

Brief communications

The control of guineaworm with Abate: a trial in a village of North-West Ghana

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Abstract

In the village of Gbegrú guineaworm infection is contracted by drinking the water of a man-made pond during the dry season. The lethal effect on the vector cyclops of each application of Abate to a concentration of 1 mg/litre lasted 5-7 weeks and was clearly reflected in the following year's incidence of guineaworm cases. This indicates that Abate is potentially useful in the chemical control of guineaworm infection.

The transmission of guineaworm in North-West Ghana, assuming an incubation period of around 1 year, is greatest during the dry season from November to March or April.

In the village of Gbegrú (pop. 160), a pond is used by all the inhabitants and is regularly dug out so as to contain water for some months into the dry season; thereafter small dug wells are used that fill by seepage and from which cyclops are absent.

The monthly incidence of guineaworm cases in Gbegrú appears to follow a similar pattern each year, the maximum number of infections having been recorded in February in 1969, 1970, and 1971. The Gbegrú pond was confirmed as a transmission site by the finding of infected cyclops in April 1969. Because it is the principal source of water for the village, an attempt was made to interrupt transmission by chemical control of the vector in it. The chemical selected for this purpose was Abate.^a It was applied during the dry season of 1970-71 and this report describes the results.

Methods

Previous work had indicated that very low densities of cyclops were capable of maintaining guineaworm transmission.^b After the initial application of

Abate, therefore, the pond was re-treated whenever periodic sampling yielded any live cyclops. The presence or absence of adult cyclops was determined on each occasion by filtering 20 litres of water obtained from the point at which the local women fill their water-pots.

The first application of Abate (1% on sand granules) was made to a concentration of 0.5 mg/litre on 1 December 1970, when the pond contained about 280 m³ of water and reached a maximum depth of 1.75 m. At this time, cyclops were very scarce, only about one adult (all species) being present in every 5 litres of water. This was consistent with the previous years' observations of this habitat in which a steady increase in relative density occurred during the dry months.

In water sampled 24 hours after the first treatment, the cyclops were still alive and active. At 48 hours, most of the few cyclops that were seen were dead or sluggish, but as others appeared still to be unaffected it was decided to re-treat the water, once again at a concentration of 0.5 mg/litre.

Twenty-four hours after the second application, only two slow-moving cyclops were seen in the 20-litre sample. No cyclops were present in samples taken 1, 3, and 5 weeks later, but they had returned (at the pre-control density) by the 7th week. The pond was immediately re-treated on 23 January 1971 at a concentration of 1 mg/litre. Cyclops were absent 1 and 3 weeks later, but a single live specimen was found 5 weeks after the re-treatment. By this time (1 March 1971), only some 10 m³ of water remained at the bottom of the pond. As it was still being used by some of the inhabitants it was again dosed with Abate at 1 mg/litre. However, within a few days the pond dried up with only a trickle of water entering by seepage at one point.

Results

The data on guineaworm infections in Gbegrú were derived from monthly house-to-house case-finding visits from December 1968 to September 1972.

In the 3 years prior to control, the numbers of

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^a *O,O'*-(thiodi-4,1-phenylene)-*O,O,O',O'*-tetramethyl phosphorothioate.

^b LYONS, G. R. L. *Bull. Wld Hlth Org.*, 47: 601-610 (1972).

persons infected with guineaworm in Gbegru were 53, 46 (with one month's data omitted), and 46, respectively. In the year following control 12 cases were recorded.

Taking as autochthonous cases those who were living in Gbegru a year previous to the appearance of their guineaworms, 41 of the 46 cases in the year prior to control were infected locally. Of the 12 cases of 1971-72, three were classed as imported. Five of the other nine lived in an isolated compound on the side of the village away from the pond and half-way to one of the larger rivers in the area, the Mangatanga. They, as well as the four remaining cases, when questioned, stated that in addition to the pond they obtained water from pools in the Mangatanga during some part of the dry season. It is reasonable to believe that all nine autochthonous infections in 1972 were contracted in these pools that were used by the inhabitants from several other villages as well.

Discussion

In 1970, Muller reported that Abate (technical product) at a concentration of 0.6 mg/litre added to a pond in Western Nigeria, maintained the pond free of cyclops for 6 weeks.^a

^a MULLER, R. *Bull. Wld Hlth Org.*, 42: 563-567 (1970).

In the Gbegru pond, the first two applications of Abate to a total concentration of 1 mg/litre effectively freed the water of *mature* cyclops for 5-7 weeks. Immediate re-treatment then cleared the pond for a further 3-5 weeks. Because of the subsequent drying up of the pond, the third treatment could have had no influence on the course of events. The efficacy of the two dry season applications of Abate was clearly shown by the following year's incidence of guineaworm cases in Gbegru. There was no local opposition to the trial at any stage.

It is concluded that chemical control of cyclops by Abate is a useful addition to the existing means of preventing and controlling guineaworm infection and has a potentially wide application to other types of transmission site besides the one in which this trial was carried out.

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