

# **Inflation of a Type II Error Rate in Three-Arm Non-Inferiority Trials**

**Nor Afzalina Azmee**

*Faculty of Science and Mathematics, Universiti Pendidikan Sultan Idris, 35900*

*Tanjong Malim, Perak, MALAYSIA*

*E-mail: afzalina@fsmt.upsi.edu.my*

## **ABSTRACT**

The aim of a non-inferiority trial is to demonstrate that the new experimental treatment is not worse relative to the reference treatment by more than a predefined margin. Assuming that the inclusion of a placebo arm is properly justified, the three-arm non-inferiority trial is termed as the gold standard design and should be used whenever possible. This study focuses on the problem of sample size determination in three-arm non-inferiority trials, a crucial matter that needs to be addressed in the early stage of clinical trial. The current two-stage procedure involved in the analysis of three-arm noninferiority trial presents a problem known as the inflation of type II error rate. In other words, the sample size obtained does not ensure enough power to reject the null hypothesis when it is false. This paper illustrates the problem via simulation study and proposes an alternative solution using assurance.

**Key Words:** Clinical trial, gold-standard design, sample size, power, assurance