Prevalence of Malaria and Associated Factor among Out Patients in Wolenchity District Hospital East Shewa Zone, Oromia Region, Ethiopia

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Abstract

Introduction: Malaria is a life threatening infectious disease caused by the protozoan parasite called the genus Plasmodium. It is prevalent and the leading public health problem in tropical and subtropical countries of Africa including Ethiopia.

Objective: The aim of this study was to determine the prevalence of malaria and associated factors among the out patients visiting Wolenchity District Hospital during the study periods.

Materials and methods: Hospital based cross - sectional study was carried out to determine the prevalence of malaria and associated factors among the out patients at Wolenchity district Hospital form September 30/2015 to December 30/2015 G.C The sampling population was interviewed using questionnaires. Blood samples were collected and tested for the absence or presence of malaria parasite from suspected patients using thin & thick smear of blood films on a single slide. Logistic regression model were used to evaluate the association between the outcome variable and associated factors. P-value and adjusted odds ratio within 95 % level of Confidence (CI) were used to interpret the results.

Result: From the total of 384 study participants, the overall prevalence of malaria parasite among the out patients visiting Wolenchity District Hospital was 15.4% (59/384). Associated factors such as, age [AOR = 0.197, 95% CI (.048-.814)], Mosquitoes breeding site [AOR =4.213, 95% CI (1.919-9.252)], not use of ITN [AOR =0.247, 95% CI (0.104-0.588)], were found to be significantly associated with prevalence of malaria parasite.

Conclusion: The current study shows that fifteen percent of the out patients that visit Wolenchity District Hospital were affected by malaria parasite. Prevalence of malaria parasite was associated with age, mosquitoes breeding site, Availability of ITN. We recommended implementing the appropriate health interventions to prevent and control the infections.

Introduction

The word malaria came from the Italian word ''mal''-"aria" which means "bad air", it is so named because for centuries the diseases is associated with miasma of swamps and damp place [1]. Malaria is a blood and tissue protozoan caused by four species of parasite of the genus plasmodium. There are 4 species of plasmodium affecting human *P.falciparum*, *P.vivax*, *P. malaria* and *P. ovale*. Out of the total cause of malaria globally, it is estimated that about 40% are caused by P. falciparum, about 50% caused by *P.vivax* and 7-8 % caused by *P. malaria* and the rest by *P. ovale* it is transmitted from the blood of infected persons to female anopheles mosquito and then to susceptible new person. Occasionally transmission is through the placenta to the fetus or by transfusion of blood which contains malaria [1,2].

The incidence of malaria parasite is one the increasing there is growing resistance to current anti malaria drugs in many areas, including multi drug resistance in several countries of south East Asia and Africa. Increasingly insect side resistance is also a major threat as are changing agricultural practice especially irrigation programs in many endemic countries. Malaria is the most important and wide spread of parasite disease in tropical developing countries with more death than other disease [3,4].

Clustering of malaria cases also depends on a number of risk factors present in individuals and households including cases of entry in to the house by mosquitoes the economic circumstance and cultural habits of its occupation and again the proximity of dwelling to a mosquito breeding site the breeding mosquitoes is favored by manmade ecological changes ranging from Neolithic agriculture to current practices of deforestation and migration [1,4].

Malaria causes severe anemia, splenomegaly and other clinical symptoms in immune compromised patients, children and pregnant women and increases their vulnerability to the diseases. Therefore, it is at the head of priority, which needs the planning of intervention strategies against malaria in the study area [5].

Materials and methods

Study setting

The study was conducted in Wolenchity District Hospital (WDH) East Shewa zone, Oromia Region, in Ethiopia. Wolenchity town is one of the administrative towns in the East Shewa Zone, Oromia Region, Ethiopia. It is found around 130 Km East of Addis Ababa along the rail way and high way to Djibouti.

Study design and period

A hospital-based cross-sectional study was conducted from September 30/2015 G.C to December 30/2015 G.C among outpatients who visit WDH Laboratory for Laboratory investigation, Ethiopia.

Source population

All patients who were visit the WDH outpatient department during the study period.

Study population

All febrile and clinically malaria suspected patients who were sent to WDH Laboratory department during data collection period.

Variable of the study

Dependent Variables:-Prevalence of malaria parasite

Independent Variables: - Sociodemographic factors such as age, sex, Occupation, Residence, and Related factors such as, ITN users and non-users, Mosquitoes breeding site in residents.

Sample size determination and sampling technique

The sample size was determined using a single population proportion formula with the following

Assumptions: Estimate prevalence taken as 0.5(50%), 95% confidence level, and 5% degree of precision. After considering 10% for the non-response rate, the final sample size was 384. To recruit study participants convenient sampling technique was used.

Data collection

Socio-demographic characteristics and related factors were collected using a pre-structured questionnaire by the trained laboratory technologist through a face-to-face interview. The purpose of the study and related risk and benefits of the study were explained to the study participants, parents or legal guardians of the study participants.

Collection of specimen and identification of parasite

After written consent was obtained from the study participants, capillary blood sample was collected from finger prick. A drop of capillary blood was evenly spread on pre-labeled slides. Thin and thick blood films were air dried and stained for 10 minutes with Giemsa stain using standard procedure. The blood film was examined microscopically by using 100 x objectives. A blood film was reported as no Hemoparasite seen for those no malaria parasite was seen in an average of 200 fields.

Quality control

To ensure the quality of data, training was given for data collectors before starting data collection. The questionnaire was pre-tested that represents 5% of the sample size to check for its appropriateness and completeness on randomly selected patient before going to actual work. The quality of the prepared Giemsa stain was checked to decide whether it is functional or not before starting the procedure by using known positive and negative blood smears.

Data processing and analysis

Data were coded and entered by using Epi data Version 3.1 and exported to SPSS software version 21 for analysis. Descriptive statistics were used to determine the prevalence of malaria parasite. The association between dependent and independent variables was checked by using binary logistic regression model; variables with a p-value of less than 0.25 were further analyzed using multivariable analysis model. Variables with a p-value of < 0.05 were considered as cut point to determine a significant association. Data were organized, summarized and presented in text, tables, and figures.

Results

Socio-demographic characteristics of the study participants

Of the total 384 study participants, were suspected of malaria and included in the study. Their mean age was 4 with standard deviation of 1.8. Among these, (219) 57% were male and 26% were in the age range of 10-14. Of them, 79.2% were from rural and. About 24.0% of study participants were merchants (**Table 1**).

Table 1: Socio demographic characteristics of suspected of malarias in Wolenchity District Hospital, September 30/2015-December 30/2015 G.C, Wolenchity, Ethiopia (N=384).

Variable	Categories	Frequency	(%)
Age in years	0-4	44	11.5
	5-9	31	8.1
	10-14	100	26
	15-19	34	8.9
	20-24	87	22.7
	25-29	51	13.3
	>30	37	9.6
Sex	Male	219	57
	Female	165	43
Occupational status	Housewife	17	4.4
	Merchants	92	24
	Employee	80	20.8
	Students	28	7.3
	Labor	77	20.1
	Farmer	90	23.4
Residence	Urban	80	20.8
	Rural	304	79.2

Prevalence of malaria parasite

Among a total of 384 study participants overall prevalence was 15.4% (59/384). During the study period, a total of 384 malaria suspected patient gave blood film for malaria diagnosis in WDH laboratory, of these 15.4% (59/384) study subject were positive for malaria parasite. The predominant; plasmodium species was plasmodium falciparum 8.6 %(33/384), followed by plasmodium vivax 6.8% (26/384) (**Table 2**).

Table 2: Prevalence of malaria parasite among outpatients in WDH, September 30/2015-December 30/2015 G.C, Wolenchity, Ethiopia (N=384).

Plasmodium Species	Frequency	Percent's (%)
Plasmodium falciparum	33	8.6
Plasmodium vivax	26	6.8
Total	59	15.4

Associated factors of the study participants

In the current study, multivariatelogistic analysis showed a statistically significant association between malaria Infections and participants whose age from 10-14 (p = 0.025) and 15-19 (p = 0.018), the use of ITN compared not use of ITN in the study participants (p = 0.002), and study participants who lives around Mosquito breeding site were more likely infected by malaria parasite as compared to those who live far from mosquitoes breeding site (P=0.000) (**Tables 3**).

Table 3: Bivariate and multivariate analysis of factors associated with malaria infection among outpatients in WDH, September 30/2015-December 30/2015 G.C, Wolenchity, Ethiopia (N=384).

Variables	Bivariate analysis		Multivariate analysis	
	COR (95% CI)	*p*-value	AOR (95% CI)	p-value
Age in years				
0-4	1	-	1	-
9-May	.494 (.102-2.383)	0.38	.496 (.096-2.553)	0.402
14-Oct	.333 (.093-1.197)	0.092*	.197 (.048-.814)	0.025**
15-19	.238 (.058-.979)	0.047*	0.147 (0.030-0.718)	0.018**
20-24	.563 (.147-2.162)	0.403	.359 (.082-1.578)	0.175
25-29	.266 (.069-1.025)	0.054*	.167 (.038-.735)	0.018**
>30	.829 (.157-4.377)	0.825	.505 (.0843.043-)	0.456
Mosquitoes breeding site				
YES	3.656 (1.735-7.705)	0.001*	4.213 (1.919-9.252)	0.000**
No	1	-	1	-
Availability of ITN				
YES	.540 (.270-1.081)	0.082*	0.247 (0.104-0.588)	0.002**
No	1	-	1	-

Key: *Variables significant at P < 0.05, COR: Crude Odds Ratio; AOR: Adjusted Odds Ratio; CI: Confidence Interval; 1: Reference Group.

Discussion

Malaria is a major public health problem in Ethiopia over the past years. The disease has been consistently reported as the first lead cases of outpatient's visits, hospitalization and death in health facilities across the country [6,7,8]. In the current study the overall prevalence rate of malaria infection was 15.4 % (59/384). This finding was higher than the study conducted in Adama town (2.8%) [9], Akaki town (3.7%) [10]. This finding was lower than the study done in Zeway (42%) [11]. This finding shows that the most predominant malaria species were *P.falciparum* 33 (8.6%), followed by *P.vivax* 26 (6.8%). This indicates *P.falciparum* was the predominant species in Wolenchity hospital at outpatient. This difference might be due to attitude variation and climatological difference that may contribute to a great roll for breeding of Anopheles vector.

In the current study, multivariate logistic analysis showed a statistically significant association between malaria Infections and participants whose age from 10-14 (p = 0.025) and 15-19 (p = 0.018), the use of ITN compared not use of ITN in the study participants (p = 0.002), and study participants who lives around Mosquito breeding site were more likely infected by malaria parasite as compared to those who live far from mosquitoes breeding site (P = 0.000).

In the study area malaria was observed in almost every month of the year ,although there was a significant fluctuation in the number of malaria cases the highest prevalence of malaria cases was observed during spring(from September to December) followed by summer (from June to August) occurrence of malaria depends on adequate rain fall and temperature.

Conclusion

In the present study, high prevalence of malaria infection was observed. The common type of malaria parasite which observed in the current study was P. falciparum, followed by *P. vivax*. Study participants age, nearby mosquito breeding site

and not use of ITN were significant predictor of the occurrence of malaria infections. Due to high prevalence of malaria infections found in the current study area, strengthening infection prevention in the Wolenchity hospital and giving health education for the community is highly needed.

Author's contribution

BDM Conceived and designed the protocol, Laboratory work, data collection, data analysis, writing the original draft, ED Supervision, data analysis, writing the original draft and Manuscript preparation and review ,YAW Supervision, Data analysis, Manuscript preparation and review, NAM Data analysis, Manuscript preparation.

Ethical consideration

The study was approved by the institutional review board of Haramaya University, College of medicine and health sciences with reference number IRB112/13). Permission letter was obtained from the WDH Administration office. Before data collection, informed consent was obtained from study participants and parents or legal guardians for participants under the age of 18 years.

Data availability

All relevant data are available within the paper.

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