Compbdt: an R program to compare two binary diagnostic tests subject to a paired design

CURRENT STATUS: UNDER REVISION

BMC Medical Research Methodology

Jose Antonio Roldán-Nofuentes
jaroldan@ugr.es Corresponding Author

DOI:
10.21203/rs.2.22525/v1

SUBJECT AREAS
Health Economics & Outcomes Research

KEYWORDS
binary diagnostic test, likelihood ratios, paired design, predictive values, Sensitivity and specificity
Abstract

Background: The comparison of the effectiveness of two binary diagnostic tests is an important topic in Clinical Medicine. The most frequent type of sample design to compare two binary diagnostic tests is the paired design. This design consists of applying the two binary diagnostic tests to all of the individuals in a random sample, where the disease status of each individual is known through the application of a gold standard. This article presents an R program to compare parameters of two binary tests subject to a paired design.

Results: The “compbdt” program estimates the sensitivity and the specificity, the likelihood ratios and the predictive values of each diagnostic test applying the confidence intervals with the best asymptotic performance. The program compares the sensitivities and specificities of the two diagnostic tests simultaneously, as well as the likelihood ratios and the predictive values, applying the global hypothesis tests with the best performance in terms of Type I error and power. When the global hypothesis test is significant, the causes of the significance are investigated solving the individual hypothesis tests and applying the multiple comparison method of Holm. The most optimal confidence intervals are also calculated for the difference or ratio between the respective parameters. Based on the data observed in the sample, the program also estimates the probability of making a Type II error if the null hypothesis is not rejected, or estimates the power if the alternative hypothesis is accepted. The “compbdt” program provides all the necessary results so that the researcher can easily interpret them. The estimation of the probability of making a Type II error allows the researcher to decide about the reliability of the null hypothesis when this hypothesis is not rejected. The “compbdt” program has been applied to a real example on the diagnosis of coronary artery disease.

Conclusions: The “compbdt” program is one which is easy to use and allows the researcher to compare the most important parameters of two binary tests subject to a paired design. The “compbdt” program is available as supplementary material.

Full-text

Due to technical limitations, full-text HTML conversion of this manuscript could not be completed. However, the manuscript can be downloaded and accessed as a PDF.
