EARLY DIAGNOSIS AND TREATMENT OF MALARIA IN A REFUGEE POPULATION IN SRI LANKA

W van der Hoek[1], DAR Premasiri[2] and AR Wickremasinghe[3]

[1]Department of Parasitology, Faculty of Medicine, University of Leiden, the Netherlands; [2]Anti-Malaria Campaign, Puttalam, Sri Lanka; [3]Department of Community Medicine and Family Medicine, Faculty of Medical Sciences, University of Sri Jayawardenepura, Sri Lanka

Abstract. To provide early diagnosis and prompt treatment for malaria, two interventions were compared in refugee camps in Kalpitiya, Sri Lanka. Community health volunteers (HV's) were trained in diagnosis and management of malaria on clinical grounds, while a field laboratory was established in another group of camps providing treatment after laboratory confirmation of a malarial infection. Patients with fever sought treatment from HV's on average after 2.74 days and from the field laboratory after 3.20 days. Although acceptance of both interventions was high, the effective catchment areas, especially of the HV's were small. Large numbers of health volunteers would be needed to cover all families, making it difficult to sustain supervision and necessary logistic support. For every malaria patient treated by HV's, three others would receive anti-malarial drugs unnecessarily. The maintenance of a field laboratory with a microscopist of the Anti-Malaria Campaign is not an economically viable option. Training of HV's in microscopy with a mechanism for cost recovery should be given serious consideration. HV's and diagnosis and treatment centers should be able to handle a wide spectrum of common diseases. A better option for Sri Lanka in the short term might be to improve existing general health facilities that are accessible to the refugee population.

INTRODUCTION

Sri Lanka has a long history of malaria eradication programs based mainly on spraying of houses with residual insecticides (Edirisinghe, 1988). Despite some dramatic successes in the past, these programs could not be sustained to control the malaria problem, let alone eradicating malaria. In 1993 there were 363,197 cases of malaria confirmed by microscopic examination (Ministry of Health and Women's Affairs, 1994). The actual number of malaria cases is estimated to be double this figure and is one of the highest per capita in the world. In line with the new Global Malaria Control Strategy (WHO, 1993), the emphasis of control methods has now shifted to rely more on early diagnosis and prompt treatment. In areas where the population has no easy access to existing health facilities, community-based health workers, called health volunteers (HV's) in Sri Lanka, are used to administer timely treatment to suspected malaria cases, the diagnosis of which is made on clinical grounds. In Sri Lanka, HV's have been involved in general disease preventive and health promotive activities. More than 100,000 HV's have been trained between 1976 and 1987. It was only under the Mahaweli Development Program when massive migration took place to new settlement areas, that HV's were assigned curative tasks, mainly to treat malaria. The HV program in Sri Lanka suffered high attrition rates and today very few trained HV's are still active. Their impact on malaria control has not been scientifically evaluated. Anecdotal reports say that HV's were very useful when settlers, often from non-malarious areas, had to face a serious malaria problem at a time when the government health infrastructure was not yet developed. Others claim that distribution of anti-malarial drugs by HV's was haphazard, promoting the development of resistance of *Plasmodium falciparum* against chloroquine.

A more recent population migration in the malaria endemic areas of Sri Lanka is caused by the conflict situation in the north and east of the country. The number of internally displaced persons in Sri Lanka due to civil disturbances is estimated at more than 500,000. There is little information

Correspondence: W van der Hoek, 6 Tolentino Street, San Lorenzo Village, 1223 Makati, MM, Philippines.
Tel and Fax: (63-2) 8172899; E-mail: wimepi@mnl.sequel.net

available on the health status of these people. In Pakistan, which has a comparable malaria transmission pattern, prevalence of malaria was higher in refugees from Afghanistan than in the general population (Suleman, 1988). In Sri Lanka, non-governmental organizations often operate local clinics or mobile health teams in areas where existing health facilities cannot cope with the influx of displaced persons. Several organizations are involved in training HV's, but these efforts are not coordinated and rarely evaluated.

This study was done to compare the usage and performance of HV's with a field laboratory in the treatment of uncomplicated malaria, and to propose ways in which early diagnosis and treatment of malaria could best be provided to communities of displaced persons in Sri Lanka.

MATERIALS AND METHODS

Study area and population

The study took place in Kalpitiya, an administrative division of Puttalam District in the north-west of Sri Lanka. The Kalpitiya peninsula has an estimated permanent resident population of 48,704 (based on the 1981 national census), and an additional 20,000 displaced persons, living in 78 camps. The displaced persons in this area are all of the Muslim ethnic group, mainly from the Mannar District situated to the north of Puttalam District. Most of the displaced persons came to Kalpitiya in October 1990. The displaced persons are accommodated in camps which are situated in the northern and the central part of the peninsula where families live in small cadjan (palm leave) huts on sand dunes. The camps are of varying sizes having populations ranging from a hundred to a couple of thousands. Living conditions are poor although a few basic facilities like water wells are provided by several non-governmental organizations working in the area. Members of refugee families are mostly unemployed and live on rations provided by the government.

Malaria transmission and control

There are no natural streams in the area and breeding places for mosquitos are mainly small stagnant water pools of rain water and unused water wells. Peaks of mosquito densities and malaria transmission are observed after the periods of rainfall. This results in a high incidence of clinical malaria especially in the month of January. In 1994 Malathion which was routinely used as a residual insecticide in the Puttalam District was replaced by Fenitrothion by the Anti-Malaria Campaign. Permanent houses in the Kalpitiya peninsula were sprayed with Fenitrothion, but not the temporary houses in the refugee camps. There is a small government hospital in Kalpitiya town with 52 beds and an out-patient attendance of approximately 300 patients per day, half of whom are residents in refugee camps. In addition, there are two government dispensaries, and a number of private dispensaries. Most camps are visited once a month by a mobile team of the Sri Lanka Red Cross Society which provides basic health care services on an out-patient basis. None of the health facilities in Kalpitiya has a laboratory equipped to diagnose malaria microscopically. True incidence figures are therefore not available for the area. Puttalam town, located 20 to 50 km from the refugee camps, has a Base Hospital and the Regional Laboratory of the Anti-Malaria Campaign with laboratory facilities to perform microscopy. These institutions also provide treatment for malaria. In addition, there are a few private medical practitioners and laboratories that perform microscopy. The Regional Laboratory reported 9,135 microscopically confirmed malaria cases in 1993 of which, 6,121 were *P. vivax* and 3,014 *P. falciparum*.

Subjects and methods

A total of 20 refugee camps were selected for the study. All the camps were comparable with regard to demographic, socio-economic and environmental characteristics. In 11 camps (population 2,196), HV's were selected and given a two day training in the clinical diagnosis of malaria based on a simple fever protocol, and in the treatment of malaria according to national guidelines with a full course of chloroquine and primaquine effecting a radical cure. The HV's were provided with guidelines for referral of cases and were instructed on methods of data recording and management. The seven female and four male HV's who were selected had already been trained in health related issues by different non-governmental organizations. However, this was the first training program with respect to ma-

laria diagnosis and treatment. The training was conducted by the investigators with the assistance of the staff of the Regional Malaria Office, Puttalam. The HV's were youths from the selected refugee camps with a mean age of 21.6 years. All HV's had some years of secondary education. They were supervised weekly by a Tamil speaking field assistant of the Anti-Malaria Campaign, who supplied necessary drugs and stationery as and when required during the entire study. The HV's were supplied with chloroquine, primaquine, and paracetamol tablets and treatment for malaria was provided free of charge. To obtain an estimate of the accuracy of the clinical diagnosis, HV's were taught how to make thick blood smears and were given a limited number of glass slides towards the end of the study period. The slides were subsequently stained and checked by a senior microscopist of the Regional Laboratory of the Anti-Malaria Campaign. The HV's were paid an allowance of Sri Lanka Rupees 500 amounting to approximately US$10 per month for additional work that had to be done with respect to record keeping.

In a cluster of 4 camps (population 3,191), a field laboratory was established and operational from December 1994 to March 1995. This corresponded with the usual high malaria transmission season in the area. Treatment for malaria at the laboratory was given only to blood film positive cases. The laboratory operated from an existing simple structure having sufficient lighting, and consisted of no more than a table with a microscope, glass slides, laboratory reagents required for fixing and staining the slide, stationery and drugs. Although it was planned to train a HV in the microscopic diagnosis and treatment of malaria this could not be done due to a number of administrative problems. Therefore, a trained microscopist of the Anti-Malaria Campaign was assigned to the field laboratory. The microscopist was paid a government approved allowance for the duration of the study. In the remaining five camps included in the study, no specific intervention was introduced.

Two mass blood surveys were conducted in a random sample of the population in the 20 camps. The first was conducted in June 1994, before the application of interventions, while the second was done in January 1995, during the peak transmission period. The mass blood surveys were conducted by staff of the Regional Malaria Office, Puttalam. Thick films were examined at the Regional Laboratory by senior microscopists. A short questionnaire was administered to identify fever cases that occurred within the two weeks before the first mass blood survey. Those who reported to have had fever during this time period were questioned as regards their health seeking patterns.

In March 1995, a semi-structured interviewer administered household questionnaire was used to obtain information on community priorities, usage and acceptance of the interventions. A systematic sampling procedure was used, enumerating 25% of the families living in each of the 20 camps. Six Tamil speaking Muslim women were trained to conduct the interviews. The wife of the head of the household or the female head of household were selected as respondents.

RESULTS

Mass blood surveys

The prevalence of malaria, a measure of the occurrence of asymptomatic disease, due to both species, *P. falciparum* and *P. vivax* in June 1994 was 3.15% [95% confidence interval (CI) 2.12-4.18] in the 1,112 individuals screened. Of the 146 people who reported fever in the two weeks before the survey, 142 had taken treatment, the majority in the form of tablets. Home treatment generally consisted of paracetamol. Forty-three percent of those reporting fever had obtained treatment at private dispensaries. The reason that was cited most frequently for this trend was the availability of these facilities at any time of the day, whereas government facilities have long waiting times and close early in the afternoon. The Kalpitiya government hospital was visited by 28% of the patients and 9% had bought drugs from a private pharmacy, without consulting a medical practitioner. In January 1995 prevalence of malaria was 2.39% (CI 1.60-3.18) with 1,424 people screened. The reduction in prevalence was not statistically significant. There were no differences in prevalence between the control camps and camps in which an intervention took place (2.40% and 2.38%, $p = 0.98$).

Use of field laboratory and HV's

From November 1994 to March 1995 the field

laboratory was visited by 425 patients, of whom 78 were found positive for *P. vivax* and 10 for *P. falciparum* (slide positivity rate 20.7%; CI 16.8-24.6). Most patients (84.5%) were from the camp where the laboratory was located. Few people of the three other camps nearby made use of it. In the same period 476 patients came for treatment of fever to the HV's. Of the blood films collected by the HV's towards the end of the study period, 25.0% (CI 10.0-40.0) were positive. More female than male patients had visited the HV's (56.5% and 43.5%). Treatment was sought from HV's on average after 2.74 days of fever, against 3.20 days at the field laboratory, a significant difference ($p < 0.001$). Records kept by the HV's showed that almost all patients (97.6%) had received the correct dosage of chloroquine according to their age whereas at the field laboratory it was 99.8%.

Household interviews

A total of 423 household interviews took place in March 1995. Most important problems in the camps faced by the respondents were lack of water and poor sanitation. Lack of medical facilities ranked fifth, following lack of transport and poor housing. Fever, without further specification was by far the most common health problem, mentioned by 79.7% of all families. Other conditions considered important by the respondents were cough, diarrhea, headache, and skin diseases. Only 24 people (5.7%) specifically mentioned malaria to be a problem.

In the 11 camps where HV's were trained only 57 (45%) of the respondents were aware that a trained HV was present. In two camps all respondents knew about the HV, whereas in three other camps almost nobody knew. In some camps opinion about the same HV varied widely, from 'did not work for three months' to 'very satisfied with the HV'. Despite these disappointing results, most of the respondents would find it very useful to have a trained HV in the camp because they can give quick treatment, and are less expensive than other modes of treatment both western and indigenous. There was a general opinion however that the HV's should not just treat malaria but other conditions as well such as wounds and (itching) skin conditions. As an additional comment some respondents proposed that environmental sanitation in the camps could improve through the health education by trained HV's. There was a general awareness in this population, even among the ones with poor knowledge about the disease that treatment for malaria should take place only after a blood test. This was not included as a question but was mentioned by most respondents without prompting.

More than half of the families who were interviewed in the camp where the field laboratory was located visited the laboratory to obtain diagnostic services for one or more of their family members. The numbers were less for the other 3 camps covered by the laboratory. Average waiting time at the laboratory was reported as 42 minutes (range 5 minutes to 3 hours). Although the service was very much appreciated, there were some complaints about the long delays in receiving the result of the blood test while others claimed not to have received a result at all. Thirty-nine of the 77 families who had made use of the laboratory were not really satisfied because their blood film was negative and therefore no treatment was given. About half the respondents stated to have saved money on transport, blood test and/or drugs by visiting the field laboratory. The average amount saved on these items was 46 Sri Lanka rupees (US$ 0.92) per visit.

DISCUSSION

Refugee populations face many difficulties in trying to relocate themselves in new surroundings. In addition to the problems faced with respect to basic necessities such as water, food and shelter, they have to overcome other problems which include disease. Due to the many problems faced by the refugees, health care becomes of secondary importance. The refugee population studied in Kalpitiya clearly endorsed this fact by stating that lack of water and poor sanitation were their most important problems. Lack of health facilities ranked only fifth.

In this study, usage, performance, and acceptance of HV's to treat malaria based on a clinical diagnosis was compared with a field laboratory and a control area. A major limitation of the study was that the design was not suitable to detect changes in health seeking behavior or morbidity due to malaria that might have occurred as a result of the interventions. An important finding was that the effective catchment areas of the field laboratory and espe-

cially of the HV's were very small. Although the reactions to the performance of HV's were mixed, there was general consensus that having a HV in a camp is beneficial. The reasons that were given such as HV's are resident in the camps, can provide quick treatment and are cheaper than obtaining treatment from other sources clearly reflects the problems, such as lack of transport and health facilities, faced by this community. It is also evident that malaria was not a major problem and the community felt that HV's should treat many other conditions/diseases. This could easily be applied in the primary health care model adopted by Sri Lanka.

A large number of families from the camp in which the field laboratory was located had visited the field laboratory. The waiting time at the laboratory ranged from 5 minutes to 3 hours depending on the patient load at the time of the visit. Although there were some complaints, the service was very much appreciated as most respondents admitted to having saved money. The average savings of Sri Lanka rupees 46 is a considerable amount in local terms considering the fact that most of the adults in this population are unemployed or without a regular source of income. A large proportion of persons who visited the field laboratory were not really satisfied with the field laboratory as no treatment was given when their blood film was negative. This stresses the importance of providing treatment for a wide spectrum of diseases when establishing a diagnosis and treatment center. Facilities for a single disease will prove to be inefficient and unpopular as patients would have to seek another opinion in case they are negative for that particular disease. Considering the incidence of malaria in the area, the catchment area of, and the reported workload at, the field laboratory, the operation of such a laboratory is not justified for an extended period of time. The cost of maintaining a microscopist is also excessive. It could however still be considered for large camps during the peak transmission season.

Another finding of this study is the patient's desire to know the results of the blood film examination prior to administration of antimalarials. This has not been documented but is well known from other parts of Sri Lanka and is probably a reflection of the high literacy rate and the generally high expectations of the community with respect to health. Given the fact that maintaining a field laboratory with a trained microscopist from the Anti-Malaria Campaign is not an economically viable option, it appears that training of adequately qualified HV's or primary health care workers in microscopy is a suitable alternative. A mechanism to recover the expenses incurred in the maintenance of a field laboratory should also be considered. Other options will include the use of dipsticks in the diagnosis of malaria which can be performed with a minimum of training. However, the dipsticks that are currently available on the market are only for *P. falciparum* and hence, would not be useful in Sri Lanka as falciparum malaria accounts for only about 25% of all malaria cases.

HV programs are only successful if adequate supervision and support can be provided. Supportive supervision during the study period took place once every week and the HV's were paid a monthly allowance. This frequency of supervision is not sustainable in the long term when more HV's are trained. While community health workers can be successful in small-scale, well managed projects, it has been described that these programs lose most of their effectiveness once they grow too big, mainly due to failures of training, supervision, and logistics (Walt *et al*, 1989). If such a program is to succeed then the HV's should be merged into the health care delivery system in the country. The slide positivity rate of subjects treated for malaria by HV's was approximately 25%. This implies that HV's give anti-malarial treatment unnecessarily 75% of the time. There was no statistically significant difference in the slide positivity rates of slides taken by HV's, at the field laboratory and at the Regional Laboratory of the Anti-Malaria Campaign during the same period. It is therefore unlikely that this over-treatment could be reduced by improved training and supervision.

Both interventions do not seem feasible when considered alone when large refugee populations have to be covered. A combination of the two, *ie* having HV's trained in microscopy, with a mechanism to recover some or all of the costs should be considered. Mobile medical teams currently used in many refugee camps in Sri Lanka, funded by external donors, are expensive due to staff and transport requirements. Some interesting options for donors involved in refugee health care, would be to embark on some of these innovative schemes and to improve facilities in existing small hospitals in rural areas. One of the major health care delivery problems in Sri Lanka today is the by-passing of small hospitals, because of their poor facilities, and

consequent overcrowding of big urban hospitals. Provision of efficient and effective diagnostic and treatment services that are accessible and acceptable, and improvement of existing health facilities, including provision of laboratory facilities would benefit both the refugee and the permanent resident populations.

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