INFORMATION POINT:

Tukey Multiple Comparison test

Tukey's multiple comparison test is one of several tests that can be used to determine which means amongst a set of means differ from the rest. Tukey's multiple comparison test is also called Tukey's honestly significant difference test or Tukey's HSD. Alternative multiple comparison tests include Sheffé's test and Dunnett's test. With only two groups of observations we could compare the two group means using a *t*-test. When we have more than two groups, it is inappropriate to simply compare each pair using a *t*-test because of the problem of multiple testing. The correct way to do the analysis is to use a one-way analysis of variance (ANOVA) to evaluate whether there is any evidence that the means of the populations differ. If the ANOVA leads to a conclusion that there is evidence that the group means differ, we might then be interested in investigating which of the means are different. This is where the Tukey multiple comparison test is used. The test compares the difference between each pair of means with appropriate adjustment for the multiple testing. The results are presented as a matrix showing the result for each pair, either as a *P*-value or as a confidence interval. The Tukey multiple comparison test, like both the *t*-test and ANOVA, assumes that the data from the different groups come from populations where the observations have a normal distribution and the standard deviation is the same for each group. Many statistical packages offer Tukey multiple comparison test as an option when conducting a one-way ANOVA, for example this test is available in SPSS and Minitab.

Considering the results in the above paper, we see that the conclusions are not absolutely clear cut. There appear to be two groups of manufacturers with similar means – A, B, D, E, F and B, C – but B appears in both groups. This is typical for what can happen with a multiple comparison test.

Further reading

Bland J.M. & Altman D.G. (1995) Multiple significance tests: the Bonferroni method. *British Medical Journal* **310,** 170.

Altman D.G. (1991) *Practical statistics for medical research.* Chapman and Hall, London, pp. 210–211.

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