Reverse dot blot hybridization assay — An expeditious diagnostic tool for drug resistant TB

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Madam, Tuberculosis (TB) is one of the leading infectious diseases that is highly transmissible. It is reported to cause approximately 10 million infections and 1.4 million deaths globally in the year of 2019.[1] Prompt detection and treatment of TB are essential to intercept the proliferation of the disease. In the case of drug- resistant TB, failure to detect the resistance of anti TB drugs may give rise to extensively drug-resistant tuberculosis (XDR-TB). Thus, the rapid detection of drug resistance is vital;, however, the current standard drug susceptibility tests (DST) may take up to 12 weeks raising an alarming concern.[2] A study was done in China by Li Wan et al, on the accuracy of the reverse dot blot hybridization assay (RDBH) for rapidly detecting the resistance of four anti TB drugs (rifampicin (RIF), isoniazid (INH), streptomycin (SM) and ethambutol (EMB)) in mycobacterium tuberculosis (MTB) isolates.[3]

TheRDBH assay has a detection turnaround time of about 7 hours for 42 samples showing a significantly high simultaneous detection rate compared to the gold standard DST test.[3] Although other commercially available line probe assays (LPA) such as Genotype MTBDR and FluoroType MTBDR exist, their turnaround time is not as efficient as the RDBH assay.[3] Genotype MTBDR and Fluoro Type MTBDR also did not detect the mutant oxyR-ahpC region that is accountable for 10-15% of INH resistance, while RDBH assay did.[3]

Approximately 95% of TB cases arise in developing countries, with Pakistan amongst the top eight countries that account for two-thirds of the total number of cases worldwide. Pakistan was estimated to suffer from over 560,000 TB infections in 2018 and approximately 27,000 drug-resistant TB cases annually.[1,4] Detecting drug resistance in TB cases is essential to prevent further disease progression into XDR-TB and allows the formulation of an appropriate drug regimen for optimal treatment. The management of TB cases can be further improved by implementing more efficient detection methods concerning time and quantity of samples. RDBH assay has proven its ability to generate an effective turnaround in detecting resistance over a variety of anti TB drugs in a short amount of time. It is imperative for healthcare workers in Pakistan to consider and implement this assay for favourable outcomes in patients with TB associated drug resistance.

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References

1. World Health Organization 2020. Tuberculosis: Key facts. [Online] [Cited 2021 May 22]. Available from: URL:http://www.Tuberculosis (who.int)
2. Gopalaswamy R, Shanmugam S, Mondal R, Subbian S. Of tuberculosis and non-tuberculous mycobacterial infections - a comparative analysis of epidemiology, diagnosis and treatment. J Biomed Sci. 2020; 27:74.
3. Wan L, Guo Q, Wei JH, Liu HC, Li MC, Jiang Y, et al. Accuracy of a reverse dot blot hybridization assay for simultaneous detection of the resistance of four anti-tuberculosis drugs in Mycobacterium tuberculosis isolated from China. Infect Dis Poverty. 2020; 9:38.
4. World Health Organization. Global TB Report 2019. [Online] [Cited 2021 May 12]. Available from: URL: http://www.9789241565714-eng.pdf (who.int).