Outbreak investigation of needle sharing-induced malaria, Ahvaz, Iran

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1. Introduction

Malaria is a febrile illness caused by a parasite named Plasmodium.1 Reporting of malaria cases to the World Health Organization (WHO) is improving, but is still variable. Malaria cases still occur in the countries of the Eastern Mediterranean Region, such as Afghanistan, Pakistan, and Iran.2 Almost all regions of Iran are free of the disease, with the exception of the southeastern tropical provinces of Kerman, Hormozgan, and Sistan-Baluchestan. In the southeast, Iran borders Afghanistan and Pakistan. The cross-border traffic in this area is a prime factor in the persistence of the disease. In addition, Iran has provided a shelter for millions of Afghan refugees in the past years.3–5

Humans acquire malaria from the bite of infected anopheline mosquitoes. Malaria is very rarely acquired by needle sharing among intravenous drug users (IVDUs).6 There are only very few reports of malaria outbreaks caused by needle sharing worldwide.7–11 In recent years, cases of induced malaria have been reported from Brazil.8–10 Lo et al. reported that their patients declared that they had not been to any possible transmission area of malaria; however, all of them had taken cocaine, sharing the same contaminated needle and syringe.10 González García et al. reported the first outbreak of induced malaria among heroin users in Spain.11 The aim of this report is to describe malaria in Iran, highlighting the role of IVDUs in malaria outbreaks occurring in malaria-free regions.

2. Materials and methods

This investigation was conducted to control a febrile illness occurring among IVDUs in a camp near Ahvaz, the capital city of Khuzestan (southwest of Iran) during the summer of 2000. The camp was a separate section of Ahvaz Prison, in which addicted prisoners were detained to quit their addiction. The camp included two separate sections, the first section contained 40 people, among whom 30 were IVDUs, and the other section contained 58 people, of whom 42 were IVDUs. The persons in each section had no contact with the persons in the other section, except for during eating and sporting activities.

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ABSTRACT

Background: Humans acquire malaria from the bite of infected anopheline mosquitoes. Malaria is very rarely acquired by needle sharing among intravenous drug users (IVDUs). The aim of this report is to describe the role of injecting drug usage in malaria outbreaks occurring in malaria-free regions.

Materials and methods: This investigation was conducted to control a febrile illness occurring in IVDUs in a camp near Ahvaz, a city in the southwest of Iran, during the summer of 2000. All 98 men (mean age 25 years) in this camp took part in the study. A questionnaire was completed for data collection. Peripheral blood smears were examined for Plasmodium by Wright and Giemsa staining. Those who were positive for Plasmodium were treated with chloroquine 600 mg immediately on day 1, with a 300 mg follow-up dose 6 h later; this was followed by 300 mg doses on days 2 and 3.

Results: Twenty-seven patients (27.6%) were positive for Plasmodium falciparum, and all of them had shared needles and syringes in the days before their illness. One of the men had been transferred into the camp from Bandar Abbas two weeks previously. There were no anopheline mosquitoes in the camp environment and none within a 1-km radius. There had been no report of malaria transmission previously in this camp, nor among the population living within the 1-km radius. All of the cases (100%) were negative for P. falciparum at follow-up examination.

Conclusions: With regard to increasing injecting drug addiction and the presence of malaria in some parts of Iran, malaria should be included in the differential diagnosis of IVDU cases with fever.

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All 98 men with a mean age of 25.4 ± 18.6 years (range 16–45 years) in the camp took part in this study; no new case was allowed to enter the camp during the investigation. A questionnaire was completed for each case to collect the following data: age, days spent in the camp, travel history, medication, drug addiction, route of drug use, needle sharing, blood transfusion history, and history of malaria. Clinical samples including blood, uri nate, sputum, and body secretions and tissues were tested by Gram stain, culture, serology, and histopathology. Peripheral blood smears were examined for the presence of Plasmodium by Wright and Giemsa staining.12 The thick blood smear technique was used for diagnosis, in accordance with the standards of the Iranian Ministry of Health.4,12 All the slides were examined within 24 h of blood sample collection. The diagnoses were made at the Malaria Reference Laboratory of the Ahvaz Health Center (AHC). A vector control investigation was performed by experts of the AHC, and additional vector information was collected from the AHC. Those who were positive for Plasmodium in their blood samples were treated with chloroquine 600 mg immediately on day 1, with a daily dose of 250 mg for 4 days. If the patient continued to be febrile for 4 days, additional drugs, such as mefloquine, were used.13

3. Results

Of the total 98 people, 27 (27.5%) were positive for Plasmodium falciparum in their blood. No other pathogen (e.g., bacteria, viruses, parasites) was detected. All of the patients declared that they had shared needles and syringes in the days before the onset of their illness. One of them had been transferred into the camp two weeks previously from a prison in Bandar Abbas, the capital city of Hormozgan Province. There were no anopheline mosquitoes in the camp environment and none within a 1-km radius of the camp. All the persons who contracted malaria were in one section, and all had shared injection equipment with the case who had been transferred-in or with each other. Blood examinations for Plasmodium detection in the other 45 IVDUs were negative (in spite of equipment sharing in the other section); three of the Plasmodium-negative IVDUs had shared injection equipment with the transferred-in case or with other malaria patients. There had been no report of malaria transmission previously in this camp, nor among the population living within the 1-km radius.

Data for those with and without malaria are shown in Table 1. All of the cases (except the index case) had no history of previous malaria or travel to a malaria endemic area. The majority of IVDUs declared that they had continued their injection drug use in the camp. All of the cases (100%) were negative for P. falciparum in their blood samples at follow-ups 1, 2, 4, and 8 weeks after treatment.11

4. Discussion

The epidemiological findings of this investigation indicate that the transmission route was not by means of the bite of locally infected Anopheles spp mosquitoes. As the individuals concerned did not have any history of traveling to endemic areas or other possible exposures relating to the transmission of malaria, the presence of a febrile illness in the IVDU cases who were positive for P. falciparum in a camp holding drug addicts, established a focus for the transmission. Other causes of fever were not found. However, one of the febrile cases (the index case) declared that he had acquired a similar illness three months ago when he was in prison in Bandar Abbas, and that he had not completed the ordered treatment. Ahvaz is a city that is free of malaria transmission, but Bandar Abbas is a city in which transmission of malaria frequently occurs.4,11 This suggests that the index case caught his illness in Bandar Abbas, and that a low parasitemia of P. falciparum due to inappropriate treatment may have persisted in this individual for some weeks.6,10 This could explain the origin of the cases of malaria falciparum among the other prisoners who shared needles and syringes with him.

We found only five reports of malaria outbreaks in drug addicts in the literature.6–10 three from Brazil7,9 and one from Spain.10 Our findings are in agreement with these reports. We believe this to be the first report and virtually the only outbreak of induced malaria in the Eastern Mediterranean Region.

5. Conclusions

Although malaria is only rarely acquired by needle sharing among injecting drug users, with the increasing population of injecting drug users and the frequent occurrence of malaria in some parts of Iran, malaria should be included in the differential diagnosis of IVDU cases with fever in the region.

Conflict of interest

No conflict of interest to declare.

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Table 1

Demographic characteristics and addiction-related variables in the studied population.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Persons with malaria</th>
<th>Persons without malaria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>26.4 ± 18.9</td>
<td>24.7 ± 17.8</td>
</tr>
<tr>
<td>IVDU</td>
<td>27 (100)</td>
<td>45 (63.4)</td>
</tr>
<tr>
<td>SWIC</td>
<td>27 (100)</td>
<td>3 (4.2)</td>
</tr>
<tr>
<td>MTSC (days)</td>
<td>382 ± 181</td>
<td>401 ± 260</td>
</tr>
<tr>
<td>Total</td>
<td>27</td>
<td>71</td>
</tr>
</tbody>
</table>

IVDU, intravenous drug user; SWIC, sharing injection equipment with index case or with malaria patient; MTSC, mean time spent in camp. Results are mean ± standard deviation or n (%).