

Biostatistical Errors in Medical Journals: A Critical Evaluation

Sadi Elasan

Van Yuzuncu Yil University, Faculty of Medicine, Department of Biostatistics, Van, Türkiye

Dear Editor;

I would like to emphasize that Biostatistical errors in studies published in medical journals are an important problem. These errors affect the accuracy and reliability of studies and can lead to the spread of misunderstandings and incorrect practices in the field of health sciences. The quality and accuracy of scientific literature is highly dependent on the accuracy and appropriateness of the statistical analyzes performed. However, in recent years, it has been observed that serious statistical errors have been made in many studies. A significant portion of these errors in health studies arise from statistical analyzes made by people outside the field who are not competent in biostatistics. First, errors related to sample size are common. In most studies, results are attempted to be obtained with insufficient sample sizes without adequate power analysis, which endangers the reliability and validity of the results. Insufficient sample sizes can lead to false negatives (Type II error) or false positives (Type I error) in the study's results (1,2). Secondly, insufficient attention to the suitability of statistical methods used in data analysis is a major problem. In particular, the use of parametric tests, performed without evaluating whether the data are suitable for normal distribution, may damage the reliability of the results. The deficiencies of researchers outside the field in choosing and applying appropriate statistical methods cause the analyzes to be inaccurate. Additionally, failure to make necessary corrections when making multiple comparisons may lead to misinterpretation of the results (1,2,3). Thirdly, the lack of transparency in reporting data draws attention. Not clearly stating each step and the methods used in the analysis process makes the reproducibility of the study difficult and undermines scientific confidence. Therefore, researchers need to report in detail how

data were collected, how analyzes were conducted, and how the results were interpreted (3,4). Fourth, published studies often make the mistake of confusing statistical results with clinical significance. The misconception that statistically significant results are always clinically significant can lead to misdirection and unnecessary treatments. Therefore, it is of great importance to consider clinical significance as well as statistical significance in studies. In this context, p-value is a statistical tool frequently used in medical and health research. Misunderstanding the use of the P-value can lead to misdirection that can result in unnecessary treatment and inaccurate results. Therefore, it is important for medical and healthcare researchers to have the p-value interpreted and reported accurately by biostatisticians (5). Fifth, authors have been known to manipulate results by sometimes inappropriately using statistical analyzes to establish clinical significance in line with the literature. For this reason, reliable results can be obtained by performing statistical analyzes within the framework of ethical rules and examining them by an expert (1,2,3). Finally, international cooperation and setting standards can also play a big role in this regard. Common standards for statistical analyzes should be determined worldwide and these standards should be disseminated. This will improve the quality of scientific research and contribute to more reliable results in the field of health (4,5). The Biostatistical errors mentioned above negatively affect the reliability and validity of scientific publications, slowing down advances in medicine and health. To prevent these errors, researchers need to receive better training in biostatistics and journals need to implement stricter control mechanisms in their publication policies (e.g., applying the decisions of statistics editors, publishing after the statistical editor

*Corresponding Author: Sadi Elasan Van Yuzuncu Yil University, Faculty of Medicine, Department of Biostatistics, Van, Türkiye E-mail: sadielasan@yyu.edu.tr Orcid: Sadi Elasan [0000-0002-3149-6462](https://orcid.org/0000-0002-3149-6462)



checks the revisions, etc.). It is especially important for researchers who do not have sufficient training in

biostatistics and statistics to collaborate with an expert when performing such analyses.

References

1. D'Arrigo G, ElHafeez SA, Mezzatesta S, Abelardo D, Provenzano FP, Vilasi A, Torino C, Tripepi G. (2024). Common mistakes in biostatistics. *Clin Kidney J*, sfae-197.
2. Dwivedi AK. (2022). How to write statistical analysis section in medical research. *J Invest Med* 70(8):1759-1770.
3. Arreola EV, Irimata K, Wilson JR. (2020). Common errors of interpretation in biostatistics. *Biostat Epidemiol* 4(1):238-246.
4. Hanif A, Ajmal T. (2011). Statistical errors in medical journals (a critical appraisal). *Ann King Edw Med Univ* 17(2):178-178.
5. De Muth JE. (2009). Overview of biostatistics used in clinical research. *American J Health Syst Pharm* 66(1):70-81.
6. Wellek S. (2017). A critical evaluation of the current p-value controversy. *Biom J* 59(5):854-872.