MALARIA DIAGNOSIS AND TREATMENT PRACTICE FOLLOWING INTRODUCTION OF RAPID DIAGNOSTIC TEST IN SELECTED HEALTH POSTS OF ADAMA WOREDA, EAST SHEWA ZONE, OROMIA REGION,CENTERAL ETHIOPIA.

A Research Paper Submitted To Department Of Pharmacy, College Of Public Health and Medical Sciences, Jimma University in Partial Fulfillment of the Bachelor of Degree in Pharmacy (B.Pharm)

BY: MEBRATU TEFERA

JUNE 2014

JIMMA, ETHIOPIA

JIMMA UNIVERSITY

COLLEGE OF PUBLIC HEALTH AND MEDICAL SCIENCES

DEPARTMENT OF PHARMACY

Malaria Diagnosis And Treatment Practice Following Introduction Of Rapid Diagnostic Test In Selected Health Posts Of Adama Woreda, East Shewa Zone, Oromia Region ,Centeral Ethiopia.

BY

Mebratu Tefera

ADVISOR: Seid Mussa (B.Pharm, MSc, ASSISSTANT PROFESSOR OF PHARMACO EPIDEMIOLOGY AND SOCIAL PHARMACY)

JUNE 2014

JIMMA, ETHIOPIA

Abstract

Background: malaria rapid diagnostic tests can provide a useful guide to the presence of clinically significant malaria infection, particularly when good quality microscopy-based diagnosis is unavailable. The success of the universal parasite-based malaria testing policy for fever patients attending primary health care facilities in Ethiopia will depend highly on health workers' perceptions and practices. Rapid detection of the malaria parasites and early treatment of infection remain the most important goals of disease management.

Objective: To assess malaria diagnosis and treatment practices following introduction of rapid diagnosis test in Adama woreda health posts, central Ethiopia

Method: Descriptive cross sectional study design was conducted with fever patients and health workers to determine the perception and practice related to rapid diagnostic tests and treatment prescribed were assessed at selected Health posts.

RESULT: The survey was undertaken at ten health posts which use rapid diagnostic tests for parasitological confirmation. Twenty health workers and 104 patients were interviewed at health posts. Eighty three patients [79.85%] were seen in health post with available parasite based diagnostic with RDTs and 21[20.2%] in facility without testing with rapid diagnostic test. The overall malaria positivity rate was 48[57.8%]. Anti –malaria drugs were prescribed to all 48[100%] patients with positive rapid diagnostic tests and to 19[54.3%] of negative patients. Among non-tested patients, anti-malaria drugs were given to 12[57.15%], with a higher prescription rate in health posts without rapid diagnostic tests results. Among 104 patients presenting with fever or history of fever 64[61.5%] were prescribed antibiotics and anti-pain.

CONCLUSION AND RECOMMENDATION: Findings from this study show that over prescription with anti-malarial drugs is practiced in Adama woreda health posts, central Ethiopia. The use of malaria diagnostics was also associated with higher prescription of antibiotics among patients with negative test results. The Adama woreda health bureau should retraining health workers on rapid diagnostic tests and the importance of adhering to test results and support in the diagnosis and management of other causes of fever.

KEY WORDS: Diagnosis, Malaria, Prescription practices, Health worker perceptions, Ethiopia

ACKNOWLEDGEMENTS

I would like to express my deepest gratitude to my research advisor Seid Mussa (B.pharm, MSc, assistant professor of pharmacoepidemology and social pharmacy) for his unreserved encouragements and provision of constructive comments and guidance while preparing this research paper.

I have no words of gratitude to my mother and father for their encouragement throughout my life.

TABLE OF CONTENTS

Contents pages

List of tables page

List of tables

Operational definitions and Definition of terms

Rapid diagnostic test: Malaria rapid diagnostic test (RDT) is an antigen capture assay that enables rapid diagnosis of malaria without the need for electricity or highly skilled technicians: they are simple to use and can give results as a simple positive/negative result within 15 minutes.

Microscopy: Thin and thick blood films stained with Giemsa are examined for each eligible patient and for the identification and differentiation of Plasmodium falciparum and plasmodium *vivax.*

Primary health care: It's an essential health care based on practical, scientifically sound and socially acceptable methods and technology, made universally accessible to individuals and families in the community.

Health post: It's the most peripheral level health facility staffed by front line health workers, which give primary health care service for the community in Ethiopia.

ACRONYMS AND ABBREVIATIONS

ACT- artemisinin-based combination therapy

AL-artemether/lumefantrine

CQ- Chloroquine

PCR - polymerase chain reaction

PHC-primary health care

RDT-rapid diagnostic test

SP- Sulfadoxine –Pyrimethamin

WHO- World health organization

1. INTRODUCTION

1.1 Background

Malaria is a life-threatening disease affecting the world's most under-developed countries and regions where basic healthcare infrastructure is lacking. Malaria is a major cause of morbidity and mortality in Africa, especially in sub-Saharan African countries [1]. It is a leading cause of death amongst children in many African countries [2]. An estimated 68% of the total population of 73 million in Ethiopia lives in malarias areas covering almost 75% of its land. The diverse eco-climatic condition in the country makes the malaria transmission pattern seasonal and unstable usually characterized by frequent focal and cyclic wide spread epidemics[3].The disease has been consistently reported as one of the three top leading causes of morbidity and mortality over the past years. Similarly, in 2004/05 it has been reported as the first cause of morbidity and mortality accounting for 16.6% out-patient consultations 15.0% admissions and 29.0% deaths [4]. From the total population of Ethiopia [77,127,000 in 2007], more than 50 million people are at risk from malaria [5]. In general, 4–5 million people are affected by malaria annually [6].

Epidemics of malaria are relatively frequent [7] involving highland or highland fringe areas of Ethiopia, mainly areas 1,000-2,000 meters above sea level [8]. Notably this altitude covers 48% of the regions of Amhara, or Omiya and Southern Nations Nationalities and People's regions of Ethiopia .Malaria epidemics have serious consequences for Ethiopia's subsistence economy as the malaria transmission peaks during the major harvesting seasons. To control the risk of malaria, early diagnosis and prompt treatment is one of the key strategies. Clinical diagnosis is the most widely used to diagnose malaria. But, laboratory facilities are not available in all areas of the country [9].

The standard method to diagnose malaria is microscopy [10]. However, this form of diagnosis is not accessible or affordable in most peripheral health facilities. The recent introduction of rapid diagnostic tests [RDT] for malaria is a significant step forward in case detection, timely treatment and management, and reduction of unnecessary treatment. RDT could be used in

malaria diagnosis during population-based surveys and to provide immediate treatment based on the results.

RDTs offer the potential to extend accurate malaria diagnosis to areas where microscopy services are not available such as in remote locations or after regular laboratory hours .The introduction of artemisinin-based combination therapy [ACT] has improved malaria case management substantially. However, development and spread of ACT resistance may have drastic consequences for the recent malaria control achievements. For this reason it has become increasingly important to change from symptom-based presumptive treatment to parasitological confirmation of malaria infection before initiation of anti-malarial treatment. The use of parasite-base diagnosis will allow better targeting of anti-malarial drugs, and also provide an opportunity for other causes of fever to be identified and appropriately treated [10]. Therefore, WHO now recommends that anti-malarial treatment be confined to laboratory confirmed cases only [11], and the availability of rapid diagnostic tests [RDTs] offers a good opportunity to extend parasitological confirmation of malaria infection to peripheral areas where microscopy cannot be guaranteed [12,13].

1.2. STATEMENT OF THE PROBLEM

In developing countries, RDT make obsolete the sole dependence on clinical diagnosis for malaria in remote areas, where good microscopy has failed or never reached. RDT are also recommended in situations exceeding microscopy capability, such as in an outbreak or in occupationally exposed group [14]. Based on microscopy they require laboratory expertise which is not always available at the Periphery. The time span between sample taking and availability of results is often too long. This and occasional unreliability of the results allow for presumptive diagnosis of malaria cases by health workers. Presumptive diagnosis often leads to over-diagnosis and institution of empirical treatment of febrile cases by health workers [15].

The treatment of non-malaria febrile episodes can result in, and have been linked to drug resistance. A total of 42 countries report deployment of RDTs at the community level and 11 million patients were tested in 2010, including 10 million patients tested with RDTs in India. However, patients tested using RDTs in the community represent a relatively Small proportion (5%) of the total number of patients receiving parasitological test. Although community Diagnosed cases accounted for a low proportion of all cases, in most of the countries, test positivity rates for these cases were similar to or higher than those reported for outpatient cases. Despite recent expansion of malaria diagnostic testing, many patients still do not receive a parasitological test. In the African Region in 2010, the number of ACTs distributed by NMCPs was more than twice the total number of tests (microscopy + RDTs) carried out in 2010, indicating that many patients receive ACTs without confirmatory diagnosis. Short falls in the availability of diagnostic testing can be attributed at least in part to the relatively recent policy change and the expected lag time in securing financing and subsequent procurement of RDTs. The use of RDTs provides the most feasible means of rapidly expanding diagnostic testing, especially in peripheral health facilities and at community level in remote rural areas. The introduction of RDTs can significantly reduce expenditures on antimalarial drugs.

Comparative analysis based on the 'pre-and post' RDT deployment aspect of the evaluation, showed a 38% point reduction in anti-malarial prescriptions in all study health facilities when RDTs were introduced to support malaria clinical diagnosis. The highest drop was in the Hypo-endemic malaria transmission settings with a twofold reduction in the AMD prescriptions.

During the pre-intervention period, more than half 54% of all out-patient consultations (for all diseases) were presumptively treated as malaria based on clinical diagnosis. When RDTs were introduced to support diagnosis (post-intervention period), the proportion Of AMD prescriptions significantly dropped to one third 33% [16].

Acceptance of the use of laboratory services should precede malaria diagnosis, laboratory testing before diagnosis and diagnosis before treatment. Lack of utilization of laboratory services for confirmation of malaria diagnosis among cases of febrile illnesses can result in missing cases of malaria and over diagnosis, potential development of drug resistance, and mismanagement of Febrile cases [17]. Data on factors affecting the utilization of laboratory services for malaria diagnosis in Ethiopia are not readily available [18]. Laboratory based diagnostic facility is available at all levels of the health care delivery system except at health posts. At the health post level, therefore, malaria diagnosis and treatment is based on clinical signs and symptoms. However, malaria diagnosis based on clinical sign and symptoms alone is not specific and usually leads to excessive use of anti-malarial drugs. For the improvement of diagnosis and management of malaria cases in areas where laboratory based diagnostic service is not available, therefore, diagnosis based on clinical sign and symptom and use of rapid diagnostic tests [RDTs] is the alternative approach that should be adopted until a time when microscopic diagnostic services expand[19].

1.3 SIGNIFICANCE OF THE STUDY

With the increasing deployment of universal parasitological confirmation [RDTs] of suspected malaria prior to treatment, and the decreasing trend of malaria transmission in many endemic areas, an increasing proportion of febrile patients are being diagnosed as not having malaria .Despite this, following many years' practice of treating fever as assumed malaria, health workers may ignore negative test results and still treat the patient with an antimalarial. This problem is made more difficult to resolve given the absence of guidance and medicines for the management of non-malaria febrile illnesses. This undermines the clinical benefits of parasitological confirmation of diagnosis, and aggravates the wastage of antimalarial drugs and drug pressure on parasites. In places where health workers have been convinced not to prescribe antimalarial in RDT negative patients, limited guidance has resulted in over-prescription of antibiotics, another poor practice which will promote the emergence of antibiotic resistance, replacing one problem by another. This study may help as baseline information to examine strategies for intervention; to increase appropriate treatment and referral in order to reduce severe diseases, morbidity and deaths; to reduce unnecessary prescription of antibiotics and antimalarial so as to minimize "drug pressure" and development of drug resistance and decrease the risk of drug adverse events.

2. LITERATURE REVIEW

The success of the universal parasite-based malaria testing policy for fever patients attending health posts facilities in Ethiopia will depend highly on health workers' perceptions and practices.

The study done in India in 2008 shows that RDTs are easy to use, reliable and simple to interpret. RDTs are more suited to health workers in situations where health services are deficient or absent .the test can be used as an epidemiological tool for the rapid screening of malaria [20].

Traditional malaria diagnosis is empirical i.e. presumptive. Its specificity is about 21% when diagnosis is based on fever alone and 42% when used in combination with nail bed pallor and splenomegaly [21].

Thus, about 80% of cases are treated blindly with implication for drug wastage and potential drug resistance. The cost implication of this is enormous. "For every billion dollars in subsidy for antimalarial drugs, around $500m to $960m will be spent on treatment for people who do not have malaria" [22].

RDT has been found to be more cost saving than other malaria diagnostic strategies. It is more cost effective to use RDT than to use presumptive treatment and microscopy. In addition, "misdiagnosis of malaria results in excessive reporting of malaria cases, under-reporting of diseases that mimic malaria symptoms, increased true or perceived malaria resistance and misallocation of resources" [23]. "Malaria misdiagnosis will result in more clinic attendances, putting additional pressure on already constrained and under-resourced health systems [24].

The use of reliable malaria RDTs will help to prevent over-diagnosis, empirical treatment, and misdiagnosis by physicians. It will also enable focused diagnosis and treatment of malaria in children and prevent drug wastage, avoidable adverse drug effects, and development of resistance to the currently available antimalarial drugs [25].

Rapid Diagnostic Test ensures rational use of ACTs, ultimately preventing drug resistance. Early diagnosis fosters early and effective treatment, and reduces the risk for severity of malaria

in vulnerable groups. Treatment with ACT aids depopulation of gametocytes [sexual forms] and therefore reduces transmissibility of malaria parasite [26].

In Tanzania findings from study show that over prescription with anti-malarial drugs is still practiced in an area of Tanzania where universal testing with RDTs have been introduced as official policy since treatment of RDT-negative patients and treatment based on clinical diagnosis without testing remains. The use of malaria diagnostics was also associated with higher prescription of antibiotics among patients with negative test results. Factors responsible for these practices include system factors such as non-availability of testing facilities, limited capacity to diagnose other causes of fever, staff shortage, and health workers perceptions about the importance of malaria and test results [27].

In the study conducted in Kenya Health workers rarely prescribed AL for RDT negative patients [9%], but they often prescribed non-recommended antimalarial for RDT-negative patients [27%]. Non -ACT antimalarial was well described, health workers commonly treated RDT-negative patients and patients who did not undergo diagnostic testing with non-recommended antimalarial [28].

] In study conducted in Uganda in a total of 51,355 patient visits were included in the analysis and 46,265 [90.1%] were classified as ACT candidates. In the ACT candidate group, 94.5% were correctly prescribed ACT. There were significant differences across the sites in the proportion of patients for whom there was a failure to prescribe ACT, ranging from 3.0-9.3%. Young children and woman of childbearing age had higher odds of failure to receive an ACT prescription. Among patients who may not have been ACT candidates, the proportion prescribed quinine versus ACT differed based on if the patient had severe malaria or was referred for admission

[29].

A survey was conducted within 20 geographical clusters of drug shops from May to September 2010 in Mukono district, central Uganda. A cluster was defined as a parish representing a cluster of drug shops among febrile patients seen at drug shops, 35% had a positive RDT result and 27% had a positive blood slide. Many patients [55%] had previously sought care from another drug shop prior to this consultation. Three quarters [73%] of all febrile patients seen at drug shops

received an anti-malarial, of whom 39% received an ACT and 33% received quinine. The rest received another non-artemisinin mono therapy. Only one third [32%] of patients with a positive blood slide had received treatment with CoartemW while 34% of those with a negative blood slide had not received an anti-malarial. Overall appropriate treatment was 34 [95% CI: 28 – 40] with substantial between-cluster variation, ranging from 1% to 55% [30].

In study conducted in Côte d'Ivoire Only 34 out of 100 patients who were offered an RDT for malaria were willing to undergo the test. People who perceived blood as a sacred body fluid were less likely to comply with an RDT. The concurrent availability and use of RDTs for HIV and malaria was associated with an unwilling attitude towards RDTs for malaria. The initial willingness of patients to accept malaria testing with RDTs was significantly related to general fear and wanting to know malaria infection status. For further and regular use of RDTs, a strong relationship was observed between acceptance and the idea that an RDT is a pretext used by health worker to know HIV status 16.61. Those thinking that blood samples were useful for medical diagnoses were 8.31-times more likely to undergo an RDT compared to those rejecting blood sampling as a diagnostic strategy [31].

In study conducted in Oromia region Comparative analysis based on the 'pre-and post' RDT Deployment aspect of the evaluation, showed a 38% point reduction in anti-malarial prescriptions in all study health facilities when RDTs were introduced to support malaria clinical diagnosis. The highest drop was in the hypo-endemic malaria transmission settings with a twofold Reduction in the AMD prescriptions only 11% of patients with false positive results had received anti-malaria treatment in the previous four weeks [32].

3. OBJECTIVES

3.1. General objective

- To assess malaria diagnosis and treatment practices following introduction of rapid diagnosis test in Adama woreda health posts, central Ethiopia

3.2. Specific Objectives

- To assess availability of diagnostics and anti-malarial drugs in the Adama woreda health posts
- To assess malaria diagnosis and prescription practice in Adama Woreda health posts
- To determine health workers attitudes toward RDTs and prescription of anti-malaria drugs in Adama Woreda health posts
- To determine patient attitudes toward RDTs and malaria diagnosis in Adama wored health posts.

4. METHODS AND MATERIALS

4.1. Study area and study period

A cross sectional study was conducted using interview of fever patients and health workers in Adama woreda selected health posts, East Shewa, Oromia Region, Central Ethiopia. Adama woreda is located 90km South East of Addis Ababa. It is one of the woredas in the Oromia Region of Ethiopia. Part of the East Shewa Zone located in the Great Rift Valley, Adama woreda is bordered on the south by the Arsi Zone, on the southwest by Koka Reservoir which separates it from Dugda Bora, on the west by Lome, on the north by the Amhara Region, and on the east by Boset; the Awash River, the only important river in this woreda, defines the woreda boundaries on the east and south. Other towns in this woreda include Awash Melkasa, Shewa Alemtena, Sire Robi, Sodere and Wenji Gefersa. A total population for this woreda of 155,349, of whom 79,013 were men and 76,336 were women. The woreda has 37 health posts, 9 health centers and 1 general hospital. The study was conducted from January, 24 to February 9, 2014.

4.2. Study design

A cross sectional study was conducted using exit interview of patients at health posts and interviews with prescribers to assess their understanding, perceptions and practices related to RDTs were conducted .

4.3 Population

4.3.1. Source population

All patients visiting the health post and health workers in the health posts

4.3.2. Study population

All Patients who had visited the health post for fever and health workers in the health post

4.4 Eligibility of criteria

4.4.1 Inclusion criteria

- All patient presenting with fever and health workers in working diagnosis and giving treatment for patient.
- Caregivers (mothers, fathers, guardians) of patients who gave informed consent had been interviewed.
- The health facilities at peripheral level offering services to the general public.

4.4.2 Exclusion criteria

- ❖ Patient presenting without fever

4.5. Sample and sampling process

Simple random sampling technique was used to select study subjects from the health facility serving Adama woreda community. From the total of 37 health posts 10 were selected as study sample using lottery method. Health service providers were interviewed after giving verbal informed consent. Exit interviews were held at study site with all patients presented with fever or history of fever after giving their verbal consent during study period. The interviews were conducted by five university college health science students.

4.6. Study variables

4.6.1. Independent variables

- ❖ Age - -
- ❖ Drug name
- ❖ Distance
- ❖ Time
- ❖ Year of the study

4.6.2. Dependent variables

- ❖ Prescription practice
- ❖ Availability of diagnostic

- Malaria diagnosis
- Availability of anti- malaria drugs
- *Patient attitude toward RDTs*
- *Health workers attitude toward RDTS*

4.7. Data Collection Techniques

4.7.1 Data Collection

Health care providers were interviewed using questionnaires with both open and closed questions to collect information on their knowledge and perception, and prescription behavior in relation to malaria RDTs. Exit interviews were also conducted with fever patients or, in case of children, their caretakers to collect information about their knowledge and attitudes towards malaria testing.

4.7.2 Data collection instruments

A semi structured questionnaire was used to collect the necessary information. Questionnaire was designed by collecting different literatures and enriched by expert opinion.

4.8 Data analysis:-

Data was analyzed by SPSS16 and the result was presented using tables.

4.9 Data quality Assurance

The assistants were trained on how to collect and insure the completeness of the questionnaire. To assure the quality of the data the following measure was taken. Properly designed and data collection questionnaire was used. Questionnaires had been distributed and the collected data was reviewed and checked for completeness and consistency of response.

4.10 pretest

Pretest of the questionnaire was done at *Adullala* health post *and* the necessary corrections were made accordingly.

4.11. Ethical Consideration

Ethical clearance was obtained from the Ethical Review Board of department of pharmacy, College of Public Health and Medical Sciences, Jimma University. Then officials at different

levels in the study area were communicated through letters from department of pharmacy, College of Public Health and Medical Sciences, Jimma University. Letters of permission was presented to Adama Woreda health office and at the different health posts at Adama woreda. Verbal informed consent was obtained from responsible bodies at the health posts prior to the reviews after the purpose of the study was explained. Confidentiality of the information was assured and privacy was maintained.

4.12. Limitation of the Study

- This study was carried out during the low transmission season, Most of the malaria transmission occurs between September and December, after the main rainy season from June to August. To do study in the rest health posts, the time given for study was not enough to collect data and transportation and financial were the existing problem.

5. RESULTS

Profile of health facilities, health workers and patients.

The ten selected study sites had in total 20 staff members, of whom14 (70%) diploma nursing staff and 6(30%) had clinical training (10+1). Two of ten health facilities reported RDT stock-outs at some point since their introduction. Eight study sites were equipped with parasite-based diagnostics at the time of survey, of which eight used RDTs .RDTs are the only available diagnostics equipment in the health posts. Six health posts had the first-line antimalarial drug in stock at the time of survey.

Of the total 104 patients, 53[51%] were male and 51[49%] were female. Most of patients were single 58[55.8%] and 40[38.4%] were married, the reset 6[5.8%] were widowed and divorced. Orthodox was the predominant religion in the area accounting for 52[50%]. Among those interviewed, about 52[53.8%] of them were literate. Majority of patients 89[85.6%] were nearest to the health posts.

Tabl socio-demographic characteristics sampled patients in selected Adama Woreda health posts, January 24 to February 9, 2014

Variables		Frequency	Percentage
Age	<5	25	24
	>5	79	76
Sex	Male	53	51
	Female	51	49
Religion	Orthodox	52	50
	Protestant	37	35.6
	Wakefata	15	14.4
Educational status	Illiterate	48	46.2
	1-4	21	20.2
	5-8	28	26.9
	9-10	7	6.7
Marital status	Single	58	55.8
	Married	40	38.5
	Widowed	3	2.9
	Divorced	3	2.9
	House wife	17	16.3
Distance of health facility	<5	89	85.6
	>5	15	14.4

A total 104 patients, 53[51%] were male and 51[49%] were female or their care takers/guardians in case of children, underwent exit interview. Some 25[24%] were children under five years of age. All patients presented with fever or history of fever. Other common symptoms included, headache, cough/chest symptom, joint pain/generalized body weakness, chills and vomiting[(table2].cough/chest symptom and diarrhea were more frequent in children under five years, while headache , joint pain/ generalized body weakness ,and chills were more frequent in those above five years of age.

Table 2 Patients' presenting symptoms (%) in selected Adama woreda health posts, January 24 to February 9, 2014

Variable	<5years	>5years	All patient
Number of patient			
Fever	25(100%)	79(100)	104(100%)
Cough/chest symptom	9	13(16.5%)	22(21.2)
Headache	4	20(25.3%)	24(23.08%)
Diarrhea	5	4	9
Abdominal pain	0	5	5
Vomiting	2	9	11(10.6%)
bitter test	2	4	6(5.8)
. Joint pain	2	13(16.5%)	15(14.4%)
Challis	1	11(13.9%)	12(11.5%)
Total	25	79	104

Malaria diagnosis and prescription practice.

Eighty three patients [79.8%] were seen in health post with available parasite based diagnostic with rapid diagnostic test (RDT) and 21[20.2%] in heath posts without testing with rapid diagnostic test. The overall malaria positivity rate was 48[57.8%]. Parasite-based testing was more common in children below five years of age than those above five year. Anti –malaria drugs were prescribed to all 48[100%] patients with positive RDT and to 19[54.3%] of negative patients. Among non-tested patients, anti-malaria drugs were given to 12[57.1%]. Among 104 patients presenting with fever or history of fever 64[61.5%] were prescribed anti-biotic and anti-pain.

Table.3. Parasite-based malaria testing and prescription rates with anti-malarial drugs by age group in selected Adama woreda health posts, January 24 to February 9, 2014

Patient category	<5years	>5years	all patient	p-value
No .of patient	25	79	104	
Patient tested for malaria	21(84%)	62(78.5%)	83(79.8%)	0.00
Patients with positive Results	9(42.9%)	39(62.9%)	48(57.8%)	0.00
Patients with negative Results	12(57.1%)	23(37.1%)	35(42.2%)	0.00
Malaria positive patients prescribed anti-malarial Drugs	9(100%)	39(100%)	48(100%)	0.00
Malaria negative patients prescribed anti-malarial drugs	4(33.3%)	15(65.2%)	19(54.3%)	0.00
Non-tested patients	4(16%)	17(21.5%)	21(20.2%)	0.00
Non-tested patients Prescribed with anti-malarial Drugs	2(50%)	10(58.8%)	12(57.1%)	0.021

Since the p value is < 0.05, there is significant association between parasite-based malaria testing and prescription rates with anti-malarial drugs by age group.

Of the total prescribed anti-malarial drugs ACT 57[72.2%], since chloroquine is stock out in some health posts, the most available anti-malarial drugs was ACT. Among prescribed drugs, anti-pain 30[46.9%] and anti-biotic was 34[53.1%].

Table.4. Prescriptions of anti-malarial drugs, antibiotics and anti-pain in selected Adama woreda health posts, January 24 to February 9, 2014

Variable		Frequency	Percentage
Anti–malaria drugs	Chloroquinin	22	27.8
	ACT	57	72.2
Another drug apart from anti-malaria drugs	Anti –pain	30	46.9
	Anti- biotic	34	53.1

Presents responses by 20 health workers previously trained on RDT use to selected questions asked in the interview. The majority of health workers 14[70%] had confidence in RDT results. Those who had confidence gave the following reasons: they are sensitive/specific, the results are consistent with symptoms and positive patients respond to anti-malarial drugs. Conversely ,those who did not have confidence in RDTs mentioned false negative results in patient with symptoms, test remaining positive after treatment and good response to anti-malarial treatment in in patient with negative results as their reasons. Six [30%] health workers said patients do not trust RDT results and gave reasons, such as patients assuming that any fever is due to malaria. When asked if they sometimes prescribe anti-malarial drugs to RDT negative patients, 5[25%] of the health workers admitted to such practice and they said that the rationale for prescribing anti-malarial drugs to patients was because the clinical symptoms were suggestive of malaria. 14[70%] health workers said patients sometimes demand anti-malarial drugs despite negative results.

Table 5. Health workers' (HW) attitudes towards RDTs and prescriptions of anti-malarial drugs in selected Adama woreda health posts, January 24 to February 9, 2014

Question addressed to health workers	Diploma nurse	Health extension worker /10+1	p-value
Do you have confidence in RDT results			
YES	10	4	0.831
NO	4	2	
Do you sometimes prescribe anti-malarial drugs to patients with negative results			
YES	4	1	0.573
NO	10	5	
Do patients sometimes demand antimalarial drugs when results are negative?			
YES	3	2	0.712
NO	11	4	
Do patients trust RDT results?			
YES	11	3	0.201
NO	3	3	

Since the p value is >0.05, there is no significant association between the health workers attitude toward prescription and RDT**.**

As shown in table 6, 28[26.9%] of patients were unwilling for RDTs test and gave reasons, such as patients previously tested and being negative result with RDTs and fear of needle prick was also the problem. Those who were willing gave the following reason, advantage of using RDTs were being fast, being able to confirm the diagnosis and producing reliable results.

Table 6, Response percentage of local beliefs of patients willing RDTs for malaria, stratified by RDTs acceptance in selected Adama woreda health posts, January 24 to February 9, 2014

Patients willing for RDTs	**Willing**	**Unwilling**	**Total**
Age of respondents			
<5	17	8	25
>5	59	20	79
Total	76	28	104

6. DISCUSSION

After introduction of RDTs as parasite-based malaria diagnostic tool in Oromia Region, Ethiopia, this study found low testing rates, stock-outs of both RDTs and chloroquine, and non-adherence to negative test results. Relatively, low testing rates were found in health posts with parasite-based diagnostics, which is more pronounced in older patients than in children below five years of age. In this study ACT, 57[72.2] were the most prescribed anti-malarial drugs, since chloroquine is stock out in some health posts, the most available anti-malarial drugs were ACT. This led to the prescription of non-chloroquinin, contrary to national guidelines advocating the use of chloroquinin as first-line anti-malarial drugs for *vivax malaria.* In contrast the study done in Tanzania, Stock-outs of ACT defined as running out of ACT for some periods before the next supply is received were also observed in some health facilities, which could be due to overuse of ACT in the treatment of patients with negative RDT results, or health system factors such as delays in procurement or underestimating requirement [27].

Prescription of anti-malarial drugs for patients with negative RDTs results and those not tested is still practiced in Tanzania and Ethiopia where RDTs have been introduced. These two practiced in are contrary to the recommendations by WHO, which require universal testing of all patients suspected to have malaria and treatment with anti-malarial drugs be confined to parasitological confirmed cases[12,14]. In other areas health workers have also continued prescribing anti-malarial drugs to RDTs negative patients.

In the study conducted in Kenya Health workers rarely prescribed AL for RDT negative patients [9%], but they often prescribed non-recommended antimalarial for RDT-negative patients [27%] and non -ACT antimalarial was well described. Health workers commonly treated RDT-negative patients and patients who did not undergo diagnostic testing with non-recommended antimalarial [28]. However, the rate of over prescription observed in this study is Show that Anti –malaria drugs were prescribed to 19[54.3%] of negative patients and among non-tested patients, anti-malaria drugs were given to 12[57.1%]. This is much higher than studies done in Kenya. This could be due to health system factors such as lack of trained health workers in the diagnosis and management of other causes of fever. Although a few mentioned that RDTs are sensitive and specific and improve rational use of drugs.

In the study done in Uganda, Majority [92%] of the respondents health care workers believed that positive RDT results were always truly positive (sensitivity), but only half [51%] believed that negative RDT results were always truly negative(specificity), reasoning that the RDTs can miss a true case of malaria. Almost all [98%] health care workers said they communicate RDTs results to patients. [29]. Similar finding have been reported in Oromia Region. Proper training of health workers and equipping health facilities with the capacity to manage patients with both positive and negative RDT results will ensure that health workers have the capacity to identify and treat non-malarial causes of fever, an important factor in adherence to results [32]. Although a few health workers highlighted that sometimes patients with negative results demand anti-malarial prescriptions, the majority of patients trusted the results, mainly because they trust the health workers and get better after treatment, making it unlikely that they will demand anti-malarial drugs. Some of the patients were unwilling for RDTs and the reason they gave is previously tested and being negative result with RDTs and fear of needle prick was also the problem. Those who were willing gave the following reason, advantage of using RDTs were being fast, being able to confirm the diagnosis and producing reliable results. Similar reports from Côte d'Ivoire showed that patients had assumption blood could be utilized for checking their HIV status instead of malaria [31] and reports from Tanzania showed that people had the same feeling fear towards RDTs. It was also observed that prescription of antibiotics was higher among patients with negative results and those not tested. The rates observed in this study are similar to those reported in Northern Ethiopia. Still, there is a raising concern that the use of malaria diagnostics could lead to over prescription of antibiotic among patients with negative test results due to the lack of diagnostics and insufficient understanding of etiologies of non-malarial fever. Training of health workers in malaria diagnosis using RDTs should include training on identification of other causes of fever, including for example provision and use of simple devices such as the respiratory rate timers for pneumonia used in integrated community case management [30].

7. CONCLUSION

Findings from this study show that over prescription with anti-malarial drugs is still practiced in Ethiopia, Oromia region, Adama woreda where universal testing with RDTs have been introduced as official policy since treatment of RDT-negative patients and treatment based on clinical diagnosis without testing remains. The use of malaria diagnostics was also associated with higher prescription of antibiotics among patients with negative test results. Factors responsible for these practices include system factors such as health workers perceptions about the importance of malaria and test result, limited capacity to diagnosis other causes of fever and non-availability of testing facility.

8. RECOMENDATION

The Adama woreda health bureau should retraining health workers on RDTs and the importance of adhering to test results, training and support in the diagnosis and management of other causes of fever and close supervision. The woreda health bureau should also ensuring regular supply of testing facility and stock-out drugs.

REFERENCES

1. World Health Organization: World Malaria Report 2011fact sheet, Geneva, Switzerland: WHO; 2011.
2. Pindolia D , Garcia A , Huang Z, David L, Smith D , Alegana V, Noor A ,Snow R and Tatem A .: The demographics of human and malaria movement and migration patterns in East Africa. Malaria Journal: 2013 12:397.
3. Adugna A: Malaria in Ethiopia. Addis Ababa, Ethiopia: Ethiopian Demography and Health; 2011.
4. Federal Ministry of Health (FMH): Ethiopia health and nutrition research institute (EHNRI): Manual for the laboratory diagnosis of malaria. first edition .Addis Ababa ,Ethiopia; . September, 2012
5. The Carter Center (TCC): Prevalence and risk factors for malaria and trachoma in Ethiopia. Atlanta, USA: The Carter Center; 2007.
6. FMH: Federal Ministry of Health: Guideline for malaria epidemic prevention and control in Ethiopia. 2nd edition. Addis Ababa, Ethiopia: Federal democratic Republic of Ethiopia, Ministry of Health; 2004.
7. WHO: World Health Organization: Systems for the early detection of malaria epidemics in Africa: an analysis of current practices and future Priorities, country experience. Geneva, Switzerland: World Health Organization; 2006.
9. Adhanom T, Deressa W, Witten HK, Getachew A, Seboxa T: Malaria. In The Epdemiology and Ecology of Health and Disease in Ethiopia 1st edition. 1stedition. Edited by Berhane Y, Hailemariam D, Kloos H, Shama PLC. AddisAbaba, Ethiopia: Federal democratic Republic of Ethiopia, Ministry of Health; 2006:556–576.
10. FMH: Federal Ministry of Health: Malaria: Diagnosis and Treatment Guidelines for Health Workers in Ethiopia. Addis Ababa, Ethiopia: Federal democratic Republic of Ethiopia, Ministry of Health; 2004.
11. Lubell Y, Reyburn H, Mbakilwa H, Mwangi R, Chonya S, Whitty C, Mills A:The impact of response to the results of diagnostic tests for malaria:cost-benefit analysis. BMJ 2008, 336:202–205.
12. WHO: Guidelines for the treatment of malaria. 2nd edition. Geneva: World Health Organization; 2010.

13. WHO Informal Consultation on fever management in peripheral health care settings: a global review of evidence and practice *Geneva, 22-24 January 2013*

14. WHO: Universal access to malaria diagnostic testing. Geneva: World Health Organization; 2011.
15. Breman JG, Alilio MS, White NJ. Defining and Defeating the Intolerable Burden of Malaria III: Progress and Perspectives: American Journal of Tropical Medicine and Hygiene. 2007 Dec. 77(6).
16.) Malaria Rapid Diagnostic Test Performance: Results of WHO product testing of malaria RDTs: Round 3 (2010-2011). Geneva, World Health Organization on behalf of the Special Program for Research and Training in Tropical Diseases, 2011
17. Global malaria program : Deployment of artemether lumefantrin with rapid diagnostic tests at community level, Raya Valley, Tigray; Malaria and Other Vector-borne Diseases Control Department Tigray Health Bureau , Ethiopia , june 2009
18. Federal Ministry of Health : National five-year strategic plan for malaria prevention & control in Ethiopia 2006 – 2010:Addis Ababa, April 2006
19. .Malaria Diagnosis and Treatment Guidelines for Health Workers in Ethiopia 2nd Edition Addis Ababa July 2004,7-8).
20. . K Bharti P, Silawat N, Singh P, Singh M, Shukla M, Chand G, Dash A and Singh N: the usefulness of a new rapid diagnostic test, the First Response Malaria Combo (pLDH/HRP2) card test, for malaria diagnosis in the forested belt of central India. *Malaria Journal* 2008, **7**:126
21. Redd SC, Kazembe PN, Luby SP, Nwanyawnwu O, Hightower AW, Ziba C, Wirima, JJ,Chitsulo L, Franco C, Olivar M. Clinical algorithm for treatment of Plasmodiumfalciparum malaria in children. Lancet 1996; 347:223-227
22. Hopkins H, Asiimwe C, Bell D. Access to antimalarial therapy: accurate diagnosis isessential to achieving long term goals. British Medical Journal 2009, 339
23. Breman JG, Alilio A, Mills A. Conquering the intolerable burden of malaria. AmericanJournal Tropical Medicine and Hygiene 2004; 71: 1–15

24. Amexo M, Tolhurst R, Barnish G, Bates I. Malaria misdiagnosis: effects on the poorand vulnerable. Lancet 2004; 364: 1896– 1898

25. D'Acremont V, Lengeler C, Mshinda H, Mtasiwa D, Tanner M, Genton B. Time to movefrom presumptive malaria treatment to laboratory-confirmed diagnosis and treatment inAfrican children with fever. Public Library of Science (PLos) Medicine 2009; 6(1):e252. doi:10.1371/journal.pmed.0050252
26. World Health Organization. The role of laboratory diagnosis to support malaria disease management. Focus on the use of rapid diagnostic tests in areas of high transmission. Report of a WHO Technical Consultation 25 – 26, October, 2004. WHO Press; 2006
27. Marycelina Mubi , Deodatus akoko , Billy Ngasala , Zul Premji , Stefan Peterson , Anders Björkman and Andreas Mårtensson .: Malaria diagnosis and treatment practices following introduction of rapid diagnostic tests in Kibaha District, Coast Region, Tanzania: 2013 12:293
28. Peter O, Louise M, Simon K, John W, and Jane A .: Effect of Malaria Rapid Diagnostic Tests on the management of uncomplicated malaria with Artemether-Lumefantrine in Kenya: 2012, 5:103
29. David S, Ruth K, Arthur M, Stella K, Asadu S, Sarah G , Michelle Chang, Bryan K Kapella, Denis R, Moses R and Grant D..: Anti-malarial prescription practices among outpatients with laboratory-confirmed malaria in the setting of a health facility-based sentinel site surveillance system in Uganda: 2013 12:252
30. Anthony K Mbonye, Sham La, Bonnie Cundill, Kristian Schultz Hansen, Siân Clarke and Pascal Magnussen.: Treatment of fevers prior to introducing rapid diagnostic tests for malaria in registered drug shops in Uganda. Malaria Journal 2013 12:131
31. Comoé C , Ouattar A ,Raso G ,Tanner M , Utzinger J and G Koudou B: Willingness to use a rapid diagnostic test for malaria in a rural area of central Côte d'Ivoire: BMC Public Health 2012, 12:1089 :http://www.biomedcentral.com/1471-2458/12/1089

32. Ruth A , Takele K, Gezahegn T, Helen C, Damtew Y, Bonnie C,and Richard R: Performance of three multi-species rapid diagnostic tests for diagnosis of Plasmodium Falciparum and Plasmodium vivax malaria in Oromia Regional State, Ethiopia: 2010, 9:297

ANNEX: QUESTIONNAIRE

JIMMA UNIVERSITY

COLLEGE OF PUBLIC HEALTH AND MEDICAL SCIENCE DEPARTMENT OF PHARMACY

Malaria diagnosis and treatment practice following introduction of rapid diagnostic test in Adama Woreda primary health c are

Questionnaire No:

Date: .../…/……..

Name of Health facility:

Section A. Socio-Demographic factor

1. Age of patient: A)<5years☐ B)>5years ☐

2. Sex of patient: A). Male☐ B. female ☐

3. Occupation of patient: A). Farmer ☐ B) Trader ☐ C). Civil servant ☐ D) Others specify:

4. Religion of patient: A). Islam☐B) Orthodox ☐ C) protestant ☐ D) others☐

5. Educational status of patient: A) illiterate ☐ B) 1-4 ☐ C) 5-8 ☐ D) 9-10 ☐E)11-12 ☐ G) technique ☐ F) university ☐

6. Marital status A). Single ☐ B) Married ☐C) Widowed ☐ D). Divorced ☐

7. Address of patient or caregiver:_____

8. Distance of residence of patient from health facility A) <5km☐ B) 5-10km☐ C) >10km☐

Section B. Clinical symptoms and signs (tick as appropriate)

.

.

9. Headache ☐ 10. Cough ☐ 11. Chills and or rigors ☐ 12. Joint pain and or generalized body pains/ache /weakness ☐ 13. Vomiting ☐ 14. Diarrhea ☐

15. Nausea☐ 16. Abdominal pain ☐

m18. Others , please specify…….☐ 17. Bitter taste ☐

Semmction C. patient RDT results and prescribed drugs

19.What was the result? A) Positive ☐ B) Negative ☐ C). Don't know ☐

20. If test result was positive, which antimalarial(s) was/were prescribed for you or for your child?

A) sulifadoxine-parimetamine(fansidar) ☐

B). Chloroquine (the one you take 4 in the morning daily for 2days and 2 tabs the third day)☐

C). Quinine ☐ D). ACT (Coartem)☐ E). Others specify….. ……..

21. Were you prescribed another drug apart from antimalarial? Yes/No

24. If yes, state please ……..

section.D

Questions addressed to health workers

25.Do you have confidence in RDT results? A). Yes☐ B). No ☐

26.Do you sometimes prescribe anti-malarial drugs to patients with negative results?

A) Yes☐ B). No ☐

27.Do patients sometimes demand antimalarial drugs when results are negative?

A) YES ☐ A) NO ☐

28 .Do patients trust RDT results A) YES ☐ B) NO☐

Questions addressed for patient toward RDT

29. Are you willing for RDT? A) YES ☐ B) NO ☐

1. If yes tell me why you are willing for it?----------

2.If no tell me why you are not willing?----------

Appendix.3. Qualification/Number (No) of staff and type of equipment available in the health facility

1. Qualification/No. of staff A). Diploma nurse ☐ A). health extension worker/…☐

C) Druggist…☐ d. (Others (specify……

2. Equipment available A). Rapid diagnostic test ☐ B). Microscopy ☐

Appendix 2: Patient rapid diagnostic test result slip

Laboratory results

Malaria RDT Results (Finger-Prick)

Patient's name……..

Age: ……

Sex: …….

1. Site ID#_____

2. Specimen Number:_____

3. Specimen Date: [____/____/_____](dd/mm/yyyy)

4. SD Bioline RDT

A). Positive ☐ B). Negative ☐ C) Invalid ☐