

## Utility of Serological Tests in Achieving Accurate Laboratory Diagnosis of Typhoid Fever: A Systematic Review of TUBEX® TF Clinical Performance

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**Background:** Laboratory tests play an integral role in the diagnosis of typhoid fever infection. New technologies for diagnosing typhoid fever have been developed. However, much of these technologies are rarely used due to either the requirement of sophisticated laboratory facilities and trained personnel, or because of limited sensitivity and specificity. Due to these limitations, the serological tests continue to be the major laboratory applications for the diagnosis of typhoid fever. Among the serological tests, TUBEX® TF was proven useful in diagnosing typhoid infection, provided proper clinical correlation is observed. This systematic review evaluates the usefulness of serological tests such as TUBEX® TF as an alternative to the Widal test.

**Methods:** Different articles were reviewed for relevance. The articles were evaluated in terms of methodology focusing on reference method and choice of controls. Only the studies with control groups consisting of samples with known etiology other than *Salmonella* Typhi and blood culture negative samples were included in analysis. Studies which used laboratory confirmed *Salmonella* Paratyphi and/or malaria were also not included to evaluate the effects of using *Salmonella* Paratyphi and/or malaria cases as control in the sensitivity and specificity of TUBEX® TF. Estimates of the sensitivity and specificity of TUBEX® TF were presented in forest plots using Review Manager 5.3 while a summary receiver operating characteristics (SROC) curve as well as summary test accuracy measures were obtained using the user written program “metandi” in Stata IC ver. 14.

**Results:** A total of five studies were included. Across the extracted studies, the sensitivity of TUBEX® TF ranged from 75 to 95% while its specificity ranged from 80 to 94%. Metaanalysis showed an average sensitivity of 82% (95% CI: 72 – 89%) and an average specificity of 85% (95% CI: 80 – 89%). This pooled sensitivity and specificity were found to be higher than the pooled estimates which included studies using paratyphoid cases as controls.

**Conclusions:** The analysis illustrates that choice of controls in the clinical performance evaluation is very critical to estimate the true sensitivity and specificity of serological tests such as TUBEX® TF for the diagnosis of typhoid infection.