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Investigation of Four Different Normality Tests in Terms of Type 1 Error Rate and Power under Different Distributions

Derya ÖZTUNA
Atilla Halil ELHAN
Ersöz TÜCCAR
Department of Biostatistics, Faculty of Medicine, Ankara University, 06100 Ankara - TURKEY

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Authors

medsci@tubitak.gov.tr

Scientific Journals Home Page

Abstract: Background: An important aspect of the "description" of a variable is the shape of its distribution, which tells you the frequency of values from different ranges of the variable. Typically, as most of the statistical tests are based on the normality assumption, a researcher is interested in how well the distribution can be approximated by the normal distribution. Unless there are extreme violations of the normality assumptions, approved statistical tests usually provide accurate results. Although simple descriptive statistics can provide some information relevant to this issue, more precise information can be obtained by performing one of the tests of normality to determine whether the sample comes from a normally distributed population or not. Aim: Lilliefors corrected Kolmogorov-Smirnov, Shapiro-Wilk, D'Agostino Pearson and Jarqua-Bera tests were aimed to be compared in terms of Type I error and power of the tests. Materials and Methods: The simulation was run 1000 times for 23 different sample sizes and for 8 different distributions. Lilliefors corrected Kolmogorov-Smirnov, Shapiro-Wilk, D'Agostino Pearson and Jarqua-Bera tests were compared in terms of Type I error and power of the tests. Results: The most powerful results for normal distributions were given by the Jarqua-Bera and for non-normal distributions by the Shapiro-Wilk test. Conclusions: As it had the lowest Type I error rate, the Jarqua-Bera test was superior for normal and standard normal distributions. For nonnormal distributions, achieving sufficient power at smaller sample sizes, the Shapiro-Wilk was the most powerful.

Key Words: Lilliefors corrected Kolmogorov-Smirnov, Shapiro-Wilk, D'Agostino Pearson and Jarqua-Bera tests

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