTRODUCTION

Diarrhoeal diseases are some of the leading causes of morbidity and mortality in Ethiopia(1,2). Infants and young children are the most affected. It is estimated that an average of five episodes of diarrhoea occur per child per year. Based on the reports from health institutions (1989-91), diarrhoeal diseases were one of the fifteen top causes of hospitalisation and hospital visits(3).

Poor personal and domestic hygiene, unsanitary excreta disposal, unsafe and inadequate water supply and malnutrition are the major risk factors known. Besides, ignorance, poor socio-economic status and low health service coverage do contribute to the increased prevalence of diarrhoeal diseases(4-6).

As defined by WHO, diarrhoea is the passage of loose or watery stools, usually at least three times in a 24-hour period(7). Diarrhoeal diseases are usually classified as acute, persistent or chronic depending on the duration of diarrhoeal episode. Most diarrhoeal attacks are acute (last for 5 - 7 days)(8). When the stool contains visible red blood it is termed dysentery(9). In some cases the episode lasts 14 days or more leading to persistent diarrhoea. Although persistent diarrhoea accounts for only 5% of all diarrhoeal attacks, the case fatality rate is usually higher. Among the risk factors for persistent diarrhoea, age less than one year, malnutrition, poor immunological status, previous occurrences of acute diarrhoea and infections such as measles have been reported(8).

In the Amhara National Regional State of Ethiopia, reports from health institutions showed diarrhoeal diseases as being among the common causes of health institution visits (Annual Report of Region Three Health Bureau, 1994/95, Bahir Dar). Diarrhoeal diseases were the second leading causes of epidemics, next to malaria. In the first six months (July 1995 - December 1995) alone, reports from North Gondar Zone accounted for 79% of diarrhoeal cases and 95% of the deaths reported to the Regional Health Bureau (Epidemic and Surveillance Report, 1995).

This study was therefore conducted to estimate the magnitude of acute and persistent diarrhoea in under-five years old children in Gondar Zuria and Alefa Takussa woredas of North Gondar Zone and identify some of the associated factors.

MATERIALS AND METHODS

North Gondar is one of the 10 Administrative zones in the Amhara National Regional State. It has 16 administrative woredas (districts). The total population is 2,139,710. The majority (88.5%) resides in rural areas. The under-five children account for 15.6% of the population (Based on 1994 population census). Under the Zone Health Department, there are 10 health centres,

one hospital, 73 health stations and 11 non-functional health posts. Additionally, the teaching hospital of the Gondar College of Medical Sciences is located in Gondar.

According to the reports of the Zonal Health Department (1995), diarrhoeal diseases are the fourth commonest reasons for hospital visits and the eighth for admission. Similarly, in health centres and health stations, diarrhoeal diseases are the fourth top causes of visits next to malaria, tuberculosis, and helminthiasis (Alemayehu Mekonnen, Health Profile of North Gondar Administrative Zone, 1997).

This cross-sectional study was conducted from March 1 through May 4, 1997 in Gondar Zuria and Alefa Takussa woredas of North Gondar Administrative Zone where persistent and repeated epidemics of diarrhoeal diseases were reported to the Regional Health Bureau since the last 2-3 years. The total populations of Gondar Zuria Woreda and Alefa Takussa Woreda (projected population of 1996) are 196,919 and 218,959 respectively. Each of these two woredas has one health centre and seven clinics.

Based on the current administrative structure, 24 Farmers' Associations and eight semi-urban villages were identified after excluding areas served by health centres. The areas served by health centres were excluded because of better capacities as compared to the health stations. Using simple random sampling technique six Farmers' Association and two semi-urban localities were selected. The basis for the selection was only catchment population under health stations, which were run by health assistants or nurses. The semi-urban and rural areas were similar in many of government social and administrative arrangements. The health stations were located in the semi- urban areas. Households were identified in each village using systematic random sampling method.

Data were collected using a questionnaire. Focus group discussions were conducted to improve the content and form of questionnaire. Data collectors were 12th grade complete and above. A four-day training was given on how to collect the data. In the training, standardisation and pre-testing of the questionnaire were included. The trainees were made to identify and interpret immunisation cards. They were also trained on the indications, preparations and use of ORS. Questionnaires were filled for each under-five in a household independently. A two-week recall period was used to interview mothers.

Data were collected on the essential demographic characteristics of each under five child, morbidity from acute and persistent diarrhoea, characteristics of diarrhoea, water sources, history of previous diarrhoea, current status of diarrhoeal attack, distance from the nearest health station, etc.

In this study a diarrhoeal episode is defined as a reported occurrence of diarrhoea that meets the WHO definition of diarrhoea beginning in the first 24 hours until the end of the occurrence of diarrhoea that does not satisfy the definition(7). Therefore, episodes refer to the number of attacks and not the number of each loose bowel motion. Kebele is the lowest administrative unit in both urban (Urban Dweller's Association) and rural (Farmer's Association) areas. Woreda is equivalent to a district.

Before the study was conducted, each Woreda health office made permissions and arrangement. Verbal consent was obtained from each participant and ORS sachets were distributed to children with diarrhoeal attacks. Data entry and analysis were made using a computer (EPI-INFO version 6 statistical package). Chi square test was used to detect statistical associations.

The results of the study were communicated to the Regional Health Bureau, the North Gondar Health Department, Alefa and Gondar Zuria Woreda Health Offices.

RESULTS

A total of 1101 under five children were enrolled from 1,512 households. The majority 636 (57.8%) were from Alefa Takussa Woreda. Almost two-thirds of the children were under three years of age. Over fifty seven percent of the infants did not attend any of the vaccination programmes (Table 1).

Table 1

Characteristics of the under-five children, North Gondar Administrative Zone, May 1997

Characteristic	Frequency	%
Population by Woreda		
Gondar Zuria	465	42.2
Alefa Takussa	636	57.8
Sex		
Male	559	50.8
Female	542	49.2
Address		
Rural	925	84.0
Semi-Urban	176	16.0
Age(months)		
<12	232	21.1*
12-23	196	17.8
24-35	205	18.6
36-47	250	22.7
48-59	218	19.8
Immunisation < 1 year (n=232)		
Never	134	57.8
Partially	23	9.9
Complete (card)	7	3.0
Complete (mother-word)	6	2.6
Vaccinated for age	56	24.1
Unknown	6	2.6
Immunisation (12-23 months, n = 196)		
Never	93	47.4
Partially	48	24.5
**Complete (card)	20	10.2
**Complete (mother-word)	35	17.9

*49.1 % (114) of the under one year children are below six months of age.
**Complete = fully immunised.

The mean age for weaning was 12.8 (SD ± 4.4) months. Ninety seven percent of the children were breast-fed. Thirteen (3%) of the children were bottle-fed and these were from one of the urban dwellers associations which was on the main road to Bahir Dar and Gondar. Fifty-five (28.1%) of the children aged 12-23 months were reported to have completed their vaccination. Of these, vaccination cards were available for 20 children.

Eighty-four percent of the study population reported that the water supply was from unprotected source. The proportion of children with protected water supply was lower in Gondar Zuria Woreda (3.9%) than Alefa Takussa Woreda 17.9% (Table 2). Eighteen percent of the under-five children had previous diarrhoeal attacks prior to the present episodes (Table 3). The prevalence of diarrhoea was 17.9% (197). In some kebeles it was as high as 24-27%. In 65 children, the diarrhoea had persisted for 14 days or more. The proportion of children with persistent diarrhoea was 5.9% and it accounted for 65/197 (33%) of

all the diarrhoeal episodes. Forty four (22.3%) of the under five children with diarrhoeal episodes had visible blood in the stool.

Table 2

Distribution of children by water source, Gondar

Water source	Frequency	%
Gondar Zuria Woreda(district)		
Unprotected		
River	308	66.2
Spring	88	18.9
Well	34	7.3
Tana Lake	17	3.7
Protected	18	3.9
Alefa Takussa Woreda(district)		
Unprotected		
River	203	31.9
Spring	237	37.3
Well	34	5.4
Tana Lake	6	0.9
Protected	114	17.9
Both sources	42	6.6
Overall		
Unprotected		
River	511	46.4
Spring	325	29.5
Well	68	6.2
Tana Lake	23	2.1
Protected	132	12.0
Both sources	42	3.8

Table 3

Characteristics and magnitude of diarrhoea, Gondar

Characteristic	Frequency	%
Diarrhoea		
Yes	197	17.9
No	904	82.1
Previous diarrhoea(n=972)		
yes	175	18.0
no	797	82.0
Duration of diarrhoea (days) n=197		
1-7	89	45.2
8-13	43	21.8
14 and above	65	33.0
Type of diarrhoea		
watery	65	33.0
mucoid	47	23.9
bloody	44	22.3
other *	41	20.8
Other symptoms		
Tenesmus		
yes	144	73.1
no	53	26.9
Cramp		
yes	157	79.7
no	40	20.3
Fever		
yes	144	73.1
no	53	26.9
Status of diarrhoea		
decreased	73	37.1
stopped	61	30.9
continued	55	27.9
worse	8	4.1

Other * includes "egg-yolk" like or greenish diarrhoea.

Table 4

Factors associated with diarrhoea, Gondar

Factor	Diarrhoea Yes=n(%)	No=n(%)	Total	P value
Sex				
Male	102 (18.2)	457 (81.8)	559	
Female	95 (17.5)	447 (82.5)	542	P>0.05
Address				
Semi-urban	37 (21.0)	139 (79.0)	176	
Rural	160 (17.3)	765 (82.7)	925	P>0.05
Age				
<12 months	31 (13.4)	201 (86.6)	232	
12-23	60 (30.6)	136 (69.4)	196	P<0.01
24-35	48 (23.4)	157 (76.6)	205	
36-47	37 (14.8)	213 (85.2)	250	
48-59	21 (09.6)	197 (90.4)	218	
Water source				
Unprotected	176 (19.0)	751 (81.0)	927	
Protected	21 (12.1)	153 (87.9)	174	P<0.05
Breast-feeding				
Yes	191 (17.6)	897 (82.4)	1088	
No	6 (46.2)	7 (53.8)	13	P<0.05*
Previous diarrhoea (n = 972)				
yes	100 (57.1)	75 (42.9)	175	
no	97 (12.2)	700 (87.8)	797	P<0.00001
Immunisation (n=232, age<12 months)				
Never(partial)	29 (17.8)	134 (82.2)	163	
Complete	8 (11.6)	61 (88.4)	69	P>0.05

*= All were from the semi-urban area

Almost seventy five per cent of the children with diarrhoea had associated tenesmus, abdominal cramp and fever. At the time of the survey, 55 (27.9%) of the children had ongoing diarrhoeal attacks and in eight children the situation got worse as compared to their previous status (Table 3).

The mean frequency of diarrhoeal attacks was 4.3 motions per day and the duration 11.1 days. The median duration of attack was eight days.

Only 14.6 % of the children with diarrhoea started weaning food at the age of six months, whereas 23.1% started at the age of nine months. Children who were bottle-fed had diarrhoea than those who were not (Fisher exact test: 2 tailed p-value = 0.02) (Table 4).

Water supplies were from unprotected sources as compared to children without diarrhoea ($\chi 2=4.31, p<0.05$). Children with diarrhoea had previous attacks than those without diarrhoea, ($\chi 2=176.82, p< 0.00001$). The majority of the children with diarrhoea were under three years of age. The magnitude was lower in infants less than six months and children greater than three years of age as compared to children between six months to three years (Chi-square for linear trend = 6.87, $p<0.01$).

In infants those who were never immunised or partially immunised had more episodes of diarrhoea than those who reportedly completed their vaccination, although this did not achieve statistical significance ($p > 0.05$).

DISCUSSION

Although slightly lower than previous reports in Gondar, the magnitude of diarrhoeal diseases is still high(6). In contrast to our finding, a higher prevalence rate (22%) was reported in Zeway, southern Ethiopia(10). Most probably the survey results might have underestimated the magnitude because of seasonal fluctuations. In fact, proportions as high as 24-27% were also detected in some kebeles of the study area. This shows that some kebeles were severely affected by diarrhoeal diseases. The proportion of children with persistent diarrhoea episodes (14 days or more) of 33% was much higher than that in other reports from developing countries which ranged between 3 - 20%(8). In addition, the magnitude of persistent diarrhoea was slightly higher than the report of the Ethio-Swedish Children's Hospital in Addis Ababa(11). This is impressive in contrast to the report of the hospital-based study in the latter. The high rate of persistent diarrhoea maybe one of the reasons for the increased number of deaths reported by Regional Health Bureau. The majority of children with diarrhoea had recent history of diarrhoeal attacks during the preceding three months. According to different reports children with persistent diarrhoea are more likely to have previous attacks of acute or persistent diarrhoea(8).

Twenty two percent of the diarrhoeal episodes had blood visible to the naked eye, and this was more than twice the expected proportion reported by WHO which is 10%. It has also been reported that dysentery accounts for 15% of the diarrhoea associated deaths in under-five children(9).

This might have added to the reasons for increased mortality during epidemics in the area. According to a study conducted in the teaching hospital of Gondar College of Medical Sciences, an unusually high proportion of resistance to common antibiotics was also reported for *Shigella* and *Salmonella* strains(12). Thus, there is a need to further inquire into the problem of dysentery.

As found out from the survey, more children were affected by diarrhoeal diseases in Gondar Zuria Woreda than in Alefa Takussa Woreda. On the other hand, protected water supply was lower in Gondar Zuria Woreda than in Alefa Takussa Woreda (personal communication, North Gondar Zone Health Department). Water sources were unprotected (unsafe) for most of the children who developed diarrhoeal diseases. Other studies have indicated that access to safe water is one of the most important factors in the distribution of diarrhoeal disease(4,5,6,13). It was also reported that absence of safe water supply contributed to the high under-five morbidity in Ethiopia(14). As indicated by different authors, contaminated water used for preparing weaning foods, drinking, and other domestic purposes might play a crucial role in the transmission of diarrhoeal diseases(15). This may partly explain why there were more children with diarrhoeal attacks in Gondar Zuria Woreda than Alefa Takussa Woreda. The highest prevalence of diarrhoeal diseases was reported in some kebeles of Gondar Zuria Woreda as compared to the others.

It was shown that those kebeles with protected water source had lower prevalence of diarrhoeal diseases. Although this could not be the whole explanation, for example, in one Farmers' Association, there were only two cases of diarrhoeal diseases within two-week recall period and there were no reports of epidemics within two years. Similarly, the magnitude of diarrhoeal diseases was also lower where there were protected water supplies.

In this study, children between six months and three years of age were the most affected groups than infants below six months and children three years and above. This finding agrees with other reports(6,8). Almost half of the children who were bottle-feeding had diarrhoea as compared to those on breast-feeding. All the children who were bottle-feeding were from urban areas. Here, the finding denotes that there is a need to discourage the growing tendency of bottle-feeding in urban areas and promote and encourage breast-feeding practices. It was also shown that weaning did not start at the appropriate time and this affects the nutritional status of the children. As revealed in other studies the chance of getting diarrhoeal attacks is less in those who are breast-fed and properly weaned(16,17). Late introduction of supplementary feeding and non-breast-feeding were found to be associated with high under-five mortality(18).

In this study, the immunisation status did not seem to be associated with diarrhoeal diseases, especially in children 12 to 24 months of age. After the first year of life, children might be active with an increased chance of exposure to the risk factors for diarrhoeal diseases.

Based on the findings, the following recommendations are made: (i) improve the supply of protected water to the communities most affected; (ii) organise supply of ORS with EPI Outreach programmes to kebeles most affected; (iii) establish a simple surveillance system to detect epidemics early and; (iv) further study on dysentery and persistent diarrhoea.

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