Schistosomiasis reinfection and community compliance in a primary health care participatory research project in Menoufia, Egypt

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This study aimed to train local primary health care teams on sound scientific techniques for schistosomiasis case-finding, recording, treatment and follow-up in the context of primary health care; involve local community members in designing and conducting epidemiological research on schistosomiasis and follow-up of positive cases in collaboration with primary health care teams; and assess the impact of this methodology on community compliance to laboratory testing and treatment, besides the impact on rates of prevalence, intensity, incidence and reinfection.

La réinfection par les schistosomes et l’observance de la communauté dans un projet de recherche participatif dans le contexte des soins de santé primaires à Menoufia en Égypte

L’objectif de cette étude est de former des équipes SSP aux techniques scientifiques éprouvées pour le dépistage, l’enregistrement, le traitement et le suivi des cas de schistosomiasi dans le contexte des soins de santé primaires. Il s’agit également d’impliquer les membres de la collectivité locale dans la conception et la réalisation des travaux de recherche épidémiologique sur la schistosomiasi ainsi que dans le suivi des cas positifs en collaboration avec des équipes SSP. Cette étude s’intéresse en outre à l’évaluation de l’impact de cette méthodologie sur l’observance de la communauté en matière d’épreuves de laboratoire et de traitement, ainsi que sur les taux de prévalence, l’intensité de la maladie, son incidence et la réinfection.

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Introduction

Many endemic disease control activities can be carried out in the context of primary health care, depending on the degree of development of the supporting structure, and the proper orientation of primary health care (PHC) personnel [1]. In Egypt, many schistosomiasis control activities have been the responsibility of rural health units and centres since their establishment in the early 1940s. These activities have gradually developed into a primary health care strategy, extending coverage to urban areas [2].

Yet studies have shown that shortcomings in implementation of schistosomiasis control, among other activities carried out by PHC teams, are mainly due to the need for training and acceptance of the application of primary health care principles [3]. Other studies performed in the course of this research have revealed poor utilization of the facilities and practically no community participation in schistosomiasis control in the local PHC units [4].

This study aimed to:

- Train local primary health care teams on sound scientific techniques for schistosomiasis case finding, recording, treatment and follow-up in the context of PHC.
- Involve local community members in designing and conducting epidemiological research on schistosomiasis and follow up of positive cases in collaboration with PHC teams.
- Assess the impact of this methodology on community compliance to laboratory testing and treatment, besides the impact on rates of prevalence, intensity, incidence and reinfection.

Methods

Study setting

Two villages, El-Garda and Salamoniya, in Menoufia governorate were chosen, because they are:

- large villages with almost similar populations: El-Garda has a population of 7679, and Salamoniya 8181 inhabitants;
- threaded by canals and drains;
- represent different sewage disposal facilities: El-Garda is provided with a sewage disposal system serving one third of the village houses, while Salamoniya lacks a municipal disposal system, and most houses, particularly those on the canal banks, dispose of sewage and refuse into the canal;
- El-Garda has no PHC unit, and villagers resort to a nearby unit in another village, whereas Salamoniya has its own unit.

Laboratory facilities

For the purpose of this study a temporary laboratory was set up in El-Garda, and the PHC team from nearby Batanoun village was given the responsibility of running it. Meanwhile, laboratory facilities in Salamoniya were upgraded by the provision of new binocular self-illuminated microscopes, a bench and extra lighting.

Training

The PHC teams in both villages, including professional and paramedical staff, together with selected villagers were subjected to several training sessions throughout the study period. The training included preliminary sessions tackling the detailed description of the dimensions of the schistosomiasis problem, schistosomiasis transmission, the clinical picture, complications and public health implications. The ideal role of the PHC unit in mass diagnosis, treatment and
follow-up, in addition to its role in raising community awareness and mobilizing community involvement in prevention and control, received particular emphasis.

Training on active sample collection by house-to-house visits and follow-up of defaulters with accurate recording were also explained initially and throughout the study. Meetings to discuss obstacles and solutions suggested were held regularly, and a special form was constructed and modified accordingly. These sessions were attended by the PHC teams and community participants.

Training in the use of the thick-smear Kato technique, for qualitative and quantitative stool examination, took place at Qalyoub Training Centre near Cairo. It was repeated several times on site by the PHC staff of the High Institute of Public Health, Alexandria, who also performed quality control and refresher training throughout the study.

The pilot study and the in-depth study sample
The pilot study was performed on 5% of all residential units in each of the villages, with the aim of estimating the required minimum size of the in-depth study sample. At the same time it provided a good opportunity to evaluate the efficiency of PHC teams and their retraining. Accuracy was ensured by a complete quality control procedure. Since the whole project was household based, the in-depth study was performed on a sample of households in each village. The sample ratio in each village was calculated using pilot study results, so as to secure a preset approximate number of about 100 schistosomiasiis positive cases. Accordingly, a 15% systematic random sample of households in El-Garda was chosen (comprising 156 houses containing 177 families). To maintain approximately the same number of positive cases, the sample in Salamoniya village was 6% (comprising 78 houses with 102 families). Since a very low prevalence rate of 1% of *Schistosoma haematobium* appeared, the in-depth study was limited to *Schistosoma mansoni*; epidemiological study stool examination and case treatment was performed yearly for three years.

Quality control in the in-depth study was performed on 20% of the total sample plus all positive cases. Two slides were prepared for every stool sample, each of which was examined by a different technician. Schedules were constructed with special columns for examiner's code, examiner's results and quality control results. Positive cases were treated and re-examined four months later.

Statistical analysis
The SPSS computer program was used. The chi-square and the z tests of significance were applied.

Results
Salamoniya village is provided with a rural PHC unit of five rooms, staffed with one physician, eight nurses and nurse-midwives, a clerk, a sanitarian and several other workers. A laboratory technician comes three times a week to perform necessary urine and stool examinations for patients referred from the outpatient clinic. The PHC unit is responsible for the provision of all the elements of primary health care including schistosomiasis control as part of the endemic disease control element.

Table 1 shows that the prevalence rates of *Schistosoma mansoni* in 1992 were 8.1% in El-Garda and 27.9% in Salamoniya. They dropped sharply after the first year, but the decline was less pronounced after the second year.

Table 2 demonstrates that the incidence rates of *Schistosoma mansoni* in the two
villages were 3.8% and 10.3% respectively in the second year; and a negligible, if any, decline in incidence and reinfection appeared in the third year (shown in Table 3). Reinfection rates (10.9% and 8.0%) scarcely differed between the two villages.

In Table 4, it is obvious that the highest rates of "severe" intensity of schistosomiasis infection appeared in the first year in the age groups from 6 to 18 years, with rates exceeding 95.0%. These rates, however, dropped gradually in the second and third years of the study in the same age groups.

Table 5 shows the improving compliance rates in both villages, particularly from the first year with a compliance rate of 85.1% to the second year with a rate of 95%. For the noncompliance cases, 60.8% simply refused to give samples and 13.5% were not present at the time of sample collection. Only 19 out

| Table 1 Schistosoma mansoni prevalence rates, by village, 1992–1994 |
|-----------------|--------|--------|--------|
|                | No.    | %      | No.    | %      | No.    | %      |
| El-Garda       |        |        |        |        |        |        |
| Total examined | 998    | 8.1    | 961    | 4.3    | 949    | 2.4    |
| Positive       | "51   |        | "41"   |        | 23"    |        |
| Salamoniya     |        |        |        |        |        |        |
| Total examined | 462    | 27.9   | 437    | 10.3   | 430    | 11.9   |
| Positive       | "129  |        | "45"   |        | 51"    |        |
|                 |        |        |        |        |        |        |
| *z = 3.525     | p < 0.01 |
| *z = 2.238     | p < 0.05 |
| ** = 6.665     | p < 0.001 |
| ** = 0.733     | p > 0.05 |

| Table 2 Schistosoma mansoni incidence rates, by village, 1993–1994 |
|-----------------|--------|--------|
| Village        | 1993   | 1994   |
|                | Year II | Year III |
|                | No.    | %      | No.    | %      |
| El-Garda (+ve) |        |        |        |        |
| Total examined | 880    | 3.8    | 908    | 2.2    |
| Positive       | "33   |        | "20   |        |
| Salamoniya (+ve) |        |        |        |        |
| Total examined | 319    | 10.3   | 390    | 11.5   |
| Positive       | "33   |        | "45   |        |
| (previous year negatives) |        |        |        |        |
|                 | *z = 1.929 | p < 0.05 |
|                 | **z = 0.505 | p < 0.05 |

| Table 3 Annual Schistosoma mansoni reinfection, by village, 1993–1994 |
|-----------------|--------|--------|
| Village        | 1993   | 1994   |
|                | Year II | Year III |
|                | No.    | %      | No.    | %      |
| El-Garda       |        |        |        |        |
| Total cured    | 64     | 10.9   | 40     | 7.5    |
| Reinfected     | "7"    |        | "3"    |        |
| Salamoniya     |        |        |        |        |
| Total cured    | 75     | 8.0    | 32     | 12.5   |
| Reinfected     | "6"    |        | "4"    |        |
| Grand total    |        |        |        |        |
| Cured          | 139    | 9.4    | 72     | 9.7    |
| Reinfected     | 13     |        | 7      |        |
|                 | *z = 0.579 | p > 0.05 |
|                 | **z = 0.732 | p > 0.05 |
|                 | *z = 0.593 | p > 0.05 |
|                 | *z = 0.712 | p > 0.05 |
Table 4: Intensity of *Schistosoma mansoni* infection by age and year

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Year I</th>
<th></th>
<th>Year II</th>
<th></th>
<th>Year III</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intensity</td>
<td>Low</td>
<td>Mod.</td>
<td>Severe</td>
<td>Total</td>
</tr>
<tr>
<td>&lt; 6 years</td>
<td></td>
<td>1</td>
<td>0</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>14.3</td>
<td>0</td>
<td>85.7</td>
<td>100</td>
</tr>
<tr>
<td>6–11</td>
<td></td>
<td>0</td>
<td>1</td>
<td>19</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>0</td>
<td>5.0</td>
<td>95.0</td>
<td>100</td>
</tr>
<tr>
<td>12–17</td>
<td></td>
<td>0</td>
<td>1</td>
<td>35</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>0</td>
<td>2.8</td>
<td>97.2</td>
<td>100</td>
</tr>
<tr>
<td>18–23</td>
<td></td>
<td>16</td>
<td>4</td>
<td>9</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>55.2</td>
<td>13.8</td>
<td>31.0</td>
<td>100</td>
</tr>
<tr>
<td>24–29</td>
<td></td>
<td>13</td>
<td>3</td>
<td>6</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>59.1</td>
<td>13.6</td>
<td>27.3</td>
<td>100</td>
</tr>
<tr>
<td>≥ 30 years</td>
<td></td>
<td>71</td>
<td>16</td>
<td>9</td>
<td>96</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>74.0</td>
<td>16.7</td>
<td>9.4</td>
<td>100</td>
</tr>
</tbody>
</table>

\[ \chi^2_{20} = 122.367 \quad p < 0.001 \]
\[ \chi^2_{10} = 48.461 \quad p < 0.001 \]
\[ \chi^2_{10} = 8.593 \quad p < 0.05 \]

*Low = egg count < 100  \quad Mod. = egg count 100-199  \quad Severe = egg count ≥ 200*
Table 5 Population compliance with *Schistosoma mansoni* diagnosis and treatment, by village

<table>
<thead>
<tr>
<th>Village</th>
<th>1992 Year I</th>
<th>1993 Year II</th>
<th>1994 Year III</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
</tr>
<tr>
<td>El-Garda</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complied</td>
<td>998</td>
<td>84.2</td>
<td>960</td>
</tr>
<tr>
<td>Total sample</td>
<td>1185</td>
<td></td>
<td>998</td>
</tr>
<tr>
<td>Salamonlya</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complied</td>
<td>482</td>
<td>87.0</td>
<td>437</td>
</tr>
<tr>
<td>Total sample</td>
<td>531</td>
<td></td>
<td>473</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complied</td>
<td>1460</td>
<td>85.1</td>
<td>1397</td>
</tr>
<tr>
<td>Total sample</td>
<td>1716</td>
<td></td>
<td>1471</td>
</tr>
</tbody>
</table>

\[ z = 9.134 \quad p < 0.001 \quad **z = 5.157 \quad p < 0.001 \]

Table 6 Population noncompliance in schistosomiasis stool testing by sex and reason, 1993

<table>
<thead>
<tr>
<th>Sex</th>
<th>Refused</th>
<th>Temporary absence</th>
<th>Permanent absence</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number</td>
<td>20</td>
<td>44.4</td>
<td>8</td>
<td>80.0</td>
</tr>
<tr>
<td>Percent</td>
<td>54.1</td>
<td></td>
<td>21.6</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number</td>
<td>25</td>
<td>56.6</td>
<td>0</td>
<td>20.0</td>
</tr>
<tr>
<td>Percent</td>
<td>67.6</td>
<td></td>
<td>5.4</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number</td>
<td>45</td>
<td></td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Percent</td>
<td>60.8</td>
<td>100</td>
<td>13.5</td>
<td>100</td>
</tr>
</tbody>
</table>

Permanent absence = deceased, emigrated or moved.

\[ \chi^2 = 6.206 \quad p > 0.05 \]

of 74 absenteees were permanently unavailable (Table 6).

**Discussion**

The results show that in spite of the quick drop in the prevalence rates of *Schistosoma mansoni* after one year, the curve flattened out, probably as a result of the continuous incidence of new cases which hardly changed from the second to the third year. Besides, the persistently high rates of reinfection were apparently unaffected by the different environmental conditions in the two villages. Meanwhile, there was a drop...
in the rate of infection, as indicated by the sloping curve of severe intensity cases apparent in the second and third years, in the total study sample. This shows that to achieve a continuous drop in prevalence, incidence, and reinfection rates, more effort is needed than the ongoing mass media educational messages. In fact, even the training of PHC teams, mass diagnosis and case treatment, though effective, are apparently insufficient in themselves. Sociological and water-contact studies performed in other areas of the Nile Delta [5,6], as well as in the course of this study [7], have demonstrated that the pattern of community canal-water interaction involves many traditional, cultural and occupational factors that should be taken into consideration in any effective long-term control programme.

Moreover, the difference between the physicochemical nature of canal water and that of tap water apparently plays a role in the persistence of peasants in using canals for many domestic purposes. These findings are supported by results of previous studies in the Delta [8].

Compliance rates clearly improved, particularly after the first year of the study. While no other intervention took place during that period except the training of personnel, effective mass diagnosis, and case treatment, this improvement could be attributed to these factors.

On the other hand, the majority of cases of noncompliance were due to community rejection and temporary absence at the time of sample collection. Both reasons point to the need for further continuous training of PHC personnel to upgrade case follow-up abilities and skills; not to mention the need to raise confidence in the health services. It is obvious that while refusal rates higher among females, temporary absence predominated among males, possibly indicating the important role of assuring women responsiveness to PHC personnel, and the need for more concentration on this category in community involvement programmes. In fact, the important part played by women in self-help programmes has frequently ranked first in previous studies [9,10].

Acknowledgement

This research project was supported by the Egyptian Ministry of Health/USAID-funded Schistosomiasis Research project.

References

1. WHO. Analysis of the content of the eight essential elements of primary health care. Final report to the HPC by the HPC working group on PHC, 10 August 1981.


