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EPIDEMIOLOGY OF POLIOMYELITIS IN NORTHWESTERN ETHIOPIA
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ABSTRACT

Objectives: **To determine the magnitude of poliomyelitis and assess its epidemiological features.**
Design: **A cross-sectional community based, house-to-house survey.**
Setting: **Six urban and ten rural villages in Gondar Zuria district, north-western Ethiopia.**
Subjects: **Twelve thousand children aged 1-15 years residing in the randomly selected areas were enrolled in the study to identify children with walking abnormality. Paralytic poliomyelitis is considered as flaccid paralysis in one or both legs with normal sensations and acute onset without progression.**
Results: **Out of 12,000 children aged 1-15 years enrolled, 20 were found to have paralytic poliomyelitis. The prevalence of residual poliomyelitis was found to be 2.1 per 1000 children aged 1-15 years with the estimated annual incidence rate of 7.7 per 100,000 population. Sixty percent of the cases were from urban areas and 55% of the cases were males.**
Conclusions: **The magnitude of paralytic poliomyelitis is high in the study area, thus expanding the expanded programme of immunisations with a strong surveillance system is suggested.**

INTRODUCTION

Paralytic poliomyelitis is an indispensable public health problem in developing countries affecting young age groups, mainly pre-school children(1), which is now getting a particular attention. This is reflected by the inclusion of either types of poliomyelitis vaccine in the respective immunisation programmes. In Ethiopia the expanded programme on immunisation against tuberculosis, poliomyelitis, diphtheria, pertussis, neonatal tetanus and measles was started in 1980 G.C. The aim was to increase the coverage by 10% every year and reach a universal immunisation coverage by ten years time. There is an attempt to intensify the EPI programme by organising the service in an integrated, static and outreach activities in almost all health service infrastructures in the country to assist the global eradication of poliomyelitis. Despite the presence of a potent vaccine, poliomyelitis is still found to be a serious problem in many developing countries(2). In a study done in Ethiopia, the prevalence of paralytic poliomyelitis among children aged 5-9 years was reported to be 7.3 per 1000(3). Other school and institutional based studies revealed a higher prevalence(4,5). Though the magnitude is expected to be high, in a country where there is a weak disease surveillance system it was considered necessary to assess the existing magnitude of the problem. This will help evaluate the contribution of immunisation to the endeavor towards the global eradication of poliomyelitis.

MATERIALS AND METHODS

A community based cross-sectional survey was conducted in urban and rural areas of north-western Ethiopia, between July and August 1993 to determine the prevalence of paralytic poliomyelitis among children 1 - 15 years of age, to estimate the annual incidence of clinical cases of the diseases and to assess the epidemiological features of poliomyelitis in the study area. The study was conducted in Gondar Zuria district which is administratively divided into 20 urban kebeles and 30 rural villages, with an estimated population of 200,000. The sample design was based on the administrative divisions of the district and used the urban and rural areas as a stratum, and urban kebeles and rural villages as a sampling unit. All the 20 kebeles in the urban and 30 rural villages were included as our sampling frame. By simple random sampling six urban kebeles and 10 rural villages were selected for the study. Children aged 1-15 years in the study area were considered as a source population. Sample size determination was based on the recommendation by La Force(6), thus 6000 urban and 6000 rural, a total of 12,000 children aged 1-15 years were taken as a representative sample to meet our objectives. Enumerators trained for the purpose of the study went house to house. All children in the house whose ages fell within the age group chosen for the survey were registered using a registration list to obtain data on the number of children in each house. Questions were forwarded to the respondent to find out whether there were children aged 1 - 15 years with walking abnormality. Children with walking abnormality were then examined by a paediatrician to ascertain the diagnosis.

Paralytic poliomyelitis in our study was considered as flaccid paralysis with atrophy in one or both legs with normal sensation and acute onset without progression(1). Additional information on socio-demographic characteristics. Immunisation

status, onset of the disease, residence at onset, fever at onset, progression, family history of walking abnormality, provided care, and type of care providers were recorded. Information on socio-demographic characteristics and immunisation status was also collected on 80 controls which is four controls per case of poliomyelitis matched with ±1 year of age, same gender and same kebele/village. Possible revisits were made to minimise none responses. Data processing and analysis was performed using the EPI-INFO computer programme(7). Correction factors were used when calculating the prevalence rate, for those who recovered or died early at the onset of the disease, for missing upper limb lameness and for those who migrated from the area in accordance with the suggestion by La Force(6).

RESULTS

Among 12,000 children aged 1-15 years, 6185 (52%) were boys and 5814 (48%) were girls. Out of these, 48 children with walking abnormalities were identified. Among them 20 (41.7%) were cases of paralytic poliomyelitis, 10 (20.8%) were attributed to cerebral palsy, seven (14.6%) to congenital abnormalities, three (6.3%) to trauma and the rest (16.6%) to different infections. The prevalence rate of paralytic poliomyelitis was found to be 1.7 per 1000 children. Correcting using a factor of 1.25 to include cases of paralysis not involving the legs, the prevalence of residual poliomyelitis was 2.1 per 1000 children. This figure suggest that approximately 1200 children in this age group in Gondar Zuria district were disabled as a result of poliomyelitis. An estimate of the annual incidence in the 0-4 year age group was obtained by dividing the prevalence rate 2.1 by number of years at risk which is five and it was 0.42 per 1000. The incidence of paralytic poliomyelitis for the whole population was then estimated by taking a 17.8% proportion of the the 0-4 age group from the total population(8) and multiplying it with the annual incidence in 0-4 year age group which is 0.076 per 1000 population or 7.6 per 100000 population. The estimate of all cases of poliomyelitis using the correction factor 1.33 for those who recovered completely or died early at the onset of the disease was 1.7 per 1000 or 17 per 100000 population. The calculated incidence implies that with an estimated population of 3,178,692 about 245 new clinical cases occur each year. On the assumption that 15% of all poliomyelitis cases are fatal(9), the estimated annual number of deaths due to poliomyelitis in Gondar region was 37.

Out of the total cases identified 12 (60%) were from urban and eight (40%) from rural areas. Eleven (55%) of the total cases and nine (45%) were males and females respectively. However, both locality and gender differences were not statistically significant P<0.005 (Table 1). The reported age at onset in all of the cases was under four years. Fifteen (75%) of the cases were reported as having fever at the time of the development of the clinical signs and symptoms.

Table 1

Distribution by residence and gender

Characteristic	Cases (%)	Non-cases (%)	Odds ratio	P value
Residence				
Urban	12 (0.2)	5988 (99.8)		
Rural	8 (0.1)	5992 (99.2)	1.50	0.37
Gender				
Male	11 (0.2)	6175 (99.8)		
Female	9 (0.2)	5805 (99.8)	1.2	0.75

Table 2

Distribution of cases and controls by different characteristics

Characteristic	Cases	Controls	Odds ratio	P value
Family monthly income				
High	2	36		
Low	18	44	0.14	0.003
Source of water				
Pipe	12	48		
Spring	5	28	0.7	0.20
River	3	4	2.1	0.93
Latrine				
Sanitary	3	9		
Open field	17	71	1.39	0.44
Vaccination with OPV at least once				
Yes	4	2		
No	16	78	9.75	0.01

The nature of flaccidity, intact sensation, atrophy, and absence of progression were universal among the cases. In 12 (60%) of the cases the affected extremities were the lower left, six (30%) in their lower right and two (10%) on both of the lower extremities. In 16 (80%) of the cases the parents attempted to have care for their sick child whereever the place may be. Out of those, 7 (44%) had their reported care at onset and the rest 9 (56%) later on. Ten (50%) of the cases were seen by health professionals, 6(30%) by traditional healers. Nine (45%) of the total cases were treated with unidentified drugs, two (10%) had physiotherapy, two (10%) were on walking aid and seven (35%) were exposed to a variety of traditional practices. Table 2 shows the percentage distribution of cases and controls by different characteristics considered to be risk factors. Twelve (60%) of the cases lived in a family where their water source was from a pipe line, five (25%) from spring and three (15%) from a river. Fourteen (70%) and 17 (85%) of the cases lived in a family where they use open field for excreta disposal and garbage disposal respectively. Sixteen (80%) of the cases had no history of vaccination. Two (10%) of the cases took three doses, one (5%) two doses and one (5%) one dose of oral polio vaccine. Table 2 shows in addition that children from low socio-economic status are at a lower risk than those from a high socio-economic status.

DISCUSSION

The prevalence rate of residual poliomyelitis, 2.1 per 1000 among children aged 1-15 years made the magnitude of the disease to be moderate based on La Force arbitrary classification(6). This finding is similar to other reports in developing countries. However, our finding is higher than the 0.486 per 1000 in a similar age group in a study done in China(10), and lower than the 7.3 per 1000 prevalence among school children in Gondar six years ago(3). The observed moderate prevalence of residual poliomyelitis shows that the disease is still a major problem in the study area. The tendency of a reduced prevalence might be attributed to the existing EPI programme since 1974. In addition the traced cases were among older age groups, which might be attributed to the later introduction of EPI services.

The number of paralytic poliomyelitis comprised 41% of all identified children with walking abnormality. Studies done elsewhere show a similar proportion(10). The rest of the children (58.3%) with walking abnormality were attributed to cerebral palsy, congenital abnormalities, trauma and infections like meningitis, extra pulmonary tuberculosis based on clinical grounds. This indicates that apart from poliomyelitis there are other causes of walking abnormalities among children in the study area. Our estimate for the annual incidence rate of poliomyelitis for the whole population, 7.7 per 100000 which represent 245 new cases and 39 deaths every year was not far from the lower estimates in the USA where an incidence of 15 per 100000 was described four decades ago(6). Male preponderance among cases of paralytic poliomyelitis was observed as in other studies(9).

A statistical significance of urban rural difference was not observed as it is also the case in other reports from developing countries(6). The reported age at onset of attributed clinical signs and symptoms in all identified cases of paralytic poliomyelitis was under the age of four years, which is the case in developing countries(9). This is in contrast to the findings in developed countries prior to the wide spread use of poliomyelitis vaccine, where the disease was commonly affecting adolescents. Out of the total paralytic poliomyelitis cases, 95% were identified between the age of 5 -15 years which is almost similar to that in previous reports(6,9). The majority of the cases (80%) were getting some sort of care wherever the place. Among these only 62.5% were seen by health professionals and were reported to be treated symptomatically. Only two cases who were lucky enough to travel 750 kms away and reach Addis Ababa were on walking aid. The rest were exposed to a variety of traditional practices. This might be due to the lack of awareness of the parents, the meager health care in the area and the non-existent rehabilitative unit for disabled children. Eighty percent of the cases had no history of vaccination against poliomyelitis. Taking into consideration the problem of recall by the parents and the non-existent vaccination cards at home, the observed low immunisation coverage is still an indication for the responsible sectors to find a better mechanism to increase the existing immunisation coverage. Those children from low socioeconomic status seem to be at a lower risk of poliomyelitis. This is against the general understanding of the epidemiology of the disease. The family income in this study is extracted from the words of caretakers which may not reflect the actual amount and especially in the rural setting it is an overall estimate. Thus, these results should be interpreted with due care. In most developing countries over 90% of clinical poliomyelitis occur in the first five years of life, thus studies of the prevalence of poliomyelitis where the identified cases are in children aged over 5 years provide a retrospective estimate of the annual incidence of poliomyelitis(6). Our method will be highly sensitive as we try to include the possible lower age group for detecting walking abnormality and also specific because we used the same criteria where the diagnosis of lameness due to poliomyelitis can be made with a higher degree of confidence and the clinical examination was carried out by the same paediatrician.

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