PRELIMINARY TRIAL OF THE EFFECT OF HYCANTHONE (ETRENOL) IN THE MASS TREATMENT OF URINARY BILHARZIASIS*

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(Received 5 September 1971; in revised form 11 January 1972)

ARFAA F., SAHBA G. H., JAMSHIDI C. H. and ARDALAN A. 1972. International Journal for Parasitology 2: 369-372. Mass-chemotherapy of urinary bilharziasis has been undertaken with hycanthone hydrochloride (Etrenol) among the infected cases found in two villages in the endemic areas of Khuzestan, Iran. A total of 71 cases were treated with a single i.m. dose of 3.0 mg/kg body weight of patients. Follow-up examinations carried out 3 and 6 months after the end of therapy have revealed cure rates of 95.5 and 100 per cent respectively among treated persons. Side-effects encountered were not very severe except for nausea and vomiting. The advantage of this drug, which is the single dose required, is discussed.

INDEX KEY WORDS: Iran; hycanthrone; etrenol; urinary bilharziasis; schistosomiasis; drugs; anthelminthics; thioxanthone.

INTRODUCTION

SUCCESS achieved in the interruption of transmission of urinary bilharziasis by application of molluscicides and sanitary modification of the snail habitats in the bilharzia endemic area in Khuzestan, Southwest Iran (Arfaa et al., 1967a & 1970a) has justified the use of mass-chemotherapy in the reduction of the number of infected people in this country (Arfaa et al., 1966a, 1966b, 1967b & 1970b).

Although good results have been obtained by some of the antischistosomal drugs used, the short duration required in the use of hycanthone has encouraged the authors to evaluate also the effect of this drug in the mass-treatment of infection.

MATERIAL AND METHODS

The inhabitants of one infected village (Boneh Arabha) where no mass-treatment has been undertaken and the students in another village (Shams Abad) where re-infection occurred due to the extension of irrigation canals, were examined; the prevalence of infection in the first village and the number of the infected cases in the second village were indicated.

Medical examinations were performed for 80 cases found positive in these villages. The hearts and respiratory tracts of the patients were checked and blood pressures and pulse rates were also indicated and recorded. Nine patients were excluded from the treatment because of other conditions and a total of 71 cases whose sex and age distribution are shown in Tables 1 and 2 were treated. To determine the intensity of infection among patients chosen for treatment, urine samples were collected from them between 10 a.m. and 2 p.m. and were examined and egg counts were performed using the following method:

* This study was supported in part from funds of the School of Public Health and Institute of Public Health Research and partly by the Public Health Research Project of the Ministry of Health and Plan Organization.
The amount of urine was thoroughly mixed and 20 ml of each sample were filtered through a Whatman filter paper No. 1, using a Millipore pressure filter (Sterifil), eggs collected on the paper were stained by ninhydrin solution and counted.

The range and average number of eggs in 20 ml of urine in various age and sex groups are shown in Table 3. As indicated in this table, the highest intensity is observed in the age group 6–10. The reason for this unusual finding is that in the village of Shams Abad the children with more contact with newly infested water were in the age group 6–10 and thus they had the highest prevalence and severity.

**Table 1—Age and Sex Distribution of Cases Treated with Hyacanthone and the Result of Follow-Up Examinations in the Village of Shams Abad, Dezful**

<table>
<thead>
<tr>
<th>Age group</th>
<th>Male</th>
<th></th>
<th></th>
<th>Female</th>
<th></th>
<th></th>
<th>Total</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. treated</td>
<td>No. examined</td>
<td>No. +</td>
<td>No. treated</td>
<td>No. examined</td>
<td>No. +</td>
<td>No. treated</td>
<td>No. examined</td>
<td>No. +</td>
</tr>
<tr>
<td>Below 6</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>5</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>6–10</td>
<td>13</td>
<td>13</td>
<td>0</td>
<td>15</td>
<td>15</td>
<td>1</td>
<td>28</td>
<td>28</td>
<td>1</td>
</tr>
<tr>
<td>11–20</td>
<td>12</td>
<td>11</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>15</td>
<td>13</td>
<td>2</td>
</tr>
<tr>
<td>21 &amp; over</td>
<td>1</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>1</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Total</td>
<td>29</td>
<td>26</td>
<td>2</td>
<td>20</td>
<td>19</td>
<td>1</td>
<td>49</td>
<td>45</td>
<td>3</td>
</tr>
</tbody>
</table>

Figures outside parentheses = follow-up examination 3 months after therapy.
Figures inside parentheses = follow-up examination 6 months after therapy.

**Table 2—Age and Sex Distribution of Cases Treated with Hyacanthone and the Result of Follow-Up Examinations in the Village of Boneh Arabha, Dezful**

<table>
<thead>
<tr>
<th>Age group</th>
<th>Male</th>
<th></th>
<th></th>
<th>Female</th>
<th></th>
<th></th>
<th>Total</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. treated</td>
<td>No. examined</td>
<td>No. +</td>
<td>No. treated</td>
<td>No. examined</td>
<td>No. +</td>
<td>No. treated</td>
<td>No. examined</td>
<td>No. +</td>
</tr>
<tr>
<td>Below 6</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>6–10</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>11–20</td>
<td>6</td>
<td>6</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>9</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>21 &amp; over</td>
<td>7</td>
<td>6</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>10</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>14</td>
<td>0</td>
<td>7</td>
<td>7</td>
<td>0</td>
<td>22</td>
<td>21</td>
<td>0</td>
</tr>
</tbody>
</table>

Figures outside parentheses = follow-up examination 3 months after therapy.
Figures inside parentheses = follow-up examination 6 months after therapy.
TABLE 3—AVERAGE AND MEAN NUMBER OF EGGS FOUND IN 20 ml OF URINE IN VARIOUS AGE GROUPS IN BOTH VILLAGES

<table>
<thead>
<tr>
<th>Age group</th>
<th>Below 6</th>
<th>6-10</th>
<th>11-20</th>
<th>21 and over</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>4</td>
<td>66.6</td>
<td>37.5</td>
<td>20.7</td>
<td>45.8</td>
</tr>
<tr>
<td>Range</td>
<td>2-6</td>
<td>2-258</td>
<td>2-168</td>
<td>2-108</td>
<td>2-258</td>
</tr>
</tbody>
</table>

All patients were weighed and hycanthone was administered in a single intermuscular injection of 3-0 mg/kg body weight.

The site of injection was the gluteus minimus muscle (located at the upper outer quadrant of the buttock), high up under the iliac crest.

The maximum dose administered was 200 mg.

Patients treated were under direct supervision and the side-effects encountered from the time of injection up to 48 h thereafter were recorded.

Follow-up examinations of patients treated have been undertaken 3 and 6 months after treatment.

RESULTS

Out of 97 persons examined in the village of Boneh Arabha, 29 were found infected (a prevalence of 29.8 per cent) while in the village of Shams Abad, of 478 persons examined 51 were found positive.

Out of 66 treated cases who were examined 3 months after therapy, 3 or 45 per cent (all in age group W-20) were still passing a few viable schistosome eggs in their urine (a cure rate of 95-5 per cent) but in the second follow-up examination undertaken 6 months after therapy, of 71 patients treated in both villages, 66 were examined and all found negative.

Cure rates observed in various age groups are shown in Tables 1 and 2. The prevalence of infection, which was 29-8 per cent in the village of Boneh Arabha before therapy, was re-established 6 months after treatment and found to be only 4-7 per cent.

Side effects. Of 71 persons treated 38 (53.5 per cent) did not show any side reactions. Among others, there were various side-effects observed up to 3 days after treatment, viz., in order of frequency, nausea (28%), vomiting (18-3%), headache (12-6%), anorexia (5-6%), myalgia (5-6%), fever (4-2%) and insomnia (2-8%). The severity of nausea and vomiting was slightly higher among children.

DISCUSSION

The results of this limited trial indicate the effectiveness of this thioxanthone compound in the mass-treatment of urinary bilharziasis. The cure rate observed was more or less similar to what was observed when using niridazol compound of Ambilhar (Arfaa et al., 1970b).

However, it must be noted that in the present trial because of the success achieved in the control of bilharziasis in Iran (Arfaa et al., 1970a), it was not possible to find villages with a great prevalence and high intensity of infection and both villages under study had a low prevalence and intensity (as is indicated by the egg count).

Thus more investigations are needed to have better ground for comparison with the drug extensively used for mass-treatment in Iran (Arfaa et al., 1966b and 1970b).
Side-effects encountered with this drug were more severe than it was observed when using Ambilhar, especially nausea and vomiting which in many patients had caused discomfort needing immediate administration of drugs such as chlorpromazine (Largactil) to cure these conditions.

More investigations on the severity of side-effects among patients with higher intensity is required.

The main advantage of Hycanthone over other schistosomicidal drugs tried is the short duration of treatment (a single injection), which is very important during the mass-chemotherapy, greatly reducing time, man-power, transport and expenses of mass-treatment operations.

Acknowledgements—The authors are indebted to Dr. R. Moini, Medical Officer, Mr. Sh. Keyvan and Miss M. Sedghi Massoud for their assistance and help during this study.

Our thanks are also due to the authorities of Winthrop Products Inc., New York, U.S.A., who had kindly provided us with the Hycanthone needed for this trial.

REFERENCES


