Rate of Tuberculin Reactivity Among Health Care Workers in Ibn-Zuhur and Ibn-Alkhateeb Hospitals

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ABSTRACT:

BACKGROUND:

Tuberculosis is one of the oldest diseases known to affect humans, it caused by infection with Mycobacterium Tuberculosis, which is part of a complex organisms including M.bovis (reservior Cattle) and M.africanum (reservior human). Mycobacterium Tuberculosis is most commonly transmitted from a patient with infectious pulmonary TB to other person by droplet nuclei which are aerosolized by coughing, sneezing or speaking. Health care workers are exposed to a variety of infections, including TB. the standard test for detecting Latent TB infection is tuberculin skin test (Mantoux test) using purified protein derivatives of Mycobacterium Tuberculosis.

OBJECTIVE:

Is to estimate the rate of TB transmission from patients with active disease to the Health care workers, and also to study the relation of different variables to the transmission risk including (Gender, Vaccination, and Duration of contact or occupation duration).

SUBJECT AND METHODS:

Cross sectional descriptive study done in Ibn-Zuhur hospital and Ibn-alkhateeb hospital between April and May 2013 .One hundred and two Health care workers were included in this study (50) HCWs from Ibn-zuhur hospital and (52) Health care workers from Ibn-Alkhateeb hospital. 5 units of PPD (0.1mL) had been injected intradermally to the volar surface of forearm to be seen within 48-72 hours. The test was considered positive if (>=10mm induration) developed.

RESULTS:

The study shows the rate of tuberculin reactivity among health care workers 25.5% (26/102) a significant relationship between duration of work in hospital and tuberculin reactivity among HCWs. (50) HCWs from Ibn-zuhur hospital their age ranging between 24-48 years mean 36 year, 34 (68%) were male and 16 (32%) female and (52) HCWs from Ibn-Alkhateeb hospital their age ranging between 21-43 years mean 32 year, 42 (81%) were male and 10 (19%) female.in Ibn-zuhur hospital 32%(16/50) Ward nursing staff (5-10) years' work duration shows the higher rate (38.5%) followed by Laboratory staff (5-10) years (28.57%) and then doctors < 5 years' work (25%) ,service workers (2-5) years' work shows (22.22 %).While in Ibn-Alkhateeb hospital 19% (10/52) ward nursing staff (5-10) years' work duration shows the higher rate 27% followed by Laboratory staff (20%) and then service workers (2-5) years' work shows (12.5%) while doctors < 5 years work duration shows (8.5%).

CONCLUSION:

Health care workers have high rate of latent TB infection. Their positivity correlated with the duration of their jobs. Health care workers with negative tuberculin skin test should be immunized with BCG vaccine**.**

KEYWORD: tuberculine skin test.

INTRODUCTION:

Tuberculosis (TB) is one of the oldest diseases known to affect humans; it caused by *Mycobacterium Tuberculosis* (M.TB) complex, the disease usually affects the lungs, although in up to one third of cases other organs are involved. It is curable disease if treated properly if untreated the disease can be fatal within 5 years in more than half cases. [1]

A diagnosis of tuberculosis is never made only on the result of tuberculin skin test it will always require further testing as chest X ray & sputum test, People who have had a positive tuberculin skin test test, generally will always have a positive test and should not be tested again. Also, anyone who is known to have active TB should

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not be tested because the local reaction to the test may be so severe that it requires emergency medical care. Remember it is important to ask the person before conducting the test if they may be pregnant, or have had a positive TST test in the past, or have had Tuberculosis in the past. The greatest limitation of Mantoux test is lack of Mycobacterium species specificity. The size of the reaction is determined by measurement of the indurations (not erythema) across the forearm at the site of the injection. The criteria for interpreting the reaction as positive (indicating the presence of tuberculosis infection) varies depending on certain characteristics of the person being tested [2, 3, 4].

False-positive reactions include the following: Infection with non-tuberculosis mycobacteria, Previous BCG vaccination and incorrect interpretation of reaction. False-negative reactions include

Severe TB (25% of Cases negative), New born and elderly, Immune suppressive drugs, HIV (if CD4 Count < 200 cells/ml), Recent infection, Malnutrition, Malignancy and Sarcoidosis. [5, 6,7,8,9, 10]

Administration of the TST should be administered by the Mantoux method, which consists of intradermal injection of 0.1 mL of PDD (5 tuberculin units) into the volar surface of the forearm, about half between the elbow and wrist, using a disposable tuberculin syringe. Other areas may be used, but the forearm is the preferred site for testing. A skin area away from superficial veins and free of lesions should be selected. A 5 mm tense white wheal should appear at the injection site. If this does not appear, replace the test at least 2 inches away from the initial injection site. The tuberculin test solution should be refrigerated (not frozen) and stored in the dark as much as possible (exposure to strong light should be avoided) [11, 12.13].

There are two broad categories of candidates for testing for latent tuberculosis infection persons who are likely to have been infected recently and persons who are at increased risk for tuberculosis because of certain clinical conditions.[11,14]

OBJECTIVES OF THE STUDY:

1. To estimate the rate of TB transmission from patients with active disease to the HCWs.
2. To study the relation of different variables to the transmission risk including (Gender, Vaccination, Duration of contact or employment duration) for planning better to protects HCWs from LTBI.

SUBJECT AND METHODS:

Study design, setting and time:

Cross sectional descriptive study done in Ibn-zuhur hospital and Ibn-alkhateeb hospital between April and May 2013.

PATIENTS:

One hundred and two HCWs. (fifty HCWs work in Ibn-zuhur hospital and fifty two HCWs work in Ibn-alkhateeb) were included in this study.

Inclusion criteria:

- Any health care workers in Ibn-zuhur hospital and Ibn-alkhateeb hospital (doctors, word nursing staff, Laboratory staff, and service workers).

Exclusion criteria:

- Persons with active TB.
- History of TB infection.
- History of immunosuppression (DM, uremia, steroid dependent, HIV infection…) was excluded from this study.

METHODS:

Data collection:

Data about (Age, Gender, Occupation and department, Duration of occupation, Vaccination and scar status) were collected from participants and as required.

Any individual with positive history of vaccination and BCG scar is absent considered as negatively vaccinated while any individual with positive history of vaccination and BCG scar is present consider as positively vaccinated.

TST was done after taking a verbal permission from the individuals who participate in this study. 0.1 m1 (5/ tuberculin units) had been injected intradermally to the volar surface of forearm and the site of injection was labeled. The test observed 48-72 hours after injection, if no indurations developed considered as (0mm). If an induration develop it was reported as either (>=10mm) and (<10mm) induration. Erythema of any size without indurations was considered as 0mm.

Statistical analysis

All data were coded and entered to the computer for analysis using statistical package for social sciences (spss 20). Association between different variables and TST results measured by using (CHI-SQARE) test. P value<=0.05 considered as the level of significance.

RESULTS:

In this cross sectional descriptive study shows the distribution of the sample according to gender, duration of Contact, vaccination & results of tuberculin skin tests in Ibn-alkhateeb hospital and in Ibn zuhur hospital were : 12(23%) ,8(16%)

doctors < 5 years contact, 22(43%) ,26(52%) ward staff 5-10 years contact, 10(19%) ,7(14%) Laboratory staff whose contact 5-10 years and lastly service workers 2-5 years contact 8(15%) ,9(18%) respectively.

40(77%) of the studied sample were vaccinated 10(19%) of the tested sample developed >=10mm indurations in Ibn-alkhateeb hospital, While in Ibn zuhur hospital 37(74%) of the studied sample were vaccinated, 16(32%) of the tested sample developed >=10mm indurations as shown in table (1).

Table 1: Frequencies of sample according to gender, duration,BCG vaccination & results of tuberculin skin test in ibn alkahteeb & ibn Zuher hospitals.

frequencies		NO.ibn alkahteeb	% ibn alkahteeb	NO. ibn Zuher	% ibn Zuher
gender	male	42	81	34	68
	female	10	19	16	32
duration of contact ((occupation))	doctors <5 years	12	23	8	16
	ward staff 5-10 years	22	43	26	52
	Laboratory staff 5-10 years	10	19	7	14
	services workers 2-5 years	8	15	9	18
vaccination	Positive	40	77	37	74
	Negative	12	23	13	26
results of tuberculin skin test	>=10mm	10	19	16	32
	<10mm	24	44	17	34
	Zero	18	37	17	34

Table 2: Distribution of gender with results of Tuberculin skin Test Ibn-zuhur hospital Ibn-alkhateeb hospital.

			Gender		Total	Gender		Total
			male	female		Male	Female	
Results of Tuberculin skin Test	>=10 mm	NO.	12	4	16	10	0	10
		%	35.3	25	32	24	0	19.5
	<10 mm	NO.	12	5	17	19	4	23
		%	35.3	31.25	34	45	40	44
	Zero	NO.	10	7	17	13	6	19
		%	29.4	43.75	34	31	60	36.5
Total		NO.	34	16	50	42	10	52
		%	100	100	100	100	100	100

P = 0.586 in Ibn-zuhur hospital while P = 0.091 Ibn-alkhateeb hospital.

The distributions of the sample according to gender with test results in Ibn-zuhur hospital were: 12(35.3%) of male sample and 4(25%) of female sample shows >=10mm indurations, while 12(35.3%) of male sample and 5(31.25%) of female sample shows <10mm induration.10 (29.4%) of male sample and 7(43.75%) of female sample shows 0mm induration, While the distributions of the sample according to gender with test results in Ibn-alkhateeb hospital were: 10(24%) of male sample and 0(0%) of female sample shows >=10mm indurations, 19(45%) of male sample and 4(40%) of female sample shows <10mm induration.13 (31%) of male sample and 6(60%) of female sample shows 0mm induration as illustrated in table (2)..

According to the vaccination the test results in Ibn-zuhur hospital and Ibn-alkhateeb hospital respectively were: 15(40.5%), 8(20%) of vaccinated sample and 1(7.7%), 2(16.7%) of

unvaccinated sample developed >=10mm induration, while 10(27.1%) , 20(50%) of vaccinated sample and 7(53.8%), 4(33.3%) of unvaccinated sample developed <10mm indurations. No indurations developed in 12(32.4%), 12(30%) of vaccinated sample and 5(38.5%), 6(50%) of unvaccinated sample respectively as shown in table (3).

Table 3: Distribution of Vaccination with results of Tuberculin skin Test Ibn-zuhur hospital & Ibn-alkhateeb hospital.

			Vaccination in Ibn-zuhur		Total	Vaccination in Ibn-alkhateeb		Total
			Positive	Negative		positive	Negative	
Results of Tuberculin skin Test	>=10 mm	NO.	15	1	16	8	2	10
		%	40.5	7.7	32	20	16.7	19
	<10 mm	NO.	10	7	17	20	4	24
		%	27.1	53.8	34	50	33.3	46
	Zero	NO.	12	5	17	12	6	18
		%	32.4	38.5	34	30	50	35
Total		NO.	37	13	50	40	12	52
		%	100	100	100	100	100	100

P= 0.068 Test Ibn-zuhur hospital While Ibn-alkhateeb hospital is P=0.432.

Regarding the relationship between duration of contact (occupation duration) and test results in Ibn-zuhur hospital was : 2(25%) of doctors<5years of Contact, 10(38.4%) of ward staff 5-10 years Contact, 2(28.5%) of Lab.staff 5-10 years Contact and 2(22.2%) of service workers 2-5 years of Contact developed >=10mm indurations, while 5(62.5%) of doctors<5 years of Contact, 6(23.1%) of ward staff 5-10 years of Contact, 3(43%) of Lab.staff 5-10 years of Contact and 3(33.3%) of service workers 2-5 years of Contact developed <10mm indurations. No indurations developed in 1(12.5%) of doctors<5 years of Contact, 10(38.4%) of ward staff 5-10 years of Contact, 2(28.5%) of Lab.staff 5-10 years of Contact and 4(44.5%) of service workers 2-5 years of Contact. While the relationship between duration of contact (occupation duration) and test results in Ibn-alkhateeb hospital was; 1(8.5%) of doctors< 5years of Contact, 6(27%) of ward staff 5-10 years Contact, 2(20%) of Lab.staff 5-10 years Contact and 1(12.5%) of service workers 2-5 years of Contact developed >=10mm indurations, while 7(58.3%) of doctors< 5 years of Contact, 10(45.5%) of ward staff 5-10 years of Contact, 2(20%) of Lab.staff 5-10 years of Contact and 4(50%) of service workers 2-5 years of Contact developed <10mm indurations. No indurations developed in 4(33.2%) of service workers 2-5 years of Contact as shown in table (4).

DISSCUSION:

No data were available about tuberculin reactivity in Iraqi population in last decade. HCWs have increased risk of exposure to TB and their risk is related to the prevalence of the disease in their community, no data were available about the prevalence of TB in HCWs also about tuberculin reactivity in them.Many medical authorities recommend tuberculin test screening for all HCWs and then follow up with repeated testing.[6]The current study shows the rate of tuberculin reactivity among HCWs to be 25.5% Many studies found that the reactivity of tuberculin in HCWs reflect the prevalence of TB in the population for examples in Thailand the prevalence of TB in their population is (142/100000) and the rate of tuberculin reactivity in HCWs was found to be 68%.[22]While in United States the prevalence of TB in population is (5.2/100000) and tuberculin reactivity in their HCWs is 4 %.[23]

Table 4: Distribution of duration of occupation ((occupation)) with results of Tuberculin skin Test in Ibn-zuhur hospital.

			occupation duration (Duration of contacts).									
			Ibn-zuhur hospital					Ibn-alkhateeb hospital				
			doctors<5 years	Ward staff 5-10 years	Lab. staff 5-10 years	service workers 2-5 years	Total	doctors<5 years	Ward staff 5-10 years	Lab. staff 5-10 years	service workers 2-5 years	Total
results of tuberculin skin test P = 0.05	>=10 mm	NO.	2	10	2	2	16	1	6	2	1	10
		%	25	38.5	28.57	22.22	32	8.5	27	20	12.5	19.5
	<10 mm	NO.	5	6	3	3	17	7	10	2	4	23
		%	62.5	23	43	33.3	34	58.3	45.5	20	50	44
	Zero	NO.	1	10	2	4	17	4	6	6	3	19
		%	12.5	38.5	28.5	44.5	34	33.2	27.5	60	37.5	36.5
Total		NO.	8	26	7	9	50	12	22	10	8	52
		%	100	100	100	100	100	100	100	100	100	100

P = 0.05 Test Ibn-zuhur hospital While Ibn-alkhateeb hospital is P=0.0223.

The significance of tuberculin reactivity in HCWs in our study will be of more value if it can be compared with tuberculin reactivity in the general population but no recent data available at the present.

The current study shows significant relation between the tuberculin reactivity and the types of work in hospital as it was highest among word staff in job for 5-10 years.

This relation is well recognized in many other studies. [2, 6, 13, 20, 24]

BCG vaccination was found to have no effect on tuberculin reactivity in our study which is also the finding of other studies.[20,25]Its well known that the effect of BCG vaccination on tuberculin test rarely exceeds 10 years[25] and BCG in our country is usually done in the first week of life.

The current study shows the rate of Tuberculin reactivity in HCWs more in one hospital than other this is due to direct contact of HCWs in Ibn-zuhur hospital with TB patients including open cases (AFB Positive cases).

While Ibn-alkhateeb hospital dealing with infectious diseases other than TB.

The risk of development of active TB is higher in people with reactive tuberculin and its estimated that the risk reaches up to 7.5% during the life time of the person and the risk even higher in patient who developed an immunosuppressive condition.[12]

Many authors advice treatment of latent TB in immunosuppressed patients and also in patients treated by immunosuppressive drugs and also in recent converters.[11,12,17]

No clear advice available regarding the best approach to healthy tuberculin positive persons in highly endemic areas were the persons is in continuous exposure but follow up of those people is a reasonable advice.[16]

CONCLUSION:

HCWs have high risk of acquiring TB infection because of their prolonged and frequent contact with TB patients.

The positivity of test correlated with types of jobs of HCWs in both hospitals.

Recommendations:

Tuberculin testing at the start of their job and regular follow up after that is an important step to prevent active TB in the HCW_S.

HCWs with negative tuberculin skin test should be immunized with BCG vaccine.

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