

Zinc protoporphyrin in HIV+ drug naïve rural Kenyan women

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Introduction

Anemia is caused by:

- Blood loss from parasites
- Ineffective red blood cell (RBC) production from deficiencies of iron, vitamin A, folic acid (FA), vitamin B₁₂ (B₁₂)
- Decreased RBC production from chronic inflammatory disease (CID)
- RBC hemolysis
- Genetic abnormality.

Mean corpuscular volume (MCV) is: Decreased in iron deficiency
Increased with deficiencies of FA, B₁₂
Normal in CID anemia

Zinc protoporphyrin (ZPP): Accumulates within iron-deprived erythrocytes

ZPP/heme ratio (ZPP/H): Detects iron depletion before anemia occurs.
Is more reliable than transferrin receptor when malaria is present.

Objective:

To determine if ZPP/H is a good indicator of iron depletion in drug naïve asymptomatic HIV-infected rural Kenyan women who are of reproductive age and enrolled in a randomized nutrition intervention field study that will determine the impact of added meat, soy or wheat protein on iron status.

Methodology:

Population

- Drug naïve HIV-infected women of reproductive age
- Asymptomatic, (WHO Stage 1 or 2; CD4 cell count > 250 cells/uL)
- Enrolled as patients in the USAID Academic Model Promoting Access to Healthcare Partnership (USAID-AMPATH) and living in Turbo Division, Kenya.



Specimen collection and analysis

Hemoglobin (HB), hematocrit (HCT), MCV, red cell width (RDW) and ZPP/H were determined from fresh blood samples obtained from patients in the field clinic and transported 40 kilometers to the AMPATH reference laboratory where they were processed and analyzed.



ZPP was assessed using a hemato-fluorometer (Aviv Biomedical, Lakewood, NJ).

Red blood cells were washed three times with saline. Low, medium and high controls obtained from Aviv were run daily before and after samples (CV 13.0% for low control, 5.9% for middle control and 3.8% for high control).

ZPP/H	(umol/mol)	iron status
< 60		normal
60-80		possible iron depletion
> 80		iron depletion

Results: ZPP/H correlated ($p < 0.001$) with HCT ($r = 0.58$), MCV ($r = 0.49$) and RDW ($r = 0.49$).

Results were grouped by ZPP/H (umol/mol): normal, possible iron depletion, iron depletion and mean HB, HCT, MCV, RDW were compared between the groups.

Measures at baseline are reported here for the first 139 women enrolled into the study.

Mean (SD) of indices to assess anemia (* $p < 0.001$, ** $p < 0.05$)

ZPP/H (umol/mol)	N (%)	HB (mg/dl)	HCT (%)	MCV (fL)	RDW (%)
< 60 normal	61 (44)	12.7 (1.6)**	39.5 (3.8) ^a	86.9 (7.6) ^a	13.4 (1.6)*
60-80 possible iron depletion	34 (24)	12.4 (1.4)	38.3 (2.9) ^b	85.3 (7.4) ^b	14.3 (2.4)**
> 80 iron depletion	44 (32)	12.1 (1.7)**	33.9 (4.1) ^{a, *b}	76.9 (10.0) ^{a, *b}	15.7 (2.5)*, **

Conclusions and Recommendations:

- ZPP/H appeared to be a good indicator of iron depletion when compared to HCT, MCV and RDW in this population of drug naïve HIV-infected rural Kenyan women,
- ZPP/H may be useful to differentiate iron depletion from other anemias, especially in individuals with malaria.

Key References

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