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Total lymphocyte count is a good marker for HIV-related mortality and can be used as a tool for starting HIV treatment in a resource-limited setting

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Summary

OBJECTIVES Total lymphocyte counts (TLC) may be used as an alternative for CD4 cell counts to monitor HIV infection in resource-limited settings, where CD4 cell counts are too expensive or not available.

METHODS We used prospectively collected patient data from an urban HIV clinic in Indonesia. Predictors of mortality were identified via Cox regression, and the relation between TLC and CD4 cell counts was calculated by linear regression. Receiver operating characteristics (ROC) curves were used to choose the cut-off values of TLC corresponding with CD4 cell counts <200 and ≤350 cells/μl. Based on these analyses, we designed TLC-based treatment algorithms.

RESULTS Of 889 antiretroviral treatment (ART)-naïve subjects included, 66% had CD4 cell counts <200 and 81% had 350 ≤ cells/μl at baseline. TLC and CD4 cell count were equally strong predictors of mortality in our population, where ART was started based on CD4 cell count criteria. The correlation coefficient (R) between TLC and √CD4 was 0.70. Optimal cut-off values for TLC to identify patients with CD4 cell counts <200 and ≤350 cells/μl were 1500 and 1700 cells/μl, respectively. Treatment algorithms based on a combination of TLC, gender, oral thrush, anaemia and body mass index performed better in terms of predictive value than WHO staging or TLC alone. In our cohort, such an algorithm would on average have saved $14.05 per patient.

CONCLUSION Total lymphocyte counts is a good marker for HIV-associated mortality. Simple algorithms including TLC can prioritize patients for HIV treatment in a resource-limited setting, until affordable CD4 cell counts will be universally available.

keywords total lymphocyte count, CD4 cell count, clinical algorithm, resource-limited settings

Introduction

Ideally, decisions about starting antiretroviral treatment (ART) for patients infected with human immunodeficiency virus (HIV) are based on CD4 cell count criteria, combined with clinical staging. The latest WHO guidelines advise to start ART at a CD4 count ≤350 cells/μl (WHO 2009), but the former guidelines that use a CD4 cell count of 200 cells/μl as a cut-off are still being used in many countries (Raizes *et al.* 2008). Unfortunately, CD4 cell counts are not available or too expensive in many resource-limited settings. Under these circumstances, ART is mostly initiated based on disease stage according to WHO criteria (WHO 2007). As an alternative, decisions may use the total lymphocyte count (TLC), which is more widely accessible and cheaper than CD4 cell counts.

Several studies have investigated the ability of TLC to predict CD4 cell counts. However, the correlation between TLC and CD4 cell counts appears to be only moderate (Akinola *et al.* 2004; Kamya *et al.* 2004; Liotta *et al.* 2004; Schreibman & Friedland 2004; Angelo *et al.* 2007; Gitura *et al.* 2007; Daka & Loha 2008). Combining the TLC with other simple markers, like haemoglobin and body mass index (BMI), can increase its accuracy (Kumarasamy *et al.* 2002; Spacek *et al.* 2003; Chen *et al.* 2007). In addition, some studies have compared TLC-based treatment algorithms with WHO staging criteria for starting ART (Morpeth *et al.* 2007). However, only few studies evaluated the prognostic value of TLC for mortality among patients infected with HIV (May *et al.* 2010). We investigated the ability of TLC to predict mortality and CD4 cell counts, and identified the most important covariates that