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SCHEMOSOMA MANSONI INFECTION 3 MONTHS AFTER PRAZIQUANTEL THERAPY AMONG FARMERS IN QALYUB, EGYPT

BY

P.R. Abu-Elyazed, N.S. Mansour, M. Habib
and J.K. Podgore

U.S. NAVAL MEDICAL RESEARCH UNIT No. 3
(CAIRO, ARAB REPUBLIC OF EGYPT)
PSC 452, BOX 5000
FPO AE 09835-0007
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**Abstract:**
The prevalence of Schistosoma mansoni infection was 52% among 1494 male farmers aged 15-42 years old in 3 rural communities in the Qalyub region of the Nile Delta. Treatment with praziquantel at the recommended dose 40 mg/kg body weight in a single oral dose was taken by 668 (87%) of the infected farmers. After 3 months 607 (91% of the volunteers) submitted three daily faecal samples and 186 (31%) were infected. Since this study was conducted during the winter when transmission was low this 31% post treatment infection is most likely due to treatment failure. Prospective studies to evaluate optimal dosage of praziquantel and sequential treatment schedules to achieve effective control of transmission are indicated.

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- Schistosoma mansoni; Treatment; Praziquantel; Farmers; Nile Delta, Egypt.

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Naval Medical Research Unit No. 3, Cairo, Egypt and *Center for Field and Applied Research, Egyptian Ministry of Health, Cairo, Egypt.

Abstract
The prevalence of Schistosoma mansoni infection was 52% among 1494 male farmers aged 15-42 years old in 3 rural communities in the Qalyub region of the Nile Delta. Treatment with praziquantel at the recommended dose 40 mg/kg body weight in a single oral dose was taken by 668 (87%) of the infected farmers. After 3 months 607 (91%) of the volunteers submitted three daily faecal samples and 186 (31%) were infected. Since this study was conducted during the winter when transmission was low this 31% post treatment infection is most likely due to treatment failure.

Prospective studies to evaluate optimal dosage of praziquantel and sequential treatment schedules to achieve effective control of transmission are indicated.

Introduction
Schistosomiasis is one of the most important public health problems in Egypt. It is the major occupational disease in rural areas where agricultural workers acquire the infection through repeated daily contact with schistosomal cercarial infested water (Kloos et al., 1990). Water-resource development projects for irrigation purposes have increased the areas of disease transmission. Treatment of schistosomiasis was simplified with the advent of praziquantel, a safe and effective anti-schistosomal drug. The cure rate with a single dose of 40 mg/kg body weight ranges from 72% to 100% for S. haematobium and 63% to 97% for S. mansoni (King and Mahmoud, 1989). Although praziquantel treatment achieves high cure rates, it does not prevent re-infection. How frequent it is necessary to re-treat patients to achieve lasting impact on re-infection rates is not known.

This study was designed to evaluate effectiveness of praziquantel therapy in a cohort of Egyptian farmers with Schistosoma mansoni infection three months after a single dose treatment during the low transmission season.

Materials and Methods
Study area and study population
The study was conducted in three rural sites in the Qalyub district in the Nile Delta about 30 km north-west of Cairo, Egypt. Three villages (Halaba, Sanafeir and Aghour) were chosen because of a known high prevalence of schistosomiasis.
in farmers. Male farmers 18-42 years of age, with no anti-schistosomal treatment during the previous three months, were invited to participate in this study which was the initial step of a study to evaluate a schistosomal topical antipenetrant.

Schistosomiasis Survey

Between September and November 1990, all participants were given a labeled 50 ml plastic centrifuge tube for urine and a wide mouthed plastic screw-cap container for faeces and were asked to provide specimens the next morning. Specimen examinations were done within 2-4 hours of collection. Urine samples were examined by a sedimentation concentration technique (Mansour et al., 1981) and faecal samples were examined using the Kato-Katz thick smear method (Katz et al., 1972).

Treatment Procedure

Praziquantel in a single oral dose of 40 mg/kg was given under the supervision of Egyptian Ministry of Health physician to each farmer immediately after urine and faecal samples indicated schistosome infection.

Post-treatment stool survey

Twelve weeks after treatment, a faecal sample was collected on each of three consecutive days from each subject. Faecal samples were examined by the modified Ritchie technique, a more sensitive procedure to determine complete cure following therapy (Knight et al., 1976). If the first or second faecal sample was positive for *S. mansoni* the subject was determined to be infected and subsequent samples were not examined.

Results

Of the 1494 farmers participating in the study, 374 were from Halaba, 615 from Sanafeir and 505 from Aghour. The prevalence of *Schistosoma haematobium* infection was 0.9% and that of *Schistosoma mansoni* was 51.5%. Of the 14 individuals with *S. haematobium*, 11

<table>
<thead>
<tr>
<th>Type of infection</th>
<th>Halaba</th>
<th>Sanafeir</th>
<th>Aghour</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>S. mansoni</em></td>
<td>169(45.2%)</td>
<td>309(50.2%)</td>
<td>291(57.6%)</td>
<td>769(51.5%)</td>
</tr>
<tr>
<td><em>S. haematobium</em></td>
<td>4(1.1%)</td>
<td>4(0.7%)</td>
<td>6(1.2%)</td>
<td>14(0.9%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type of infection</th>
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<th>Sanafeir</th>
<th>Aghour</th>
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</tr>
</thead>
<tbody>
<tr>
<td><em>S. mansoni</em></td>
<td>47(33.6%)</td>
<td>80(31.1%)</td>
<td>59(28.1%)</td>
<td>186(30.6%)</td>
</tr>
</tbody>
</table>
also had *S. mansoni*. The prevalences of *S. mansoni* and *S. haematobium* positive individuals among the three villages (table-1) were not significantly different. All infected individuals were offered treatment with a single dose of praziquantel, but because the prevalence of *S. haematobium* was very low (0.9%), only *S. mansoni* infected individuals were included in this study. Of the 668 (86.9%) individuals treated, 607 (90.0%) provided the required consecutive daily faecal specimens during post treatment follow-up. Three months after treatment 168 of the 607 individuals (30.6%) were still infected with *S. mansoni*. There was no significant difference in prevalence of post treatment infection among the study villages (table-2). The value of three consecutive daily faecal examinations post treatment is shown in figure-1. The first sample identified 50% or less of those infected.

![Fig. 1: The number and percent of positive cases by the examination of 3 consecutive stool samples 3 months after therapy in the study sites.](image)

- Sample 1
- Sample 2
- Sample 3
Discussion

The prevalence of *S. mansoni* infection (51.5%) at the time of this study was higher than that reported previously in this area (El-Alamy and Cline, 1977 and Cline et al., 1977). The increase in prevalence of *S. mansoni* infection is probably due to the selective nature of this study focusing only on male farmers. The prevalence of *S. haematobium* (<1%) was much lower than that reported by other investigators in this Qalyub area, but the decrease in *S. haematobium* prevalence is consistent with its dramatic decline in the Nile Delta (Abdel Wahab et al., 1979).

Persistent *S. mansoni* infection after treatment may be due to infection just prior to treatment, re-infection after treatment, or treatment failure. Praziquantel affects only the mature worm stages of schistosomes, so immature stages at the time of treatment may survive, reach maturity and excrete eggs 4-6 weeks later. Exposure after treatment may result in re-infection with egg excretion after 6-8 weeks. The post-treatment *S. mansoni* infection of 31% in this study is most likely due to drug failure since the study was done during the low transmission season from December through February. This winter period is considered a low season of schistosomiasis transmission because snail breeding is minimal, most snails either die or hibernate in mid winter and human contact with infested water is greatly reduced. The 69% cure rate is consistent with studies in Sudan (Kardaman et al., 1985); Burundi (Gryseels et al., 1987); Botswana (Friis and Byskov, 1989) and Ethiopia (Simonsen et al., 1990).

Single treatment of *S. mansoni* infected individuals with praziquantel has a limited effect on schistosomiasis control. A single mass treatment may achieve 70% cure rate but will not prevent re-infection. Repeated treatment of infected individuals, or repeated mass treatment if prevalence rates are high, could achieve long-term control. A field trial to evaluate the efficacy of praziquantel in Sudan, (Kardaman et al., 1985) suggested repeating chemotherapy every 6 months for school children living in high prevalence area.

The present study suggests that examination and treatment of a population should be done at the end of the high transmission season with re-examination three months after therapy and re-treatment of infected individuals prior to the beginning of the next high transmission season. If re-examination and treatment are not conducted the high number of infected patients remaining in the population will result in a high level of transmission in the next season with persistence of endemic patterns of the disease. Improved cure rates up to 85% such as those reported by El-Masry et al., (1988), utilizing a 60 mg/kg body weight in divided doses alone or in conjunction with a 3 months follow-up treatment, would be another possible approach to reducing the high level of residual infection due to single 40 mg/kg body weight praziquantel treatment failure.

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