Pattern of Mortality in Children Aged 1 month up to 5 years in a Teaching Hospital, Addis Ababa, Ethiopia.

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Abstract: Ethiopia has one of the highest under-five mortality rates in the world. This retrospective study was designed to determine the pattern of under-five mortality in Tikur Anbessa Hospital, Addis Ababa, Ethiopia. All deaths among infants and children in the age group 1-59 months that occurred during September 2001 to August 2002 were included in the study. From a total of 1556 admissions, 297 died making the mortality rate 19.1%, with 95% confidence interval of 17.1-21.1%. Among 263 deaths, the documents of which could be retrieved, the majority (70%) were infants (below 12 months). Deaths occurred in the first 48 hours in 61.6% of the cases. The median duration of illness was 7 days. Nearly one third of the deaths had severe protein-energy malnutrition. The top five causes of death were pneumonia, gastroenteritis, tuberculosis, pyogenic meningitis and sepsis. Serology for HIV was positive in 5 cases and the infection was suspected in another 60 cases. Further study on the impact of HIV on under-five mortality is recommended.

INTRODUCTION

Under-five mortality rate (U5MR) reflects the level of development in a given nation. Ethiopia, as one of the least developed countries, has a high U5MR. For instance, in the 1998 UNICEF report, Ethiopia had the 16th highest U5MR among 189 nations (1). The most recent (year 2001) Ministry of Health report of U5MR was 140/1000 live births (2). Various high figures have emerged in several studies conducted in the country (3-7). All in all, deaths in the under-five account for about 50% of the total recorded deaths in Ethiopia (8).

The leading causes of death in children have been investigated in several community-based studies (4,9,10) and has been found to be similar in pattern with those of hospital-based studies (11,12). Similar studies were not conducted recently in our hospital since 1971, necessitating up-to-date information to help in planning in reducing mortality among the admitted under-5 children.

The objective of this study was to determine the clinical pattern of under-five mortality in the pediatric wards of Tikur Anbessa Hospital.

Materials and Methods

Setting: Tikur Anbessa Hospital is a central referral hospital located in Addis Ababa, Ethiopia. The hospital serves as a teaching institution for both undergraduate and post

graduate study of medicine. The Department of Pediatrics and Child Health, which is one of the various departments of the Hospital, has an emergency ward and a more conventional ward (Ward 7B) for under-five inpatient set-ups. The emergency ward, traditionally called casualty ward, admits children mainly from emergency outpatient department (OPD), and also from the regular OPD and follow-up clinics. Patients may be transferred to Ward 7B for completion of therapy or when patients' condition would be too critical to manage at that level. Most of the patients are discharged improved without being transferred to Ward 7B. In each ward a team of senior pediatricians, residents, interns and nurses manage patients. Deaths are confirmed by physicians and documented on the patients' charts. The name, age, sex, chart number, date of admission, and date of discharge or death of the patients were recorded in the registration book kept at the wards.

The charts are returned to their respective chart rooms and sorted according to their chart number.

Study design: The study had a retrospective study design.

Study population: The study population included all children aged 1 month up to 5 years who died in the pediatric wards of Tikur Anbessa Hospital, Addis Ababa.

Study period: The study period included September 2001 to August 2002. The study period covered one year.

Inclusion criteria: The study included all deaths among children aged 1 month up to 5 years that occurred in the study period in the pediatric emergency ward and Ward B-7 of Tikur Anbessa Hospital.

Exclusion criteria: the study excluded all deaths that occurred in other wards of Tikur Anbessa Hospital. It also excluded all deaths among infants below 1 month of age.

Data collection: The names and chart numbers of subjects of the study was collected from the ward's registration book. Patient's chart was retrieved from the chart room. Data was collected from patient's chart using a structured format. The variables included were: age, sex, address, nutritional status, vaccination history, HIV test (ELISA-1 and ELISA-2) results, and main cause of death. In the charts where both the intern and the resident have written history, the resident's history was used as the source of information. The final diagnosis was recorded from the patient's charts. The diagnosis was labeled as primary if it has contributed the most for the patient's death, and secondary if it was found concomitantly with the primary diagnosis. The primary diagnosis was taken for the analysis of the main causes of death.. Data was entered into and analyzed using EPI-info version 6.

Limitations of the study:

As this was a hospital-based study, the study population may not represent the general population. Findings of the study were based on chart reviews. Thus, results were limited to non-missing data.

Infants under the age of 1 month were excluded from the study. Even though this age group contributes significantly to under-five mortality, their mortality is related to antenatal and neonatal

conditions. The findings of the study were thus limited to the post-neonatal conditions of the under-five children.

Results

Of the total of 1556 admissions, there were 297 deaths (19.1%), with 95% confidence interval of 17.1-21.1%. Of the 297 deaths, charts of 263 were available for review. The age ranged from 1 month to 57 months, with a mean of 10.4 months and a median of 6 months. Most of the deaths occurred in the age group below 12 months (Table 1 & Graph 1). Male to female ratio was 1.2:1 (Table 1). The majority (82.6%) came from Addis Ababa.

The median duration of illness before admission was 7 days (range: 12 hours to 180 days). Deaths in the first 48 hours occurred in 242 (56.2%) of the cases (See table 2).

The majority of the cases were either fully vaccinated or vaccinated for age (Table 3). In the age group below 9 months, 108 infants (82.4%) were vaccinated for age, while 16 infants (4.6%) were not vaccinated for age, and 7 infants (5.3%) were not vaccinated at all. Of the total 100 children/ infants, in the age group 9 months and above, 84 (84%) were fully vaccinated, while 10(10%) were not vaccinated for age, and 6 (6%) were not vaccinated at all. Considering both age groups together, 36.4% were fully vaccinated, while 46.8% were vaccinated for age, 11.3% were not vaccinated for age, and 5.6% were not vaccinated at all.

The nutritional status was as depicted in Table 4. Severe protein-energy malnutrition (marasmus, kwashiorkor, and marasmic-kwashiorkor) accounted for 31.0% (N=79) of the deaths. Forty eight percent (N=250) of the cases were stunted.The five leading causes of death were pneumonia, gastroenteritis, pyogenic meningitis, tuberculosis and sepsis (Table 5). Serology for HIV was positive in 5 cases and the infection was also suspected clinically in another 60 cases.

Discussion

The study showed mortality rate of 19.1%, not different from that seen about 30 years ago in the

same hospital, which was 20.8% (12). The high mortality rate can be attributed to the fact that as a tertiary referral hospital it is likely that critical and terminal patients could have been referred to the hospital. The other reason for the high mortality could be because of the HIV/AIDS pandemic. The causes of under-five mortality have been depicted in several studies conducted both in hospital setup and in the community (5-12). With the advent of the HIV pandemic, the under-five mortality will undoubtedly increase. But the pattern of diseases among the under-five mortality, and the contribution of HIV has not yet been studied.

This study found that the majority of the deaths were among infants. The proportion of infant admissions may influence this result. But when compared with the other studies where admissions were also analyzed, similar high burden of death among infants was seen (11,12,15). So infancy is probably the most important period of intervention for any kind of improvement in the under-five mortality.

The fact that most of the deaths occurred in the first 48 hours was also seen in other studies (11,12,15). Whenever the child is admitted to the wards, the best possible care should be given during the first few days until the child is stabilized. We need to increase the awareness among referring health professionals and care providers about the signs of severe illness for early referral and initiation of management.

Severe protein-energy malnutrition accounted for about a third of the deaths among the under-fives. For obvious reasons, these are the children that need due attention and urgent intervention. The findings are also consistent with other studies conducted in this country (11,12,15). The role of nutritional management should also be emphasized in the emergency ward where it can easily be overlooked. One of the areas that is usually neglected is the plight of the child who is underweight. Slightly more than one-third of the deaths were among this group. Further study is needed to explain how they fair in the face of infection. Almost half of the children were stunted, as is the case among children in this country (15).

The top five causes of death are all infectious conditions that are known to be important in our country (16). Early detection and treatment would decrease mortality from these leading causes of

deaths.

The study emphasized on HIV infection due to its relevance as underlying infection predisposing children to growth failure and early death. Serology for HIV was positive in 5 cases. But another 60 cases were suspected of having HIV infection on clinical grounds. The low number of serology confirmations may be due to parents' refusal for HIV test or poor documentation. A lot need to be done to counsel families for HIV test. Children whose HIV status is known to be positive will get more attention with respect of anticipating opportunistic infections and if feasible antiretroviral therapy. It also contributes to the prevention of future HIV mother-to-child transmission.

Conclusions and Recommendations

The study found that most of the deaths occurred among infants. Deaths occurred mainly in the first 48 hours after admission. Severe protein-energy malnutrition contributes significantly to under-five mortality. The five leading causes of death were pneumonia, gastroenteritis, tuberculosis, pyogenic meningitis, and sepsis. Underlying HIV infection was suspected in more than one-fifth of the deaths.

The study, thus, forwards the following recommendations:

Intensive management of critical children in the first 48 hours of admission until stabilization should be improved. This may call for a well equipped intensive care unit.

Prevention of protein-energy malnutrition and its proper management should be improved.

Great emphasis should be given to implementation of programs involved in prevention of infectious diseases through timely vaccinations, sanitation improvements, etc.

Counseling skill for testing of sick children suspected of HIV needs to be improved.

Better documentation and record-keeping system should be given emphasis.

Finally, a large-scale study should be done to determine the impact of HIV on under-five mortality.

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Table 1. Age and sex distribution of children, age 1 month - 5 years, who died in Tikur Anbessa Hospital, Addis Ababa, Ethiopia, Sept. 2001 to August 2002.

Age group (months)	Sex	Total	
	M	F	
1 to 11	100	85	185
12 to 23	26	19	45
24 to 35	7	10	17
36 to 47	4	5	9
48 to 59	6	1	7
Total	143	120	263

Graph 1. **Age distribution of children, age 1 month up to 5 years, who died in Tikur Anbessa Hospital, Addis Ababa, Ethiopia, Sept. 2001 to August 2002.**

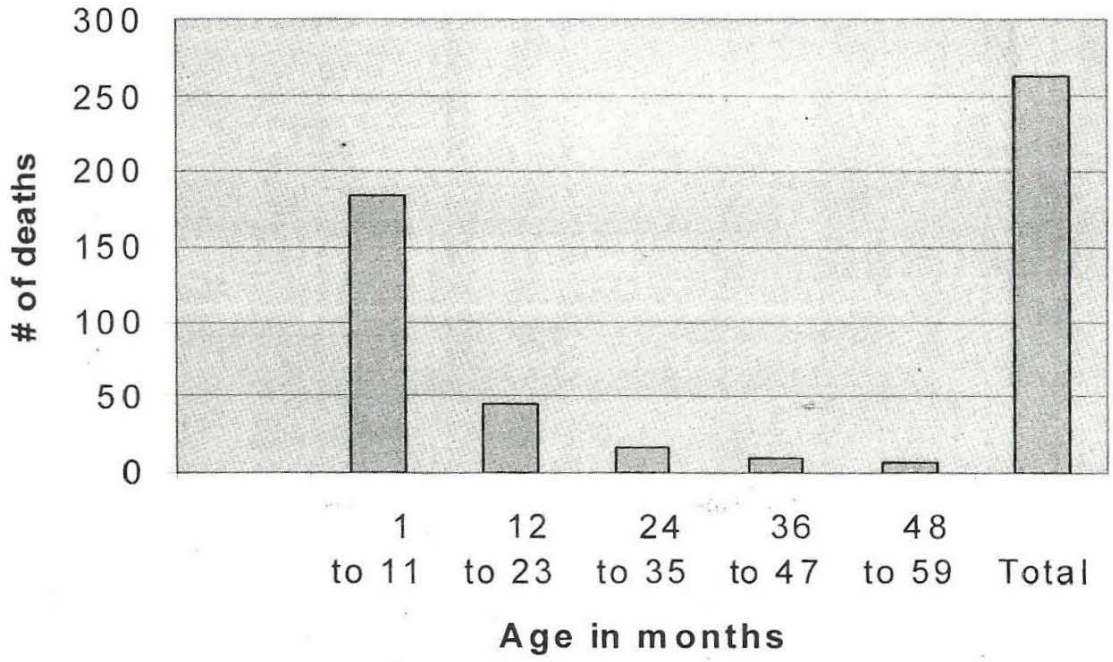

Table 2. Duration of stay among children, age 1 month - 5 years, who died in Tikur Anbessa Hospital, Addis Ababa, Ethiopia, Sept. 2001 to August 2002.

Duration of stay (day/s)	Frequency	Percentage
<1	38	15.7
1	64	26.4
2	34	14
3	13	5.4
>3	93	38.4
Total	242*	100.0

*Total number in this table is less than the total number of deaths because of incompleteness of the records.

Table 3. Vaccination status by age group among children, age 1 month - 5 years, who died in Tikur Anbessa Hospital, Addis Ababa, Ethiopia, September 2001 to August 2002.

Vaccination status	Number of children (%)	Total	
	<9 months	= and >9 months	
Fully vaccinated	0 (0)	84 (84)	84 (36.4)
Vaccinated for age	108 (82.4)	0 (0)	108 (46.8)
Not vaccinated for age	16 (4.6)	10 (10)	26 (11.3)
Not vaccinated at all	7 (5.3)	6 (6)	13 (5.6)
Total	131*	100	231*

*Total number in this table is less than the total number of deaths because of incompleteness of the records.

Table 4. Nutritional status of children, age 1 month - 5 years, who died in Tikur Anbessa Hospital, Addis Ababa, Ethiopia, September 2001 to August 2002.

Nutritional status	Frequency	Percentage
Weight for age		
Normal	83	32.5
Underweight	93	36.5
Kwashiorkor	12	4.7
Marasmus	53	20.8
Marasmic-Kwashiorkor	14	5.5
Total	255*	100.0
Height for age		
Normal	130	52.0
Stunted	120	48.0
Total	250*	100.0
Head circumference for age		
> or =2 SD	5	2.0
Normal	190	75.7
<-2 SD	56	22.3
Total	251*	100.0

*Total number in this table is less than the total number of deaths because of incompleteness of the records.

Table 5. Main causes of death among children, age 1 month - 5 years, who died in Tikur Anbessa Hospital, Addis Ababa, Ethiopia, Sept. 2001 to August 2002.

Cause of death	Frequency	Percentage
Pneumonia	107	40.7
Gastroenteritis	48	18.3
Pyogenic meningitis	24	9.1
Tuberculosis	18	6.8
Sepsis	14	5.3
Viral encephalitis	9	3.4
Congenital heart disease	6	2.3
Hemolytic uremic syndrome	5	1.9
Others	32	12.2
Total	263	100.0

Table 6: HIV/AIDS status and causes of Death

	NOT TESTED	TESTED (ELISA)		TOTAL
		Positive	Negative	
Pneumonia	30	-	1	31
Gastroenteritis	12	1	-	13
Tuberculosis	10	-	1	11
Pyogenic meningitis	2	1	-	3
Sepsis	3	-	-	3
Haemolytic uremic syndrome	-	-	-	-
Viral encephalitis	2	-	-	2
Congenital heart disease	-	-	-	-
Others	1	1	-	2
Total	60	3	2	65