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Evaluation of Tuberculosis Skin Test in Al-Hilla Province

Ahmed Hussein Jasim[1], Amjed H. Abbas[2], Munqith Abdul-mohsin Kadhim[3], Nadia H. Sahib[2]

[1]Department of Internal Medicine, University of Babylon, Iraq, [2]College of Hammurabi, University of Babylon, Iraq, [3]FICMS (med), FICMS (rasp), Ministry of Health, Iraq

Abstract

The accurate diagnosis of latent tuberculosis infection (LTBI) is an important component of any tuberculosis control programme and depends largely on tuberculin skin testing. The appropriate interpretation of skin test results requires knowledge of the possible confounding factors such as previous BCG vaccination. This study aimed to assess tuberculin skin testing in patient with latent tuberculosis infection.

The study was performed at Tuberculosis Centre in Babylon Province in the period from February 2016 to February 2017, it included 1109 patients.

History and physical examination were performed, the history included information about age, gender, address, history of contact with tuberculosis patients , and history of BCG vaccination. Tuberculin skin test was performed by mantox test,0.1 unit of purified tuberculin protein injected intra-dermally and read after 48 hours, the result was measured in millimeter (mm).

The age ranged from 1-85 years and the mean age was 24.30±20.241, percentage of females was more than males (52% versus 48%), the number of positive cases of BCG were 966 (87%) while the negative cases was 143 (13%), the number of positive cases of tuberculin skin test was 86 (7.8%) while the negative cases were 1023 (92.2%). The diameter of skin test was higher in vaccinated subjects than non-vaccinated and the result was significant (p value=0.004).The number of positive skin test was higher in vaccinated than non-vaccinated patients and the difference was significant.

In subjects without active tuberculosis, immunization with BCG largely increases the likelihood of a positive tuberculin skin test. The interpretation of the skin test therefore needs to be made in the individual clinical context and with evaluation of other risk factors for infection. The size of the induration should also be considered when making recommendations for treatment of latent infection.

Keywords: *Tuberculosis, tuberculin skin test, latent tuberculosis infection*

Introduction

Tuberculosis (TB) is caused by *Mycobacterium tuberculosis* (MTB) and is one of the deadliest infectious diseases worldwide. Despite recent progress in molecular diagnosis and effective medications, its morbidity and mortality remain high. The World Health Organization (WHO) reported that 8.7 million people developed active TB in 2011 and 1.4 million people died from it[1]. Meanwhile, one-third of the world's population is estimated to be infected by MTB. Latent TB infection (LTBI) is defined by evidence of immunological responses by *Mycobacterium tuberculosis* (MTB) proteins in the absence of clinical symptoms/signs of active diseases[2]. An estimated 30% of the people exposed to MTB will have evidence of LTBI by tuberculin skin test[3]. Therefore, identifying and sterilizing latently infected individuals, especially those at high risk, are of paramount importance for eliminating TB[4].

Compared to numerous reports on active TB, disparities between sexes in LTBI are less frequently analyzed and have inconsistent findings. Male sex has been identified as an independent risk factor associated with LTBI in some studies[5,6,7]. Infection with Mycobacterium tuberculosis can result in latent tuberculosis infection (LTBI) or active tuberculosis (TB)[1]. The progression of LTBI to active TB can be

reduced by up to 90% with nine months of preventive treatment[8,9]. The World Health Organization has identified that better identification and treatment of those with LTBI who are at higher risk of progressing to active TB is integral to the new TB elimination goals[10].

This study aimed to assess tuberculin skin testing in patient with latent tuberculosis infection.

Materials and Method

The study was performed at Tuberculosis Centre in Babylon Province in the period from February 2016 to February 2017, it included 1109 patients, history and physical examination were performed , the history included information about age, gender, address, history of contact with tuberculosis patients , and history of BCG vaccination. Tuberculin skin test was performed by mantox test,0.1 unit of purified tb protein injected intra-dermally and read after 48 hours, the result was measured in millimeter (mm)[11].

Statistical Analysis

The data were analyzed by using SPSS version 18, descriptive analysis was used for demographic data, cross tabulation was used for finding relation between different variables, p value less than 0.05 was considered statistically significant

Results

The age ranged from 1-85 years and the mean age was 24.30±20.241, percentage of females was more than males (52% versus 48%) (Table 1).

Table 1. Demographic data

Parameters		
Age (years) (Mean ± SD)		24.30±20.241
Gender	**Males/ no. (%)**	537 (48%)
	Females/ no. (%)	572 (52%)
Address	**Rural**	569 (51 %)
	Urban	540 (49%)

Table (2) shows that the number of positive cases of BCG were966 (87%) while the negative cases was 143 (13%)

Table 2. Frequency of BCG cases

		No. (%)	**Total No. (%)**
BCG	positive	966 (87%)	1109 (100%)
	negative	143 (13%)	

Table (3) shows that the number of positive cases of tuberculin skin test was 86 (7.8%) while the negative cases were 1023 (92.2%)

Table 3. Distribution of tuberculin skin test results

		Frequency	**Percent**
Valid	Negative	1023	92.2
	Positive	86	7.8
	Total	1109	100.0

The diameter of skin test was higher in vaccinated subjects than non-vaccinated and the result was significant (p value=0.004)

The number of positive skin test was higher in vaccinated than non-vaccinated patients and the difference was significant (Figure not shown) (p=0.039)

The percentage of positive skin test in non-contact individuals was higher than contact subjects (Figure not shown) and the result was significant(P=0.002)

Discussion

For the purpose of identifying latently infected individuals in the laboratory, two associated factors (place of birth in a foreign country with a high prevalence of tuberculosis and history of exposure to patients with untreated active tuberculosis) are useful preselection criteria before performing tuberculin skin testing[12].

The presentrevision is regarded the first population-based investigationinspecting the epidemiology of tuberculosis infection in Hilla province in one year and thefirst revision ever to survey LTBI by using TST in a population-based sample.

The age ranged from 1-85 years and the mean age was 24.30±20.241, percentage of females was more than males (52% versus 48%) due to the females visiting the

health care assurance were higher than malesand this agrees with a study performed by al-Kassimi*et al.,* 1993. The numbers of positive tuberculin skin test were higher in younger age group (1-55) years than age-group (> 56 year)and this was consistent with a previous studieslike Al-Jahdali*et al.,* 2005 and Ayubi*et al.,* 2015), and the probable higher waning of the T-cell mediated immune response to TST in older age. The percentage of positive skin test was more in females than males (p=0.006) which may be due to the cases for our study was females more than males and this result was different from a studies performed by[13,14,15]

Vaccination with bacillus Calmette-Guérin (BCG) has been used for the prevention of tuberculosis (TB) in humans since 1921; approximately 100 million doses per year are administered to children in 170 countries of the world[4]. BCG vaccine is thought to be effective in preventing or ameliorating severe complications of TB in children, i.e., disseminated disease or meningitis, but is of marginal efficacy in preventing adult forms of TB[5,6]. The occurrence of a higher conversion rate among those individuals with a BCG scar might indicate true conversion due to recent infection than a boosting effect of BCG since these individuals were TST negative at enrollment[6].

In one study, the researchers found that in teenagers who had received one BCG vaccination at birth, 10 mm of induration was the most sensitive and specific cutoff for the development of TB, whereas in those who had been revaccinated, 16 mm was more predictive[7] and this is confluent with our results. Table (2) shows that the number of positive cases of BCG was 966 (87%) while the negative cases was 143 (13%).The diameter of skin test was higher in vaccinated subjects than non-vaccinated and the result was significant (p value=0.004). The number of positive skin test was higher in vaccinated than non-vaccinated patients and the difference was significant (p=0.039).

Conclusion

The data presented here will contribute to the efforts made to control and prevent TB infection by increasing the awareness of latent TB infection, conversion rates, and the problems related to the TST

Ethical Clearance: The Research Ethical Committee at scientific research by ethical approval of both environmental and health and higher education and scientific research ministries in Iraq

Conflict of Interest: The authors declare that they have no conflict of interest.

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