Original Article

A comparative study between T-Spot and tuberculin skin tests for the diagnosis of tuberculosis

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Objective: To compare tuberculin skin test (TST) with T-Spot for diagnosis of active tuberculosis (TB) as well as latent tuberculosis infection (LTBI).
Methodology: This study was conducted at Department of Immunology, Islamabad diagnostic Center, Islamabad from January to December 2018. Blood Samples of 126 individuals for T SPOT and same patients were inoculated with PPD (Mantoux test).
Results: Among 126 participants, 64 (50.8%) were male and 62 (49.2%) were female. T-Spot. was positive in 52 (41.0%) while PPD was positive in 13 (10%). Furthermore, 25 (19.84%) T-Spot. TB test was positive for male while tuberculin skin test was positive in 6 (4.7%) male. T-Spot. was positive in 27 (21.4%) female while PPD was positive in 7 (5.5%). Additionally, one (0.79%) patient each of males and females was also found to be intermediate positive for PPD, which was clearly positive for T-Spot. TB test.
Conclusion: T-Spot. was much more sensitive and specific in all age groups and different clinical conditions including immune-compromised individuals. Skin test has limitation especially for older age groups but in T-Spot. is unaffected by age and provides excellent agreement. (Rawal Med J 202;45:510-512).
Keywords; Tuberclosis, IGRA, T Spot, Tuberclin skin test, PPD.

INTRODUCTION

Tuberculosis is an airborne bacterial infection caused by *Mycobacterium tuberculosis (Mtb).* Alveolar macrophages ingest the Mtb whenever the person is exposed which initiates the infection.[1] Globally TB is affecting more than 10 million individuals annually while around 1.8 million dies of it including about 0.3 million deaths of HIV-associated infection.[2] More than two-thirds of the cases are found in seven countries i.e. China, Indonesia, India, Pakistan, Nigeria, Philippines and South Africa.[3] Pakistan stands 5th with high tuberculosis (TB) burden and ranked 6th in drug resistance TB.[4]

The Mtb enclosed in immune system in and the patient shows no clinical indication and affected subjects may remain latent throughout their life. However, when bacterial replication starts, it will be converted to active TB and clinical symptoms will appear.[5] About 5 to 10% of latent TB infections (LTBI) convert to active TB at any stage of life and incidence can be higher in first two years of infection.[6]

The acid fast staining (AFS) of sputum is commonly adopted diagnostic method worldwide but the culture of Mtb is reference diagnostic tool. Since last decade different molecular based methods for example the Xpert MTB/RIF (Cepheid) and the Geno-Type line probe assays (HAIN Life Sci) are also being used for fast detection of Mtb.[7] For LTBI, currently, no gold standard diagnostic tool exists. Indirect methods depending on cell mediated immune response and Mtb antigen recognition are used like Mantoux test (PPD) or tuberculin skin test (TST) and the blood test which is an interferon gamma release assay (IGRA). In comparison of TST, higher specificity of IGRAs have been documented.[8] T-Spot TB and QuantiFERON-TB Gold test are two IGRA based products which are utilized by different diagnostic setups. In T-Spot, an enzyme-linked immune-spot assay is utilized. ESAT-6 and CFP-10 TB antigens make complex with IFN-γ which is produced by T-lymphocytes.[7]

IGRAs sustain a advanced investigative specificity

and sensitivity for LTBI than that of TST and assess tuberculosis infectivity by discriminating LTBI and active tuberculosis positive outcome from other disparity finding and apart from non-infected immune-compromised persons having indeterminate or negative or outcomes.[9] In Pakistan, due to high burden of TB, the only workable strategy to end TB is to diagnose LTBI cases, which, can result in significant decrease in both transmission and morbidity due to active disease. Considering this gap, present study was performed to determine the prevalence of LTBI using PPD or TST and IGRAs.

METHODOLOGY

This study was conducted from January to December 2018 at Department of Immunology, Islamabad diagnostic center, Islamabad and included 126 participants. The selection criteria were only suspected patients, who had no previous active TB infection, who were not treated for LTBI and who had no active tuberculosis infection were included in the study. They were referred for diagnosis of tuberculosis to the laboratory by physician and had symptoms suggestive of TB infection i.e. low grade fever, coughing and weight loss. Participants comprised of both children and adults. The study approval was done by the review board of Pir Mehar Ali Shah Arid Agriculture University, Rawalpindi.

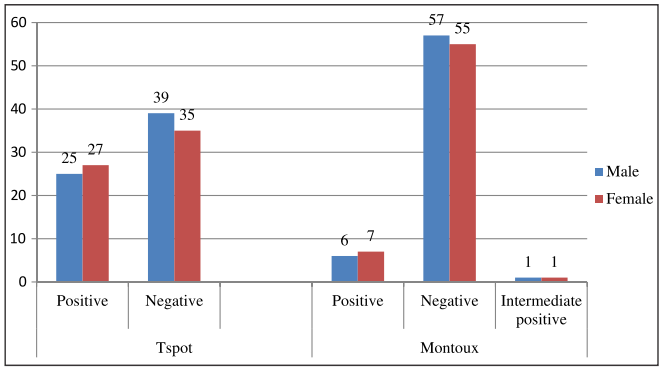
Samples of blood for T-Spot. TB test were collected in Lithium heparin tubes and same patients were inoculated with PPD. Patients were advised to revisit after 48-72 hours to read the induration of inoculated PPD. A positive PPD result was considered to be an induration of 10 mm or more.

Statistical analysis: We used SPSS version 16.0. Frequency and percentages were calculated for categories variables like gender and TB diagnosis with T-Spot. test and PPD. $p<0.05$ was considered significant.

RESULTS

Out of 126 individuals, there were 64 (50.7%) male and 62 (49.3%) females. The age ranged from one year to 81. T-Spot. TB test was significantly better than TST ($p=0.0001$).

Figure. Comparison of T SPOT TB Test and PPD test.



T-Spot TB test was positive in 52 (41%) cases while PPD test was positive in 13 (10.0%) cases. The results showed that 25 (19.8%) male patients were positive for T Spot TB test whereas in 6 (4.7%) of males PPD test was positive**.** Similarly, in females 27 (21.4%) were found positive by T Spot TB test and in 7 (5.5%) PPD test was positive. Additionally, one male and one female patient (0.79%) each were also found to be intermediate positive for PPD test, which was clearly positive for T-Spot TB test (Figure). There was significant difference between the genders ($p=0.0002$).

DISCUSSION

In the present study, 13 out of 126 individuals showed a positive result for PPD while 52 out of 126 members were T.SPOT positive. There is a tough conformity found between PPD and T-Spot TB test. The current study showed a negative association of older age was significant with respect to PPD and trend towards positive cases was indicated for both PPD and T-Spot TB in lower to middle age grouping.

A study from Turkey showed greater sensitivity for T-Spot TB test compared to TST for both active and LTBI.[10] Our results are in concordance with their findings that high sensitivity of T-Spot than the TST. Some studies concluded that T-Spot was a superior marker for indefinite results in contrast with QfN-Gold test, designates improved consumption in clinical scenario to expose the indefinite outcomes.[10,11]

Male in our culture is less exposed to TB than females due to contact and community family setup.[12] Sharma et al from India also witnessed

similar distribution of gender.[13] Another study reported that a similar proportion of male and female cases had positive findings of latent TB when tested on T Spot Test and TST.[14]

T-Spot TB was not influenced by higher age groups and was able to screen dormant TB in aged persons. Leung et al reported similar findings.[15] Our judgments are that it could be useful in lower age, as reported by another study.[14] Regardless of the entire discussion about usefulness of both TST assay and T-Spot TB & other IGRAs based latent TB recognition assay a number of queries is to be response that to consumption in term of predictive abilities to recognize sufferers with dormant tuberculosis likelihood of reversion and conversion with time possession.

CONCLUSION

T-Spot TB had better performance in all age groups and different clinical conditions including immune-compromised individuals as this test a unique procedure to make a standard count of T cells to optimize the test.

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