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Original Research Article

Short Term Outcome of Malaria at Rwanda Level 2 Hospital Bria in Central African Republic: A Cross-sectional study

Abstract

Background: Malaria has been recognized as a disease affecting peacekeeping forces serving in malaria endemic countries. We wanted to determine the short term outcome of malaria at Rwanda Level 2 hospital.

Methods: Malaria cases were prospectively reviewed and followed at Rwanda Level 2 hospital Bria in Central African Republic for a period of three months. Clinical, laboratory, treatment and short outcome findings were analyzed.

Results: 102 patients with positive rapid diagnostic test and blood smear were reviewed, prevalence rate was 14.97 %, mean age of 37.77±8.4 years and male presented with 91.2%, male sex ratio of 10,3:1. Headaches, body weakness, joint aches, muscle aches, chills and fever presented respectively 98%, 89.2%. 84.3%, 81.4%, 61.8% and 49%. Digestive symptoms were presente anorexia, nausea, abdominal discomfort and vomiting 41.2%, 37.2 %, 31.4% and 8.8% respectively. Plasmodium falciparum was found in 98%, associated with vivax in 1% and isolated vivax in 1%. High parasitemia of 1 to 10 parasites per thick field was found in 8.8%. Malaria recurrence rate was 13.7% with a duration period mean of 38.92 days (range 20-82 days). 35.71% had recurrent within thirty days. 82.4 % of patients received tablets Artemether-lumefanthrine. This Hyparasitemia was associated respectively with nausea p=0.013, OR=5.9, 95% (1.3 - 26.93) and anorexia p=0.003 OR=11.43, 95% (1.43-87.99). Clinical and laboratory findings post treatment showed a strong statistical association.

Conclusion: Malaria is prevalent at Bria; multitudes of symptoms and sign have been documented. Post treatment clinical and laboratory findings showed efficacy of treatment.

Keywords: Malaria, Outcome, Rwanda Level 2 Hospital

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1. Introduction

Malaria is a life-threatening disease caused by parasites that are transmitted to people through the bites of infected female *Anopheles* mosquitoes, the most deadly, and it predominates in Africa. It remains an important health threat to non-immune travelers with the explosive growth of global travel and affecting peacekeeping forces serving in malaria endemic countries [1-4].

The human-pathogenic *Plasmodium* species shows preponderance of *P. falciparum* in tropical Africa, while *P. vivax* prevails over *P. falciparum* in South America. Both *P.falciparum* and *P. ovale* are prevalent in South-Eastern Asia and Western Pacific. Although *P.malariae* may occur in all malarious areas, its prevalence is generally low. *P. ovale* is widespread principally in tropical Africa whereas *P. knowlest* infection occurs in certain forested areas of South-Easter Asia [5].

Although severe malaria is more often seen in cases of P. falciparum infection, complications and even death have been reported in non-falciparum malaria as well [6].

It is manifesting as a multitude of symptoms, degrees of severity and indirect morbid consequence and accuracy of a clinical diagnosis varies with the level of endemicity, malaria season, and age group [7-9].

There were an estimated 219 million cases of malaria (154–289 million) and 660 000 deaths (range 610 000–971 000) in 2010 [1,5].

In 2015, the region was home to 88% of malaria cases and 90% of malaria deaths

Sub-Saharan Africa continues to carry a disproportionately high share of the global malaria burden [1]**.**

The Security Council established the United Nations Multidimensional Integrated Stabilization Mission in the Central African Republic (MINUSCA) by its resolution 2149 (2104) on 10 April 2014 [10]. Rwanda Level 2 hospital is the UN hospital, which serves UN personnel based in Eastern headquarter. It is staffed with surgeons, anesthetists, gynecologist, internist physician, pediatrician, general practitioners, nurses, dental therapeutists, psychologist and physiotherapist.

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1. Materials and Methods

This was a cross-sectional prospective study on malaria cases received from outpatient department and admitted from April to July 2017. Were included all patients whom clinical and laboratory findings confirmed malaria infection among people having facility to this hospital. Post treatment, patients were followed for clinical and laboratory examinations.

Proposal was submitted and approved by Rwanda Level 2 ethical committee.

Data were entered in the computer programme Statistical Package for the Social Sciences (SPSS) software version 16.0 and were analyzed both with the aid of the computer programme SPSS and Microsoft Excel.

Descriptive statistics were used for frequencies, mean, and analytical statistics being used for cross tabulations, 95% confidence intervals applied as necessary. Comparison of means and proportions were done.

The statistical test Pearson's Chi-square was computed only for 2x2 tables with cells which had expected count more than 5 and those having expected count less than 5, Fisher's Exact Test was used. McNemar test was applied for qualitative variables and Paired Samples t-test used on quantitative ones for comparison and the limit of significance was established at $p < 0.05$.

1. Results and Discussion

3.1. Results

102 patients met our inclusion criteria with a prevalence ~~rate~~ of 12.22 %. Male sex ratio of 10.3:1 with a mean age of 37.77 ± 8.4 years. The median (middle) was 38 years and minimum age was 22 years, maximum being 60 years.

98% presented headaches, 89.2 % Body weakness, 84.3 % joint aches, 81.4 % myalgia, 61.8% chills, 41.2 % anorexia, 37.3% nausea, 31.4 % had abdominal discomfort and 8.8 % presented vomiting.

Plasmodium falciparum was found in 98 % of cases and 1% presented both falciparum associated with vivax, 1% was found to have isolated Vivax. 79.4 % of all patients had 1 to 10 parasites per 100 fields, 11.8 % had 11 to 100 parasites per 100 fields, 2.9 % presented 1 to 10 parasites per field and 5.9 % had more than 10 parasites per field.

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13.7 % of this cohort had another malaria episode after recruitment due to *P. falciparum*. 82.4 % were treated with Artemether 20 mg and Lumefanthrine 120 mg, four tablets bid for 72 hours and on fourth day analyze of blood smear was obtained. 12.7 % had IV artesunate for 24 hours; blood smear control was obtained then complete with Artemether 20 mg and Lumefanthrine 120 mg four tablets bid for 72 hours. 3.9 % had IV quinine for 48 hours; blood smear control was obtained then complete with quinine per os for five days. The one with quinine per os had blood smear control on eighth day. After the completion of treatment, clinical examination was obtained.

A morbidity of three days counted for coartem, four days for artesunate and coartem and seven days for quinine was noted. The mean was 3.32 days which patient spent taking treatment for a total of 339 days.

After completing anti malaria drugs, patients followed had 67.6 % of headaches, 53.9% of body weakness, anorexia of 27.5%, abdominal discomfort of 4.9 %, nausea of 3.9 %. 100% of patients had no chills neither vomiting.

There was no association between male or female and presenting high or low parasitemia, p=0.407.

There was a strong association p=0.013 between presenting high parasitemia and nausea. And those presenting nausea had a risk of 5.9 times to be found having more than 11-100 per 100 thick fields malaria parasites. Anorexia had a strong association also with high parasitemia, p=0.003, OR=11.43

Fourteen patients had recurrent malaria where 35.71% had malaria before completing thirty days, 37.71% got it between 30-45 days. The mean days of recurrence were 38.92 days.

There was significance proportions and mean regression of symptoms and signs of malaria after a short term follow up, where some symptoms completely disappeared after immediate treatment. **Table 1**

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Table 1

Variables	Group 1a	Group1b	Diff. of proportions	Chi-square	P-value
Headaches	98%	67.60%	0.3	29.032	p<0.001
Body Weakness	89.20%	53.90%	0.35	21.814	p<0.001
Joint aches	84.30%	2.90%	0.81	81.012	p<0.001
Muscles aches	81.40%	2%	0.79	79.012	p<0.001
Chills	61.80%	0%	0.62	61.016	p<0.001
Anorexia	41.20%	27.50%	0.14	4.024	0.045
Nausea	37.30%	3.90%	0.33	32.029	p<0.001
Abdominal discomfort	31.40%	4.90%	0.26	21.806	p<0.001
Vomiting	8.80%	0%	0.09	Binominal distrib.	0.004
Blood smear	Positive	Negative	1	100.01	p<0.001

				95% CI of difference				
Variable	**Mean 1**	**Mean 2**	**Diff. of Means**	Lower	Upper	**t**	**df**	**p-value**
Fever1-Fever2	37.604	36.417	1.1873	1.0106	1.3639	13.332	101	p<0.001

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5. DISCUSSIONS AND CONCLUSION

5.1. Discussion

In this study, hundred and two malaria cases have been diagnosed, treated and followed at Rwanda Level 2 hospital Bria in Central African Republic for a short period.

Male sex ratio was 10,3:1 where males represented 91.2%.
In the different other studies found high prevalence in males. *Sumadhya D et al.* (2016) [11], found 98.4%, *Barbara E et al.* **(**2011-2012**)** [12] found 84 %, *Muhammad I et al.*(2014-2015) [13]**.** found 88.6%, *Fabien Sauvet et al.* (2006) found 97.39%[14]. This is obviously due to the very small number of females deployed in peacekeeping missions compared to males.

Our patients' age was between 22 and 60 years old with a mean of 37.77 ± 8.396. These results are similar to results found by below other authors: [13] found that peacekeepers with skin diseases were aged form 20 to 60 years. Regarding our mean age of 37.77 years, [9] found that troops aged between 20-40 years constituted 96.3%.

In this study, symptoms and signs dominated by headaches, body weakness, joint aches, muscles aches were quietly comparable to those found by L. Sanchez et al. [15]. The difference being due to sample size. **Table 2**

	Our study =102		**L Sanchez et al. =38**	
	Number	**%**	Number	**%**
Headaches	100	**98**	30	**79**
Weakness	91	**89.2**	13	**34**
Fever (° C)	50	**49**	30	**79**
Joint aches	86	**84.3**	3	**8**
Muscle aches	83	**81.4**	2	**5**
Nausea/vomiting	47	**46**	5	**13**
Anorexia	42	**41.2**	1	**3**

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Plasmodium falciparum was prevalent at 98% and associated or not with *P.vivax* in 2%. These results are similar to those found by [11] where descriptive statistics of the malaria attacks during deployment of military in endemic overseas territories found a rate of (n=44); where *P. falciparum* was found to be prevalent with 22.7% and *P. vivax* with 13.6%; they found also that not recorded of 63.7% in 44 malaria attacks.

In this study, patients had a minimum time of treatment of three days up to seven days. A morbidity of 3.22 days loss (out of work) was found during this study for a total of 339 days. These results are comparable to the result found by [3] in the last century, malaria historically caused greater loss of manpower than combat-related injuries during deployments to tropical regions. This study found that there is no association between sex and parasitemia neither age with parasitemia p=0.407 and p=0.939 respectively. These results are similar to those found by Hassan Ali et al. where they found that malaria parasite density was not related to age, gender and hepatosplenomegaly [16].

Our study found a malaria recurrence mean of 38.92 days (20-82 days), where 35.71% had malaria before 30 days, 37.71% got it between 30-45 days, 14.29% got it between 46 to 60 days and 14.29 % had it after 60 days. These results are superposable to those of Yehenew A. Ebstie et al (2015), where it is reported that only 1.5 % of participants were shown late parasitological failure between seventh and 14th day follow up and 1.3 % were free from anemia at the end of follow-up [17].

The study found an association between parasitemia of more than 2+ parasites, p=0.013, OR=5.9 95% CI (1.3 - 26.93). There is a relative risk of 5.9 to have parasitemia of more than 2+ when you presente nausea due to malaria. There was also association between presenting anorexia due to malaria with parasitemia of more than 2+ parasites p=0.003,OR= 11.43 95% CI (1.43-87.99).

Regarding comparison of clinical manifestations of malaria before and after the treatment, this study found that all presented symptoms and sign of our patients had significantly decreased with positive proportions, means and significant probabilities less than 0.05 as shown in the comparative table with free from parasitemia. These results are

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similar to those found by [17] (2015), among 130 participant in the study, 60% were males and 96.1% participants were free from parasitemia at day 3. At the end of the study, 98.5% of participants showed adequate clinical and parasitological response of the drug.

Artemisinin derivatives were used in 95.1% in this study, and showed a good outcome from clinical and laboratory results. These findings are similar those of Houston S, Houston A (2015)**,** where Artemisinin derivatives are currently the mainstay of antimalarial treatment throughout the world. Their implementation, along with expanded use of insecticide-treated bed nets, accounts for a large part of the reduction in malaria deaths in Africa over the past decade [18].

This study found that two patients had malaria while were on prophylaxis of Lariam and doxycycline. These findings are correlated to this statement where Prophylactic and clinical failures of doxycycline against *P. falciparum* have been associated with both inadequate doses and poor patient compliance. However, resistance can also explain failures of prophylaxis [19].

5.2. CONCLUSION

Malaria is still considered as global morbidity health problem and major killer. It is prevalent in Bria area; where multitude of symptoms and sign some associated with parasitemia and mixed species of *Plasmodium* have been proved.

The association between high parasitemia, nausea and vomiting has been documented. Artemisinin derivatives showed good clinical and laboratory outcome. There was a significant immediate decrease of symptoms and sign after treatment. An average of 3.32 days malaria morbidity was found.

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