



## Metabolic Disturbances for Instance Diabetes and Renal Diseases

Aliena G\*

Department of Pathology, Al-Yamamah University, Riyadh, Saudi Arabia

\*Corresponding author: Aliena G, Department of Pathology, Al-Yamamah University, Riyadh, Saudi Arabia, E-mail: martinmarklijs@gmail.com

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### Introduction

Hematological analysis is an important aid for clinical diagnosis of systemic, infectious and some parasitic diseases. Hematopoiesis maintains adequate balance between production and destruction of blood cells. Due to the decrease in the bone marrow's ability to respond to stimuli such as bleeding, infection and cytotoxic damage during ageing this modulation becomes imbalanced. Various studies have shown that malaria infections were associated with complications such as cerebral involvement, renal involvement and anemia among people of older age groups. Respiratory disorder has also been associated with malaria in older people. Also, some studies suggest a decline in the stem cell population reserve, decreased sensitivity of stem cells and precursor cells to the action of cytokines, imbalance in the hematopoietic cytokine production and alterations in the microenvironment impairing homing. Anemia, generally mild, is a common problem in the elderly, especially in men. The incidence of anemia increases with age, principally after 60-years-old. This high prevalence raised the hypothesis that lower levels of hemoglobin could be associated with the normal ageing process.

### Non-Communicable Diseases with Oxidative Stress in the Blood

Furthermore, there is increased prevalence of geriatric non-communicable diseases in tropical malaria endemic areas particularly diabetes, hypertension etc. These diseases are associated with possible immunosuppressive functions likely to affect the integrity and sustenance of partial immunity like that developed against malaria. While it is possible that impaired immunity as a result of non-communicable disease pathologies could increase susceptibility to severe infections including malaria, it is also possible that high malaria prevalence and intensity could make one susceptible to non-communicable diseases. The etiology of these non-communicable diseases in tropical endemic areas is largely unknown. However, it is known that malaria parasite activity is associated with oxidative stress in the blood and other associated tissues. Frequent exposure to the parasite without control and increased parasite intensity will only translate to oxidative stress. Increased oxidative stress on the other hand triggers inflammation, contributing significantly to the pathology of non-communicable diseases by inducing a lot of metabolic disturbances as a result of the activities of reactive oxygen species.

The incidence of diseases related to such metabolic disturbances for instance diabetes, renal diseases; cancers are rising and are mostly age dependent. In addition immune response to malaria is associated with the release of pro-inflammatory cytokines that are associated with the compromise of normal body metabolism that could result in non-communicable disease conditions. Frequent exposure to infectious diseases such as malaria without proper management and control could have pathophysiological impacts associated with non-communicable disease conditions and outcomes.

Hematological parameters such as packed cell volume, total white blood cell and platelet count are very important in the management of malaria infected patients. Samje et al. in the University of Buea Cameroon observed 45% decreases in PCV level among malaria infected patients. Attributed the decrease in PCV level (anemia) to some degree of hemolysis in malaria infected patients. The added that mild thrombocytopenia with counts down to  $100 \times 10^9/L$  are common in malaria infected subjects. This decrease in platelet count might be due to mild splenomegaly reported in some malaria infected patients. Thrombocytopenia in malaria infection was also reported in Uttarakhand State of India.

Furthermore, showed that white cell count was slightly increased in malaria infected patients. The mean value of total white cell count among malaria infected patients was about  $2 \times 10^9/L$  less than that of non-malaria infected elderly and this difference was statistically significant ( $p$ -value=0.0008). This increase may also be due to neutrophil reported in most cases of acute haemorrhage or due to monocytosis as seen in most cases of malaria infection. This finding is different from the work done in a semi-urban community in southwestern Nigeria where leukopenia was observed in acute malaria infection. The relationship between malaria in the elderly and its outcome on their state of health in endemic areas such as Nigeria continues to be a subject of research. Hence this present work is carried out to ascertain the hematological parameters of the elderly infected with malaria parasitaemia.

### Decreased Platelet Membrane of Protein Kinase C Activity

The platelet count does not change with age. Increased plasma levels of two platelet granule constituents, b-thromboglobulin and platelet factor 4, have been found in individuals over 60 years of age in comparison with younger individuals. Enhanced *in vitro* reactivity to platelet-aggregating agents has been observed. Observed decreased platelet membrane protein kinase C activity and translocation to the cytosol after platelet activation was noted in platelets from older subjects. Also, the non-significant difference in platelet counts observed in the present study confirms these findings.

Further reported that the aged infected with plasmodium falciparum malaria exhibited important changes in some haematological parameters with low platelet count and hemoglobin concentration being the two most important predictors of malaria infection.

Hematological investigation is relatively inexpensive and a less technical sophisticated way for malaria detection. Hematological parameters of malaria infected elderly subjects significantly differ from that of healthy unaffected elderly individuals. The mean values of haematological parameters of malaria infected elderly males are significantly different from those of their female counterparts. PCV,

TWBC and neutrophils are higher in the male subjects than in the females. HB, platelets and neutrophils are lower in the males than the females. The present study has demonstrated that asymptomatic malaria has deleterious effects on haematocrit and hemoglobin

concentration which can predispose the elderly subjects to anemia. Since malaria in the elderly can lead to anemia, the use of insecticides treated nets and regular medical check-up is strongly advocated to reduce mortality and morbidity among the elderly.