



# A Study of The Prevalence of Latent Tuberculosis in Household Contacts of Patients with Active Tuberculosis in Kurdistan Region of Iraq: A Brief Report

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## Abstract

**Background:** Tuberculosis (TB) is a major public health problem. Close household-contacts are at high risk of infections, particularly latent TB (LTBI).

**Objectives:** The study aimed to investigate the prevalence of LTBI in household-contacts of active TB patients.

**Methods:** A total of 150 household contacts with active TB patients were recruited. Blood samples were collected and tested for the presence of LTBI by QuantiFERON-TB-Gold-Plus assay.

**Results:** Amongst those recruited in this study, 62/150 (41.3%) were positive. Amongst the positive subjects, 33/62 (53%) were male. Four samples gave indeterminate results including two males and two females.

**Conclusions:** The prevalence of LTBI was high in household-contacts. For successful TB control, close screening of contacts should be considered.

**Keywords:** Latent, TB, Tuberculosis, Kurdistan, Iraq, Contact, Household

## 1. Background

TB is a major public health problem particularly after the re-emergence of the disease and the spread of drug-resistant bacilli (1). LTBI is defined as persistent stimulation of the immune system by Mycobacterium tuberculosis without the evidence of clinical infection (2). The worldwide burden of LTBI is estimated to be 23%, which amounts to 1.7 billion people around the world (3). Approximately, 10% of subjects with LTBI will develop active TB infection (2). Identification of people at risk of LTBI is crucial for the control of TB and sustain the decline in the incidence of infection (2). The risk of transmission of TB-bacilli from patients with active TB to others is well recognized. Healthcare workers (HCW) and close contacts of such patients are at high risk of acquiring the infection (4, 5). LTBI is diagnosed by the tuberculin skin test with several limitations in sensitivity and specificity. It gives a false positive result in people with a history of BCG vaccination or exposure to nontuberculous mycobacteria. False negative results may occur in impaired T-cell function. Interferon-gamma release assays

(IGRA) is used for the diagnosis of LTBI. These include the T-SPOT-TB and QuantiFERON-TB-Gold tests. Such tests are not affected by prior BCG vaccination with a better sensitivity in immunocompromised-subjects. The prevalence of LTBI has been studied previously in Iraq in HCW (6). No study has been conducted in investigating the prevalence of LTBI in household-contacts.

## 2. Objectives

The aim of this study was to determine the prevalence of LTBI in household-contacts using QuantiFERON-TB-Gold-Plus assay.

## 3. Methods

### 3.1. Study Design

A cross-sectional study was conducted in Duhok city, Kurdistan region of Iraq to estimate the prevalence of LTBI in subjects who had come in close contact with patients with active TB. From January 2018 to January 2019, 155

subjects who were close contacts with active TB patients (smear and Gene Xpert positive) were referred to the Infectious Disease Unit, Azadi Teaching Hospital for further investigation. Close contact was defined as those who come in contact with a patient with infectious TB for a long time (more than eight hours) in a closed area (1). Those subjects did not have symptoms of active TB. The inclusion criteria included subjects who had come in close contact with active TB patients, were older than five years, had no symptoms of active TB, and agreed to participate in the study. HCW were excluded from this study.

### 3.2. QuantiFERON-TB Gold Plus Assay

Blood was drawn using 5CC syringes. After collection, the blood was incubated immediately at 37°C for 16 to 24 h. Then, plasma was separated by centrifugation and stored at 4°C for ELISA. QuantiFERON-TB-Gold-Plus assay (Qiagen) was performed according to the manufacturer's instructions. The specificity and the sensitivity of the test are higher than 95%.

### 3.3. Ethics

Research proposal and consent were reviewed by the Ethics Committee in the Duhok Department of Health. Written informed consent was obtained from all subjects.

## 4. Results

### 4.1. Studied Sample

During the study period, 155 subjects were referred to our unit for screening for LTBI. Amongst those, five subjects were HCW and were excluded from the study. The age of recruited subjects ranged from 11 - 90 years, with an average age of  $41.3 \pm 18.6$  year. A total of 77/150 (51.3%) of the recruited subjects were male while 73/150 (48.7%) were female. All the recruited subjects were Kurdistan region inhabitants.

### 4.2. QuantiFERON-TB Gold Plus Assay

Three outcomes were obtained from the test: positive results suggesting the presence of TB-bacilli is likely, negative results suggesting the presence of TB-bacilli is unlikely and indeterminate results suggesting further investigations. Amongst those recruited in this study, 62/150 (41.3%) were positive. Amongst the positive results, 33/62 (53%) were male. Four samples gave indeterminate results including two males and two females. Subjects with intermediate results were scheduled for re-testing after six months.

## 5. Discussion

To control TB, the first priority is early diagnosis and management of all TB patients (1). The second priority is to screen contacts, evaluate them, and treat them for LTBI and active TB. HCW and close contacts of patients are at high risk of acquiring the infection (2).

The prevalence of LTBI has been studied thoroughly in HCW. The prevalence of LTBI was found to be 72% and 41% in Turkey and India, respectively (4, 7). In a study conducted in Iran recruiting HCW dealing with TB samples, the recruited samples were classified into two groups: low-risk and high-risk staff. The prevalence of LTBI was found to be 24.8% and 14.8% in high and low risk, respectively (8). In a study conducted in Iraq recruiting 212 HCW, the prevalence of LTBI was 27.8%. The highest rate was found amongst TB centers staff (6). The second group of people who are at high risk of acquiring the infection is household-contacts (1). In a meta-analysis study analyzing 203 published studies, it was found that the prevalence of LTBI in household-contacts in low-income countries was 51.5% whereas the prevalence was 28.1% in high-income countries (9). In a study conducted in South Korea recruiting 308 subjects with a household-contact history with patients with active TB, 38.6% of examined samples were positive for LTBI (10). In another study conducted in Switzerland, 44% of the household-contacts were positive for LTBI (11). In Taiwan, the prevalence of LTBI was 46% amongst close contacts (12). In Iraq, no study has been conducted investigating LTBI in household-contacts to patients with active TB. In this study, we found that 41.3% of the tested samples were positive for LTBI. The WHO Tuberculosis controlling program aims at the reduction of TB incidence by 90% and mortality by 95%. To achieve this aim, successful management of LTB is essential. This is the first project to study the prevalence of LTB in household-contacts. As the prevalence is high, screening contacts should be a part of the TB control program. Our study has limitations. We invited household-contacts for screening. Unfortunately, not all invitees attended the screening.

### Footnotes

**Conflict of Interests:** Nothing to declare.

**Ethical Approval:** Research proposal and consent was reviewed and approved by Ethics Committee in the Duhok Department of Health.

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**Patient Consent:** Written informed consent was obtained from all subjects.

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