Short Communication

The introspection of P-value for the clinical researches

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It is known that the p-value is the probability of finding the observed or more extreme results when the null hypothesis (H0) of a statistical question is true. The definition of 'extreme' based on how the statistical hypothesis is being tested. The p-value is also described in terms of rejection of H0 when it is actually true but it is not a direct probability of this state. The significance level (alpha) is used to refer to a pre-chosen probability and the p-value is used to indicate a probability that the researcher calculate after a given study. Its interpretation is made extraordinarily difficult because it is not part of any formal system of statistical inference.[1]

"A two-side p-value of <0.05 was considered statistically significant." There are so many analyses done after the data were collected without controlling for multiple analyses, however, it is very difficult to determine what should be considered "significant". In addition, the results are misinterpreted, as authors only based all their conclusions on p-values rather than clinical relevance of the estimates. One example is the interpretation of the sex difference between men and women. Suppose we write "In the crude analysis, both men and women with obesity has an increased risk of gallstone disease compared to their respective controls [crude relative risk (RR) being 1.95 (95% CI: 1.32-2.89) and 1.80 (95% CI: 1.09-2.97), respectively]. After adjustment for potential confounding factors, men with obesity still had a significantly higher risk of gallstone disease than controls [adjusted RR 1.51 (95% CI: 1.01-2.25)] but women with obesity did not [adjusted RR 1.35 (95% 0.82-2.24)]." This interpretation is based on p-values alone. In fact, the adjusted estimates for men and women are very similar, as both support a 35-51% increased risk. The precision, as measure by the width of the confidence interval, is poor and the estimates overlap quite a bit for men and women.

Writing about p-values seems barely to make a dent in the mountain of misconceptions.[1] From the evidence-based medicine viewpoint, the statistical significance is presented as either a p-value or 95% confidence interval. A p-value shows the probability that an observed effect is due to sampling error and a 95% confidence interval is a range of treatment effects in which we could be 95% confident that the true effect lies.[2] The consideration of a statistically significant effects measured also should be a clinically meaningful for the measurement of primary outcomes.

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