REVIEW

HIV-*Plasmodium* Co-infection: Malaria in AIDS patients

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Abstract: Malaria and HIV are amongst the two main diseases worldwide and creating troubles of our time. Together, they grounds extra than four million deaths a year. Malaria causes around about for more than a million deaths each year, of which over 80-90% come about in tropical Africa, somewhere malaria is the primary source of mortality in children below six years of age. Sideways as of adolescent, children, pregnant women are surrounded by the largest part exaggerated by the disease. In the wide geographical extend beyond in event and the follow-on co-infection; the interface flanked as a result of the two diseases visibly has foremost communal strength results. Thus both are dangerous for health at the same time.

Keywords: Immunocompromised, shizogony, replication, macrophages.

INTRODUCTION

Malaria is a ruthless disease caused by a parasite, which is widen through ways of contaminated mosquitoes. In developing countries mostly this disease is a problem with unenthusiastic climates. There are four types of malaria caused by four linked parasites. Symptoms of malaria consist of fever, nausea, flue related symptoms, diarrhea, jaundice and fever (Good *et al*., 2010). HIV and malaria are diseases of related interactions with mutual distributions, which highlights the issue in which way these two diseases are related. Yet small belongings and minute relations can have a huge rage. Co-management of the two conditions gives a figure of therapeutic and prepared challenges, mainly when HIV infected pregnant lady comes to the prenatal care (Migot *et al*., 2006).

Epidemiology

Co-infection of malaria and HIV is mainly the main disease spreading in the Africa. This co infection is also the main spreading disease delivering at large public hospital in Kisumu, and western Kenya. There has been lot of improvement in comprehensive maps to sort threat areas for this mixed co-infection. Identification of levels of antimalarial medicine use in sub-Saharan Africa connected, with HIV ranking disease management. A statically replica applied to a setting in and around the world with an adult population of roughly 220,000 estimated that, since 1981, the disease communication may have been accountable for 8,600 excess HIV infections and 990,000 excess malaria episodes. Deaths have occured in Africa due to sever effects of malaria in AIDS patients (Ouedraogo *et al*., 2006; Xiao *et al*., 2006).

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Association between HIV and Malaria

Infection with HIV results in destruction of immune system as well as causes progressive cellular immunosuppression and any consequential harm in the immune response. *Plasmodium falciparum* has been exposed to HIV and then copying through the meeting of cytokines by activated lymphocytes. *Plasmodium falciparum* also increases the latent pool for HIV in the placenta by raising the number of $CCR5^+$ macrophages. HIV plasma viral loads were severely prominent in patients with malaria infection than in those lacks of this infection, and these levels remain higher about upto ten weeks after treatment. The increase in viral load was maximum in those with investigational malaria, high levels of parasitemia, and relatively high CD4 counts. In short, HIV-*Plasmodium* co-infection causes impact on disease manifestation, along with an enlarged risk of difficult and severe malaria and leads to death (Froebel *et al*., 2004; Tkachuk *et al*., 2004; Kublin *et al*., 2005; Mermin *et al*., 2004). There is higher rate of malaria treatment failure in HIV-infected patients. Co-trimoxazole as prophylaxis has been used to be effective for avoidance of some opportunistic infections in HIV-infected patients, sometime also in prevention of malaria episodes (Kuile *et al*., 2004; Mwapasa *et al*., 2004).

Impact of malaria on HIV

Malaria plays a very dangerous role of disease in HIV-infected patients. On very top of the brief viral load increase, many adults are most likely ill with malaria and are always uncertain to connect in much sexual intercourse. Malaria may have an important stimulating effect on the threat of HIV transmission, as blood deficiency is caused by *Plasmodium falciparum* ruminants a number of causes is of blood transfusions.

Seventy percent of children hospitalized for malaria were transfused and there was a physically prevailing dose reaction between transfusions and HIV possibility (Inion *et al*., 2003; Ayisi *et al*., 2003). Increased in the number of observations have proved pathological interactions between HIV and malaria in dually infected patients. During prevailing malaria episodes a brief almost one-log increase in HIV viral weight occurs and as a result weakness to malaria s is increased in HIV-infected patientsf. Mixed infection may also have helped the geographic growth of malaria in those places where HIV occurrence is near to touching the highest point. Thus it can be stated that a major factor in increasing the HIV infected patients is due to increase in the viral load, as viral load has a direct relation in malarial infected patients (Brahmbhatt *et al*., 2003; Ned *et al*., 2005).

Effect of HIV on malarial parasitaemia

In widespread areas HIV disease impairs the acquired immunity to malaria in older children and adults. Adults with HIV also have a higher risk of harsh quantifiable malaria, predominantly in areas of uneven broadcast. People with HIV were supplementary to have brutal malaria, and the possibility was increased in HIV-infected patients with a CD4 cell count below two hundred (Schofer *et al*., 2006). Non-immune HIV-infected patients were extensively more liable to have rigorous irrefutable malaria than were non-immune patients without HIV. In children the situation is a bit denser. Rates of parasitaemia amongst older HIV infected children under the age of five were one point seven fold advanced than in those exclusive of HIV, and they had bigger parasite solidity as well. Cruel anaemia and hospitalisation owed to malaria was more frequent in HIV unhygienic infants (Rolfs *et al*., 2006). In a case studied, Sixty-four (4.6%) of 1388 children with severe malaria had bacteremia; nontyphoidal *Salmonellae* (NTS) accounted for 58% of all bacteremias. The prevalence of any bacteremia and of NTS bacteremia was highest in children with severe malarial anemia (11.7% and 7.6%), compared with the prevalence in children with cerebral malaria and severe anemia (4.7% and 3.8%) and in those with cerebral malaria alone (3.0% and 0.9%). HIV infection status was determined in 1119 patients. HIV prevalence was 16% (and was highest in those with severe malaria anemia, at 20.4%) but HIV infection was not significantly associated with bacteremia. Neither bacteremia nor HIV infection was associated with death (Buchacz *et al*., 2010).

Management of Malaria in AIDS Patients

The emergence of resistance and tolerance to the existing drugs has created a decreased efficacy of these drugs in use. This problem has been tried to be overcome by increasing the drug delivery to the target site by the use of polymers (Khalid *et al.*, 2009; Hussain *et al.*, 2011) or through nanotechnology (Naz *et al.*, 2012; Ehsan *et al.*, 2012), synthesis of new drugs, either by the use of proteomics (Qadir, 2011; Qadir and Malik, 2011), or synthesis from lactic acid bacteria (Masood *et al.*, 2011), or marine microorganisms (Javed *et al.*, 2011). However, now a days, the trend is being changed from synthetic drugs to the natural drugs either from plants or microbes to control the diseases (Iqbal *et al.*, 2014). The natural products are constantly being screened for their possible pharmacological value particularly for their analgesic (Parveen *et al.*, 2014) anti-inflammatory (Qadir, 2009), hypotensive (Qadir, 2010), antihyperlipidaemic (Ahmad *et al.*, 2012) hepatoprotective (Ali *et al.*, 2013; Mallhi *et al.*, 2014; Saleem *et al.*, 2014a; Qadir *et al.*, 2014), hypoglycaemic (Qadir and Malik, 2010), amoebicidal (Asif and Qadir, 2011), anti-fertility, cytotoxic (Saleem *et al.*, 2014b), antimicrobial (Amin *et al*., 2012; Azam *et al*., 2013; Saleem *et al.*, 2014c), spasmolytic (Janbaz *et al.*, 2014), bronchodilator (Janbaz *et al.*, 2013a), antioxidant (Janbaz *et al.*, 2012), anti-diarrheal (Janbaz *et al.*, 2013b), anti-cancer (Saleem *et al.*, 2013) and anti-Parkinsonism properties. Every year more than 4 million death casualties occurred due to malaria and more than five and half billion deaths occurred due to antimalarial therapy. New informations are provided on the basis of the nutrition, pregnancy and immune deficiency syndrome and other parameters, as malaria and AIDS effect the patients on the basis of the pregnancy and malaria is also disturbed by the immune compromised status of the patient. This information about the malaria and mortality rates in different patients according to pregnancy, nutrition and immuno-compromised status requires a high-modified research by high qualified researchers in different ways by a WHO involvement and a health care system of different countries. Use of Artemisinin-based combination therapy (ACT) is very effective now a day against malaria, as it helps to strengthen treatment against malaria, along with the choloroquinine against the *Plasmodium falsiparum*. Other drugs may be costly against the malaria but use of ACT has become cost effective for malarial therapy. Some time medical tools can also be used along with this therapy. A number of cases leading to success due to anti- malarial therapy has been seen, and ACT has been proved a good triumph (Whitworth *et al*., 2000). Health care system of Canada has not given a good success against the malaria since 1960. Different approaches were developed to remove malaria in and around Canada. DDT spraying and insecticide spraying was used to kill malarial parasites. Use of nets was employed to treat malaria. A number of such protective measures are being applied to eradicate malaria in different areas, insect killing spraying and spraying of DDT and insect preventing beds are being applied. There are a number of methods employed as 53% success has been obtained in case of this therapy against malaria in Canada. We should also take many steps to remove malaria and its diseases. Quinine and choloroquinine are being applied as treatment for this purpose and a number of research products arte being

used now a days and scientists are working on it get new treatment for the malarial patients, if they got success, then it will be economical and will be easy to eradicate the malaria, as well as HIV along with malaria has also given success against such cases. There are a number of experiments on the hit list are being on use against malaria and success is being on the hand (Davis, 2000).

Cotrimoxazole role in prevention and treatment of malaria with HIV

Assessment of the value for an every day basis cotrimoxazole for treatment with analytic HIV infection with the worth of IPT with sulfadoxine-pyrimethamine with look upon to the lessening of: placental at release and motherly Anti-malarial value of cotrimoxazole.

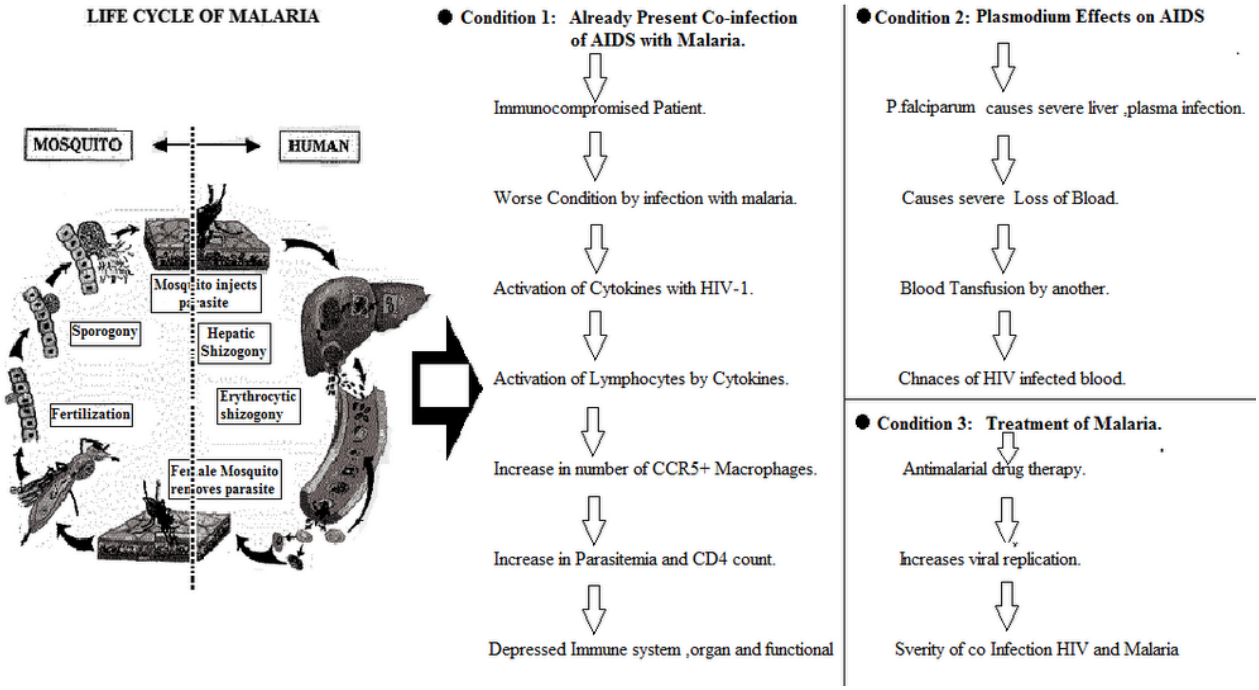

Fig. 1: Malaria and AIDS Co-infection, Condition 1 = Already Present Co-infection of AIDS with Malaria, Condition 2 = Plasmodium effects on AIDS, Condition 3 = Treatment of Malaria.

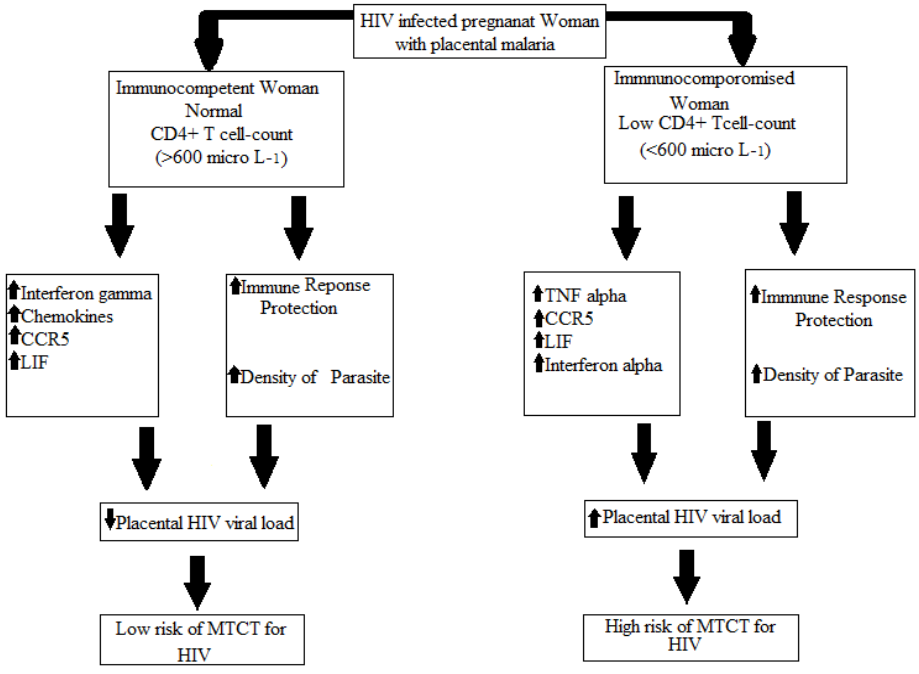

Fig. 4: Effects of HIV and Malaria in Pregnant Woman

Table 1: Effect on Immune System

Parasites	Malarial Pathogens	
Target Cell	Macrophage and Dendrite cells	CD4 and CD8 T cells
Changes due to Immune system	1. Monocytes and dendrite cells T activation. 2. Inflammatory cytokines are produced. 3. Upergulated Expression of chemokine receptors(HIV Receptors)	Lymphocytes activation. Immunosuppression. Inflammatory cytokines are produced. Upergulated Expression of chemokine receptors.
Possible Effects.	1. Increased chances of susceptibility of mononuclear cells to HIV infection. 2. Increased viral replication chances in HIV infected cells. 3. Placentas have immunologic and pathological changes. 4. Use of antimalarial can cause increase in viral replication because they are immunosuppressants.	

Table 2: Malaria and HIV outcomes on Mother and infants

Mother	1. Increased load of HIV virus. 2. Increased transmission of HIV vertically 3. Birth weight is decreased of infants of infants produced from dually Infected mothers.
Infants	1. Blood transfusion increases HIV transmission. 2. Persistent very high HIV viral load. 3. Possibility of increased HIV progression. 4. Increase in the possibility of rapid death of increased HIV infected infants.
Adolescent	1. Chances of increased HIV viral load. 2. Chances of high accelerated diseased progression.

Accountability of cotrimoxazole in the action of stride onward infections. HIV infected patient are at risk factor rates and are affected by the immune deficiency some times. For such patients who are HIV infected, we should employed anti malarial therapy, we use sulfa based therapy for this purpose, cotrimoxazole can be used as a prophylaxis as it prevents a patient from being infected by malaria along with HIV. As cotrimoxazole prophylaxis also helps to prevent the fetus during pregnancy from infected woman with malaria. Such health care needs are being applied against malaria as well as HIV infected patients, so mortality rate can be decreased to a very low value and a number of lives can be save (Sadiq *et al*., 2004; Augenbraun *et al*., 2005; Erbelding *et al*., 2006; Gregory *et al*., 2006; Hicks *et al*., 2004).

Interactions and consequences of chemotherapy

The world wide study of malaria along with the HIV diseased patients has shown us that there are a number of cases has been seen in which malaria transmission occurs into the HIV diseased patients. Co infection of malaria and HIV is still completely non-understood, and there are many worse conditions seen for malaria as leads to death. Anti-malarial therapy is some time being applied, but an anti-malarial drug is not anti-reteroviral, but an antireteroviral drug is being applied against malaria as it is used against HIV infections as well as against malaria (Ali *et al*., 2012; Aslam *et al*., 2012; Ali *et al*., 2013a & b; Janbaz *et al*., 2013; Qadir *et al*., 2013; Rompalo *et al*., 2003; Rusnak *et al*., 2007; Tikjob *et al*., 2006; Joyanes *et al*., 2005).

Prevention of malaria in pregnant women with AIDS

Observing the worth of currently optional plan of at least three doses of IPT with sulfadoxine-pyrimethamine. sulfadoxine-pyrimethamine for obstruction of malaria in pregnant women and stratified by HIV contamination rank different antiretroviral are being used. Women who are pregnant or to be predictable to become pregnant should always avoid from being traveling in pregnancy conditions of malaria program in adding to put a end to mosquito bite and to convey into play of chemoprophylaxis. HIV infected patients should always use cotrimoxazole and insect killing treated mosquito nets. Malaria avoidance is above all important for pregnant women with HIV, even though more information is desired about the best grouping of strategies for prevention. In people with HIV, malaria diagnose should be complete, highly effective drugs may be used for management, and achievable drug relations should be measured (Bordon J *et al*., 2005; Hook *et al*., 2005; Lukehart *et al*., 2004; Musher *et al*., 2003; Musher *et al*., 2003; Yinnon *et al*., 2005; Hook EW *et al*., 2006).

CONCLUSION

The major effects of HIV on malaria in adults are recently have been importantly recognized. International scientists are estimating the rage of infrastructure pushed between malaria and HIV resting on the physical state of people appreciated by both diseases. The main issue is on the hand to combine events in the direction to manage malaria and HIV at mixed levels of the health system, and along with it to modify responses to civilization needs, and optimize also to work out of insufficient belongings for included check delivery. On the other hand there are many possibilities for synergism, in persnickety next to an example of increasing unfair and monetary pledge on the way to orderly down the load of HIV/AIDS, tuberculosis and malaria.

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