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## **An outbreak of dracunculiasis in a peri-urban community of Ilorin, Kwara State, Nigeria**

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### **Summary**

An outbreak of dracunculiasis was investigated at Egbejila, a peri-urban community near the city of Ilorin, the capital of Kwara State, Nigeria. Of 589 persons examined in June 1983, 265 (45.0%) had active ulcers with protruding guinea worms. The infection rates among males (42.1%) and females (47.8%) were not statistically different ( $p > 0.1$ ) but children below 10 years of age were significantly less infected than the older subjects ( $p < 0.001$ ). Altogether, 67.2% of the infected subjects had more than one guinea worm lesion while 54.7% were incapacitated by the infection. The peculiar circumstances which led to the spontaneous outbreak of dracunculiasis and contributed to its severity in this community after the construction of the Asa Dam to solve the problem of acute water scarcity in the Ilorin municipality, were identified and discussed.

**Key words:** dracunculiasis; drinking water; Nigeria.

### **Introduction**

Several studies have been made of guinea worm infection in Nigeria (Ramsay, 1935; Onabamiro, 1951; Gilles and Ball, 1964; Cowper, 1966; Muller, 1971; Abolarin, 1981; Kale, 1977, 1982; George, 1975; Edungbola, 1980a; Nwosu et al., 1982; Edungbola, 1983a, b). In spite of being among the most easily preventable diseases (Muller, 1979; Belcher et al., 1975) which has been effectively controlled in some parts of the world where it was previously highly endemic, dracunculiasis is increasing in prevalence, distribution, intensity and in public health significance in Kwara State and some other parts of Nigeria due to a wide range of factors (Edungbola, 1983a). Guinea worm infection is rarely

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directly fatal, seldom reported and occurs predominantly in rural and poorly accessible communities with unsafe drinking water sources. Consequently the infection has not been given the appropriate priority needed to control it effectively.

Recent observations show that as a result of changes in the administrative structure of the State and the extensive movements of people between the endemic villages and urban centers, dracunculiasis is now becoming an important public health problem on the rapidly growing fringes of Ilorin, the Kwara State Capital. Edungbola (1980b) reported the problem of water scarcity and the risk of introducing dracunculiasis into Ilorin because of various prevailing local conditions which were conducive for the transmission of the infection.

The current study made in a peri-urban settlement near the Ilorin International Airport demonstrates how easily endemic dracunculiasis can be established and cause serious disruption of the social and economic life of the affected community.

## **Materials and Methods**

### *The study area*

Egbejila community is situated within 5 km of the edge of the built-up area of the city of Ilorin, the capital of Kwara State, Nigeria (Fig. 1). This community, which is close to the Ilorin International Airport and about 4 km from the Ilorin–Ibadan highway (Fig. 1B), is easily accessible by motor vehicles from the state capital. There are about 80 houses with 700 to 1,000 permanent residents in the community. The people are exclusively muslims of the Yoruba tribe. Men are predominantly subsistence agricultural farmers while women combine domestic responsibilities with crop harvesting and petty trading.

The dry season is fixed and long (about 5–7 months of the year), during which time water scarcity becomes a major problem in the locality. At this critical period, when the village pond dries up and the streams are reduced to stagnant pools, there is an extensive demand and search for water and a promiscuous contamination of the available sources.

During the wet months water for domestic purposes, including drinking, is obtained mainly from the River Jia (Fig. 1B) and sometimes from a pond and the shallow wells in the village. During the dry season, when these sources dry up, drinking water was obtained from the perennial Asa River. However, following the construction of the Asa Dam to supply Ilorin municipality with drinking water, the lake caused by the dam flooded the lower portion of the Jia stream (a tributary of Asa River) thus forming a stagnant pond. Since then, this pond has become the alternative source of domestic water supply, being closer to the village than the River Asa which, before the construction of the dam, used to be the exclusive source of drinking water in the dry season.

### *Data collection*

A house to house survey was conducted to determine the prevalence of guinea worm infection, using questionnaires to record each subject's name, age, sex, occupation, religion, marital status, duration of residence and of absence from the community, house location for subsequent contacts, and the source of drinking water. When an infected person was found, the number, anatomical location, duration and severity of the infection were determined and recorded. An infected subject was considered incapacitated if, although found mobile, he or she was unable to perform effectively routine daily obligations such as going to the farm, market or school and could not leave the village. Also, information was obtained on the type of medication used, the type of water treatment practised, and the knowledge of the aetiology of dracunculiasis, its mode of trans-

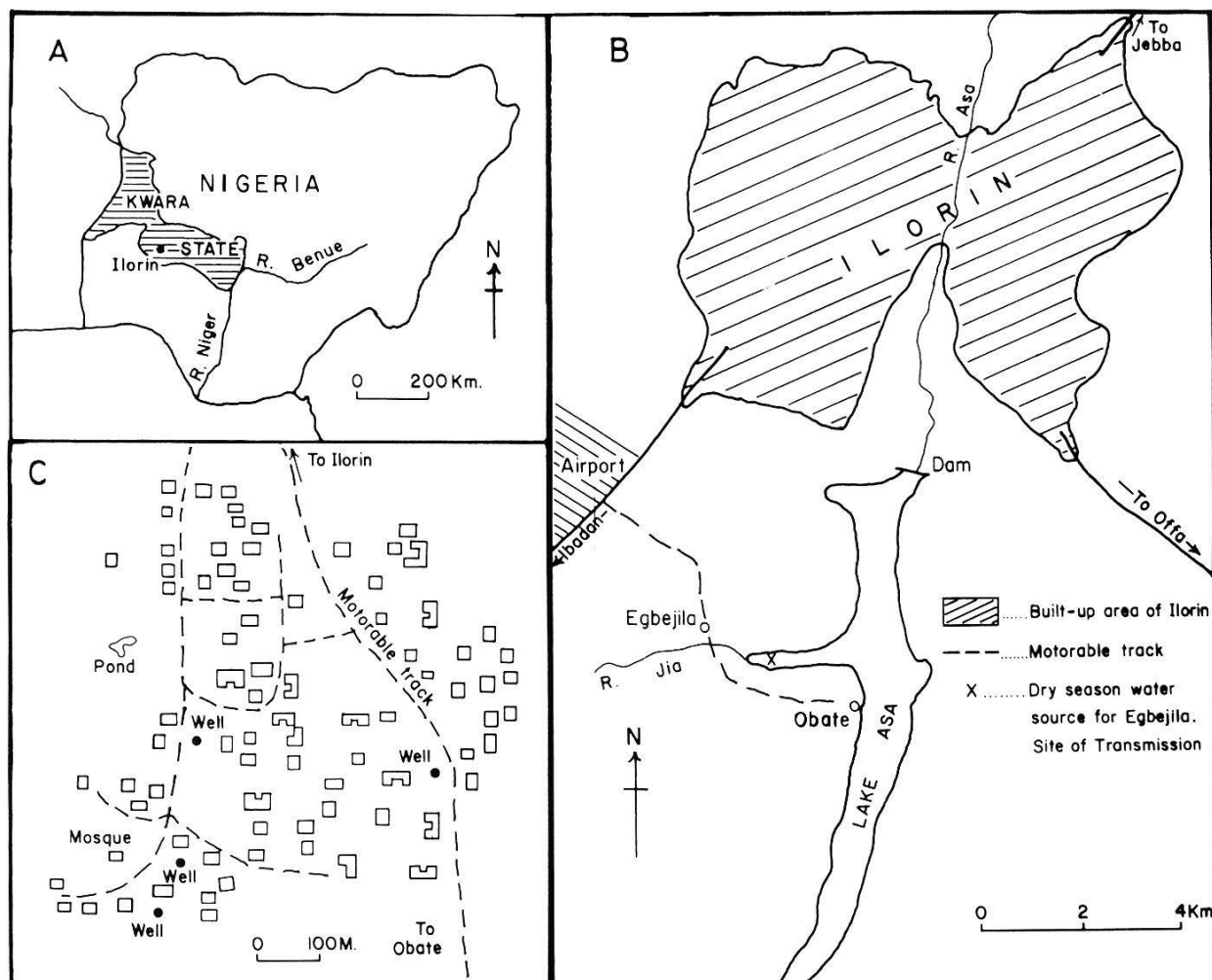


Fig. 1. The sketch map of the study area. A: The map of Nigeria showing Kwara State (shaded area) and Ilorin, the state capital. B: The layout of the city of Ilorin and the location of the Airport and the Asa Dam, relative to the location of Egbejila. C: The distribution of inhabited houses in Egbejila and the location of wells which contain no water for domestic use during the dry season.

mission, its impacts, and when and how it was first introduced into the village. At the community primary school shared with other villages, the number of pupils infected and the proportion of those who could not attend classes due to dracunculiasis were determined.

Two 5-litre water samples were obtained from the community pond (Fig. 2). One was taken in the morning and the other in the evening at the times which coincided with water fetching activities in the community. The samples were examined for the presence of cyclops and guinea worm larvae. To do this, the water sample was filtered through two sets of 8-inch brass sieves, mesh numbers 50 and 120, in succession. Thereafter, the cyclops were washed off the finer mesh into 10 ml specimen bottles containing 2.5 ml distilled water. These were kept in the refrigerator for about 24 h. Thereafter, the specimen bottle was emptied into a cross hatched Petri-dish and counted under the dissecting microscope with a Talley hand counter. After counting, the cyclops were pipetted onto a glass slide, coverslipped, and examined under the compound microscope for the presence of guinea worm larvae, as described by Onabamiro (1951). The chi-square test was used for statistical analysis of the data.

Table 1. Prevalence of dracunculiasis by age and sex at Egbejila (June, 1983)

Age groups (years)	Male			Female			Both sexes		
	No. exam.	No. infected	% infected	No. exam.	No. infected	% infected	No. exam.	No. infected	% infected
<5 .....	34	3	8.8	31	4	12.9	65	7	10.8
5-9 .....	52	8	15.4	53	7	13.2	105	15	14.3
10-19 .....	51	26	51.0	30	14	46.7	81	40	49.4
20-29 .....	24	11	45.8	29	11	37.9	53	22	41.5
30-39 .....	38	20	52.6	53	39	73.6	91	59	64.8
40-49 .....	35	23	65.7	35	20	57.1	70	43	61.4
≥50 .....	58	32	55.2	66	47	71.2	124	79	63.7
Total	292	123	42.1	297	142	47.8	589	265	45.0

## Results

In early June 1983 almost one out of every two residents examined in this community had at least one active lesion with a protruding guinea worm (Table 1). Females and males had infection rates which did not differ significantly ( $p > 0.1$ ). However, subjects below ten years of age were significantly less infected than those who were older ( $p < 0.001$ ), the highest infection rate being recorded among subjects who were 30 years and above (Table 1).

The frequencies of multiple infections and incapacity were both relatively high (67.2% and 54.6% respectively). Of the 265 infected persons seen, 87 (32.8%) had one active lesion, 98 (37.0%) had 2, 48 (18.1%) had 3 and 32 (12.1%) had 4 or more. The highest number of lesions in one individual was 13. Less than 10% of the infections were located at anatomical sites other than below the knees. These included: the buttocks, thigh, trunk, back, breast, upper limbs, and genital areas in males and females.

As shown in Table 2, 145 (54.7%) of the infected persons in the village were incapacitated to the extent that they could not perform effectively their routine daily obligations such as going to the farm, school or market, playing, fetching water or performing other domestic duties. Of these, 9 (3.4%) were totally helpless, being critically sick and in excruciating agony from guinea worm infection when seen. The rate of incapacity was strikingly high among the youngest and the oldest subjects. 18 (51.4%) of 35 pupils enrolled in the village primary school could not attend classes at the time of the survey. Six of the incapacitated young girls were identified as house-maids who were sent from Ilorin to their parents in the village because their infections prevented them from performing their tasks. In general, the duration of disability ranged from 2 to 12 weeks in this community.

The analysis of the water sample taken from the suspected pond (Fig. 2) revealed the presence of an average of 88 *Thermocyclops nigerianus* per litre of

Table 2. The severity of dracunculiasis as determined by the proportion of incapacitated infected subjects in different age groups

Age group (years)	Number infected	Number incapacitated	% incapacitated
<5 .....	7	4	57.1
5- 9 .....	15	6	40.0
10-19 .....	40	15	37.5
20-29 .....	22	10	45.4
30-39 .....	59	29	49.1
40-49 .....	43	27	62.8
≥50 .....	79	54	68.3
Total	265	145	54.7





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Fig. 2. The pond where active guinea worm transmission occurs. A man and his wife returning from the farm, are seen with firewood on their heads, wadding through the pond.

Fig. 3. A protruding guinea worm on the ankle of a house wife is held to a piece of thread around the lower part of the leg. The leaves contained in the bowl are ground and applied as medication for the ulcer.

Fig. 4. The infected foot of a 4-year-old girl showing incisions made with a knife.

water. Water samples taken in the morning and evening had similar cyclop densities and infection rates. About 5% of these harboured the characteristic larvae of *D. medinensis* which were morphologically distinguished from larvae of a similar nematode, *Camallanus* sp.

## Discussion

It was established that the flooding of the lower portion of the seasonal Jia stream and the stagnant pond formed by it, following the construction of the Asa Dam to supply Ilorin municipality with drinking water, was primarily responsible for the outbreak of dracunculiasis in Egbejila. Guinea worm infection was unknown in the village before the construction of the dam and the creation of the pond when the villagers were obtaining their drinking water directly from the free flowing perennial Asa River. Up till now, there is no dracunculiasis in the adjacent village of Obate (Fig. 1B) which is similar to Egbejila in all respects except that the inhabitants of Obate still obtain drinking water directly from the Asa River throughout the dry season.

The situation of dracunculiasis in this community is striking in some ways. The construction of dams and other water projects is known to be responsible for the increasing prevalence of schistosomiasis and some other communicable diseases (Burch, 1975; Dalton and Pole, 1978; Edeson, 1975; Jackson, 1975; Jordan et al., 1980; Webbe, 1972). However, this is a unique case in which a dam constructed to provide domestic water for urban residents was the major cause of the rapid establishment of endemic dracunculiasis in a rural community near the water project site. This reveals that while efforts to solve the problems of urbanization in the developing countries with the available modern resources should be encouraged and intensified, the possible health hazards that could result directly or indirectly from such efforts, must be identified and balanced against the desired benefits.

The history of dracunculiasis in this community was traced back to about 3 years ago when a guest who came to a wedding ceremony from a neighbouring village introduced the infection into the community stagnant pond. This pond had become the new source of dry season drinking water after the damming of the Asa River. The interviews conducted showed that although the villagers recognize, have a local name (*Sobia*) for and treat dracunculiasis by various methods (Fig. 3 and 4), they are ignorant of its mode of transmission and its association with contaminated water.

Drugs were given to severely infected persons for quick relief and the prevention of further complications by secondary pyogenic infections. However, the effectiveness of this temporary measure was hampered by the rigid observance of the Ramadhan which was going on in the village; this muslim fast, according to the villagers, prevented them from eating, drinking and taking any drug by mouth or by injection between 4 a.m. and 7 p.m. for about 30 days.



The high prevalence of guinea worm infection in this community is due to ignorance and poor water management habits, rather than to the absolute scarcity of water in the dry season which is commonly seen in many other parts of Kwara State (Edungbola, 1983a). Because the necessary precautionary measures are not adopted, reintroduction and reinfection occur annually with increasing severity.

The difference in infection rates between males and females was not statistically significant but more adults were infected than children. These findings conform to previous reports in Nigeria (Edungbola, 1983a, b; Kale, 1977; Nwosu et al., 1982; Onabamiro, 1952). Sita Devi et al. (1969) contended that the overwhelming majority of individuals drinking from the same untreated water source are prone to guinea worm infection. Possible factors which protect some people against guinea worm infection in communities where the disease is endemic are enumerated by Edungbola (1983a), George (1975), Scott (1960) and Onabamiro (1958).

It is thought that differences in age-related resistance account largely for the greater debilitating effect of dracunculiasis on the youngest and oldest subjects than on the other members of the community with the same number of lesions of similar durations on comparable anatomical locations. The refusal for religious reasons, to take medication as prescribed and other contributory factors such as poor care (Edungbola, 1983a), are responsible for the severity and prolonged incapacity caused by dracunculiasis in this community. Although the disease is relatively new here, the impacts of the disease are considerable and similar to what Edungbola (1983) and Nwosu et al. (1982) have observed elsewhere in Nigeria.

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