ONCHOCERCIASIS IN BRAZIL

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An endemic focus of onchocerciasis, the so-called “river blindness” widespread in parts of Africa, has been discovered in Brazil. Until recently the only confirmed foci in this Hemisphere were in Guatemala, Mexico, Colombia, and Venezuela. The research confirming this new Brazilian focus indicates the disease has spread over a fairly large swath of backlands in the vicinity of the Brazil-Venezuela border.

Introduction

The presence of the filaria worm *Onchocerca volvulus* in the New World has been known since 1915, when Robles (4, 12) discovered it in Guatemala. But until a short time ago the known endemic areas of onchocerciasis in the Americas were limited to Guatemala, Mexico, and Venezuela (1, 3). Isolated cases reported in Surinam (7) and Ecuador (8) could not be confirmed.

Then in 1970 Little and D’Alessandro (9) described the first focus in Colombia, situated in a number of places along the Mucay River. According to the authors, however, this focus was confined to a relatively small area. *O. volvulus* infections were detected in 44 of 292 individuals examined, almost all of whom were Negroes.

Only one indigenous case had previously been found in Brazil; it was discovered in the far-north Federal Territory of Roraima, and was described by Bearzoti, et al. (2) in 1967. Unfortunately, diagnosis of the case did not stimulate research aimed at finding the focus of the disease.

In 1972 Moraes and Dias (10) reported finding two other cases in American woman missionaries living on the Toototobi River in the State of Amazonas among Indians of the Waica Tribe, a subdivision of the Yanomama Indian group. Both women had nodules in the sacral region that were several years old. The diagnosis was made by chance, in the course of a routine histopathologic examination. Some months later a new case, originating in the same area, was discovered by Moraes and Chaves (11). The patient was yet another American woman missionary living among the Waicas, this time in the Surucucus Mountains of the Roraima Territory. All three of these patients were treated with diethylcarbamazine (Hetrazan); the drug was also administered to the husband of one of the women after he complained of severe prurigo of the thighs and buttocks.

The fact that the missionaries were living in contact with the Waicas, in the extreme northern part of Brazil near the Venezuelan border, and the fact that the Venezuelan Indians of the same Yanomama group customarily crossed the border to visit villages on the Brazilian side, caused us to suggest
that a focus of onchocerciasis might extend throughout the parts of Brazil and Venezuela inhabited by the Yanomamas. To verify this hypothesis, in July 1973 we travelled to the Toototobi River area, where the first two missionary patients were still living. Apart from the parasitologic examination of the Indians in villages along the river, some insects of the vector genus *Simulium* were captured. These are known throughout the Amazon region by the name of “pium,” but the Waicas call them “okuxib.” However, this report covers only the finding of *O. volvulus* parasites among those Indians that we were able to examine.

**Materials and Methods**

The Toototobi River is a small tributary of the Demini (Map 1), which in turn is a tributary of the Rio Negro. According to the classification system used for the rivers of the Amazon Basin, it can be considered a river of “white water,” that is, its water carries a large quantity of suspended clay particles. The area is very hard to reach by boat because rapids in the Demini are only navigable during a short period each year when the river is at flood stage. However, there are a number of Waica villages along its banks, and it was near one of these that the missionaries (affiliated with the Mission of the New Tribes of Brazil) established their post. To avoid isolation of this mission facility for most of the year, a small airplane landing strip was built about one kilometer from the Indian village. The authors travelled there in a light airplane (belonging to another religious group) that is commonly used to transport missionaries and supplies between Boa Vista (capital of the Roraima Territory) and various mission posts that dot the frontier region. The distance from Boa Vista to the Toototobi post is about 200 miles. Indians from three villages on the Toototobi were examined. The location of
these villages, whose chiefs were called Roberto, Plinio, and Fialho by the missionaries, is shown in Map 2. According to a census taken by the missionaries, Roberto’s village, Plinio’s village, and Fialho’s village had respective populations of 80, 52, and 22 persons.

The first step in the examination consisted of taking a skin sample from each subject with small scissors. This was obtained from the area of the shoulder blades if no cutaneous lesions were observed; if there were manifestations apparently attributable to *O. volvulus*, however, the tissue was taken from the affected area. The material obtained was placed in a drop of saline solution on a glass slide and covered with a coverslip. It was then warmed slightly and examined at once for microfilaria; if the first examination proved negative, the material was examined again ten minutes later.

Even if no microfilaria were found, the examination continued with an immediate search, primarily by palpation, for subcutaneous nodules. Missionaries’ reports (11) had already informed us that the nodules were very hard to see, and this fact was confirmed during the examinations. One characteristic of these nodules, known as onchocercomas, is their high degree of mobility in the subcutaneous tissue. They could quite readily be rolled around with the index finger.

We were able to remove nodules from three Indians for histopathologic examination. Another nodule was also removed from one of the missionaries, whose case was the first previously reported by Moraes and Dias (10).

Results

A total of 91 Indians (49 men and 42 women) from the three villages were examined. Of this total, 41 persons (23 men
and 18 women) were from Roberto’s village, the one closest to the mission post; 36 persons (18 men and 18 women) were from Plinio’s village; and 14 (8 men and 6 women) were from Fialho’s village.

Biopsy of the skin samples showed that 57 Indians (30 men and 27 women) were infected with *O. volvulus* microfilaria. In other words, the results were 62 per cent positive, being slightly higher for the women (64 per cent positive) than for the men (61 per cent positive). The rate of positive findings for samples from each village was 65 per cent for Roberto’s village, 81 per cent for Plinio’s village, and 57 per cent for Fialho’s village.

Ages of the positive cases ranged from 13 to 58 years. Of those in the 40-and-over age group, all of the individuals tested (a total of 13) were infected with microfilaria (see Figure 1). Unfortunately, the youngest Indians whom we could examine were already at least 10 or 11 years of age. According to the beliefs of the Yanomamas, children’s souls are not yet firmly lodged in their bodies and may escape through their mouths if they cry. Mothers will make considerable effort to keep their children from crying for this reason. Therefore, to avoid the major task of recovering fugitive souls, we had to leave children under 10 years of age out of the test.

Subcutaneous nodules later were found in 10 of the 57 Indians with microfilaria, and also in one Indian woman whose skin test remained negative even after a second biopsy. In seven of these cases, including that of this woman, the nodules were localized principally in the scalp. In the three previously mentioned instances in which the detected nodules were actually removed from Indian subjects, histopathologic examination revealed the presence of *O. volvulus* in each case. In one nodule the filariae were already in a state of degeneration. It is probable that some onchocercomas escaped notice during the examination, which was somewhat hurried. If so, the small size and often very deep location of the nodules were most certainly contributory factors.

One Indian man and woman with microfilaria in their skins (both from the village of Chief Roberto) were blind in one eye. Another Indian woman, from the village of Chief Fialho, complained of severe photophobia when the biopsy was being taken. We confirmed that she was suffering from blepharoconjunctivitis, which had already caused a loss of eyelashes on her lower lid. This woman had a massive case of the disease, nearly 30 microfilaria having been obtained from the small skin fragment examined.

**Cutaneous manifestations, probably attributable to *O. volvulus* microfilaria,** were

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**FIGURE 1**—The results of a 1973 study of *O. volvulus* microfilaria infecting Indians of the Toototobi River, Brazil (subjects listed by village and age group).

<table>
<thead>
<tr>
<th>Age of subjects</th>
<th>Roberto’s village</th>
<th>Plinio’s village</th>
<th>Fialho’s village</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of persons examined</td>
<td>No. positive</td>
<td>%</td>
<td>No. of persons examined</td>
</tr>
<tr>
<td>10 - 14</td>
<td>5</td>
<td>1</td>
<td>20.0</td>
<td>8</td>
</tr>
<tr>
<td>15 - 19</td>
<td>7</td>
<td>1</td>
<td>14.2</td>
<td>6</td>
</tr>
<tr>
<td>20 - 29</td>
<td>15</td>
<td>12</td>
<td>80.0</td>
<td>10</td>
</tr>
<tr>
<td>30 - 39</td>
<td>7</td>
<td>6</td>
<td>85.7</td>
<td>9</td>
</tr>
<tr>
<td>40 and over</td>
<td>7</td>
<td>7</td>
<td>100.0</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>41</td>
<td>27</td>
<td>65.8</td>
<td>36</td>
</tr>
</tbody>
</table>
observed in a number of cases. These most frequently took the form of slightly erythematous and highly pruritic papules localized in the regions of the buttocks and shoulder blades, and of dry, shiny, and wrinkled patches of skin in the same regions. Whenever these lesions were found, the biopsy was invariably positive. (Second only to malaria, the principal complaint of the Waicas is severe prurigo in the upper and lower extremities.)

Besides the Indians, five people from the two missionary families living in the area were examined. None of them were found to have microfilaria in the skin. However, as previously noted, we removed an onchocercotic nodule from one of the women. Histopathologic examination of this nodule, taken from the left iliac crest, showed filariae in the process of degeneration. This missionary had been given the diethylcarbamazine treatment only a short while before, after examination of another nodule removed earlier. Moreover, she had administered the same drug to her husband when he complained of intense prurigo in the area of the pelvic girdle. Despite this symptom, no microfilaria were found in his skin during the course of several subsequent biopsies.

Discussion

As we have previously suggested, this firm evidence that *O. volvulus* exists among Indians living along the Toototobi River means that Brazil should be included on the world’s list of areas with endemic onchocerciasis. It also makes Brazil the third country of South America in which the presence of these filariae has been confirmed.

Even though the Toototobi River focus by itself is small, certain factors relating to the Waicas lead us to suppose that there is an extensive endemic zone, including portions of both Brazil and Venezuela, that coincides with the geographic distribution of the Yanomama Indian group and probably that of the Makiritare Indians as well. One of these factors is the nature of the region inhabited by these Indians among the Curupira, Tapirapecó, Urucuzeiro, Surucucus, and Parima mountains. This area is rather high and thus favors propagation of the *Simulium* flies that transmit *O. volvulus*. Another equally important factor are the frequent visits between the various villages, almost always motivated by the periodic ceremonial gatherings of the Yanomamas. The visitors generally remain in the host villages for several days, which is a sufficient period for transmission. Furthermore, there is no doubt that the disease has been carried from the previously reported focus in eastern Venezuela to the headwaters of the Orinoco and to its tributaries, such as the Mavaca River, from whence it has passed to Brazil via either the visits of the Waicas or their migrations.

The Yanomama people are characterized by a high degree of mobility. Of the 91 Indians we examined, at least 11 had once come from the region of the Orinoco or from the mountains along the border, according to information given us by the missionaries. And of these 11, every one tested positively for microfilaria. One among them named Tito, who had come from the Orinoco region, was only 14 years of age.

According to Chagnon (5) and Chagnon *et al.* (6), the Yanomamas’ total population is estimated at or above 10,000 persons living in some 125 scattered villages containing anywhere from 40 to 250 inhabitants. The Makiritares, whose territory overlaps part of the Yanomamas’ are estimated to have around 2,000 members. They are also distributed in a number of villages, most of which have from 50 to 150 inhabitants and almost all of which are located within Venezuelan territory. While the Yanomamas are accustomed to travelling on foot through the forests, the Makiritares prefer river travel, building canoes and
making long trips upon the tributaries on the right side of the Orinoco descending from the mountains; they thus come in contact with distant settlements of civilized people.

Prior to the arrival of missionaries in Yanomama territory, the latter got all their metal implements from the Makiritares, who thus served as intermediaries between the Yanomamas and the whites. It is almost certain that through their contacts with the two groups the Makiritares also served as a connecting link in the spread of onchocerciasis.

Besides these background considerations, a number of findings confirm that the endemic area is quite extensive, and that the Toototobi River focus is only a small part of it. These findings are as follows: (1) Moraes and Chaves (11) found a missionary from the Surucucus mountains in Roraima to have onchocercotic nodules. (2) Toototobi missionaries have reported that one of their company living on the Venezuelan side of the border had an *O. volvulus* nodule removed in the United States. (3) Blind Indians are known to be present among Waicas living along the Marari River (a tributary of the Padauiri) in the State of Amazonas. (4) Finally, one infected person included in this study was living in the village of Chief Roberto, but had actually come from the area of the Mapulau River, a tributary of the Demini downriver from the Toototobi.

Although any conclusions about the disease in this general region would be premature, given the small size of the area studied, it is noteworthy that nodules were found in only 17 per cent of the positive cases, about the same percentage found among those suffering from onchocerciasis in Venezuela. In Mexico and in Guatemala the nodules are much more numerous. However, the preferred location for the nodules studied, i.e. the head, is a more common site in Mexico and Guatemala than in Venezuela. More studies at various localities within the endemic area will be needed in order to definitively determine the characteristics of this new focus of the disease.

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SUMMARY

A chance identification of onchocercal nodules in American woman missionaries living among the Waica Indians in northern Brazil has resulted in discovery of a focus of the disease along the Toototobi River in the State of Amazonas. This is the first focus of onchocerciasis to be recorded in Brazil.

Of 91 Indians examined, 57 had *Onchocerca volvulus* microfilaria present in their skins. All these Indians were living in three malocas or villages along the course of that river, only a short distance from the post occupied by two of the missionaries. Subcutaneous nodules were found in 11 of the Indians, one of whom showed no cutaneous microfilaria.

The fact that two of the Indians examined were blind in one eye and another had blepharconjunctivitis suggests that ocular involvement may be relatively common among those infected with the parasite. However, examinations for microfilaria in the anterior chamber of the eye were not performed.

The authors believe that the focus discovered may be quite extensive, corresponding to the geographic distribution of the Yanomama Indian group to which the Waica Tribe belongs.
REFERENCES


