

Diagnostic Accuracy of the Tuberculin Skin Test for Tuberculosis Diagnosis: Interest of Using ROC Curve and Fagan's Nomogram

Authors : Nouria Mariem, Ben Rayana Hazem, Ennigrou Samir

Abstract : Background and aim: During the past decade, the frequency of extrapulmonary forms of tuberculosis has increased. These forms are under-diagnosed using conventional tests. The aim of this study was to evaluate the performance of the Tuberculin Skin Test (TST) for the diagnosis of tuberculosis, using the ROC curve and Fagan's Nomogram methodology. Methods: This was a case-control, multicenter study in 11 anti-tuberculosis centers in Tunisia, during the period from June to November 2014. The cases were adults aged between 18 and 55 years with confirmed tuberculosis. Controls were free from tuberculosis. A data collection sheet was filled out and a TST was performed for each participant. Diagnostic accuracy measures of TST were estimated using ROC curve and Area Under Curve to estimate sensitivity and specificity of a determined cut-off point. Fagan's nomogram was used to estimate its predictive values. Results: Overall, 1053 patients were enrolled, composed of 339 cases (sex-ratio (M/F)=0.87) and 714 controls (sex-ratio (M/F)=0.99). The mean age was 38.3 ± 11.8 years for cases and 33.6 ± 11 years for controls. The mean diameter of the TST induration was significantly higher among cases than controls (13.7mm vs. 6.2mm; $p=10^{-6}$). Area Under Curve was 0.789 [95% CI: 0.758-0.819; $p=0.01$], corresponding to a moderate discriminating power for this test. The most discriminative cut-off value of the TST, which were associated with the best sensitivity (73.7%) and specificity (76.6%) couple was about 11 mm with a Youden index of 0.503. Positive and Negative predictive values were 3.11% and 99.52%, respectively. Conclusion: In view of these results, we can conclude that the TST can be used for tuberculosis diagnosis with a good sensitivity and specificity. However, the skin induration measurement and its interpretation is operator dependent and remains difficult and subjective. The combination of the TST with another test such as the Quantiferon test would be a good alternative.

Keywords : tuberculosis, tuberculin skin test, ROC curve, cut-off

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