Editorial

Beyond statistical significance

Probability value (*P* value) is the level of significance in a statistical hypothesis test. The significance test is widely used to establish the "statistical association" of the experimental result. It represents the probability of occurrence of an event. If the *P* value is large, lesser probability and *P* value is less, it denotes higher probability of the event. *P* values are often misunderstood and provide no evidence on the quantitative significance of the effect in the study. It is a qualitative construct and highly subjective.[1] *P* values aid removing the uncertainties in the statistical interpretation but do not remove ambiguities of interpretation in clinical situations. The inferences established on probability calculations must be used with caution and can be inaccurate since it is mostly calculated assuming null hypothesis is true. *P* value expresses that the results have occurred due to chance but not true. However, in reality, the chances of errors are greater. The misuse of *P* value leads to erroneous conclusions and interpretations. The awareness and understanding of *P* value can reduce misinterpretations.[2]

The American Statistical Association provided standard guidelines for its effective understanding of *P* value.[3] It has advised that the *P* values do not express much on the null hypothesis. It assists in obtaining a dichotomous result on null hypothesis of rejection or failing to reject. *P* value reveals the inconsistency of the facts in a particular statistical model, but it does not provide any evidence on the hypothesis. The *P* value does not quantify the effect size or the importance of a result and the research conclusions cannot be done based on *P* values since it does not quantify the probability.[3] This necessitates full reporting of data obtained from the analysis rather than selective reporting which is one of the common mistakes made in the literature.

Confusing *P* value with clinical significance is the most common statistical error in the prosthodontic literature. On the contrary, in many experimental situations, a nonsignificant *P* value is considered as no effect against the hypothesis. However, in reality, since no significant information is provided on effect size and clinical importance of the effect observed, it should be considered as insufficient evidence against the hypothesis rather than no effect.[4] This makes it necessary that reports have to consider data beyond *P* value and assess the measures of effect size. The effect size is the degree of the quantitative difference among groups. Although the primary objective of the hypothesis is to respond to the research question with either acceptance or denial, the effect estimation provides a quantitative difference between two groups and provides a range of likely difference in the values.

The confidence interval specifies a range of values for the effect estimate. The other effect estimates such as the correlation coefficient, relative risk, risk ratio, aggressive coefficient, risk difference, odds ratio, or incidence ratio can provide more effective quantitative measures of reporting results. Similar to the hypothesis testing software's, the statistical program can aid in determining the effect estimates.

The effect size is the key observation of a quantitative study. While a *P* value can provide the information on the existence on effect, it does not reveal the size of the effect. The *P* value and the effect size aid in-depth understanding of the study. The *P* value provides statistically significant or insignificant relation to null hypothesis, whereas the effect size is useful in determining the clinical relevance or application. It is important to report both the substantive significance (effect size) and *P* value as the outcomes in all studies. It is essential to think beyond *P* values and report the effect size parameters to improve the research impact.[5]

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