

Evaluation of Blood and Urine Polymerase Chain Reaction for the Diagnosis of Tuberculosis

Ali Akbar Heydari*

Mashhad University of medical Sciences, Mashhad, Iran

*Corresponding author: Ali Akbar Heydari, Research Center for Infection Control and Hand Hygiene, Mashhad University of Medical Sciences, Iran, Tel: 985118515001; E-mail: heydariaa@mums.ac.ir

Rec Date: April 18, 2014, Acc date: July 14, 2014, Pub date: July 16, 2014

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Summary

Tuberculosis (TB) has killed 1.4 million people in 2011 and, like Human Immunodeficiency Virus (HIV) is the main cause of death from infectious agents in the world [1]. Stained smears and cultures of sputum samples are the first step for evaluation of patients with suspected pulmonary tuberculosis. However in some cases, there is no sputum, or its obtaining is impossible due to depressed mental status of the patients. Furthermore, in some cases obtaining the specimens for smear and culture needs performing invasive procedures. In the other hand, sometimes patient's clinical status does not permit performing invasive procedures. Finally in many cases Mycobacterium tuberculosis is not detectable with the help of a microscope or culture. Thus it is necessary to find faster and/or more accurate methods such as blood and urine TB- Polymerase Chain Reaction (PCR) for diagnosis of pulmonary tuberculosis.

In the recent years, molecular diagnostic methods by Rapid Nucleic Acid Amplification Tests (RNAAT), have replaced traditional diagnostic methods [2]. These methods can detect very small numbers of microorganisms in clinical specimens. The urine PCR was evaluated for diagnostic value in Burkina Faso. The authors concluded that this test is not an appropriate method to detect new TB cases in the usual laboratory. However, it can be beneficial for cases where the clinical and bacteriological diagnosis of TB is not definite [3]. Rebollo in his study collected blood and urine specimens of patients with tuberculosis on several occasions [4]. The PCR-TB urine specimens increased the diagnostic sensitivity of blood PCR by 10%. In another study in Italy researchers determined that the sensitivity of urine PCR was 79%. They concluded that the DNA fragments of TB microorganisms can be measurable in the urine of patients with active pulmonary tuberculosis [5].

In a study [6] that was conducted prospectively and included 65 patients with proven pulmonary and extrapulmonary TB and 28 subjects who were completely healthy, we observed that Blood PCR in 23 out of 65 patients with tuberculosis were positive, but none of the controls had a positive PCR (sensitivity of 35 /7% and specificity of 100%). In another case-control study [7] with 77 proven pulmonary TB cases and 30 subjects who were completely healthy, we mixed 50 ml of urine with 0.5 ml EDTA. DNA extraction and PCR testing using SI 6110 primers was performed for all blood samples. Sputum and urine samples of patients, was also cultivated for Mycobacterium tuberculosis. Of 77 patients, 48 (62.3%) cases had positive sputum culture. Urine cultures and acid-fast smears were negative. Urine PCR-TB was positive in 48.0% (37/77) of patients. The TB complex specific PCR was positive in 56.2% (27/48) of the culture positive and 34.4%

(10/29) of the culture negative PTB patients. The control group had negative urine PCR (sensitivity 56.2% and specificity 100%).

The sensitivity of blood PCR in diagnosis of tuberculosis (extrapulmonary and disseminated) has been reported as 20% to 95% in different studies. [8,9] These values was lower for pulmonary tuberculosis (0 to 8/43%) [10,11], although in some cases amounts of 93% have been reported [12]. However, the results of the most of these studies are similar to the results of our studies. Considering the mentioned points and the fact that blood and urine collection is simple and noninvasive, these methods can be suitable diagnostic tools for diagnosis of pulmonary or disseminated tuberculosis.

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