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Review Article

Hematological profile and pregnancy: a review

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ABSTRACT

Many physiological hematological changes occur during pregnancy to accommodate the demands of the developing foetus. Infect, these changes may appear to be pathological in the non-pregnant state. Although physiological in nature, but abnormal hematological profile does affect pregnancy and its outcome. One of the most important underlying cause of maternal mortality is due to underlying hematological complications. This review deals with thorough understanding of range of these haematological parameters during pregnancy.

Keywords: Hematological parameters, Physiology, Pregnancy

INTRODUCTION

Maternal mortality is defined as 'the death of a woman while pregnant or within 42 days of the end of pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental cause'.[1] Maternal mortality is the vital indicator with the greatest disparity between developed and developing countries. It is necessary to determine the cause of maternal mortality for the prevention as well as making the action plan for targeting the health goals.

According to World Health Organization, one woman dies every minute from a pregnancy-related complication. The main causes causing mortality are due to antepartum and postpartum hemorrhage, unsafe abortion, eclampsia, obstructed labour and infection[2] .Thus, it is important to know variation in hematological profile during the entire course of pregnancy as well as delivery such that adverse incidents leading to maternal mortality can be minimized.

Many physiological hematological changes occur during pregnancy due to continuous development of fetus.[2] These changes revert back to normal after puerperium.[3] But, these changes are required to meet metabolic demands of mother and also ensure adequate oxygen delivery to fetus.[4] Depending upon the degree of change in the hematological profile, the pregnancy outcome may vary.[5]

Thus, it becomes important to monitor hematological parameters during pregnancy, thereby improving its outcome.

CHANGES IN BLOOD VOLUME

Blood volume begins to increase as early as 6 weeks of gestation and increases to more than 50% of the prepregnant state.[1,6] The change in plasma volume during pregnancy is attributed to increased plasma renin activity and reduced atrial natriuretic peptide levels. The hormonal changes are due to pregnancy induced systemic vasodilatation and increased vascular capacitance.[3,7] After delivery the plasma volume gradually comes to prepregnant values as a result of diuresis.

PHYSIOLOGICAL ANEMIA

There occur no change in the hemoglobin concentration till 16th week of gestation but thereafter, there is a steady fall to reach the nadir in second trimester as a result of expansion of plasma volume. A similar trend is seen in the PCV and the RBC count.[8] The increase in red cell and hemoglobin mass is reported to be maximum at 12-28 weeks of pregnancy.[9] There is little change in red blood cell indices during pregnancy. The underlying cause of anemia during pregnancy is hemodilution i.e. rise in plasma volume more as compared to increase in the red cell mass (40% vs. 20% respectively).[3] This is also called as 'physiological anemia of pregnancy'.[10] It is advised to maintain the hemoglobin level at or above 11 g/dl and should not be allowed to fall below 10.5 g/dl in any trimester.[11]

These parameters are important to be kept above the reference levels as significantly poor positive correlations were found between birth weight of newborns and maternal serum hemoglobin, hematocrit and MCV levels.[12] Haemoglobin showed a positive correlation with newborn length and did not correlate with weight probably because length is more stable than weight.[13] It is seen that, haemoglobin and haematocrit increases on day 1 after delivery, reduced on days 3 and 5 then started rising such that by day 42, the normal haemoglobin in non-pregnant women was achieved.[14]

CHANGES IN WBC COUNT

The other prominent change in the hematological profile during pregnancy is leukocytosis which is due to physiological stress. This rise occur early in pregnancy and remain elevated throughout pregnancy.[15] There WBC count during healthy pregnancy vary from 6×10^9-16×10^9/L which further increases to 9×10^9-25×10^9/L hours after delivery.[16] It takes 4 weeks time for WBC count to come back to normal after delivery.[17]

The leukocytosis is due to increased inflammatory response during normal pregnancy, which can be as a consequence of selective immune tolerance, immunosuppression and immunomodulation of fetus.[18] However one study proposes that this increase in leucocyte count is seen only after normal spontaneous delivery.[19] Tzur et al. has shown that leukocytosis during first trimester is associated with complications during pregnancy.[20] Thus it is important to interpret and correlate the clinical findings with leukocyte count throughout pregnancy and puerperium.

Amongst leucocytes, there is preponderance of the neutrophils on differential counts which is due to impaired neutrophilic apoptosis in pregnancy.[21,22] Neutrophil counts during pregnancy can double up twice to its postpartum values. The monocytosis occurs during pregnancy but the other cells in differential count i.e. lymphocyte, eosinophil and basophil decline in number.[23] There is also evidence of bone marrow hyperplasia with neutrophilic leukocytosis during last trimester of pregnancy.[24]

Leukocyte and neutrophil count increased significantly on day 1 but start decreasing until fifth day, when the value returns back to normal.[25] This important finding should always be kept in mind to avoid the unnecessary use of antibiotic in the postpartum period.

GESTATIONAL THROMBOCYTOPENIA

Although the average platelet count decreases monotonically in pregnancy, there is an increase in platelet aggregation especially during last 8 weeks of gestation.[26] It has been reported that there can occur significant fall in platelet count from 32 weeks gestation onwards.[27] Increased consumption of platelets as well as decreased life span in the uteroplacental circulation has been suggested to be the explanation of the reduction in the number of circulating platelets during pregnancy.[27] Platelet count as well as other hemostatic factors return to normal after 6 weeks of delivery.[28]

After anemia, most common hematological abnormality during pregnancy is thrombocytopenia.[29] Especially, as we call it 'gestational thrombocytopenia' which is partly due to hemodilution and partly due to increased platelet activation and accelerated clearance.[27] Gestational thrombocytopenia requires no specific treatment and corrects itself spontaneously after delivery but the other etiologies must be excluded i.e. megaloblastic anemia, immune thrombocytopenia, thrombotic microangiopathy syndromes, eclampsia and liver disorders before labeling the patient as gestational thrombocytopenia.[29]

CONCLUSION

Hematological parameters are the routinely performed investigations during pregnancy and after delivery. Thus it is important to know the normal variation in all the parameters throughout the pregnancy and puerperium and reason behind them. The proper interpretation of this routinely performed parameters help in early recognition of impending antepartum and postpartum complications The physiological leukocytosis should always be kept in mind while using antibiotics during postpartum period so as to minimize its unnecessary use.

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