

Improving Diagnostic of Pulmonary Tuberculosis in HIV Patients by Bronchoscopy: A Cross Sectional Study

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ABSTRAK

Latar belakang: diagnosis TB paru pada pasien HIV merupakan suatu tantangan karena fitur klinis atau tampilan radiologis yang tidak spesifik. Pasien HIV dengan sel CD4 ≤ 200 sel/ μ L yang terinfeksi *M. tuberculosis* memiliki kapasitas yang lebih rendah dalam menampung *M. tuberculosis*, membentuk granuloma, nekrosis, atau kavitas. Kondisi ini disebabkan oleh melemahnya inflamasi yang kemudian mengurangi produksi sputum dan dapat menyebabkan hasil negatif palsu. Penelitian ini bertujuan menilai perbedaan tingkat positivities basil tahan asam (BTA) dan kultur *M. tuberculosis* dari sputum non-bronkoskopi dibandingkan dengan sputum bronkoskopi (bronkoalveolar) pada pasien tersangka tuberkulosis (TB) paru HIV dengan CD4 ≤ 200 sel/ μ L. **Metode:** penelitian potong lintang dilakukan pada pasien HIV dewasa yang dirawat di Rumah Sakit Hasan Sadikin dengan CD4 ≤ 200 sel/ μ L yang disangka memiliki TB paru dengan uji analitik komparatif berpasangan. Semua pasien diminta memberikan dahak secara spontan atau dengan induksi sputum pada hari pertama. Pada hari berikutnya dilakukan pemeriksaan bronkoskopi dengan bilasan bronkoalveolus. Bahan yang diperoleh dari kedua cara diperiksa secara mikroskopis dengan pewarnaan Ziehl Neelsen (ZN) dan kultur *M. tuberculosis* dengan media padat Ogawa. Positivitas, sensitivitas dan peningkatan sensitivitas BTA dan kultur *M. tuberculosis* pada kelompok non-bronkoskopik dan bronkoskopik kemudian dibandingkan. **Hasil:** terdapat perbedaan tingkat positivities ZN pada kelompok non-bronkoskopi dibandingkan bronkoskopi yaitu 7/40 (17,50%) vs 20/40 (50,00%) ($p < 0.001$). Perbedaan antara kultur kelompok non-bronkoskopi dengan kelompok bronkoskopi yaitu 16/40 (40,00%) vs 23/40 (57,50%) ($p = 0,039$). Bilasan bronkoalveolus menunjukkan tingkat positivities pemeriksaan dahak BTA lebih tinggi sebesar 32,5% (dari 17,5% menjadi 50%) dan juga kultur sebesar 17,5% (dari 40,0% menjadi 57,5%). **Kesimpulan:** bilasan bronkoalveolar dapat meningkatkan tingkat positivities pemeriksaan sputum BTA dan kultur *M. tuberculosis* pada pasien tersangka TB paru dengan HIV positif dan CD4 ≤ 200 sel/ μ L.

Kata kunci: bronkoskopi, diagnostik mikrobiologi, HIV, sputum, tuberkulosis.

ABSTRACT

Background: diagnostic of pulmonary TB in HIV patients is a problem due to non specific clinical features, or radiological appearance. HIV patients with CD4 ≤ 200 cells/mL infected with *M. tuberculosis* have less capacity in containing *M. tuberculosis*, developing granulomas, casseous necrosis, or cavities. This condition is caused

by weekend inflammatory which later reduced sputum production and may cause false negative result. This study aimed to assess differences in the positivity level of acid fast bacilli (AFB) and cultures of *M. tuberculosis* from non-bronchoscopic sputum (spontaneous and induced sputum) compared to bronchoscopic sputum (bronchoalveolar lavage) in HIV positive patients suspected pulmonary tuberculosis with $CD4 < 200$ cells/ μ L. **Methods:** this cross sectional study was conducted in adult HIV patients treated in Hasan Sadikin Hospital with $CD4 \leq 200$ cells/ μ L suspected with pulmonary tuberculosis by using paired comparative analytic test. All patients expelled sputum spontaneously or with sputum induction on the first day. On the next day, bronchoalveolar lavage (BAL) was performed. The two samples obtained from two methods were examined by AFB examination with staining Ziehl Neelsen (ZN) and cultured of *M. tuberculosis* on solid media Ogawa on all patients. Positivity, sensitivity and increased sensitivity of AFB and culture of *M. tuberculosis* in the non bronchoscopic and bronchoscopic groups were compared. **Results:** there were differences in the positivity level of AFB with ZN staining between non-bronchoscopic and bronchoscopic groups which were 7/40 (17.5%) vs 20/40 (50.0%) ($p < 0.001$). The differences between the cultures of non-bronchoscopic and bronchoscopic groups were 16/40 (40.0%) vs 23/40 (57.5%) ($p = 0.039$). Bronchoscopic sputum increased the positivity level of the ZN AFB examination by 32.5% (from 17.5% to 50.0%) as well as on culture examination by 17.5% (from 40.0% to 57.5%). **Conclusion:** Bronchoalveolar lavage can improve the positivity level of smears and cultures in patients suspected of pulmonary TB in HIV patients with $CD4 < 200$ cells/ μ L.

Keywords: bronchoscopy, HIV, microbiological diagnostics, sputum, tuberculosis.

INTRODUCTION

Tuberculosis (TB) is still a major health problem in Indonesia which has the second highest number of cases in the world after India.¹ The problems of TB are increasingly complex due to complications from Human Immunodeficiency Virus (HIV) infection which may increase the risk of acquiring pulmonary tuberculosis. The risk of developing tuberculosis in HIV patients is 20 to 37 times greater than non-HIV patients.²

Diagnostic of pulmonary TB in HIV patients is problematic due to non specific clinical features, or radiological appearance. HIV patients with $CD4 \leq 200$ cells/ μ L infected with *M. tuberculosis* have less capacity in containing *M. tuberculosis*, developing granulomas, caseous necrosis, or cavities.^{3,4} This condition is caused by weekend inflammatory which later reduced sputum production and may cause false negative result. This cause significant important problem in the diagnosis of tuberculosis.^{3,5} Chest X-ray is unable to distinguish *M. tuberculosis* infection from *Pneumocystis jiroveci*, fungal infection, or other microorganism.⁶ Therefore, microbiologic test is necessary to confirm causative agent in suspected TB-HIV patients.⁷

Previous studies and literatures reported that the best method to gain a good quality specimen

is by bronchoalveolar lavage (BAL).^{3,8-10}

The aim the study is to assess differences in the positivity of acid fast bacilli (AFB) and cultures of *M. tuberculosis* in the specimen acquired from non-bronchoscopic sputum (spontaneous and induced sputum) compared to bronchoscopic sputum (bronchoalveolar lavage) in HIV positive patients suspected of pulmonary tuberculosis with $CD4 < 200$ cells/ μ L.

METHODS

A cross-sectional study with paired comparative diagnostic analysis was conducted in Hasan Sadikin Hospital, a referral hospital in West Java, Bandung, Indonesia. Calculation of sample based on test formula of two proportions of Mc Nemar, with $\alpha = 0.05$, hypothesis of two ways test, 95% confidence interval and power test 80%. We enrolled all patients older than 14 years old who were admitted to the hospital and clinic with a diagnosis of HIV and pulmonary infection. The study was conducted between November 2011 and October 2013.

Specimens were divided into two groups: the non-bronchoscopic specimens which was spontaneously expectorated and induced sputum sample (non-bronchoscopic group) and the bronchoscopic specimens which was sputum