

Prevalence of Malaria among Patients Visiting Nekemte Hospital

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Abstract

Malaria has been one of the most prominent and ancient disease which has been profiled and studied malaria distribution seasons from September to December following the major rainy seasons from June to August with minor transmission seasons from February to march with some changes from place to place. The primary objective of this study is to determine the prevalence of malaria among patients visiting Nekemte hospital. Across sectional study was conducted to determine the prevalence of malaria among patients visiting Nekemte hospital. For the present study 120 patients were included in this study which was selected by convenient sampling techniques. The data was sorted by hand and using table and the calculation was done by using scientific hand calculator. Results were presented using tables. Two species of malaria, *P. falciparum* and *P. vivax* were identified with relatively higher prevalence of *P. vivax* (59.2%). Educational status, presence of stagnant water and bed net usage had an association with prevalence of malaria. Age and religion had no any association with prevalence of malaria between the age group of 17 to 27 and illiterate patients had relatively higher prevalence of malaria. Malaria infection can be reduced with the help of early treatment and by using bed nets.

Keywords: Malaria; Nekemte; *P. falciparum*; *P. vivax*; *P. ovale*; *P. malariae*

Introduction

Malaria has been one of the most prominent an ancient disease which has been profiled and studied. It has been one of the greatest burdens to mankind with mortality rate that unmatched by any other modern disease other than tuberculosis. This disease caused by four different species *Plasmodium falciparum*, *Plasmodium vivax*, *Plasmodium malariae* and *Plasmodium ovale* of the same genus, is a major problem health in most of the countries in the tropics [1].

The parasite life cycle involves two hosts during a blood meal, infected female anopheles mosquitoes inoculates sporozoites in to the human host which infect liver parenchyma cells, and forms schizonts which rupture and release merozoites. After this initial replication in the live exoerythrocytic schizogony, the parasite undergoes 30 asexual multiplications in the erythrocyte [2]. Merozoites infect RBC; some merozoites differentiate in to sexual erythrocytic stages or gametocytes. Blood stage parasites are responsible the clinical manifestation of the disease. Recrudescence occurs in *Plasmodium falciparum*, *Plasmodium malariae* and relapses due to hypnozoite occurs in *Plasmodium vivax* and less commonly in *Plasmodium ovale* malaria distribution seasons runs from September to December following the major rainy season from June to August with minor transmission season from February to march with some change from place to place even though the most transmission of malaria is by bite of mosquito sometimes it can be transmitted by blood transfusion, contaminate syringes and needles. The first malaria eradication effects were started in Ethiopia in 1959 following 1958 malaria epidemic. Now days also control of malaria is directed at elimination of appropriate mosquitoes or stages of development. In addition, treatment of reservoir with active infections and prophylaxis of

susceptible persons are also beneficial. Be nets utilization and biological control was also applicable in the country to ay [3].

Methodology

Study design

Across sectional study was conducted to determine the prevalence of malaria among patient visiting Nekemte hospital.

Study area

The study was conducted in Wollega zone Nekemte town in Nekemte hospital, Oromia Ethiopia. The town is located at 328 km to the west of Addis Ababa in Oromia region. The town has an attitude and longitude of 9° 5'N, 36° 33'E respectively and elevation of 2088 m. And also it has a temperature range from 14°C -26°C and annual rain fall estimated to 1500-2000 m³ (<http://www.edu.et> and et.wikipedia.org/wiki/Nekemte, 2013).

Data collection method

To obtain relevant secondary data source or clinical records of documentary data would be collected starting from March 2004-2005 E.C by using structure of questioner from Nekemte Hospital.

Data source

For this study primary and secondary data was used as a source of data. Primary data would be collected from interview; and secondary data would be obtained from various books, similar research paper, from clinical and internet service.

Sample size

For the present study 120 respondents were selected purposively from the data interpretation based on the age and sex.

Result

Result obtained from Nekemte Hospital from March 2004 to April 2005 E.C

Sampling techniques

The verbal consent was first obtained from laboratory technician and the patients were selected by simple random sampling. The patient was recorded in reference data with their age and sex.

Month	Malaria species				Sex		Age		
	<i>P. falciparum</i> (%)	<i>P. vivax</i> (%)	Mixed (%)	Total	M	F	0-4	5-14	15t
March	8(47.06)	8(47.06)	1(5.88)	17	7	10	3	8	6
April	3(33.33)	5(35.55)	1(11.11)	9	5	4	1	1	7
May	17(36.17)	15(31.91)	15(31.91)	47	25	12	6	20	21
June	6(23.08)	17(55.38)	3(11.54)	26	10	16	6	9	11
July	2(8.70)	14(60.87)	3(13.04)	23	10	13	4	10	9
August	8(28.57)	17(60.71)	3(10.71)	28	17	11	7	15	6

Table 1: The record of malaria cases in Nekemte hospital from March to August 2004 E.C

In March 17 case of malaria were recorded. Out of this 8(17.06.2) persons infected with *P. falciparum* 8(47.06%) persons were infected with *P. vivax* and 1(5.88%) persons were infected with both of them. In April, nine case of malaria were recorded. Out of this 3(33.3%) persons were infected with *P. falciparum* 5(55.55%) persons were infected with *P. vivax* and 1(11.11%) were infected with both of them. In May 47(Forty seven) case of malaria were recorded. Out of these

17(36.17%) person were infected with *P. falciparum* 15(31.91%) persons were infected by *P. vivax* and 15(31.91%) were infected with both of them. In June twenty six cases of malaria were recorded. Out of these, 6(23.08%) persons were infected with *P. falciparum* 17(62.38%) persons were infected with *P. vivax* and 3(11.58%) person were infected with both of them (Table 1).

Month	Malaria species				Sex		Age		
	<i>P. falciparum</i> %	<i>P. vivax</i> %	Mixed %	Total	M	F	0-4	5-14	15t
September	1(4.76)	20(95.24)	-	21	13	8	5	9	7
October	4(14.76)	26(76.48)	4(11.76)	34	17	17	5	9	20
November	4(14.26)	21(75.00)	3(26.71)	28	13	15	2	6	20
December	2(13.33)	9(60.00)	4(26.61)	15	8	7	1	3	11
January	6(40.00)	7(46.67)	2(13.33)	15	8	7	2	3	10
February	-	9(90.00)	1(10.00)	10	7	3	2	4	4
March	6(35.29)	8(47.05)	3(17.65)	17	10	7	2	5	10
April	2(28.57)	5(71.42)	-	7	3	4	-	3	4

Table 2: The hospital records of malaria in Nekemte hospital from September to April 2004 E.C

In July 23 cases of malaria were recorded. Out of this 2(8.70%) persons were infected with *P. falciparum* 14(60.87%) persons were infected with *P. vivax* and 7(30.43%) were infected with both of them. In August 23 cases of malaria were recorded. Out of this, 8(28.57%) persons were infected with *P. falciparum* 17(60.70%) persons were infected with *P. vivax* and 3(10.71%) persons were infected with both of them (Table 1). The number of malaria cases during the period from

March to August 2004 was classified under three age groups, 0.4 years, 5-14 years and greater than 15 years old. The greatest number of malaria cases was recorded in the age group of greater than 15 years old. The least number of malaria cases were recorded in the age group of 0.4 years or in children, and also the number of malaria cases during this period are classified in to sexes: male and female. The highest cases of malaria were recorded in male than female (Table 1).

From the above table, the incidence of malaria in Nekemte hospital from September-April 2004E.C in September, twenty one malaria cases were recorded. Out of this, one (4.76%) persons were infected with *P. falciparum* and twenty (95.24) persons were infected with *P. vivax*. in October thirty four cases of malaria were recorded. Out of this (11.26%) persons were infected with *P. falciparum* both *P. falciparum* *P. vivax* and twenty six (76.48%) persons infected by *P. vivax*. in November twenty-eight cases of malaria were recorded. Out of this, four (14.26%) persons were infected by *P. falciparum*; twenty one (75%) persons were infected with *P. vivax* three (10.7%) persons were infected by both of them (Table 2).

In December fifteen cases of malaria were recorded. Out of this, two (13.33%) persons were infected with *P. falciparum*, nine (60) persons were infected with *P. vivax* and four (26.61%) persons were infected with both of them. In January, fifteen cases of malaria were recorded. Out of this, six (40%) persons were infected with *P. falciparum*, seven (46.67%) persons were infected with *P. vivax* and one (10%) persons was infected both of them in March seventeen cases of malaria were recorded. Out of this, six (35.29%) persons infected by *P. falciparum*,

eight, (47.5%) were infected with *P. vivax*; three (17.65%) persons were infected with both of them. In April, seven, cases of malaria were recorded. Out of this two (28.57%) persons were infected by *P. falciparum* and five (71.42%) persons were infected with *P. vivax*.

The number of malaria cases during the period from September-April 2004 are classified in to three groups, 0-4 year, 5-14 years and greater than 15 years old, the highest number of malaria cases were recorded in greater than the age group of greater than 15 years old and the least number of malaria cases were recorded in the age group of 0-4 year of in children and also a number of malaria cases during this period classified under sex, male and female (Table 2).

During the study period a total of 120 patients were participated and gave supportable idea which are more necessary information for our research. The percentage of male and female were 86.7% and 13.3% respectively. From those of 120 malaria patients, 27(22.5%) were *P. falciparum* 71(59.2%) were *P. vivax* and 22(18.3%) were mixed in plasmodium species.

Sex	Plasmodium species						Total	%
	<i>P. falciparum</i>	%	<i>P. vivax</i>	%	Mixed	%		
Female	5	4.2	8	6.7	3	2.5	16	13.3
Male	22	18.3	63	52.5	19	15.8	104	86.7
Total	27	22.5	71	59.2	22	18.3	120	100

Table 3: Distribution of malaria by sex (distribution of plasmodium species in sex) among study population in 2005 E.C

The above table shows that, from the total of 120 patients 104(86.7%) male and 16(13.3%) female respectively. From this the

more participated (included) and risked malaria patient was malaria *Plasmodium vivax* species (Table 3).

Age	Types of plasmodium species						Total 8	%
	<i>P. vivax</i>	%	<i>P. falciparum</i>	%	Mixed	%		
0-5	4	3.3	2	1.7	2	1.7	12	6.7
6-10	6	5	3	2.5	3	2.5	15	10
11-16	10	8.3	1	0.8	4	3.3	20	12.5
17-22	13	10.8	3	2.5	4	3.3	30	16.7
23-27	20	16.7	6	5	4	3.3	15	25
28-33	9	7.5	3	2.5	3	2.5	13	12.5
34-39	5	4.2	6	5	2	1.7	7	10.8
40+	4	3.3	3	2.5	-	-	120	5.8
Total	71	59.2	27	22.5	22	18.3		100

Table 4: Distribution of plasmodium species with regard to age of patient among the study population in 2005 E.C

Regarding to the above table, from the total of 120 patients 38(31.7%) were Orthodox, 32(26.7%) were protestant, 27(22.5%) were Muslim and 23(19.2%) were other religious believer or follower. According to this situation or amount of the more vulnerable infected group of religion were Orthodox which is 38(31.7%) and minimum

infected (venerable) group were other religion believers (follower) which is 23(19.2%). As the above table shows, relatively higher prevalence of malaria was observed in the age group between 17 to 27 years old. Hence, as the patient puts tier response, the individual whose age group between 17 to 27 was spent their time out of their

home village to different works such as farming, to develop more by producing of oil seeds such as linseed sesame and other species in semi-desert area (Tables 4-6).

Religion	Plasmodium species						Total	%
	<i>P. falciparum</i>	%	<i>P. vivax</i>	%	Mixed	%		
Orthodox	8	6.7	25	20.8	5	4.2	38	31.7
Protestant	9	7.5	15	12.5	8	6.7	32	26.7
Muslim	6	5	15	12.5	6	5	27	22.5
Other	4	3.3	16	13.3	3	2.5	32	19.2
Total	27	22.5	71	59.2	22	18.3	120	100

Table 5: Distributions of malaria plasmodium species in relation with patient religion in Nekemte Hospital 2005 E.C

Educational status	Plasmodium species						Total	%
	<i>P. falciparum</i>	%	<i>P. vivax</i>	%	Mixed	%		
Illiterate	17	14.2	41	34.2	17	14.2	75	62.5
Literate	10	8.3	30	25	5	4.2	45	37.5
Total	27	22.5	71	59.2	22	18.3	120	100

Table 6: Distribution of plasmodium species in relation with educational status of patients in 2005

Regarding to educational status, out of 120 patient that were risked in malaria 75(62.5%) were illiterate, and 45(37.5%) were literate. This literate group were in includes all higher grade patient peoples.

According to this educational status of the respondent or patient people, the more vulnerable group was illiterate people, 75(62.5%) (Table 7).

Bed-net usage	Plasmodium species						Total	%
	<i>P. falciparum</i>	%	<i>P. vivax</i>	%	Mixed	%		
User	2	1.7	1	0.8	0	0	3	2.5
Non user	25	20.8	40	58.3	22	22	117	97.5
Total	27	22.5	71	59.2	22	18.3	120	100

Table 7: Prevalence of plasmodium species between ITN users and non-users in 2005 E.C

Prevalence of malaria	Number of respondent (patient)	Percent
Low	90	75
Medium	30	25
High	0	0
Total	120	100

Table 8: Patient's attitude on the distribution of plasmodium species in 2005E.C

Out of the total patients participated in the study 117(97.5%) were non users and the remaining 3(2.5%) were bed net user. From this most non users were risked by the malaria disease. According to the

above table, using of bed nets can protect (keep) from malaria disease and can decrease the distribution of the disease (Table 8).

According to the respondent response depend on around their home villages of prevalence of malaria, from the total of 120 patient, 90(75%) were said low, 30(25%) were said medium and none of the respondents said higher prevalent of malaria were exist in their relative home villages (Table 9).

From the above table the distribution of plasmodium species through stagnant water is 87.5% and through non stagnant water were 12.5% here the above table implies that, more patients, 105(87.5%) were live around stagnant water bodies, an some patients, 15(12.5%) were live outside of stagnant water. Depend on the number of patients we can detect (say) that, stagnant water is more causative agent for the distribution of plasmodium species.

Water body	Plasmodium species						Total	%
	<i>P. falciparum</i>	%	<i>P. vivax</i>	%	Mixed	%		
Stagnant water	24	20	64	53.3	17	14.2	105	87.5
Non stagnant water	3	2.5	7	5.8	5	4.2	15	12.5
Total	27	22.5	71	59.2	22	18.3	120	100

Table 9: Distribution of plasmodium species relation with water bodies in 2005 E.C

Discussion

Malaria has been one of the major public health problems in many developing countries including Ethiopia depending on the climate condition, geographical, location, seasonal variation, and socio economic pattern of the population varying degree of prevalence of malaria infection was reported from different studies [9].

The prevalence of malaria in this study is complimentary to the study done in Oromia region from 1995 to 2000 in which a total of 6214,322 malaria causes were diagnosed and treated. In the study the two most prevalence causes of malaria were *P. falciparum* comprising 32.3% and *P. vivax* which accounted 51.5% the cases [9].

The study conducted in assendabo teaching health center in 2003 partially disagreed with this finding in that the prevalence of *P. falciparum* is 32(51.6%) with 12(7.8%) mixed infection which show that the dominance of *P. falciparum* in contrast to this study. This may be due to difference in the study period, sample size used, study area and other factors [10].

The prevalence of malaria in this study is similar from the study conducted in Jimma town in September 1994. In the study, from 3,424 malaria patient cases *P. vivax* accounted for 58.4%, *P. falciparum* accounted for 30% and the remaining 11.6% mixed infection, which shows that the dominance of *P. vivax* is complementary to this study [11].

With respect to sex, males constitute the highest number of patients due to un used of bed nets, and lives around stagnant water more illiterate people were infected by malaria than other people due to the unknown of cause and distribution of malaria in the area. In this study bed net usage are associated with malaria distribution. This means that prevention (distribution) of malaria and bed net usage has a great association (result).

In general the difference in the overall prevalence and specific malaria species in this study and the study conducted at different place mentioned above might be again due to variation in the study area, period, sample size used, climate condition, environmental factor, economic pattern of the population, difference in study subjects and other factors (Result and other related research).

Conclusion

Stagnant water and educational status are among the major factors that contribute to malaria infection most patient were not using bed

nets. Illiterate patients had increased prevalence of malaria compared to the literate patients. The high number of malaria cases was occurred during the period from September to December, and all age groups were shown to be vulnerable to malaria. During this period due to developed immunity, greater number of malaria cases occurred in male and female patients between 17 to 27 age groups.

Recommendation

Based on the result obtained the following recommendation would be drawn

A. Usage of bed nets should be customized by all patients and the responsible body should be distributing it to the population, especially illiterate peoples and peoples who lives around stagnant water body.

B. Health education on the mode of transmission and method of prevention in general and how to clear the stagnant and initiating to school education in specific should be given.

C. Further research on the prevalence of malaria should be given (conducted) to prevent and control the series consequence of this disease, especially during malaria transmission reason with larger size.

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