



An Update on Impact of Malaria in Pregnancy on Hematological Parameters

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ABSTRACT: Malaria infection occurs among all classes of persons including the young and the old but is more pronounced in children and pregnant women because of their immune status. Pregnant women are known to express immune suppression leading to increase prevalence of malaria in them. Malaria infection has a lot of alterations in the hematological parameters of pregnant women which may lead to high level of anemia in them. It is important to prevent malaria infection in pregnancy to avert high morbidity and mortality associated with malaria infection among pregnant women. This paper discussed impact of malaria infection in pregnancy.

Keywords: *malaria, pregnancy, hematological parameters*

Impact of malaria in pregnancy on hematological parameters

Malaria infection during pregnancy can have adverse effects on both the mother and the foetus. The effects on maternal hematological parameters, particularly hemoglobin in concentration, It is well established that anemia is the most common consequence of *P. falciparum* malaria infection and it is generally accepted that in malaria – endemic areas, *P. falciparum* is a major contributor to anemia in pregnancy (Menendez, *et al*, 2000).

Haematological changes are important features in *P. falciparum* infection in pregnant women and they play important role in malaria pathology. Malaria in pregnancy is a known cause of maternal anemia. These abnormalities involve the major cell lines such as red blood cells, leucocytes and thrombocytes (Maina *et al.*, 2010). This results in anemia, thrombocytopenia, and leucocytosis or leucopenia in patients with malaria (Maina *et al.*, 2010; Ladhani *et al.*, 2002). Hematological changes in malaria, such as anemia, thrombocytopenia and leucocytosis or leucopenia are well recognized.

Anemia in pregnancy is an important public health concern in developing countries and it is usually more pronounced in primigravidae than in multigravidae (Shulman, *et al*, 1996). The predisposing factors of malaria in pregnancy are multifactorial and it includes poor nutrition, malaria parasite, haemoglobinopathies, advanced HIV infections and infection with other parasites (Mahomed, 2000). Though most of the factors are preventable, the overall prevalence of anemia in pregnancy continues to be a common clinical problem in the third world. In pregnancy, plasma volume increases 25 – 80% between the sixth and twenty-fourth week of gestation. However, the increase in RBC mass has been found to be approximately 30% between the twelfth and thirty-sixth week of gestation when iron and folate are supplemented (Shen *et al.*, 2010). In late pregnancy, plasma volume increases at a slower rate, inducing a slight rise in haematocrit level. These physiological changes during pregnancy make it difficult to define normal hematological reference intervals for pregnant women.

Decrease in hemoglobin and packed cell volume concentration are common findings during pregnancy and results from increased plasma volume combined poor iron intake (Ruchi *et al.*, 2013). The decrease in PCV may be due to increase in plasma volume during pregnancy. Hence there is need for adequate management of their blood profiles with dietary supplementation. A study showed marked decrease in PCV in the third trimester of pregnancy might be attributed to maternal diabetes (Pilszczek *et al.*, 2008). White blood cells are responsible for body defense. Additionally, the decrease in Hb level and HCT as pregnancy advances in the gestational age groups could also be due to increase demand for iron as it progresses as well as haemodilution accompanying pregnancy. World Health Organization (2010) also reported that PCV of pregnant women tend to fall from 35 – 21% due to increased volume and decreased resistance, cardiac output rises. Decrease PCV is seen in a lowering of the blood pressure, especially in the third trimester which sometimes causes dizziness or feeling faint in women as they rise to stand during the third trimester.

During pregnancy, WBC is reported to be elevated. Increase in these haematological parameters may be as a result of the body building the immunity of the fetus and it is achieved by a state of selective immune tolerance, in the presence of a strong antimicrobial immunity (Elgari, 2013). Roy *et al.* (2007) that reported a total leukocyte count rising in early pregnancy which remained elevated through pregnancy. White blood cell count is increased in pregnancy with the lower limit of the reference range being typically 6,000/ cumm. Leucocytosis, occurring during pregnancy is due to the physiologic stress induced by the pregnant state. Neutrophils are the major type of leucocytes on differential counts. This is likely due to impaired neutrophilic apoptosis in pregnancy. The neutrophil cytoplasm shows toxic granulation. Neutrophil chemotaxis and phagocytic activity are depressed, especially due to inhibitory factors present in the serum of a pregnant female (Jessica *et al.*, 2007). There is also evidence of increased oxidative metabolism in neutrophils during pregnancy. Immature forms as myelocytes and metamyelocytes may be found in the peripheral blood film of healthy women during pregnancy and do not have any pathological significance (Kralis *et al.*, 2005). They simply indicate adequate bone marrow response to an increased drive for erythropoiesis occurring during pregnancy.

Lymphocyte count decreases during pregnancy through the first and second trimesters and increases during the third trimester. There is an absolute monocytosis during pregnancy, especially in the first trimester, but decreases as gestation advances. Monocytes help in preventing fetal allograft rejection by infiltrating the decidual tissue (7th– 20th week of gestation) possibly, through PGE2 mediated immunosuppression. The monocyte to lymphocyte ratio is markedly increased in pregnancy. Eosinophil and basophil counts, however, do not change significantly during pregnancy (Chandra *et al.*, 2012). The stress of delivery may itself lead to brisk leucocytosis.

CONCLUSION

Malaria infection during pregnancy can have adverse effects on both the mother and the foetus. The effects on maternal haematological parameters, particularly haemoglobin concentration, It is well established that anaemia is the most common consequence of *P. falciparum* malaria infection. Decrease in hemoglobin and packed cell volume concentration are common findings during pregnancy and results from increased plasma volume combined poor iron intake. Malaria infection can increase some of the physiological changes associated with pregnancy and should be prevented to save lives of the mothers and the babies.

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