

Malaria Drugs Among Health Service Providers: A Qualitative Study In Hodeida, Yemen

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Abstract— Malaria drugs should be prescribed by doctors according to the national drug policy. Using malaria drugs irrationally can be both harmful and foster malaria resistance. Resistance reduces the effectiveness of these drugs, leading to increased morbidity, mortality, and health care expenditure. Objective: To identify the tools used by different health service providers (HSPs) in Yemen to diagnose malaria, whether they believed that any of their patients had presented with a drug-resistant form of malaria, and the type of resources they use to gain awareness about drug-resistant forms of malaria. Design: A cross sectional study was carried out in Hodeidah, Yemen. Questionnaires and in-depth interviews were conducted with the HSPs. Sample and method: In order to obtain a study sample, half of the registered HSPs in the region were selected from the health registration records and surveyed. The final study sample was composed of 58 clinicians (doctors), 66 nurses, 50 laboratory specialists, and 68 pharmacists. Results and conclusion: There were no differences between the HSP groups in the use of a combination of clinical assessment and laboratory testing to diagnose malaria. However, there were differences between groups with respect to the diagnosis of malaria based on a laboratory test alone; physicians and nurses did not trust a laboratory test alone without a corresponding appropriate clinical presentation. A total of 93% of all participants were of the opinion that they had come across a form of drug-resistant malaria in their patients. All groups stated that their own experience was the main source of information on drug-resistant malaria. It is concluded that there is an urgent need to raise the awareness of all HSP groups about drug policy with respect to malaria and anti-malarial drug resistance in Yemen. More studies on drug-resistant strains of malaria should be undertaken.

Index Terms— Health providers, physicians, nurses, laboratory technicians, malaria over diagnosis, malaria drugs, malaria drugs resistant .

Introduction

In Yemen, malaria remains a significant health problem. Of the total population of 20 million, 60% live in malarious areas, placing Yemen after Afghanistan in populations at high risk in the WHO Eastern Mediterranean region(1). Plasmodium falciparum is the predominant species, which is responsible for 90% of malaria cases, followed by Plasmodium vivax and Plasmodium malariae (2). Although Anopheles arabiensis is the main vector of malaria in Yemen, Anopheles culicifacies and Anopheles sergenti have been reported to play an important role in transmission of malaria in this country (3). The irrational use of antimalarial drugs, including prescription without a laboratory diagnosis can be harmful. Sulfadoxine/pyrimethamine combination treatment may cause toxic epidermal necrolysis and Stevens-Johnson syndrome. Dose-related serious neuropsychiatric toxicity can occur with mefloquine. Cardiovascular or CNS toxicity is rare when using quinine, the main antimalarial used in many countries, but hypoglycemia may be problematic and blood glucose levels should be monitored. Halofantrine is unsuitable for widespread use because of its potential for cardiotoxicity (4). Resistance to antimalarial therapy is the another problem (5,6,7,8,9,10). Resistance reduces drug efficacy and leads to increased morbidity, mortality, and health care expenditure. In Hodiedah, a region in western Yemen, the over-diagnosis of malaria further complicates and compounds this situation (11). An effective malarial drug policy must therefore be widely understood and practiced (12,13). This study focuses on identifying the tools used by health service providers (HSP) to

diagnose malaria (14,15), their knowledge about malaria drug policy in Yemen, whether they believed that any of their patients had presented with a drug-resistant form of malaria, and their sources of information regarding malarial resistance to these drugs. The official malaria drug policy in Yemen is that chloroquine should be first line treatment for uncomplicated cases, sulfadoxine/pyrimethamine combination second line treatment, and quinine for severe and complicated cases. Questionnaires and in-depth interviews were conducted with HSPs to determine their knowledge of malarial drug policy, how anti-malarial drugs are prescribed, and whether certain drugs are ineffective due to resistance and the evidence they used to support this belief.

The Hodeidaha situation: The study area was the Al Hodeida governorate which is located in the west of Yemen, along the Red Sea coast. The climate of the Tihama plain in this region can be described as being hot, windy, arid, and humid. Mean annual rainfall in the Tihama ranges between 100 mm-600 mm. According to the 2004 census, this area is inhabited by 10% of the total Yemeni population. Malaria is present throughout the year. The diagnosis and treatment of malaria are a great challenge in this area.

According to external evaluation report done by liverpol university about 40% of the test results are false-positive(16). This leads to the unnecessary overuse of anti-malarial drugs. This has implications for other HSPs, due to the consequent increase in possible toxicity of anti-malarial medications and resistance to these drugs. The situation is further compounded by a high incidence of poverty and psychological problems in Hodeidaha, as well as a

lack of monitoring of the distribution and intake of anti-malarial drugs. Hodeidah has a poorly regulated health system that allows anyone related to healthcare to prescribe malaria treatment, and malaria drugs are available over-the-counter without the need for prescription or diagnosis. There is therefore a need for health authorities and doctors to be made aware of these issues.

Methods and study population

This study of health service providers, including doctors working in hospitals, centers, or private clinics; nurses working in clinics and laboratories involved in diagnosing and treating malaria; and pharmacists prescribing and selling anti-malarial drugs. in-depth interviews was conducted. The interview was structured with closed-ended questions to collect the data needed (Appendix I). In this we paid special attention to ask no leading questions and ensure clarity in understanding of the questions. Colleagues in the nursing department of the university were consulted regarding the validity and suitability of the questionnaire, which was modified several times before the study. Participants were questioned in order to establish the range of knowledge about malarial drug policy, how malaria drugs are prescribed, and if they thought they had come across patients with malarial resistance. They were also asked how they made that assumption (i.e., based on published research papers, periodicals, personal experience, or laboratory testing).

In this study we considered only official health providers from the registration records of the health office of the Hodeida region [2009]. The total study population was 116 doctors, 132 nurses, 100 laboratory technicians, and 136 pharmacists. In order to obtain a study sample, half of the registered health service providers were selected randomly from the registration records using random number tables and were then tested in our centre. The final study sample was therefore composed of 58 clinicians (physicians), 66 medical assistants (nurses), 50 laboratory specialists, and 68 pharmacists; all these groups treat malaria and prescribe anti-malarial drugs. Questionnaires and in-depth interviews were conducted with the subjects. To answer the study questionnaires, verbal consent was obtained from each participant prior to each in-depth interview. The study was approved ethically by the scientific team from the Tropical Medicine Center at Hodeida University.

The first item of the study aimed to determine the tools used by health service providers to diagnose malaria. The tools to be selected from were a clinical test (Signes and symptoms), a laboratory test (Thick and Thin blood film), both clinical and laboratory tests (Clinic + Lab), or other tools (Other). next I examined whether the HSPs thought that a form of malaria presented by any of their patients was resistant to anti-malarial drugs. The final item of the study addressed the type of resource used by health

service providers to gain awareness on drug-resistant forms of malaria. Scientific sources of information on malarial resistance are research papers and periodicals, including results from studies in vivo and in vitro, animal model studies, molecular techniques, and case reports. Case reports suffer from presenting a potentially biased view of drug resistance primarily because the denominators are typically unknown and rates of resistance cannot be calculated. Nonetheless, case reports can be useful and may indicate a problem that should be confirmed (17). The different types of sources examined in this study were research papers, periodicals, personal experience, or laboratory testing (Table 4).

Results

There were no differences between the health service provider groups regarding the use of a clinical Tool combined with a laboratory Tool to diagnose malaria, using Statplus2008, Chi square test shows (Pvalue 1). In respect to the diagnosis of malaria based solely on a laboratory test: physicians did not trust a laboratory test alone without a corresponding appropriate clinical presentation and only 1% of nurses trusted a laboratory test alone without a corresponding appropriate clinical presentation. On the other hand, 17% of laboratory specialists and 4% of pharmacists would diagnose malaria based on a laboratory test alone (Table 1). Furthermore, regarding the use of the option 'Other' as a diagnostic tool for malaria. A total of 3% of pharmacists, 2% of laboratory specialists, and 1% of nurses would diagnose malaria based on tools other than clinical or laboratory Tools, such as just looking at the patient. Seventy two percent of physicians, 70% of nurses, 65% of pharmacists, and 60% of laboratory specialists did not have knowledge about Yemeni malaria drug policy (Table 2). A total of 93% of all groups (physicians, nurses, laboratory specialists, and pharmacists) were of the opinion that a form of malaria that was drug resistant had been presented by a patient (Table 3). Over 74% of physicians, 73% of nurses, and 73% of pharmacists were of the opinion that their own clinical experience was the Only source of information on drug-resistant malaria, which was different from the laboratory specialists. The laboratory specialists believed in laboratory testing more than other groups.

Discussion

Previous studies have shown that the diagnosis of malaria according to clinical presentation should be restricted to doctors only (18). The consequence of involving different types of health providers in the clinical diagnosis of malaria may lead to detrimental side effects and increased malaria resistance caused by the inappropriate prescription of anti-malarial drugs (19,20,21). As a consequence, the effectiveness of these drugs may become reduced, leading to increased morbidity (22), mortality, and health care expenditure. The resulting economic impact (23) is of further harm in a poor country like Yemen, which

already has high poverty levels. Presently, laboratory blood testing of thick blood films is the main method for LabTool in Yemen for the diagnosis of malaria; however, in the Hodeidaha region alone, 40% of the laboratory test results are false-positive, resulting in over-prescription of malaria drugs, the possibility of toxicity, confusion for the doctor and consequent increases in mortality and morbidity from misdiagnosis of other diseases. Furthermore, knowledge about the drug policy with respect to malaria is very poor (24,25); our study shows that only a fraction of HSPs (3% of pharmacists, 2% of laboratory specialists, and 1% of nurses) have a false belief of the existence of other tools than clinical and/or laboratory tests for the diagnosis of malaria. The results reveal that a proportion of these groups, especially laboratory specialists, are not adequately qualified to diagnose malaria where the laboratory basic science mentions the importance of laboratory microscopic test in Malaria, and point to the necessity for the authorities concerned to further educate these groups. Only research published in research papers or periodicals are the valid source of malaria drug resistant, Laboratory research like in vivo and in vitro test and Applied clinical research by hospitalization malaria patients and taking blood test every six hours to determine the clearing effect of malaria drug (26) In this study, over 74% of physicians, 73% of nurses, and 73% of pharmacists, stated that their own clinical experience was the source of information on drug-resistance, which is potentially biased. The laboratory specialists believed in their microscopy tests more than other groups (SD 6.6), microscopy test is strongly negatively associated with clinical experience ($P = 0.02$) which are not valid methods of detecting malaria drug resistance. Only small numbers of all groups recognized research papers and periodicals as a valuable source of information. This information shortage should be corrected in order to avoid overprescribing of malaria drugs and promoting resistance by overuse.

Recommendations There is an urgent need for: (1) monitoring the use of anti-malarial drugs, (2) empowering the health authorities so that they are able to execute a job description where only Doctors should diagnose and prescribe Malaria drugs (3) raise awareness of all groups of health service providers about the drug policy with respect to malaria and anti-malarial drug resistance. Studies on drug-resistant strains of malaria should be undertaken within Yemen. Special programs that help to increase awareness of the problem of over diagnosis should be carried out by the relevant authorities.

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Table 1. How health service providers diagnose

malaria.

	Pharmacists	Lab. Technicians	Nurses	Physicians
Clinic	8%	2%	12%	12%
Clinic+Lab	85%	79%	86%	88%
Lab	4%	17%	1%	0%
Other	3%	2%	1%	0%

Table 2. Health service provider knowledge about anti-malarial drug policy.

	Pharmacists	Lab technicians	Nurses	Physicians
Yes	35%	40%	30%	28%
No	65%	60%	70%	72%

Table 3. Health service provided knowledge on drug

resistance.

	Pharmacists	Lab technicians	Nurses	Physicians
Yes	88%	94%	95%	97%
No	12%	6%	5%	3%

Table 4. Information sources about anti-malarial drug

resistance.

	Lab test	Experience	Periodical	Research
Physicians	10%	74%	9%	7%
Nurses	12%	73%	9%	6%
Lab technicians	25%	66%	7%	2%
Pharmacists	15%	73%	6%	6%