Original Article

Prevalence of Latent TB Infection among Health Care Workers in Three Main TB Health Facilities, Baghdad, Iraq, 2013

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Summary:

Background: Tuberculosis infection represents a global health problem and a great risk to Health Care Workers. Identifying individuals, particularly Health Care Workers with latent tuberculosis infection will support tuberculosis control through chemoprophylaxis and prevent cross-infection. The aim of this study was to assess the prevalence and some risk factors for latent tuberculosis infection among Health Care Workers in three tuberculosis health institutions in Baghdad.
Methods: A cross-sectional study was conducted in 2013 in Baghdad-Iraq on Health Care Workers working in the Specialized Respiratory & Chest Diseases Center (Tuberculosis institute), Ibn Zuhur Hospital for Chest Diseases and Al-Resafa Health District TB Clinic in Al-Sadr City. Information about age, gender and occupation was obtained. All subjects received a Mantoux tuberculin skin test. Induration of ≥10 mm was considered a positive test.
Results: A total of 212 Health Care Workers were enrolled, 71.7% of them were males; none had recently received BCG vaccine. Fifty nine (27.8%) had a positive tuberculin skin test. Physicians (38.2%) and nurses & paramedicals (31%) have the highest rates of positive result than other occupations. The highest rate of positive results was seen among Health Care Workers in Specialized Respiratory & Chest Diseases Center (55.1%). There was a significant association between positive TST response with the occupation (job title) and the working site. No significant association was seen with age or gender (P>0.05).
Conclusion: Around one third of Health Care Workers in these tuberculosis facilities had latent tuberculosis infection. Job and work place were significant determinants.

Keywords: Health Care Workers, Latent Tuberculosis, occupational health, Iraq.

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Introduction:

Tuberculosis (TB) is a global health problem and The World Health Organization (WHO) in 2010 reported that someone in the world is newly infected with TB bacilli every second. One-third of the world's population is currently infected with the TB bacillus. Also, 5-10% of people who are infected with TB bacilli (but who are not infected with HIV) become sick or infectious at some time during their life. (1) TB is on the list of biologic health hazards to Health Care Workers (HCWs), and remains a very important occupational risk for HCWs in Low and Medium Income Countries and for workers in some institutions in High Income Countries. Risk appears particularly high when there is increased exposure like working at infectious diseases hospitals or clinics, emergency rooms and laboratory settings, combined with inadequate infection control measures. (2-3) De Vries et al,2006 (4) confirmed the importance of vigilance in TB control and emphasized that a high suspicion of tuberculosis by the clinician, adequate infection control measures by hospital authorities, and early identification of latent tuberculosis infection by occupational and public-health specialists are necessary to prevent tuberculosis among HCWs. Many studies pointed to the high prevalence of Latent Tb Infection (LTBI) among HCWs that reached up to 69% in some studies. (5,6) On the other hand, molecular-epidemiological studies and a comprehensive review of the existing evidence concerning the infection risk for HCWs lead to the conclusion that TB in HCWs is often caused by infection at the workplace. (7) Tuberculin Skin Testing (TST) has been accepted universally as the main method for detecting LTBI, in spite of its limitations and the effectiveness of recent BCG vaccinations (8, 9) .This test is of limited value in the diagnosis of active TB (10).Identifying positive LTBI among HCWs helps in reducing the risk of later development of open TB among them. Transmission of tuberculosis (TB) in health care settings to both patients and HCWs has been reported from virtually every country of the world, regardless of local TB incidence. TB transmission occurs through droplet nuclei aerosolized by patients with infectious pulmonary TB and inhaled by other persons. Transmission is most likely to occur from unrecognized or inappropriately treated TB. Although the risk for LTBI and TB disease has generally been considered to be higher among HCWs than in the general population, some studies from countries with low TB incidence and others from countries with high TB incidence failed to show a higher estimated risk for TB among HCWs than among the corresponding local community.The

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nosocomial transmission of multi-drug resistant (MDR-TB) and extensively drug resistant TB (XDR-TB) further highlights the need for effective TB infection control measures. While most high-income countries have successfully implemented TB infection control measures, TB infection control measures are limited or virtually non-existent in most resource-limited countries (11).

The aim of this study was to identify of the prevalence of LTBI among HCWs in three main TB health facilities in Baghdad–Iraq: Specialized Respiratory & Chest Diseases Center, Ibn Zuhur Hospital for Chest Diseases and Al-Resafa Health District TB Clinic in Al-Sadr City.

Patients and Methods:

This study included 212 HCWs in three main TB health facilities in Baghdad- Iraq (Specialized Respiratory & Chest Diseases Center (TB institute), Ibn Zuhur Hospital for Chest Diseases and Al-Resafa Health District TB Clinic in Al-Sadr City). The study started from late 2012 to 2013. Data collected from each HCW included age, gender, job category, and history of BCG vaccination. They were examined for Latent TB using TST by injection of 0.1 ml (5 units) of Purified Protein Derivative (PPD) intradermaly, usually in the volar aspect of the forearm. The reaction was read 48-72 hours later. The size of the reaction was determined by measurement of the induration not the erythema measurement; a diameter equal to or more than 10 mm was considered positive. The results of the TST were correlated with other variables and p values less than 0.05 were considered significant.

Results:

The total HCWs participated in this study was 212; 34 (16.1%) were physicians, 84 (39.6%) were nurses and paramedics, 28 (13.2%) were administrative employees, six were pharmacists (2.8%), six were dentists (2.8%) and 54 (25.5 %) had other job titles. All participants mentioned they received BCG vaccine after birth and none had recently received BCG vaccine. (Table 1).

Table 1: Distribution of the study group by Tunerculine skin test and Job title

Job	Tubreculin Test Result (mm)								P-Value
	<5		5-9		10+		Total		
	No	%	No	%	No	%	No	%	
Physicians	4	11.8	17	50	13	38.2	34	16.1	0.001
Dentist	5	83.3	0	0	1	16.7	6	2.8	
Pharmacists	6	100	0	0	0	0.0	6	2.8	
Nurses & paramedics	37	44	21	25	26	31.0	84	39.6	
Administration	17	60.7	5	17.9	6	21.4	28	13.2	
Others	34	63	7	13	13	24.0	54	25.5	
Total	103	48.6	50	23.6	59	27.8	212	100	

Out of the 212 HCWs, 59 (27.8%) were positive for TST. The highest prevalence was among physicians (38.2%) followed by nurses and paramedics (31%). The least was among dentist (16.7%), and none among pharmacist (0.0%). There was a statistically significant association between rates of positive TST and job categories of HCWs (p=0.001). (Table 1) As demonstrated in table 2, the prevalnce of positive TST was higher among females (35%) as compare to males (25%). However, no statistically significant association found between TST result and sex (p=0.237).

Table 2: Distribution of the study group by Tunerculine skin test and sex

Gender	Tubreculin Test Result (mm)								P-Value
	<5		5-9		10+		Total		
	No	%	No	%	No	%	No	%	
Males	79	52	35	23	38	25	152	71.7	0.237
Females	24	40	15	25	21	35	60	28.3	
Total	103	48.6	50	23.٦	59	27.8	212	100	

Similar comparison was made with age groups and demonstrated in table 3.

Table 3: Distribution of the study group by Tunerculine skin test and age

Age (years)	Tubreculin Test Result (mm)								P-Value
	5+		5-9		10+		Total		
	No	%	No	%	No	%	No	%	
18-24	4	66.7	2	33.3	0	0.0	6	2.8	0.011
25-54	91	50.8	35	19.6	53	29.6	179	84.4	
55+	8	29.6	13	48.1	6	22.3	27	12.8	
Total	103	48.6	50	23.6	59	27.8	212	100	

The prevalence of positive TST was highest in the age group 25-54 years (29.6%) followed by the age group 55+ years (22.3%), while it was 0.0% among the age group <25 years. However there was no significant association between age and TST result. Regarding the working site, the highest rate of positive TST result was in the Specialized Respiratory & Chest Diseases Center (55.1%), while it was 13.9% in Ibn–Zuhur hospital. A statistically significant association found between TST result and work site (p= 0.000) (table 4).

Table 4: Distribution of the study group by Tunerculine skin test and work site

Work Site	Tubreculin Test Result (mm)								P-Value
	5+		5-9		10+		Total		
	No	%	No	%	No	%	No	%	
Institute TB	16	20.5	19	24.4	43	55.1	78	36.8	0.000
Resafa TB Unit	4	21	15	79	0	0.0	19	9	
Bin Zuhur Hosp.	83	72.2	16	13.9	16	13.9	115	54.2	
Total	103	48.6	50	23.6	59	27.8	212	100	

Discussion:

Efforts to control TB are huge but still inefficient. One important step in TB control is to identify LTBI especially among HCWs. In this study the prevalence of positive TST among HCWs was found to be 27.8% with the highest prevalence (29.6%) among age group 25-54 years. These results were higher than that reported by Nienhaus et al., 2007 (5) in who found a positive TST prevalence of 12.8%. In their study, a significant relationship between age and TST results was also noted (p=0.011). Schablon et al, 2009 (6) found the prevalence of LTBI to be 7.2% among health care workers in a hospital for pulmonary diseases in Germany. The prevalence of LTBI was only 3.5% among HCWs younger than 30 years, which is close to the figure reported in this study among HCWs less than 25 years (0.0%). However, among HCWs aged more than 50 years, the prevalence was 22%. Beside variations in standard care and respiratory precautions, they used the Quantiferon blood ELISA testing which has much less false positive results than standard TST used in the current study. In another study by Nienhaus, 2009 (7), he used the Interferon-Gamma Release Assay (IGRA), and found the prevalence of LTBI among HCWs in Germany was 10 %. The study recommended that prevention strategies should be reconsidered. On studying 1755 Italian HCWs, Franchi et al., in 2009 (8) found the overall Positive TST to be 6% which is much less than the prevalence in the current study. However, they also found that physicians were at high risk for TST positivity. While Demkow et al, 2008 (12) on studying 155 HCWs in Poland, using interferon-gamma whole blood and tuberculin skin tests, found that the prevalence of LTBI was, on average, 27.1%. A higher risk of acquiring LTBI was associated with certain work locations: TB lab workers 50%, TB ward clinicians 34%, nurses 30%, analytical lab technician 20%, and among administration staff 15%. Drobniewski et al, 2007 (13) mentioned that Russia is one of 22 high burden tuberculosis countries. LTBI was seen in 40.8% (107/262) of a teaching hospital staff and was significantly higher in doctors and nurses (39.1%) than in students (8.7%). In their systematic review, Joshi et al., 2006 (14), reported high rates of LTBI among HCWs in many countries; our findings agreed with their results in that physicians and nurses and paramedics had higher TST positive rates among all HCWs job categories.

Conclusions:

Around one third of HCWs in the three main TB health facilities had LTBI. Higher prevalence was reported among physicians, nurses and paramedics. Pre-employment and periodic testing for LTBI using more specific newer test, and enhance use of

enough protective measures and chemoprophylaxis for positive cases are recommended.

Authors Contribution:

Alaa Hussein Ali Al-Ameri: Selection the study subject, data collection, and drafting the manuscript

Petru Armean: Designing the methods and drafting the manuscript

Faris Al-Lami: Data analysis and drafting the manuscript

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