Abstract

Anaemia remains a pervasive complication among people living with HIV (PLWHIV), with multifactorial origins that include poor antiretroviral therapy (ART) adherence, immune dysfunction, and iron dysregulation. This study investigated the interplay between nutritional status, immune markers, and iron biomarkers in contributing to anaemia and iron deficiency anaemia (IDA) in HIV-infected adults in Western Kenya. A cross-sectional study was conducted at Busia County Referral Hospital among 163 adults comprising HIV-infected ART-adherent (n = 47), ART-naive (n = 23), non-adherent (n = 42), and healthy control (n = 51) participants. Demographic, clinical, immunologic, and biochemical data were collected through interviews, physical measurements, and laboratory analyses. Iron indices (ferritin, serum iron, and transferrin), haemoglobinconcentration, CD4+ T cell counts, HIV viral load, and body mass index (BMI) were measured using standardized protocols. Group comparisons were performed using Kruskal-Wallis and chi-square tests. Binary logistic regression was used to assess predictors of IDA. The highest prevalence of anaemia(61.9%) and iron deficiency anaemia(65.4%) was observed among non-adherent individuals, followed by ART-naïve (52.2% and 50.0%) and adherent participants (36.2% and 17.6%). Haemoglobinconcentrations and iron levels were significantly lower (P <0.0001), while transferrin levels were elevated (P <0.0001) in ART non-adherent and naïve groups compared to controls. CD4+ T cell counts were markedly suppressed, and viral loads elevated in these groups, underscoring immune compromise. Logistic regression identified unsuppressed viral load (AOR = 10.83; P =0.023), CD4+ T cell count <500 cells/µL (AOR = 4.01; P =0.010), and elevated transferrin (AOR = 2.72; P =0.047) as independent predictors of IDA. The findings suggest that poor ART adherence exacerbates inflammation, impairs iron metabolism, and increases anaemiarisk. Integrating viral suppression, immune recovery, and iron biomarker monitoring in HIV care may improve early identification and management of IDA. Future studies should explore longitudinal trajectories of iron indices and anaemiain PLWHIV across different ART regimens.