DESCRIPTION OF MENINGITIS EPIDEMIC IN HAIKOCH NA BUTAJIRA DISTRICT

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ABSTRACT: A retrospective review of a recent meningitis epidemic in Haikoch na Butajira District for the months of February and March 1989 was conducted. The epidemic is described in terms of person, place and time. The relationship of the epidemic with weather changes (rainfall and temperature) is assessed. There were a total of 6968 reported cases of meningitis with 203 deaths. The case fatality rate was 2.9%. The male to female ratio was 1.05 to 1. The peak of the epidemic was found to be during the second half of the month of February. There were 864 cases from urban, 3321 from villagized and 2783 from non villagized areas giving period prevalence rates of 6%, 8% and 2%, respectively, during the two months. Based on this study, surveillance and control recommendations are made.

INTRODUCTION

Epidemic meningitis, a recurrent major health hazard in Ethiopia, has been caused by the gram negative diplococci bacteria *Neisseria meningitides*. Epidemic strains mainly involved in major outbreaks have been types A, B and C. Serogroup B and C have been observed to cause localized outbreaks in some American Army base camps (1) and are endemic within the western world, while serogroup A has been responsible for most African epidemics. With the introduction of vaccines, strain similar to the western world have been observed. An example is the changing pattern of carrier strains to B and C reported recently in Eastern Nigeria (2).

Within Subsaharan Africa repeated major outbreaks of meningitis have been located in the cerebrospinal meningitis belt (CSM Belt). The belt is located north of the equator and south of the Sahara. Included in the belt are Cameroon, Chad, Ethiopia, Mali, Morocco, Niger, Nigeria, Sudan, Upper Volta. The countries in this zone share common characteristics, namely, a dry hot climate at the time of the peak of the epidemic, coupled with semi arid zones and desert winds resulting in very cold nights which forces people to crowd. Crowding is one hypothesis suspected as a precipitating fact for the recurrent occurrence of epidemics (1). Another hypothesis related to the episodic occurrence of outbreaks is a threshold in the population of the proportion of individuals who lack antibodies to current meningococcal strains (1). This may explain other features of epidemics in the CSM Belt, such as the occurrence of epidemics every 5-10 years. For example, in Nigeria outbreaks were observed in 1949-1950, 1960-1962, 1969-1970 and 1977-1978 (3). On the other hand, in Ethiopia, there continue to be yearly, localized smaller outbreaks. Other suspected factors include the mobility of the non-immune population, major weather changes observed in Ethiopia over recent years, virulence of the strains (which is not well understood), and carrier rates which range

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from 5-10% between epidemics to 20-90% during epidemics. Surveys undertaken at the time of the 1949-1950 epidemic in Northern Nigeria showed a carriage rate of 20% in healthy villagers (3).

The susceptible age group are mainly those below 15 years which account for 60-70% of cases, with 15-20% in the age group of 15-24 years and 5-10% above 25 years of age. The male to female ratio is around 2:1 in most instances.

There has been limited investigation of meningococcal meningitis epidemics in Ethiopia and the epidemiological features of these outbreaks is poorly documented. In Ethiopia, the Gondar, Gojjam, Wollega, Eriterea and Shoa regions have been most commonly affected (3). It has been established that meningitis outbreaks typically start in early January and decline in frequency towards the end of June, which coincides with the coming of heavy rains. It is also evident that there have been no cyclic patterns from 1982 to 1989.

This study was conducted to describe the 1989 meningitis epidemic in Haikoch Na Butajira District in terms of time, place and person.

METHODS

Lists of reported cases from hospitals, health centers, health stations and treatment shelters within Haikoch na Butajira District were obtained and reviewed. These lists provided information about the age, sex and address of each case. Any individual treated for meningitis was identified as a case.

Information about the rural areas and local climatic reports were obtained from the office of the district branch of the Ministry of Agriculture or Haikoch na Butajira District. Information about the urban areas, their population and the total population of the District was obtained from the National Population and Housing Census of Ethiopia of 1984.

A standard data collection form was used to record information about age, sex, address and death. Description of the magnitude of the epidemic in terms of case fatality rate, sex specific case fatality rate, sex ratio, and age group preponderance were undertaken. From the daily reports of rainfall and temperature, the weekly average for the months of February and March were calculated, plotted, and compared with the total number of cases and case fatality rate each week. In addition the incidence rates were compared among villagized, non villagized and urban areas.

RESULTS

There were a total of 6968 cases (3566 males and 3402 females) for a male to female ratio of 1.05:1. The sex specific case fatality rates were 3.2% for male and 2.6% for female. The total number of cases from each treatment center is shown in Table 1.

Table 1. Case fatality rates in different treatment centers of Haikoch na Butajira District, during the meningitis epidemic, February-March, 1989.

District with treatment center	Number of cases	Number of deaths	Case Fatality rates
Zeway surrounding	1287	12	0.93%
Siliti	1058	13	1.20%
Meskanena Mareko	954	36	3.70%
Koshe	842	28	3.32%
Siraro	242	18	7.40%
Negele	570	13	2.28%
Lanfero	541	19	3.50%
Meki	513	22	4.30%
Shahshemene Hosp.	413	20	4.80%
Shahshemene Hlth cener	222	9	4.05%
Alaba	208	13	6.26%
Dalocha	118	0	0%
Total	6968	203	2.90

The highest number of cases (1278) were reported from the urban Ziway and the lowest from rural Dalocha shelter (118 cases). The highest case fatality rate was reported from the rural Siraro District shelter (7.4%). Over 75%

Table 2. Age Specific Case Fatality Rates (Haikoch na Butajira District, February - March, 1989)

Age group	Number of cases (%)	Number of deaths (%)	Case fatality rate (Age specific)
<1	215(3.1)	8(3.9)	3.7%
1-4	1106(15.9)	52(25.6)	4.7%
5-14	2577(36.9)	89(43.8)	2.2%
15-49	2669(38.3)	49(24.1)	1.7%
50+	201(2.8)	5(2.5)	02.5%
	6968(100.0)	203(100.0)	2.9%

of the cases were between the ages 5 and 49 years (Table 2). Age specific case fatality rates are also shown in the same table. The highest (4.7%) was for the age group 1-4 years.
864 (0.6%), 332 (0.8%) and 2783 (0.2%) of the cases were from urban, rural-villagized and rural non-villagized areas, respectively
(Table 3).

Table 3. Description of meningitis cases in Haikoch na Butajira District as to their residential areas, February -March, 1989

Residence	No	(%) Population	No	(%) cases
Urban	135,817	(7.5)	864	(0.6)
Rural				
Villagized	393,995	(21.7)	3321	(0.8)
Non-villagnized	1,284,063	(70.8)	2783	(0.2)
Total	1,813,875	(100.0)	6968	(0.3)

The progression of the epidemic during the eight weeks of the study period is shown in Table 4. The peak of the epidemic was reached during the 3rd and 4th week of February.

Table 4. Progression of the epidemic Haikoch na Butajira District 1989.

Month	Week	# cases	% of reported
Feburary	1st	777	(11.1)
	2nd	841	(12.0)
	3rd	1357	(19.5)
	4th	1545	(22.2)
March	1st	769	(11.0)
	2nd	620	(8.9)
	3rd	429	(6.1)
	4th	287	(4.1)
Unknown		343	(4.9)

DISCUSSION

In Ethiopia meningitis epidemics have typically occurred during the dry season which begins in December, peaks in February and lasts through to April. The last epidemic in the District was in April 1987, two years prior to the present one. This was comparable to a two year gap reported in Wollega, western Ethiopia in 1983 (2). The case fatality rate in our study was 2.9% as compared to 4.5% from the Wollega study (3), and 2.3% from a study conducted in Gondar in 1989 (2).
The disparity between the fatality rates reported in this study and those from Wollega and Gondar may be due variations in reporting of deaths, the establishment of treatment centers closer to the patients' residences, efficient surveillance leading to early diagnosis and treatment, or the limitation of this study to two months while the other studies were for the entire year.

The male to female ratio in our study is 1.05 to 1; it compares favorably to that which was observed in the study done in Gojjam in 1977, which was 1.2:1 (1).

The case rate differences of 0.8% in the villagized and 0.2% in non villagized population may be due to the recent crowding which took place during villagization. These people residing in crowded village are more prone to the spread of the epidemic. On the other hand, it could be due to the increased proximity of health services in villagized areas leading to higher reporting of cases. This is supported by the finding of similarly high figures in urban areas, which had a case rate of 0.6%. The lower rate in the urban areas as compared to the villagized areas could be due to the fact that the urban people have been crowded for a longer time than the villagized people and have therefore adjusted much more to the crowding effects than the recently villagized population.

There are some limitations to this study. Since the figures reported here are based on treatment center reports, they probably represent only a portion of the total cases that have occurred in the District. The reports from these centers were at times not complete and a uniform format was not followed.

Our findings, although not conclusive, indicate higher case rates occur among urban and recently villagized rural populations than among non-villagized rural populations. They also indicate to a high case fatality rate in general.

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REFERENCES

1. Eyassu Habte Gaber and Estifanos Tekle. Cerebrospinal Meningitis in West and Central Ethiopia, *Ethiopian Medical Journal.* 1979; 17:9-17.
2. Ministry of Health. Control of Cerebrospinal (Meningococcal Meningitis in Ethiopia. Proceeding of symposium and workshop held in Addis Ababa, Ethiopia. November 20-23, 1981.
3. Eyassu Habte Gabre, Estifanos Tekle and Mengistu Mammo. Meningococcal Meningitis in Ethiopia 1974-1983 and Strategies for Control. *Ethiopian Journal of Health Development.* 1984; 1:47-65.