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The effect of incident tuberculosis on immunological response of HIV patients on highly active antiretroviral therapy at University of Gondar Hospital, Northwest Ethiopia

Abate Assefa
University of Gondar, Ethiopia

Background: HIV infection, during ART, is complicated by high rates of TB co-infection. TB-HIV co-infection remains a major public health threat in Ethiopia. Active TB has been shown to cause impaired immune responses independently of HIV status. This study assessed the effect of TB incidence on immune response of HIV patients during ART.

Methods: A follow up study was carried out on adult HIV patients who started ART at University of Gondar Hospital between 1 September 2007 and 30 August 2008. Changes in $CD4^+$ T lymphocyte count and incident TB episodes occurring in the 42 months of ART were assessed. Life table was used to estimate the cumulative immunological failure free survival. Log rank test was used to compare survival curves between the different categories. Cox-proportional hazard model was employed to examine predictors of immunological failure.

Results and findings: From the total of 400 HIV patients, 89 (22.2%) were found to have immunological failure with a rate of 8.5 per 100 person-years (PY) of follow-up. Active TB developed in 26 (6.5%) of patients, with an incidence rate of 2.2 cases per 100 PY. The immunological failure rate was high (20.1/100PY) at the first year of treatment. Though Cox-regression analysis showed borderline significant association (adjusted hazard ratio (AHR) 1.9, 95% CI 0.97-3.7, p=0.06), the risk of immunological failure was significantly higher (38.5%) among those with incident TB compared with TB-free (21.1%) (Log rank p=0.036). Baseline $CD4^+$ T cell count <100 cells/mm^3 (AHR 1.71, 95%CI1.11–2.64, p= 0.015) and being male sex (AHR 1.55, 95%CI 1.01–2.37, p=0.043) were found to be significant predictors of immunological failure.

Conclusions: High incidence of immunological failure occurred within the first year of initiating ART. Lower baseline $CD4^+$ T cell count and incident TB during ART are associated with impaired immune restoration. The result highlighted the beneficial effects of earlier initiation of ART on $CD4^+$ T cell count recovery.

abezew@gmail.com