Treatment of asymptomatic-malaria improves the CD4 cell count of HIV-positive patients in Port Harcourt, Nigeria.

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Abstract: Malaria infection has been associated with a rise in viral load and a fall in CD_4 cell count potentially worsening the clinical course of people with HIV infection. Reports have shown that this viral burden can be partly reduced with antimalarial therapy in some patients. Furthermore**,** a decrease in response to antimalarial therapy as a result of an impairment of T-cell immunity has been established in immunosuppressed persons. Confirmed asymptomatic-*Plasmodium falciparum*-positive HIV-infected patients were treated with a complete course of artemether-lumefantrine and their CD4 cell counts before and after treatment were evaluated. Results showed an increase in CD4+ cell count after treatment. PCR data for parasite carriage showed that 50% of the subjects cleared the parasites after treatment. Results suggest that treatment of asymptomatic-malaria improves the immune status of HIV-infected people by increasing the CD4 cell count.
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Introduction

Malaria and HIV overlap in sub-Saharan Africa and management of the co-infection is a major public health issue in HIV-infected patients. Adults living in stable malaria regions acquire immunity due to continued exposure. This immunity is eroded by HIV infection thereby resulting to increased parasitaemia and fever especially in those with advanced immunosuppression.[1] Studies have shown that vulnerability and frequency of malaria infections appear to be increased in HIV-positive adults particularly those with low CD4 cell counts.[2] The severity of the malaria disease is dependent on the speed of the response of the immune system and this is very much dependent on CD4 cells which control blood stage malaria infection.[3]

Asymptomatic-malaria infection is very common in adults in endemic regions due to the immunity acquired as a result of continued exposure to malaria infection.[1,4] These asymptomatic-malaria parasite carriers do not seek medical treatment and as such act as fundamental reservoirs of parasites and remain infective longer than the treated symptomatic patients thereby contributing to the persistent transmission of malaria.[5]

Artemether-lumefantrine is the first-line drug for the treatment of uncomplicated malaria in Nigeria hence the choice of its use in the study. Study was designed to address the paucity of data on the management of asymptomatic-malaria infection in HIV-infected people in the study area. The aim of the study was to assess the effect of the treatment of asymptomatic-malaria on the immune status of HIV-positive patients infected with *Plasmodium falciparum* based on their CD4 cell count. In clinical practice especially in sub-Saharan Africa, testing, treating and tracking of malaria is limited to clinical symptomatic cases.

We present a preliminary data which indicates that treatment of asymptomatic-malaria infection in HIV-positive patients improves the CD4 cell count of the patients.

Materials and methods

Study was carried out in Port Harcourt, a city in the Niger Delta region of Nigeria characterised by mangrove vegetation and heavy rainfall with a report of 46.7% Plasmodium prevalence among HIV-positive persons.[6] Ninety three (93) adult persons with previously HIV infection attending antiretroviral adult clinics who were found positive for *P. falciparum* by microscopy were recruited for the study. Venous blood samples were collected from these persons on D0 and D28 and analysed for CD4 cell count tests. All the participants were treated with full course of artemether-lumefantrine (Coartem®), 4 tablets two

times daily for 3 days. All of these individuals neither showed nor reported any symptom suggestive of clinical malaria hence they were all classified as asymptomatic-falciparum malaria carriers.

CD4 tests were carried out using the Partec Cyflow Counter FCM System (Partec GmbH. Otto-Hahn-StraBe 32. D-4816 Munster, Germany) on collected blood samples.

Plasmodium falciparum genomic DNA was extracted from dried filter papers using Chelex method as previously described elsewhere.[7] PCR amplifications were carried out on the extracted DNA to confirm parasitaemia positivity.

Results

Paired peripheral blood CD4 T-cell counts at both day 0 and day 28 were available for 56 of the participants. Analysis of the CD4 cell counts over 28 days using STATA version 11, revealed a mean increase of 107.3 cells per µl (95% CI 53.8 – 160.8; *P = 0.0002*) in 68% (38/56) of the study participants (Table 1). Using the PCR data as a more reliable test for parasite carriage, it was observed that out of the 38 subjects with decreased CD4 cell count, 19 of them cleared the parasites by day 28.

Table 1. CD4 cell counts of some study participants (n=38)

Variable	Obs	Mean	Std. Dev.	Min	Max
cd4_d0	38	429.3158	213.4573	47	952
cd4_d28	38	536.6053	221.2289	44	962

Discussion

Several studies have established the relationship between CD4 cell count and malaria infection.[8] A significant increment in CD4 cell count was observed in a Zambian study in both HIV-negative and HIV-positive adults after successful treatment of uncomplicated malaria. However in patients with asymptomatic-malaria, the CD4 cell count observed were similar to those at enrolment. The result of our study was in consonance with the observation among the patients with uncomplicated malaria but differs from those with asymptomatic-malaria in the Zambian study.

The increased CD4 cell count after treatment with AL suggests that there was an improvement in the immune status of the patients after treatment with AL since an improved CD4 result is a good measure of immune status of patients.[9] Use of CD4 cell count level as a measure for monitoring of ART has been proved to be a good measure in resource limit areas where viral load measure is not economical due to limited financial empowerment.[10]

The clearance of parasitaemia from some of the study participants after treatment and the resulting increase in CD4 cell counts is in consonance with earlier studies which evidenced lower CD4 cell counts in HIV-positive people infected with *P. falciparum*.[2] This parasite clearance is therefore presumed to be contributory to the improved CD4 cell count in these study subjects.

Earlier studies advocates that since asymptomatic-Plasmodium carriers act as reservoirs responsible for sustaining parasite population, community screening and treatment of asymptomatic-malaria with AL may reduce malaria transmission significantly.[5] This underlines the importance and relevance of the study and surveillance of asymptomatic-malaria infections in an environment.

Conclusion

Treatment of asymptomatic malaria infection improves the CD4 cell count of HIV-positive people in Port Harcourt, Nigeria thereby improving their immunity. There is need to identify, treat and control asymptomatic-malaria which may trigger clinical disease and further reduce immunity of the HIV patients thereby making them more susceptible to other infections.

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Declaration of conflicting interests

The authors declare no conflict of interest.

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Research Ethics

Permission for the study was obtained from the Ethics Committees of the University of Port Harcourt Teaching Hospital, Braithwaite Memorial Hospital Port Harcourt, Nigeria and The London School of Hygiene and Tropical Medicine, London, United Kingdom.

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References

1. Whitworth J, Morgan D, Quigley M, Smith A, Mayanja B, Eotu H, Omoding N, Okongo M, Malamba S. & Ojwiya A. Effect of HIV-1 and increasing immunosuppression on malariaparasitaemia and clinical episodes in adults in rural Uganda: a cohort study. *Lancet:* 2000:356**,** 1051-6.
2. French N, Nakiyingi J, Lugad E, Watera C, Whitworth J A. & Gilks CF. Increasing rates ofmalarial fever with deteriorating immune status in HIV-1-infected Ugandan adults. *AIDS,*2001: 15**,** 899-906.
3. Perlmann P. & Troye-Blomberg M. Malaria blood-stage infection and its controlby the immune system. *Folia Biol (Praha),* 2000: 46**,** 210-8.
4. Bottius E, Guanzirolli A, Trape JF, Rogier C, Konste L. & Druilhe P. Malaria: even morechronic in nature than previously thought; evidence for subpatent parasitaemia detectable bythe polymerase chain reaction. *Trans R Soc Trop Med Hyg,* 1996: 90**,** 15-9.
5. Zoghi, S., Mehrizi, A. A., Raeisi, A., Haghdoost, A. A., Turki, H., Safari, R., Kahanali, A.A. & Zakeri, S. Survey for asymptomatic-malaria cases in low transmission settings ofIran under elimination programme. *Malar J,* 2012: 11**,** 126.
6. Ukibe NR, Onyenekwe CC, Ahaneku JE, Meludu SC, Ukibe SN, Ilika A, Ifeanyichukwu MO, Ezeani MC, Igwegbe AO, Ofiaeli A, Onochie A & Abor N. CD4+ T-cells count in HIV-malaria co-infection in adult population in Nnewi, South Eastern Nigeria. *Int. J. Biol. Chem. Sci.* 2010*; 4(5): 1593-1601.*
7. Dlamini SV, Beshir K, Sutherland CJ. Markers of anti-malarial drug resistance in *lasmodium falciparum* isolates from Swaziland: identification of pfmdr1-86F in natural parasite isolates. *Malaria J,* 2010: **9:**68.
8. VanGeertruyden JP, Mulenga M, Kasongo W, Polman K, Colebunders R, Kestens L, D'Alessandro U. CD4 T-cell count and HIV-1 infection in adults with uncomplicated malaria. *J Acquir Immune Defic Syndr.* 2006 Nov 1; 43(3):363-7.
9. Kublin JG, Patnaik P, Jere CS, Miller WC, Hoffman IF, Chimbiya N, Pendame R, TaylorTE. & Molyneux ME. Effect of Plasmodium falciparum malaria on concentration ofHIV-1-RNA in the blood of adults in rural Malawi: a prospective cohort study. *Lancet,* 2005:365**,** 233-40.
10. Jourdain G, Le Coeur S, Ngo-Giang-Huong N, Traisathit P, Cressey TR, FregoneseF, et al. Switching HIV Treatment in Adults Based on CD4 Count Versus Viral LoadMonitoring: A Randomized, Non-Inferiority Trial in Thailand. *PLoS Med,* 2013:10**,** e1001494.

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